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GRASS VARIETIES

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Agricultural Research Service

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UNITED STATES DEPARTMENT OF AGRICULTURE

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GRASS VARIETIES in the UNITED STATES

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This handbook is a working guide to the status of named and experimental grass varieties in the United States. The first issue appeared as a processed report, CR-12-58, from the former Crops Research Division, Agricultural Research Service. Subsequent revisions were published in 1959 and 1965 as *Agricultural Handbook 170*. The format remains the same, with information furnished on the agency or agencies involved in development, individuals who assumed leadership in selecting or increasing specific varieties, method of breeding, description of variety, release date, and releasing agency or agencies, source of breeder seed, and status of certified seed production.

Throughout the descriptions, the current names for the U.S. governmental agencies involved are used.

Variety registration numbers were assigned originally under a memorandum of understanding between the former Crops Research Division, Agricultural Research Service (ARS), and the American Society of Agronomy. Currently, crop registration is performed by the Crop Science Society of America. Registration provides a permanent record of names and distinctive characteristics of crop varieties; it does not mean that a given variety is superior in any or all respects.

Insofar as possible, those individuals and agencies that have taken the initiative in developing specific varieties have been identified. It is recognized, however, that plant introductions as well as some selections and gene pools are distributed widely for evaluation purposes. Thus, it is often difficult to assign sole credit for the development of a given variety to any one individual or group. Information on source of breeding material aids in identifying the origin of germplasm. It also provides partial recognition to the contribution of plant exploration and to those individuals and agencies furnishing seed and plant material.

No attempt has been made to appraise the relative merits of varieties included in the handbook. Descriptions, with some exceptions, are those reported by developers. For the most part descriptions are based on information accumulated at

originating stations. Specific attributes may not be expressed, or at least not to the same degree, in all environments where the species is adapted.

Breeder seed has been defined by seed-certification agencies, but is a term used by plant breeders in various ways. For the purpose of this handbook it serves only to indicate the source of stock seed.

For some varieties limited local supplies of certified seed may have been overlooked. A number of named varieties have not been included in seed-certification programs, and where this is true an attempt is made to include information on the availability of uncertified seed or vegetative planting stock. The most effective system for maintaining the characteristics of a grass variety in commercial seed production is seed certification. Many grass varieties should be certified on a limited generation basis. The practice of continuing varieties by recertifying certified seed can lead to serious changes in type. The originating or sponsoring station and certifying agency must assume the responsibility of developing production practices and adequate control measures for the maintenance of those varieties for which they are responsible.

As in previous editions, descriptions are included of both named varieties and experimental varieties that have been distributed for testing purposes. To retain the utility of the handbook, descriptions of named, released varieties are included, regardless of seed availability. Insofar as reasonably acceptable descriptions are available, all varieties that may be distributed and sold in the United States are included. Conversely, experimental varieties have been dropped when it appears that authentic seed or planting stock is no longer available. An alphabetical list of obsolete experimental varieties, together with the edition of "Grass Varieties in the United States" in which the description appeared, is given on page 117.

Grateful acknowledgment is made for the cooperation of grass specialists associated with State agricultural experiment stations, the Agricultural Research Service (ARS), the Soil Conservation Service (SCS), the Canada Department of Agriculture, and private seed companies.

Agropyron cristatum (L.) Gaertn., fairway wheatgrass (also crested wheatgrass)

Important cool-season bunchgrass from Siberia. First distributed in 1927 in Saskatchewan, Canada, and later identified as Fairway variety of crested wheatgrass. Used extensively for pasture and hay in western Canada and to more limited extent in northern Great Plains and intermountain region of United States. Fairway is shorter, denser, finer stemmed, and less productive than crested, but better suited for dryland lawns and general-purpose turf. Fairway is licensed as a variety in Canada, and certified seed is available. In the United States, crested wheatgrass was considered to be one species until 1950, when the (diploid) fairway type was identified as *A. cristatum*, and the (tetraploid) crested type as *A. desertorum*. At that time many seed lots represented mixtures of the two species. Thus, in the United States, the term "fairway," that had been used previously in Canada for a specific source of *A. cristatum*, was accepted very widely as the common name for all sources of *A. cristatum*.

Nebraska 3576

Selected at Nebraska Agricultural Experiment Station; Lincoln, ARS and SCS cooperating—L. C. Newell.

Source.—Commercial lots and experiment station accessions of fairway wheatgrass collected in 1936–38.

Method of Breeding.—Selection of space-planted clones carried on through three successive generations. Seed from superior plants composited and increased.

Description.—Early-maturing, cool-season grass. Very leafy and productive of both forage and seed. In comparative tests at Lincoln it produced forage yields equal to those of Nordan. No evaluation made as to its value as pasture. Sod production indicates its possible utilization for turf purposes.

Released.—No. Included in regional testing program.

Breeder Seed.—Nebraska Agricultural Experiment Station.

Parkway

Selected at Canada Department of Agriculture, Research Stations, Saskatoon and Melfort, Saskatchewan—R. P. Knowles.

Source.—Collection of fairway wheatgrass.

Method of Breeding.—Several generations of recurrent selection for vigor, height, and leafiness followed by polycross progeny tests at three Saskatchewan stations. Synthetic of 16 clones distributed for testing as S-5565.

Description.—Hay and seed yields 7 and 10 percent above certified fairway wheatgrass. Plants 2 to 3 inches taller, slightly less leafy, much greater lodging resistance than fairway. Recommended for hay but not as turfgrass.

Released.—1969, by Canada Department of Agriculture.

Breeder Seed.—Canada Department of Agriculture, Research Station, Saskatoon.

Certified Seed.—Available in limited quantities in 1971.

Agropyron dasystachyum (Hook.) Scribn., thickspike wheatgrass

Cool-season, sod-forming native grass. Although widely distributed from Michigan westward to Nevada, more prevalent in Pacific Northwest. Provides early-spring grazing on native range. Grows well on light-textured soils; found on dry hillsides and exposed ridges up to elevation of about 10,000 feet.

Critana

Selected at Plant Materials Center, SCS, Bridger, Mont.—A. A. Thornburg.

Source.—Collected from roadside cuts near Harve, Mont., by D. E. Ryerson, 1960.

Method of Breeding.—Direct increase of field

collection after comparisons with approximately 60 other accessions representing native collections from Montana and Wyoming. Tested as P-15581.

Description.—Strongly rhizomatous with excellent seedling vigor, low growing, abundant fine leaves; produces tight sod under dryland conditions but little forage. Primary use is for stabilization of disturbed areas, roadsides, airports, and construction sites. Good seed producer.

Released.—1971, Plant Materials Center, SCS, Bridger.

Breeder Seed.—Plant Materials Center, SCS, Bridger.

Certified Seed.—Not available.

Agropyron desertorum (Fisch.) Schult., crested wheatgrass (also standard crested wheatgrass)

Major cool-season bunchgrass indigenous to eastern Russia, western Siberia, and central Asia. First successful introduction received from Russian Turkestan in 1906. Used for pasture, hay, and erosion control primarily in northern Great Plains; important for range seeding westward to Cascade and Sierra Nevada mountains, and south to northern Arizona and New Mexico. Long lived, drought resistant; tolerates heavy grazing, but not prolonged flooding. Valuable for reseeding in areas with 9- to 15-inch rainfall. Starts growth in early spring and ready to graze before native grasses.

Nordan (Reg. No. 2)

Selected at U.S. Northern Great Plains Research Center, ARS, Mandan, N. Dak.—G. A. Rogler.

Source.—Developed from selection made in old nursery at Dickinson, N. Dak., in 1937.

Method of Breeding.—Single-plant selections made under open pollination for two generations; seven plants within open-pollinated progeny bulked for increase and tested as Mandan 571.

Description.—More uniform and erect than commercial, seed more awnless and larger in size, heads more dense and compressed. Good seedling vigor and seed quality. Forage yield as good as or better than commercial.

Agropyron elongatum (Host) Beauv., tall wheatgrass

Cool-season bunchgrass from Turkey and U.S.S.R. Used for hay and pasture in northern Great Plains and intermountain region. Tall, coarse, late-maturing species. Can be grown successfully on wet, alkaline soils. Less drought resistant than crested wheatgrass. Good seed producer. Produces high yields, but less palatable than most wheatgrasses.

Alkar

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

Source.—Selection from P.I. 98526; introduced from U.S.S.R. in 1932.

Method of Breeding.—Mass selection from spaced plants of above introduction. Tested as P-2326.

Description.—Tall, very late maturing wheatgrass; stemmy bunch type. Coarse blue-green leaves. Large seeded, good seedling vigor. Very tolerant to wet, alkaline conditions and semiarid regions of West at 300- to 6,000-foot elevation.

Released.—1953, cooperatively by North Dakota Agricultural Experiment Station, Fargo, and Plant Science Research Division, ARS.

Breeder Seed.—U.S. Northern Great Plains Research Center.

Certified Seed.—Available in quantity.

Summit

Selected at Canada Department of Agriculture, Research Station, Saskatoon, Saskatchewan—R. P. Knowles.

Source.—Introduction from Western Siberian Experiment Station, Omsk, U.S.S.R.

Description.—Fairly similar to standard crested wheatgrass strains grown in the United States. No attempt made to alter strain through selection, but one generation of increase was by single plants to rogue out impurities, particularly fairway-type plants. Tested as S-131. Stock designated "Summit 62" resulted from mass selection of 40 plants in Summit for good seed yield, seed quality, and uniformity of plant type.

Released.—1953, by Canada Department of Agriculture.

Breeder Seed.—Canada Department of Agriculture, Research Station, Saskatoon.

Certified Seed.—Available in quantity.

Fairly palatable and highly productive on subirrigated and irrigated saline and alkaline land.

Released.—1951, under accession P-2326 for certified seed production in Idaho, Washington, and Oregon. Named Alkar in 1958 and accepted for certification in these States and California.

Breeder Seed.—Plant Materials Center, SCS Pullman.

Certified Seed.—Available in quantity.

Jose

Selected at Plant Materials Center, SCS, Los Lunas, N. Mex. Increased at Plant Materials Center, SCS, and New Mexico Agricultural Experiment Station, Los Lunas Branch, cooperating—J. A. Downs, G. C. Niner, and J. E. Anderson.

Source.—Received from Beltsville, Md., as BN-3654 and P.I. 150123. Native to Eurasia, but introduced from Australia.

Method of Breeding.—Mass increase of seed collected from isolated block of spaced plants after roguing atypical plants.

Description.—Uniform, leafy, medium-tall bunchgrass; not as coarse as other tall wheatgrasses tested; true-green type. Seed production not so high as some other strains tested, but forage production equal to most; limited observations indicate higher palatability. Earlier maturing than other strains tested. Tested as A-12465.

Released.—1965, cooperatively by New Mexico Agricultural Experiment Station and Plant Materials Center, SCS, Los Lunas.

Breeder Seed.—Plant Materials Center, SCS, Los Lunas.

Certified Seed.—Available.

Largo

Increased at former SCS Nursery, Albuquerque, N. Mex., as A-1876, and at Utah Agricultural Experiment Station, Logan, ARS cooperating, as P.I. 109452.

Source.—P.I. 109452. Collected by Westover-Enlow expedition near Bandirma, Turkey. Introduced as *Agropyron intermedium* and later identified as *A. elongatum*.

Method of Breeding.—Bulk increase under isolation.

Description.—Large, coarse, deep-rooted bunchgrass. Population only slightly variable, high percentage of bluish-green plants, maturing late, height 4 to 6 feet. Widely used in Colorado, Utah, Arizona, and New Mexico for soil improvement and pasture on saline and alkaline soils. Highly productive in herbage and seed yields.

Released.—1937, cooperatively by New Mexico Agricultural Experiment Station, University Park, and Nursery Division, SCS. First released as A-1876; later named Largo. Included in regional testing program as Utah 109452.

Breeder Seed.—Plant Materials Center, SCS, Los Lunas.

Certified Seed.—Available.

Nebraska 98526

Increased at SCS nurseries in cooperation with Nebraska Agricultural Experiment Station, Lincoln. Tested as Nebraska 1978.

Source.—P.I. 98526 originally grown at Colorado Agricultural Experiment Station, Fort

Collins, and later (1936) distributed to nurseries in Dakotas and Nebraska by SCS. P.I. 98526 originally introduced into United States from U.S.S.R. in 1932. Seed presented by N. I. Vavilov.

Method of Breeding.—Direct increase of P.I. 98526 without selection.

Description.—Erect, tall, somewhat coarse bunchgrass. Deeply veined, bluish-green leaves and coarse stems. Particularly well adapted to low, wet, or alkaline soil conditions, where it produces good yields. Also does very well in dry, upland plantings, where it appears moderately drought resistant. P.I. 98526 relatively leafy type, somewhat less aggressive and coarse than Turkish introductions with which it has been compared.

Released.—First grown on Nebraska farms in 1950 for seed production under field certification by Nebraska Crop Improvement Association on recommendation of Nebraska Agricultural Experiment Station, SCS, and ARS.

Foundation Seed.—Nebraska Agricultural Experiment Station.

Certified Seed.—Not available.

Orbit

Selected at Canada Department of Agriculture, Research Station, Swift Current, Saskatchewan—Tom Lawrence.

Source.—Nebraska 98526 (P.I. 98526) and seed from locally selected strains.

Method of Breeding.—Twenty-six selections made within open-pollinated progeny lines that had 80 percent or better winter survival. Selections evaluated for winter hardiness, seed yield, and forage yield in progeny test. Variety is composite of nine open-pollinated lines and one three-clone synthetic.

Description.—Not distinguishable from other varieties and sources on basis of visual characteristics. Superior to Alkar and other varieties tested in winter hardiness, similar in seed and forage yield; withstands flooding for 3 to 4 weeks in spring.

Released.—1966, by Canada Department of Agriculture.

Breeder Seed.—Canada Department of Agriculture, Research Station, Swift Current.

Certified Seed.—Available in quantity.

Agropyron inerme (Scribn. and Smith) Rydb., beardless wheatgrass

Similar to *Agropyron spicatum* in appearance except for absence or near absence of awns. Distributed over much the same area, but less abundant than *A. spicatum*.

Whitmar (Reg. No. 4)

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

Source.—Collected from native Palouse prairie grassland climax near Colton, Whitman County, Wash., by L. A. Mullen in area of 20 inches of annual precipitation at elevation of 2,800 feet on Palouse silt-loam soil.

Method of Breeding.—First observed as outstanding accession, P-3537, in observational tests among more than 500 beardless and bluebunch wheatgrass collections, which represented six ecotypes, from Pacific Northwest. Developed by selection from space-planted nursery.

Description.—Long-lived, native, perennial bunchgrass; drought resistant. Intermediate type, with moderately abundant, erect to semierect,

medium-coarse stems. Leaves abundant, soft, lax, flat basal, and cauline. Seeds awnless, but short-awned seeds occur occasionally. Seedling vigor good. Seed and forage production high. Good spring and fall recovery and retains feed value and palatability late into summer. ($2n=14$.)

Released.—1946, by Washington, Idaho, and Oregon Agricultural Experiment Stations at Pullman, Moscow, and Corvallis, respectively, and Plant Materials Center, SCS, Aberdeen, Idaho, and Pullman.

Breeder Seed.—Plants Materials Center, SCS, Pullman.

Certified Seed.—Available.

Agropyron intermedium (Host) Beauv., intermediate wheatgrass

Important cool-season, sod-forming grass from U.S.S.R. Used for pasture and hay in northern Great Plains, west to eastern Washington, and south into Colorado and northern Kansas. Adapted in areas with annual rainfall of 15 inches or more; at some locations has grown well at elevations up to 10,000 feet. Slightly inferior to *Agropyron desertorum* in persistence, drought tolerance, and winter hardiness. Produces good hay yields, grows well with alfalfa, and suitable for erosion control.

A-12496

Increased at former SCS Nursery, Albuquerque, N. Mex.—C. G. Marshall and J. A. Downs; and at Utah Agricultural Experiment Station, Logan, ARS cooperating—W. Keller.

Source.—P.I. 98568, Maikop, U.S.S.R.

Method of Breeding.—Increased at Utah Agricultural Experiment Station.

Description.—Variable, but not so mixed as many introductions. Good vigor and development at Albuquerque and Logan. Produced at the Plant Materials Center, SCS, and New Mexico Agricultural Experiment Station, Los Lunas Branch cooperating.

Released.—No. Seed distributed to SCS cooperators. Included in regional testing program.

Breeder Seed.—Plant Materials Center, SCS, Los Lunas.

Amur

Selected at former SCS Nursery, Albuquerque, N. Mex.—J. A. Downs and T. F. Spaller.

Source.—P.I. 131532, Manchuria, China. Received as *Agropyron amurense* Drob. from SCS Nursery, Pullman, Wash., P-9838. Identified by J. R. Swallen as *A. intermedium*.

Method of Breeding.—Increase, under isolation, of seed from spaced plants after roguing awned

and other offtype plants. In 1962 at Plant Materials Center, SCS, and New Mexico Agricultural Experiment Station, Los Lunas Branch, third-generation seed was space planted and rogued to maintain uniformity. Tested as A-13046.

Description.—Leafy, vigorous-growing, but slow sod-forming type; uniform gray green. Strong seedling vigor. High seed yield; maintains production in successive years better than other strains tested. Some introgression appears to have occurred with *A. trichophorum*, giving rise to a high percentage of pubescent plants. This brings into question its existing classification as *A. intermedium*.

Released.—1952, cooperatively by New Mexico Agricultural Experiment Station, University Park, and former SCS Nursery, Albuquerque.

Breeder Seed.—Plant Materials Center, SCS, Los Lunas.

Certified Seed.—Available.

Chief

Selected at Canada Department of Agriculture, Research Station, Saskatoon, Saskatchewan—R. P. Knowles.

Source.—U.S.S.R. introduction and Ree variety.

Method of Breeding.—Mass selection for plants with high seed yields and good seed quality. Open-pollinated seed of selected plants bulked for each of 5 years to form five lines. After performance tests, five lines combined in isolation to produce breeder seed. Breeder seed increased through foundation to produce certified seed. Provision made in licensing to replace five basic lines with improved lines selected from same basic material.

Description.—Grayish-green type. Forage yields 5 to 10 percent and seed yields 20 to 30 percent above Ree variety.

Released.—1961, by Canada Department of Agriculture.

Breeder Seed.—Canada Department of Agriculture, Research Station, Saskatoon.

Certified Seed.—Available.

Greenar (Reg. No. 3)

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

Source.—Developed from selection made in 1937 from P.I. 98568, which was introduced by Westover-Enlow expedition from U.S.S.R. in 1932.

Method of Breeding.—Open-pollinated selections made from planting one generation after introduction. Aberrant plants removed in following generation. Selections bulked and increased for field testing as P-2327.

Description.—Vigorous, moderate sod-forming wheatgrass; late maturing, leafy, dark green, broad leaved, high producing. Plants variable, but over 90 percent green. Less than 5 percent of plants show trace of pubescence. Spring recovery early and abundant; fall recovery good. Plants disease resistant, very productive, and aggressive. Widely adapted for conservation plantings on well-drained soils in dryland and irrigated areas.

Released.—1945, as P-2327, cooperatively by Washington, Idaho, and Oregon Agricultural Experiment Stations at Pullman, Moscow, and Corvallis, respectively, and Plant Materials Centers, SCS, Aberdeen, Idaho, and Pullman. Named "Greenar" in 1956.

Breeder Seed.—Plant Materials Center, SCS, Pullman.

Certified Seed.—Available in quantity.

Mandan 1274

Increased at U.S. Northern Great Plains Research Center, ARS, and SCS Nursery, Mandan, N. Dak.

Source.—Seed harvested by Wayne Austin in 1937 from planting of P.I. 98568 at Fort Collins, Colo.

Method of Breeding.—No breeding background; traces to same parental material as Ree.

Description.—Types intergrading into pubescent wheatgrass; green and blue-green plants; highly variable.

Released.—No official release, but grown throughout northern Great Plains.

Breeder Seed.—None.

Certified Seed.—Not available.

Oahe (Reg. No. 5)

Selected at South Dakota Agricultural Experiment Station, Brookings—J. G. Ross.

Source.—Oahe (Oh-wah-hee) selected from

Russian introduction P.I. 98568 obtained from Fort Collins, Colo., in 1937 and released by South Dakota Agricultural Experiment Station in 1945 as Ree. Introduction identified as derivative of cross between *Agropyron intermedium* and *A. trichophorum*. Named after Oahe Dam on Missouri River in central South Dakota. Oahe is abbreviation of Sioux word for "Big House," a meeting place once located near dam.

Method of Breeding.—High seed-producing plants selected from nursery of self- and open-pollinated progenies by analysis of percent seed set of individual plants. After two succeeding generations of polycross testing and selection for high seed set, forage yield, and rust resistance, four clones chosen to make this synthetic variety. Distributed for testing as South Dakota 20.

Description.—Uniformly blue green, vigorous, rhizomatous; abundant leaves; plants approximately 44 inches high under normal conditions at Brookings. Produces good yields of seed and forage. Breeder seed obtained from selected clones; variety maintained on basis of two seed generations: Foundation seed from fields established with breeder seed and certified from fields established from foundation seed. Certified seed will be used for hay and pasture, but seed from such fields cannot be certified.

Released.—1961, by South Dakota Agricultural Experiment Station.

Breeder Seed.—South Dakota Agricultural Experiment Station.

Certified Seed.—Available.

Ree

Increased at South Dakota Agricultural Experiment Station, Brookings—C. J. Franzke.

Source.—Introduced as *Agropyron pungens* (Pers.) Roem and Shult, by former Bureau of Plant Industry, USDA, from Leningrad, U.S.S.R. in April 1932. Originated in Maikop region of U.S.S.R. at elevation of 600 feet. Originally this introduction, P.I. 98568, distributed by USDA to Dickinson and Mandan, N. Dak., in 1932; and to Fort Collins, Colo., Pullman, Wash., Cheyenne, Wyo., and Bozeman, Mont., in 1935. Seed harvested from Fort Collins planting brought to South Dakota Agricultural Experiment Station in fall of 1937 by Wayne Austin of SCS as *A. pungens*. Planted in early fall of 1937 in observational plot at South Dakota Agricultural Experiment Station with several other known *Agropyron* species. Discovered that this strain exhibited certain outstanding plant differences from known strains of *A. pungens* and *A. intermedium*. Material of strain collected in July 1941 classified by J. R. Swallen as derived from cross of *A. intermedium* and *A. trichophorum* (Link) Richt.

Method of Breeding.—Strain released without

selection from original material grown at South Dakota Agricultural Experiment Station.

Description.—Plants vary from light green to dark green; many covered with whitish bloom; erect, 30 to 48 inches tall. Stems, as compared with those of smooth brome, medium fine to large, coarse, and leafy. Produce abundant basal leaves; leaf blades longer and broader than leaves of smooth brome. Seed head or spike erect to slightly nodding, lax, 6 to 14 inches long. Lemmas of some plants have pronounced awns; those of others are awnless or practically so. Sometimes pubescent. Seedlings have characteristic reddish anthocyanin color, which disappears when they become 3 or 4 weeks old. Strong and large, resembling newly emerged winter rye seedlings. Yields of this grass in South Dakota better than or equal to those of best strains of smooth brome.

Released.—1945, by South Dakota Agricultural Experiment Station.

Breeder Seed.—None.

Certified Seed.—Not available.

Slate

Selected at Nebraska Agricultural Experiment Station, Lincoln, ARS cooperating—L. C. Newell.

Source.—Nebraska 50, an experimental variety tracing to P.I. 98568 and 'Amur' from P.I. 131532.

Method of Breeding.—Eleven strains were developed by clonal selection and subsequent progeny tests. Strains developed from isolated seed increase of clones selected for plant type and foliage color. Amur, Erect Slate consisted of 57 clones and Nebraska 50, Erect Slate, 60 Clones. Clones were selected for erect growth and color intermediate between green and glaucous blue. Breeder seed consists of a mixture of seed from these two strains.

Description.—Plants strongly spreading, erect at maturity; leaves broad and flat; foliage slate-green (intermediate between bright green and glaucous blue-green of other varieties). Inflores-

cence is well-developed spike with awnless lemmas that are either glabrous or slightly pubescent. Occasional spikelets have seeds with short awns or awn-points. Suggested for use in Central Plains area.

Released.—1969, cooperatively by Nebraska Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Nebraska Agricultural Experiment Station.

Certified Seed.—Available.

Tegmar

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

Source.—Developed from accession P.I. 109219 collected in 1934 near Bolu, Turkey, by the Westover-Enlow expedition.

Method of Breeding.—Open-pollinated selections made from planting one generation after introduction. Selections bulked and increased for field testing as P-14.

Description.—Long-lived, late-maturing dwarf strain of intermediate wheatgrass; vigorous seedlings, good rapidly developing sod. Slightly more drought tolerant than other intermediate wheatgrasses. Leaves light green to blue-green and sparsely hirsute along the leaf margins and veins. Stems fine, smooth, and erect. More resistant to Banks grass mite than other intermediate wheatgrasses tested. General height about one-half that of other intermediate wheatgrass varieties. Short growth and vigorous sodding habit is suited for use as an erosion-control plant.

Released.—1968, cooperatively by Idaho and Washington Agricultural Experiment Stations and the SCS Plant Materials Centers at Aberdeen, Idaho, and Pullman, Wash.

Breeder Seed.—Plant Materials Center, SCS, Aberdeen, Idaho.

Certified Seed.—Available.

Agropyron repens (L.) Beauv., quackgrass

Cool-season, sod-forming, introduced grass, probably from Europe. Common, persistent weed in cultivated and abandoned fields in Northern

United States. Existing stands used for hay, pasture, and silage. Varieties not available.

Agropyron riparium Scribn. and Smith, streambank wheatgrass

Cool-season, sod-forming grass. Found from Montana to Washington and south into Nevada, Utah, and Colorado. Adapted for erosion control and general-purpose turf. Drought resistant and alkali tolerant.

Sodar

Selected at Plant Materials Center, SCS, Aberdeen, Idaho, and Pullman, Wash.—R. H. Stark and J. L. Schwendiman.

Source.—Collected near Canyon City, Grant County, Oreg., by R. G. Johnson in area of 12-inch annual rainfall at elevation of 3,000 feet.

Method of Breeding.—Best of 11 accessions. Improved by mass selection and elimination of aberrants during several generations at Plant Materials Center, SCS, Aberdeen. Tested as P-2415.

Description.—Drought-resistant, rhizomatous grass, particularly adapted for erosion control. Excellent seedling vigor. Narrow, tough leaves. Produces open sod highly competitive to weeds and

other plants under dryland conditions and offers excellent protection against soil erosion. Used primarily on roadsides, airports, and irrigation canal banks.

Released.—1954, cooperatively by Idaho and Washington Agricultural Experiment Stations at Moscow and Pullman, respectively, and Plant Materials Center, SCS, Aberdeen and Pullman.

Breeder Seed.—Plant Materials Center, SCS, Aberdeen.

Certified Seed.—Available.

Agropyron sibiricum (Willd.) Beauv., Siberian wheatgrass

Cool-season bunchgrass from U.S.S.R. Similar to *Agropyron desertorum* in appearance and distribution, but less widely tested and used.

P-27

Selected at Plant Materials Center, SCS, Pullman, Wash., and Aberdeen, Idaho—J. L. Schwendiman and R. H. Stark.

Source.—Original collection in 1934 from Kazakhstan, U.S.S.R.; obtained from Institute of Plant Industry, Leningrad, U.S.S.R., by Westover-Enlow expedition. P.I. 108434.

Method of Breeding.—Included in row nurseries

and field-evaluation studies since 1935. Individual clones selected in 1949 by R. H. Stark are basis of present increase.

Description.—Similar to standard crested wheatgrass, *Agropyron desertorum*, in adaptation and season of use, but differs in several important respects. Narrow, awnless heads; fine, leafy stems. Drought resistant, good seedling vigor, good seed yields. Well adapted to light, droughty soils.

Released.—1953, cooperatively by Idaho Agricultural Experiment Station, Moscow, and Plant Materials Center, SCS, Aberdeen and Pullman.

Breeder Seed.—Plant Materials Center, SCS, Aberdeen.

Certified Seed.—Available in quantity.

Agropyron smithii Rydb., western wheatgrass

Important cool-season, sod-forming grass. Widely distributed from Wisconsin to central Washington and south into New Mexico and Texas Panhandle. Major range grass in northern and central Great Plains, where used for early pasture, hay, and erosion control. Develops slowly from seed, is drought resistant, and has moderate alkali tolerance.

Barton

Increased at Plant Materials Center, SCS, Manhattan, Kans., with Kansas Agricultural Experiment Station and ARS cooperating—R. D. Lipert and H. L. Hackerott.

Source.—Seed collected in 1947 from natural grassland on clay bottomland along Walnut Creek, near Heizer, Barton County, Kans.

Method of Breeding.—Field seed collection increased and tested as PM-K-402.

Description.—A strongly rhizomatous leafy ecotype intermediate in growth between northern and southern types; shows little evidence of rust in western Kansas and relatively free of rust at Manhattan. In plot evaluations at Manhattan, superior in forage production and disease resistance to accessions representing areas where western wheat-

grass seed is frequently harvested for commercial use. At Hays Experiment Station, Barton western wheatgrass ranked first in seed culm development and forage yield in comparison with 16 other accessions.

Released.—1970, cooperatively by Kansas State University, Agricultural Experiment Station, Plant Sciences Division, SCS, and Plant Science Research Division, ARS.

Breeder Seed.—Plant Materials Center, SCS, Manhattan.

Certified Seed.—Available.

Mandan 456

Selected at U.S. Northern Great Plains Research Center, ARS, Mandan, N. Dak.—G. A. Rogler.

Source.—Field collection made at Mandan in 1939.

Method of Breeding.—Bulked seed of 13 clones originating within progeny of single selection from above source. Thirteen clones selected for density of growth, leafiness, softness of leaves, and rust resistance.

Description.—Vigorous, leafy, rust resistant.

Released.—No. Increased in 1941.

Breeder Seed.—U.S. Northern Great Plains Research Center.

Certified Seed.—Not available. (Some commercial supplies.)

P-727

Increased at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

Source.—Collected from a naturalized stand near George, Wash.

Method of Breeding.—Bulk increase of original collection after comparison with other accessions collected throughout the Western States.

Description.—A distinctly vigorous, semicoarse, robust, broad-leaved, open-sodding type. A good seed producer, which spreads vegetatively more rapidly than most other strains.

Released.—No. Increased for testing in waterway and terrace-outlet seedings.

Breeder Seed.—Plant Materials Center, SCS, Pullman.

P-14897

Selected at Plant Materials Center, SCS, Pleasanton, Calif.—O. K. Hoglund and H. W. Miller.

Source.—Original seed apparently obtained in 1935 from L. A. Prichard, Crook National Forest Nursery, Superior, Ariz.; believed to have been from a commercial lot, source unknown. This lot directly traceable only to field collection made in 1956 by C. U. Finch and O. K. Hoglund from only perennial in abandoned nursery near Montague, Calif. Believed to be progeny of *Agropyron smithii*, accession number A-1922, planted there in 1941.

Method of Breeding.—Natural selection in continental climatic area. Increased under isolation at Plant Materials Center, SCS, Pleasanton.

Description.—Vigorous, rhizomatous, glaucous, with strong seedling vigor. Tends to lodge when mature. Attacked by leaf rust in wet years at Pleasanton, but not in continental climate. Excellent seed and forage producer.

Released.—No. Included in field-evaluation plantings in California and elsewhere in Western States.

Breeder Seed.—Plant Materials Center, SCS, Pleasanton.

P-15582

Increased at Plant Materials Center, SCS, Bridger, Mont.—J. L. McWilliams and A. A. Thornburg.

Source.—Commercial harvest from native meadows along Porcupine Creek northwest of Forsyth, Mont., 1959.

Method of Breeding.—Direct increase of field collection after comparison with approximately 60 other accessions representing native collections from Montana and Wyoming. Tested as PM-M-23.

Description.—Excellent seedling vigor and strong rhizomes. Plants blue green, leafy, with moderately fine stems. Good forage and seed production. Produces the tightest sod of any accession tested.

Released.—No. Distributed for field testing.

Breeder Seed.—Plant Materials Center, SCS, Bridger.

P-15614

Increased at Plant Materials Center, SCS, Los Lunas, N. Mex., with New Mexico Agricultural Experiment Station, University Park, cooperating—J. A. Downs, G. C. Niner, and J. E. Anderson.

Source.—Collected in 1957 near Flagler, Colo., from High Plains site at elevation of 5,000 feet and annual precipitation of about 16 inches.

Method of Breeding.—Bulk increase from initial planting. Increased through five successive generations to improve seed-production potential, as C-30.

Description.—Rapid germination and good seedling establishment. Dense, dark-green, medium-height foliage; aggressive rhizomes. Superior to other accessions tested in seed production. Production block at Los Lunas yielded 258 pounds of seed per acre in 1963.

Released.—No. Distributed for field testing.

Breeder Seed.—Plant Materials Center, SCS, Los Lunas.

Agropyron spicatum (Pursh) Scribn. and Smith, bluebunch wheatgrass

P-739

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

Source.—Collected in 1934 on Mallery Ridge at elevation of 3,175–4,792 feet, Umatilla National Forest, Asotin County, Wash.

Important cool-season bunchgrass in intermountain region from western Montana to central Washington and south into Nevada and Utah. Valuable species in native range where prized for palatability and drought resistance. Seeds have awns and must be processed for satisfactory seeding.

Method of Breeding.—First observed as promising accession in Pullman nursery, which contained more than 500 Pacific Northwest beardless and bluebunch wheatgrass collections, representing six ecotypes. Developed by mass selection from spaced plantings.

Description.—Long-lived, native perennial; drought resistant. Spreads slowly from short rhizomes. Leaves abundant, erect to semierect, soft, lax, flat, and primarily basal. Stems moderately abundant, erect to semierect, and medium coarse. Seeds large, heavy, and awned; must be processed to permit satisfactory seeding. Best adapted at higher elevations where available moisture exceeds 8 inches; good spring and fall recovery. Retains feed value and palatability late into summer and fall. ($2n=28$.)

Released.—No. Included in regional testing program.

Breeder Seed.—Plant Materials Center, SCS, Pullman.

Agropyron trachycaulum (Link) Malte, slender wheatgrass

Important cool-season bunchgrass in northern Great Plains, west to eastern Washington and Oregon, and south into Nevada, Utah, and Colorado. First native grass widely used for reseeding in western Canada and United States. Good seedling development, alkali tolerant, relatively short lived, and less drought resistant than western and crested wheatgrass. Seldom found in pure stands.

Primar (Reg. No. 1)

Selected at Plant Materials Center, SCS, Pullman, Wash.—A. L. Hafenrichter, J. L. Schwendiman, and A. G. Law.

Source.—Collected near Beebe, Mont., in 1933 by Forest Service, USDA.

Method of Breeding.—Selected from original collection, assigned accession number P-2535, and tested with 104 other accessions.

Description.—Vigorous, early-growing wheatgrass; semierect, long lived, slender. Usually 10 days earlier in seed maturity and 5–10 inches taller than late commercial strains. Leaves and stems moderately coarse and glaucous gray green. Plants high in vegetative production. Resistant to leaf rust, stem rust, and stripe rust; superior to common slender wheatgrass in resistance to head smut. Seed production moderately heavy; seeds relatively large when compared with those of ordinary strains. Adapted for use in sweet-clover-grass conservation mixtures for pasture, hay, and green manure. Alkali tolerant. Adapted

P-6409

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

Source.—Native collection, Lewiston, Idaho.

Method of Breeding.—Open-pollinated selection.

Description.—A low-elevation, dryland ecotype. A densely tufted bunchgrass with abundant, narrow leaves, numerous fine stems, small seeds, and divergent awns; early maturing. Slower to establish and less productive than larger types but more drought tolerant and persistent under adverse conditions. Adapted alone or with an understory grass at low elevations in the 8- to 12-inch precipitation zones of the Pacific Northwest.

Released.—No. Distributed for testing in dryland range areas.

Breeder Seed.—Plant Materials Center, SCS, Pullman.

to short-lived dryland seedings in areas with minimum of 14 inches of rainfall.

Released.—1946 (cooperatively by Washington, Idaho, and Oregon Agricultural Experiment Stations at Pullman, Moscow, and Corvallis, respectively; Plant Materials Center, SCS, Pullman; and Plant Science Research Division, ARS.

Breeder Seed.—Plant Materials Center, SCS, Pullman.

Certified Seed.—Available in quantity.

Revenue

Selected at Canada Department of Agriculture, Research Station, Saskatoon, Saskatchewan—W. L. Crowle.

Source.—Seed of single plant collected in native prairie near Revenue, Saskatchewan, in 1961. Assigned accession number E.S.S. 1558.

Method of Breeding.—Selected from over 750 native and introduced collections evaluated from 1959 to 1969.

Description.—Superior to Primar in establishment, salinity tolerance, forage and seed yield; and similar in maintaining good stands for 3 to 5 years of production. Characterized also by a higher leaf-to-stem ratio and dry-matter digestibility and by freedom from smut. Well suited for use on saline soils and in short rotations.

Released.—1970, by Canada Department of Agriculture.

Breeder Seed.—Canada Department of Agriculture, Research Station, Saskatoon.

Certified Seed.—Available.

Agropyron trachycaulum* × *Hordeum jubatum* L.*× Agrohordeum**

Selected at Utah State University, Logan—W. S. Boyle.

Source.—Hybrid between *Agropyron trachycaulum* and *Hordeum jubatum*.

Method of Breeding.—Colechicine-induced allopolyploid from sterile, tetraploid hybrid between *A. trachycaulum* and *H. jubatum*. Selected for increased fertility.

Description.—Tall, reasonably fertile hybrid; good salt tolerance; not strongly competitive; not highly productive; has long, heavy awns, making threshing and seed handling difficult.

Released.—No. Included in regional testing program.

Breeder Seed.—No. A limited amount of seed is available upon request of researchers from W. S. Boyle, Dept. of Botany, Utah State University.

***Agropyron trichophorum* (Link) Richt., pubescent wheatgrass**

Cool-season, sod-forming grass from U.S.S.R. Distinguished from *Agropyron intermedium* by presence of short, stiff hairs on heads and seeds, but otherwise similar in appearance and use. Plant types intergrade from one species to another. Some evidence that pubescent wheatgrass may be more drought tolerant than intermediate wheatgrass.

Greenleaf

Selected at Canada Department of Agriculture, Research Station, Lethbridge, Alberta—R. W. Peake.

Source.—Seed lots from Davenport, Wash., and Bismarck, N. Dak.

Method of Breeding.—Fifty-seven plants selected for forage type from space-planted nursery. Open-pollinated progenies evaluated in greenhouse for seedling vigor and tendency to creep. Progenies reduced to 14 in greenhouse tests, and to 12 plants in subsequent field tests. Twelve plants combined to form synthetic L 1747.

Description.—Foliage green to bright green; pubescence more evident than in Topar; good establishment and fairly tolerant to soil salinity. Superior to Topar in yield of forage and seed, seedling, vigor, and winter hardiness. About comparable with Mandan selection (presumably Mandan 759) except for some superiority in seedling vigor.

Released.—1966, by Canada Department of Agriculture.

Breeder Seed.—Canada Department of Agriculture, Research Station, Lethbridge.

Certified Seed.—Available.

Luna (Reg. No. 6)

Selected at former SCS Nursery, Albuquerque, N. Mex., and increased at Plant Materials Center, SCS, Los Lunas, N. Mex., with New Mexico Agri-

cultural Experiment Station, University Park, cooperating—J. A. Downs, G. C. Niner, and J. E. Anderson.

Source.—Collected by Westover-Enlow expedition to U.S.S.R. and Turkey in 1934. Introduced as *Agropyron popovii*, P.I. 106831. Identified by J. R. Swallen as *A. trichophorum*.

Method of Breeding.—Original accession space planted and rogued heavily through two generations for *A. trichophorum* type. Tested as A-1115.

Description.—Some seed heads appear glabrous and hence similar to *A. intermedium*; however, all basal leaf blades are hairy. Excellent seedling vigor, fast establishment, and high production of herbage. Leaves wide, lax, and dark green.

Released.—1963, cooperatively by New Mexico Agricultural Experiment Station and Plant Materials Center, SCS, Los Lunas.

Breeder Seed.—Plant Materials Center, SCS, Los Lunas.

Certified Seed.—Available.

Mandan 759

Selected at U.S. Northern Great Plains Research Center, ARS, Mandan, N. Dak.—G. A. Rogler.

Source.—Increase of P.I. 116252 from U.S.S.R. in 1936. Seed presented by N. I. Vavilov.

Method of Breeding.—Progeny tests of original introduction.

Description.—Higher forage and seed yields and greater persistence than other varieties of pubescent wheatgrass in tests at Mandan. Rapid spreader under favorable conditions. Some plants intergrade taxonomically into *Agropyron intermedium*, but variety as whole forms more open sod than intermediate wheatgrass.

Released.—No. Included in regional testing program.

Breeder Seed.—U.S. Northern Great Plains Research Center.

Topar

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman and D. S. Douglas.

Source.—P.I. 107330 introduced from Tashkent, Turkestan, U.S.S.R., by Westover-Enlow expedition in 1934.

Method of Breeding.—Developed by selection from spaced planting. Selections bulked and increased under isolation. All testing prior to 1953 was as accession P-41.

Description.—Vigorous-growing, late-maturing wheatgrass; sod forming and drought resistant. Resembles and closely related to intermediate wheatgrass, but pubescent on leaves, stems, and lemmas. Forms sod more rapidly and adapted to lower fertility, higher elevations, and more alkaline sites than intermediate wheatgrass. Seedling vigor very good. Seed production moderate, and seed does not shatter easily. Adapted to shallow soils and low-fertility sites in 10- to 14-inch rainfall areas of West.

Released.—1953, cooperatively by Washington, Idaho, Oregon, and California Agricultural Experiment Stations at Pullman, Moscow, Corvallis, and Davis, respectively, and Plant Materials Centers, SCS, Aberdeen, Idaho, Pleasanton, Calif., and Pullman.

Breeder Seed.—Plant Materials Center, SCS, Aberdeen, Idaho.

Certified Seed.—Available in quantity.

Trigo

Increased at Plant Materials Center, SCS, Pleasanton, Calif.

Source.—P.I. 107328 introduced from Tashkent, Turkestan, U.S.S.R., by Westover-Enlow expedition in 1934. Bulk increase of source material as A-1488 at former SCS Nursery, Albuquerque, N. Mex.

Method of Breeding.—In 1959 clones showing superior spreading ability and lacking coarseness were selected from a range reseeding plot in New Mexico that had persisted under grazing abuse. Reselected source designated A-1488 MC and increased at Plant Materials Center, Los Lunas, N. Mex. Increased at Pleasanton from seed produced in 1964. P-15612 assigned by Pleasanton in 1967.

Description.—Leafy, productive, and develops more rapidly than Topar. Sod produced is less dense than that of Topar, but forage production greater. In the Mediterranean-like climate of California Trigo is better adapted than Topar, and is a consistently high seed producer under irrigation. In trials it has been successfully established under 6 to 8 inches of rainfall. Has potential in California for use on shallow, droughty soils where growth of most perennials is limited.

Released.—No. Included in field plantings in California.

Breeder Seed.—Plant Materials Center, SCS, Pleasanton.

Agrostis alba L., redtop

Important cool-season, rhizomatous grass from Europe. Used as temporary grass in lawn seed mixtures, for pastures, erosion control, and occasionally hay. Found throughout cooler parts of

United States, especially in northeastern and north-central regions. Adapted for use on poorly drained acid soils. Less aggressive than colonial bentgrass. Varieties not available.

Agrostis canina L., velvet bentgrass

Cool-season, stoloniferous grass introduced from Europe. Used on putting greens, bowling greens, and lawns in some coastal areas of Northeastern United States. Relatively shade tolerant, but does not thrive on poorly drained soils. Propagated from either seed or stolons.

Certified Seed.—Not available. (No information on commercial sources. Planted on some golf courses.)

Kernwood

Selected at Kernwood Country Club, Salem, Mass.

Description.—Becomes green very early in season and continues green well into winter in rather mild climate of Rhode Island. Medium to dark green.

Released.—Not officially.

Breeder Seed.—Not available.

Kingstown

Selected at Rhode Island Agricultural Experiment Station, Kingston—C. R. Skogley and J. A. DeFrance.

Source.—Inbred selection from Piper by H. F. A. North in 1929.

Method of Breeding.—Maintained vegetatively and from seed since initial selfing. Comparative testing.

Description.—Semibrilliant dark green; excellent vigor; good texture. Good resistance to most diseases; very resistant to dollar spot.

Released.—1963, by Rhode Island Agricultural Experiment Station.

Breeder Seed.—Rhode Island Agricultural Experiment Station. To be processed at Oregon State University for elimination of smut, *Tilletia pallida*, prior to release for production of foundation seed.

Certified Seed.—Available in quantity.

Raritan

Selected at New Jersey Agricultural Experiment Station, New Brunswick—H. B. Sprague.

Source.—All commercial strains and named varieties available in 1930.

Method of Breeding.—Continuous selection in

successive generations of what appeared to be outstanding individual plants. With each successive generation, outcrossing limited to families selected from previous generation. Relatively uniform and vigorous families combined to make synthetic variety.

Description.—Plants selected for seedling vigor, good seed yield, apparent freedom from disease, vigor of mature plants, and turf quality. Parallel testing of turf plots produced from seed of selected plants accompanied later stages of selection. Vigorous variety producing fine-quality turf.

Released.—1940, by New Jersey Agricultural Experiment Station.

Breeder Seed.—Not available.

Certified Seed.—Not available.

Agrostis palustris Huds., creeping bentgrass

Cool-season, stoloniferous grass from Eurasia. Used for lawns, putting greens, and erosion control. Planted on putting greens throughout much of the United States, especially in Northeastern, Midwestern, and Northwestern States. Two types commercially available. One represents group of individual strains selected from established greens of South German mixed bentgrass; all these strains must be propagated vegetatively. Second type includes Penncross and Seaside strains grown from seed.

Method of Breeding.—Increased vegetatively as C-52.

Description.—Good color and texture. Some resistance to dollar spot. Some tendency to thin out during hot weather. Adapted to parts of Midwestern United States, where used rather widely.

Released.—Distributed in golf-turf industry.

Breeder Stock.—Not available.

Certified Stock.—Not available. (Available commercially. Also sold under trademark "Old Orchard.")

Arlington

Selected at Arlington, Va., by U.S. Golf Association Green Section, ARS cooperating—John Monteith, Jr.

Source.—Collected in 1928 from practice green at Country Club of Atlantic City, Northfield, N.J.

Method of Breeding.—Increased vegetatively for testing as C-1.

Description.—Tough, sturdy, rather slow growing, bluish green. Responds to careful management. Requires high level of soil fertility, minimum irrigation, and close mowing to reduce swirl. Somewhat resistant to dollar spot and melting out (*Helminthosporium-Curvularia* complex) but susceptible to brown patch. Grows well in hot weather. Not generally recommended for use in pure stands, but combines well with Congressional if not subjected to overwatering.

Released.—Distributed in golf-turf industry.

Breeder Stock.—Not available.

Certified Stock.—Not available. (Available commercially.)

C-52

Selected in spring of 1934 at Old Orchard Grass Nursery, Madison, Wis.—R. R. Bond.

Cohansey

Selected by E. R. Steiniger in 1935.

Source.—Fourth green at Pine Valley Golf Club, Clementon, N.J.

Method of Breeding.—Increased vegetatively for testing as C-7.

Description.—Vigorous, aggressive, yellowish green. Tolerates frequent watering and exhibits wide adaptation to climatic conditions. Performed very satisfactorily in warm areas. Exhibited some tolerance to brown patch and melting out, but susceptible to dollar spot.

Released.—Distributed in golf-turf industry.

Breeder Stock.—Not available.

Certified Stock.—Not available. (Available commercially.)

Collins

Selected at Arlington, Va., by U.S. Golf Association Green Section, ARS cooperating—John Monteith, Jr.

Source.—Collected in 1937 from eighth green at Washington Golf and Country Club, Rosslyn, Va.

Method of Breeding.—Increased vegetatively for testing as C-27.

Description.—Dark green, rather nonaggressive. Somewhat comparable to Seaside in susceptibility to disease, except possibly better rating for brown patch tolerance.

Released.—Distributed in golf-turf industry.

Breeder Stock.—Not available.

Certified Stock.—Not available. (Available commercially in limited quantity.)

Congressional

Selected by R. P. Hines, Jr., in 1936.

Source.—Thirteenth green at Congressional Country Club, Rockville, Md.

Method of Breeding.—Increased vegetatively for testing as C-19.

Description.—Attractive dark green and good texture. Hardy variety; starts growth early in spring and retains color well into fall and winter. Susceptible to brown patch. Good variety either alone or in combination with Arlington (C-1) or Collins (C-27), or with both.

Released.—Distributed in golf-turf industry.

Breeder Stock.—Not available.

Certified Stock.—Not available. (Available commercially.)

Evansville

Selected at Indiana Agricultural Experiment Station, Lafayette—W. H. Daniel.

Source.—Plant found in 1958 on No. 5 putting green, Evansville Country Club, Evansville, Ind.

Method of Breeding.—Vegetative increase of original accession. Rated best for putting greens in 3-year test.

Description.—Dark-green, fine-leaved, dense turf at all nitrogen levels tested. Resistant to dollar spot and tolerant to brown patch.

Released.—1963, by Indiana Agricultural Experiment Station.

Breeder Stock.—Indiana Agricultural Experiment Station.

Certified Stock.—Available.

Metropolitan

Selected at Arlington Farms, Va., by U.S. Golf Association Green Section, ARS cooperating.

Source.—Material sent to USDA in 1917 for identification purposes by New York City seed firm.

Method of Breeding.—Increased vegetatively for testing as C-51.

Description.—Difficult to manage, turf tends to become fluffy and grainy. Very susceptible to melting out.

Released.—Distributed in golf-turf industry.

Breeder Stock.—Not available.

Certified Stock.—Not available. (Practically no Metropolitan bentgrass available commercially.)

Penncross (Reg. No. 1)

Selected at Pennsylvania Agricultural Experiment Station, University Park—H. B. Musser.

Source.—Parent strains for seed production identified under station accession numbers 10(37)4 (Pennlu creeping bentgrass), 9(38)5, and 11(38)4.

Method of Breeding.—First-generation seed produced by random crossing of three vegetatively propagated clones of creeping bentgrass.

Description.—Turf-quality records obtained over 5-year period at Pennsylvania Agricultural Experiment Station show Penncross significantly better in density, tolerance to disease, and rate of recovery from attacks than other commercially available seeded types. Because of general vigor, shows exceptional ability to produce better turf than other seeded bentgrasses under adverse conditions. Recommended for golf-course putting greens and similar intensive turfgrass areas.

Released.—1954, by Pennsylvania Agricultural Experiment Station.

Breeder Stock.—Parent clones maintained by Pennsylvania Agricultural Experiment Station.

Certified Seed.—Available.

Pennlu

Selected at Pennsylvania Agricultural Experiment Station, University Park—H. B. Musser.

Source.—First observed at LuLu Temple Golf Course, Philadelphia, Pa., by Edward Roberts and Walter Groff. Sent to Pennsylvania Agricultural Experiment Station for evaluation by C. K. Halliwell. Tested under accession number 10(37)4.

Description.—Consistently good performance, chiefly owing to high disease tolerance, good vigor, density, texture, and ability to withstand wide temperature range. Recommended for use on golf-course greens and similar specialized turf.

Released.—1954, by Pennsylvania Agricultural Experiment Station.

Breeder Stock.—Pennsylvania Agricultural Experiment Station.

Certified Stock.—Available.

Pennpar

Selected at Pennsylvania Agricultural Experiment Station, University Park—J. M. Duich.

Source.—Coos bentgrass.

Method of Breeding.—A seedling selection from vegetative strain 10(32)2, a selection from Coos bentgrass. Included in evaluation tests in 1953, under experimental number 4(42)3.

Description.—Medium texture, medium dark green, and produces good putting surface without

severe graining or mottling. Selected for resistance to snow mold, brown patch, red leafspot, and dollar spot. Good tolerance to some turfgrass herbicides, not excessively vigorous, and easier to manage than such varieties as Pennecross.

Released.—1966, by Pennsylvania Agricultural Experiment Station.

Breeder Stock.—Pennsylvania Agricultural Experiment Station.

Certified Stock.—Available.

Seaside

Description.—Established from seed. Quality poorer than that of most selected varieties of creeping bentgrass. Below average in disease resistance. Develops patches of individual strains that exhibit almost endless variation in texture, color, graininess, and disease susceptibility.

Released.—Not officially.

Breeder Seed.—Not available.

Certified Seed.—Available in quantity.

Toronto

Source.—Toronto Golf Club, Long Branch, Ontario, Canada.

Method of Breeding.—Increased vegetatively for testing as C-15.

Description.—Vigorous, aggressive, requires careful management. Dark green, fine texture. Sus-

ceptible to dollar spot and brown patch. Well adapted in eastern Canada and Midwestern United States.

Released.—Distributed in golf-turf industry.

Breeder Stock.—Not available.

Certified Stock.—Not available. (Available commercially in limited quantity.)

Washington

Selected at Arlington Farms, Va., by U.S. Golf Association Green Section, ARS cooperating.

Source.—Collected at Washington Golf and Country Club, Rosslyn, Va.

Method of Breeding.—Increased vegetatively for testing as C-50.

Description.—Washington and Metropolitan were first named strains of creeping bentgrass. Washington is heat resistant, exhibits some tolerance to disease. Relatively short growing season; grows slowly in spring, growth stops in early fall, with cool weather assumes purple tinge. Light green, excellent texture.

Released.—Distributed in golf-turf industry.

Breeder Stock.—Not available.

Certified Stock.—Not available. (Available commercially. Appears to be more than one strain being increased and used under name "Washington." Also known as Flossmoor bentgrass and Wakonda Washington.)

Agrostis tenuis Sibth., colonial bentgrass (also Rhode Island, browntop, New Zealand, Prince Edward Island)

Important cool-season, stoloniferous grass from Europe. Used for golf courses, lawns, and erosion control. Well adapted in northeastern region and along northern Pacific coast. Inferior to creeping and velvet bentgrass for putting greens and other fine turf. Common colonial seed certified in Washington State. Most of the production traces to seed collected originally from native stands found in southwestern part of State, north of Columbia River to Olympia.

Astoria

Source.—Collection made in northwestern Oregon by Engbretson and Hyslop in 1926.

Method of Breeding.—Comparative testing.

Description.—Weakly creeping; short stolons; semierect, slender culms. Short ligule, round to obtuse in shape, finely toothed, and often split. Panicle open with delicate form and somewhat larger than that of common colonial. In general, Astoria and common colonial cannot be readily distinguished on basis of growth habit or color. Astoria may be slightly more robust but not under

all conditions. Susceptible to brown patch. Used in lawn mixtures and on fairways.

Released.—Yes. Included in seed certification program in Oregon in 1926.

Breeder Seed.—Oregon Agricultural Experiment Station.

Certified Seed.—Available in quantity.

Bardot

Developed by Barenbrug Holland N.V., Arnhem, Holland.

Source.—Collections from lawns, pastures, and other uncultivated areas.

Method of Breeding.—Selection and evaluation of individual plants, clones, and families.

Description.—Late heading; rather dark green, narrow leaves; dense turf. Good resistance to *Fusarium nivale* and other diseases; good drought resistance; excellent winter color; suitable for lawns and fine turf.

Released.—1968. Agency for U.S. and Canada—Steven J. R. Frohlich & Co., Princeton, N.J.

Breeder Seed.—Barenbrug Holland N.V.

Certified Seed.—Available.

Exeter

Selected at Rhode Island Agricultural Experiment Station, Kingston—J. A. Defrance and C. R. Skogley.

Source.—Old pasture in Exeter, R.I., about 1940.

Method of Breeding.—Comparative testing.

Description.—Similar to Astoria. Becomes green earlier in spring; holds color better in summer. Bright green, more leafy than other varieties. Very winter hardy. Some leaf spot resistance. Seems best adapted to north and east in cool-season turfgrass region. Used in lawn mixtures, fairways, lawn tennis courts, and bowling greens.

Released.—1963, by Rhode Island Agricultural Experiment Station.

Breeder Seed.—Rhode Island Agricultural Experiment Station.

Certified Seed.—Available.

Highland

Source.—Collections made in southern Willamette Valley, Oreg., in about 1930.

Method of Breeding.—Comparative testing.

Description.—Astoria and common colonial bentgrass very similar in appearance; Highland has several distinctive characteristics. Bluish green, with erect, robust culms. Ligule longest of three types, about 1 to 3.5 mm., round to obtuse, finely toothed, and often split. Panicles generally largest of three, pyramidal in form, with variations from Astoria to almost appearance of red-top. Culms tend to be coarse and tall. Culms and panicles dull, light red up to spikelets and remain so at ripening. Panicles semiclosed after blooming, making it readily noticeable in fields of common

colonial, which turns brown at ripening and its panicles remain open. Highland stoloniferous, slightly stronger creeper than other types. Susceptible to brown patch. Turf tends to become puffy when mowed at ordinary lawn height. Used in lawn mixtures and on fairways.

Released.—Yes. Included in seed certification program in Oregon in 1934.

Breeder Seed.—Oregon Agricultural Experiment Station.

Certified Seed.—Available in quantity.

Holfior

Developed by D. J. van der Have, Kapelle-Biezeling, Netherlands.

Source.—Collection of plants from southern Holland.

Method of Breeding.—Initial selection for short stolons, dense plant growth, and fine leaves. Polycross progeny tested under short-mowed turf conditions. Six plants saved to produce synthetic variety based on uniform maintenance of growth throughout growing season.

Description.—Fine leaved, slightly darker green than Astoria. Under U.S. conditions does not spread rapidly, but produces dense turf with good texture. Growth more upright than other colonial bentgrasses and does not mat so severely. Produces excellent turf at height of ½ to 1 inch.

Released.—Holland, 1940, by D. J. van der Have; United States, 1963, by Northrup, King & Co.

Breeder Seed.—D. J. van der Have.

Certified Seed.—Available under Organization for Economic Cooperation and Development (OECD) scheme.

Alopecurus arundinaceus Poir., creeping foxtail

Cool-season, sod-forming grass from Eurasia. Limited use for hay, pasture, and erosion control in moist areas of northern Great Plains, Pacific Northwest, and intermountain region. Possesses strong rhizomes, forms dense sod, and well adapted to wetland pastures and some mountain meadows.

Garrison

Increased at Plant Materials Center, SCS, Bismarck, N. Dak.—J. L. McWilliams.

Source.—Field collection made near Max, McLean County, N. Dak., in 1950. Information obtained from local people there indicates grass brought into area from eastern Germany or western U.S.S.R. by immigrant in early days of homesteading. Escaped and growing around many pothole sloughs in area. In his Handbook of North Dakota Plants, O. A. Stevens stated, regarding

this grass, "Specimens were received in 1935 from Gust Steinhaus of Max, McLean County, and were identified by J. R. Swallen, who commented that it was the first record for the United States."

Description.—Resembles common meadow foxtail (*Alopecurus pratensis* L.), but has more vigorous rhizomes and broader leaves. Seed black at maturity; spikelets fall away easily, making seed harvest somewhat difficult. Field tested in mountain meadow areas of Montana and Wyoming and in wetland areas of North and South Dakota. Well adapted to wetland sites. Produces good yields of high-quality forage under these conditions. Tested as NDG-772.

Released.—Cooperatively by Wyoming Agricultural Experiment Station, Laramie, and Plant Materials Center, SCS, Bismarck.

Breeder Seed.—Plant Materials Center, SCS, Bismarck.

Certified Seed.—Available.

P-14762

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

Source.—(P-111), P.I. 110067, botanic garden Alma-Ata, U.S.S.R., and (P-124), P.I. 110351, Institute of Plant Industry, Leningrad, U.S.S.R.; introduced by Westover-Enlow expedition in 1934.

Method of Breeding.—Selected plants from original planting cloned into spaced, isolated, polycross nursery in 1948. F₂ seed produced by open pollination under isolation from other strains. In 1955, 1.8-acre planting made; in 1956, F₃ seed harvested.

Description.—Leafy, long lived, sod forming. Foliage dark green; leaves flat and mostly basal. Stems erect, medium coarse, abundant. Plants start growth early in spring and mature seed early. Seed mostly black, short awned to awnless; seed habits fair; seed ripens more uniformly than most strains, shatters readily. Foliage stays green after seed matures and until heavy frost, or as long as moisture available. Best adapted to conservation plantings in wet or poorly drained areas.

Released.—No. Included in regional testing program.

Breeder Seed.—Plant Materials Center, SCS, Pullman.

***Alopecurus pratensis* L., meadow foxtail**

Cool-season, slightly spreading bunchgrass introduced in mid-1800's from Eurasia. Used for hay, pasture, and silage in Northern United States, especially in Pacific Northwest. Weak rhizomes. Matures earlier than timothy. Well adapted at

high altitudes and northern latitudes and for use in wetland pastures. Fluffy seed character and excessive shattering restrict seeding. Varieties not available.

***Ammophila arenaria* (L.) Link, European beachgrass**

Cool-season, rhizomatous grass from Europe. Used to control shifting dunes in coastal regions. Dies out when sand ceases to move; not suitable

for permanent erosion control. Propagated vegetatively. Varieties not available.

***Ammophila breviligulata* Fernald, American beachgrass**

Cool-season, rhizomatous, native grass. Occurs on shores of Great Lakes, along Atlantic coast from Newfoundland to North Carolina, and sparingly on Pacific Coast. Used for initial sand-dune stabilization. Propagated vegetatively.

Cape

Selected at Plant Materials Center, SCS, Cape May Court House, N.J.—W. C. Sharp.

Source.—Culms collected in 1965 from single plant growing on sand dune at Sandy Neck, Cape Cod, Barnstable County, Mass.

Method of Breeding.—Vegetative multiplication and observational testing.

Description.—Very vigorous, heavy culm producer—both in number and size of stems; leaves exceptionally broad and thick; spreads rapidly by rhizomes. Propagated by culms only.

Released.—Proposed for 1971, cooperatively by New Jersey Agricultural Experiment Station and SCS.

Breeder Stock.—Plant Materials Center, SCS, Cape May courthouse.

Certified Stock.—Not available.

Hatteras

Selected at North Carolina Agricultural Experiment Station, Raleigh—W. W. Woodhouse and D. S. Chamblee.

Source.—A group of 18 clones, representing a wide range in plant type, selected from nursery planting in 1963.

Method of Breeding.—Clones increased in nursery rows near Clayton, and screened for vigor and rate of spread. Eight clones selected for testing at three sites on coast. In 1966, four promising clones planted in large duplicate plots in dune-building trial on Ocracoke Island. The clone, identified as Hatteras, selected on basis of survival and effectiveness in trapping sand.

Description.—Very stiff, large stems, wide bluish-green leaves, medium to late maturity, light to medium seed producer. Characterized by early vigor, which is important in establishment, and by rapid spread, which permits wider spacing and rapid healing of dunes broken by storms. Well adapted to entire North Carolina coast. Could be of value elsewhere on Atlantic seaboard. Can be propagated under nursery conditions by either seed or vegetative propagules.

Released.—1969, by North Carolina Agricultural Experiment Station.

Breeder Stock.—North Carolina Foundation Seed Producers, Inc.

Certified Stock.—Available.

***Andropogon* spp. (also *Bothriochloa* and *Dichanthium* spp.), bluestems**

Bluestems are major rangegrasses in North America. Native species include little bluestem (*Andropogon scoparius*), big bluestem (*A. gerardi*), sand bluestem (*A. hallii*), and several weedy species represented by ubiquitous broom-sedge (*A. virginicus*). In general, bluestems introduced from Old World have been placed under

Andropogon. However, most Old World species are now identified according to names applied in regions from where they were introduced, i.e., either as species of *Bothriochloa* or *Dichanthium*.¹ For convenience, all *bluestems* are included under *Andropogon*.

***Andropogon annulatus* Forsk. (*Dichanthium annulatum* Stapf, *D. annulatum* complex), Diaz bluestem**

Warm-season, erect to semidecumbent bunchgrass from Union of South Africa. Shows promise as pasture plant in southern Texas.

Kleberg

Selected at Kingsville, Tex.—N. R. Diaz.

Source.—Seed collected from weakened rhodesgrass pasture on King Ranch, Tex., where escaped bluestem was dominant. Growing beside King Ranch bluestem and found at same time, 1939.

Method of Breeding.—Increased at SCS Nursery, San Antonio, Tex.

Description.—Plants erect, uniform. Stems slender, nodes with prominent ring of stiff hairs, leafy; stems about 30 inches at seed maturity. Good seed producer, volunteers aggressively. Excellent drought tolerance, some salinity tolerance. Relished by cattle. Adapted for range seeding in medium-to fine-textured soils of eastern Edwards Plateau, Rio Grande plain, blackland prairies, Grand Prairie, and coastal prairie of Texas.

Released.—Informally by SCS about 1944.

Breeder Seed.—Plant Materials Center, SCS, San Antonio.

Certified Seed.—Not available. (In commercial production.)

Pretoria 90

Selected at SCS Nursery, San Antonio, Tex.—J. E. Smith, Jr.

Source.—Introduced from Transvaal, Union of South Africa, as P. I. 188926, BN-6730; received in April 1951 from F. J. Crider as *Dichanthium annulatum* Stapf.

Method of Breeding.—Selected from group of similar accessions from Union of South Africa. Increased for testing as T-20090.

Description.—Selection made on basis of seedling vigor, rapid growth, forage yield, and aggressive spread by self-seeding. Somewhat low in seed production. Good drought tolerance. Plants essentially bunchgrass, but stems in contact with moist soil will root at nodes to form loose turf; stems leafy and may reach 5 feet at seed maturity. Green forage and hay relished by cattle. Best use as hay, pasture, or silage on heavy soils of Rio Grande plain, southern blackland, and coastal prairie in Texas.

Released.—Informally by SCS in 1954.

Breeder Seed.—Plant Materials Center, SCS, San Antonio.

Certified Seed.—Not available. (Limited commercial production.)

***Andropogon caucasicus* Trin. (*Bothriochloa caucasicus* C. E. Hubb., *B. intermedia* complex), Caucasian bluestem**

Warm-season bunchgrass from U.S.S.R. Used for pasture and hay in central and southern Great Plains.

Caucasian

Increased at Plant Materials Center, SCS, Manhattan, Kans.—D. R. Cornelius and M. D. Atkins.

Source.—Introduced from Tiflis, U.S.S.R., in 1929 as P.I. 78758. Seed obtained in 1934 from A. E. Aldous, Kansas Agricultural Experiment Station, Manhattan.

¹ Celarier, R. P., and Harlan, J. R. Studies on Old World Bluestems. Okla. Agr. Expt. Sta. Tech. Bul. T-58, 31 pp. 1955.

Method of Breeding.—Increased without selection and distributed for testing as KG-40.

Description.—Bunchgrass with good leafiness, fine stems, and forage production approximately equivalent to that of native little bluestem at Manhattan. Free from disease. Indeterminate seed maturity makes it difficult to harvest; seed yields poor to fair; easily established and spreads well from seed. Best adapted in central Kansas, western Oklahoma, and central Texas, where annual precipitation is 18 inches or above. Does best on medium- and fine-textured soils, but will grow on sandy soil. Used alone for summer pasture, for

stabilization of earth structures, diversions, and critical areas, and to lesser extent with grass mixtures in range seedings and waterway plantings to provide quick cover. In Kansas reaches maturity in early summer and thereafter is less palatable than native bluestems, blue grama, and sideoats grama.

Released.—Not formally, but has come into use primarily through seed harvests from field tests.

Breeder Seed.—Plant Materials Center, SCS, Manhattan.

Certified seed.—Not available. (Available commercially.)

Andropogon gerardi Vitman, big bluestem

Important warm-season grass on relatively fertile, well-drained loam soils along eastern edge of Great Plains from North Dakota to eastern Texas. Used for pasture and hay. Has deep roots, short rhizomes, and some lateral spread.

Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Nebraska Agricultural Experiment Station.

Certified Seed.—Available.

Champ (Reg. No. 2)

Developed at Nebraska Agricultural Experiment Station, Lincoln, ARS cooperating—L. C. Newell.

Source.—Domestic collections in Nebraska by L. C. Newell, D. E. Atkinson, and R. D. Staten. Iowa introductions supplied by SCS.

Method of Breeding.—Clones with good vegetative spread and large caryopses from five north-central Nebraska sandhill sources reciprocally crossed with clones from prairie sources, two of which derived from Iowa introductions and three from Pawnee County, Nebr. Resulting 10 progeny lines grown, and eight Synthetic 1 clones from each moved to crossing block. Seed from 80 clones used to establish small field of seeded rows (Synthetic 2 of original cross) for production of breeder seed. Name "Champ" derived from sources of germ plasm: Ch-Cherry and Holt Counties, Nebr.; am-Ames, Iowa; and p-Pawnee County, Nebr.

Description.—Moderately late maturing, but ordinarily week to 10 days earlier in seed maturity than Pawnee. Leafy; variable in awn length, culm, glume color (yellow green to purple), and foliage color (light green to glaucous gray). Seed set and seed quality superior to those of ordinary bluestem. Performed well in several forage-yield tests in Nebraska, especially on sandy and fine textured soils in area of adaptation. May be grown for seed production in central and eastern Nebraska as far north as central Platte and lower Loup and Elkhorn Valleys. Seed should be produced in irrigated rows. For conservation and forage use it may be utilized in solid stands or mixtures.

Released.—1963, cooperatively by Nebraska

Kaw

Selected at Kansas Agricultural Experiment Station, Manhattan.

Source.—Composite of lines selected after four or more generations from progeny of 200 accessions collected in 1935 in native Flint Hills grasslands south of Manhattan.

Description.—Tall and more uniformly leafy than field-run types. Medium late in maturity. Somewhat resistant to rust. Forage yields greater in plot tests than those of field-run accessions with which it has been compared. Seed yields relatively high and seed set good.

Released.—1950, by Kansas Agricultural Experiment Station.

Breeder Seed.—Kansas Agricultural Experiment Station.

Certified Seed.—Available.

Pawnee (Reg. No. 1)

Developed at Nebraska Agricultural Experiment Station, Lincoln, ARS cooperating—L. C. Newell.

Source.—Collected in 1938 from Pawnee County by L. C. Newell and D. E. Atkinson.

Method of Breeding.—Collections propagated through several generations. Clones of four types selected in 1948, polycrossed in isolation, and polycross tested in 1950-51. Approximately 260 clones selected from polycrossed progenies and moved to new crossing block for recombination. These clones subsequently progeny tested in 1953-54. Seed of 1959 and 1960 harvests from duplicate plants of recombination crossing block used

as breeder seed (Synthetic 1) for foundation seed field establishment in 1961.

Description.—Typical of big bluestem of central prairies. Moderately long, dark-green leaves and tall flowering stalks, with forked, green to purplish inflorescences. Florets of spikelets long awned. Considerable variation in amount of pubescence in seed heads. Produces good forage yields in Nebraska; superior to native strains originating farther north and west. Seed yields and seed quality produced in cultivated rows and under irrigation superior to those of common

strains of bluestem. Seed maturity late, approaching frost date in southeastern Nebraska. Recommended in eastern third of Nebraska for conservation and forage, where it may be grown on dryland sites suitable for bluestem production or under irrigation, either in pure stands or mixtures. Seed should be produced in rows under irrigation.

Released.—1963, cooperatively by Nebraska Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Nebraska Agricultural Experiment Station.

Certified Seed.—Available.

Andropogon hallii Hack., sand bluestem

Warm-season grass. Resembles big bluestem, but differs in having conspicuous hairs on panicle, more vigorous rhizomes, and greater lateral spread. Plants intermediate between typical big and sand bluestem are common. Valuable range-grass on deep, sandy soils from central Nebraska into eastern Colorado and south into New Mexico and Oklahoma.

Carson

Increased at Plant Materials Center, SCS, Bismarck, N. Dak.—John McDermind.

Source.—Composite of seed from five clones selected for leafiness and seed production. Also seed collected by SCS personnel in 1959 and 1960 from abandoned field few miles north of Carson, N. Dak.

Method of Breeding.—Increase of seed from selected clones and field collection of seed. Tested as PM-ND-329.

Description.—Good vigor and leafiness. Free from disease. Well adapted to western North Dakota, South Dakota, eastern Wyoming, and Montana.

Released.—No. Distributed for field testing in 1964.

Breeder Seed.—Plant Materials Center, SCS, Bismarck.

Cherry

Increased at University of Nebraska Foundation Seed Division Field, Genoa, Nebr.—Murray Cox.

Source.—Bulk collection from combine harvest in sandhills of Cherry County, Nebr. Collected by Murray Cox, SCS, October 2, 1957.

Method of Breeding.—Increase of bulk collection.

Description.—Good seed yield. Adapted in northern half of Nebraska sandhills and in adjacent South Dakota.

Released.—1961, by SCS to provide seed adapted to Nebraska sandhill area.

Breeder Seed.—Not available.

Certified Seed.—Not available.

Elida

Increased at Plant Materials Center, SCS, Los Lunas, N. Mex., and New Mexico Agricultural Experiment Station, University Park, cooperating—J. A. Downs, G. C. Niner, and J. E. Anderson.

Source.—Collection in 1956 from native stand on sand-dune area near Elida, N. Mex., at elevation of 4,345 feet and annual precipitation about 16 inches.

Method of Breeding.—Direct increase of original collection. Field tested as PM-NM-14.

Description.—Somewhat variable, but more uniform than many other collections. Good foliage extending well up culms. Fairly uniform in ripening, and better than other strains tested in seed production. Shows superior establishment, vigor, and production in eastern New Mexico.

Released.—1963, cooperatively by New Mexico Agricultural Experiment Station and Plant Materials Center, SCS, Los Lunas.

Breeder Seed.—Plant Materials Center, SCS, Los Lunas.

Certified Seed.—Not available.

Garden

Increased at Plant Materials Center, SCS, Scottsbluff, Nebr.—Murray Cox.

Source.—Composite of several individual collections from native plants. Collected by Murray Cox and R. L. Carver, SCS, October 1, 1957.

Method of Breeding.—Increase of composite of individual collections. Field tested as PM-NB-378 in several parts of Nebraska and South Dakota.

Description.—Vigorous, tall, leafy type. Good seed yields. Well adapted throughout sandhills of Nebraska and in adjacent South Dakota.

Released.—1960, by SCS.

Breeder Seed.—Plant Materials Center, SCS, Manhattan, Kans.

Certified Seed.—Not available. (In commercial production.)

Woodward

Selected at U.S. Southern Great Plains Field Station, ARS, Woodward, Okla., in cooperation with Oklahoma Agricultural Experiment Station, Stillwater—J. R. Harlan and W. R. Kneebone.

Source.—Traces to source nursery established by M. L. Peterson in 1942. Sources about equally divided between those in and near Woodward County, Okla., and those in general vicinity of Clovis, N. Mex.

Method of Breeding.—Plants selected for high seed set and placed in six isolation blocks by J. R. Harlan: Short-early, short-late, medium-early, medium-late, tall-early, and tall-late. Process repeated with separate populations established in

1946. Selected plants moved to six new isolation blocks. Seed from two medium blocks bulked and seeded for preliminary increase in 1949, refined somewhat by removal of excessively tall plants, and today serves as breeder seed block of Woodward sand bluestem.

Description.—Variable population, but with most plants similar in type. Superior to wild strains tested in flower production, seed set, lack of excessively tall plants, and leafiness. Forage yield comparable to that of better source strains. Woodward can be combined reasonably well; seed quality superior to common sources.

Released.—1955, cooperatively by Oklahoma and Kansas (Manhattan) Agricultural Experiment Stations and Plant Science Research Division, ARS.

Breeder Seed.—U.S. Southern Great Plains Field Station.

Certified Seed.—Not available. (In commercial production.)

Andropogon ischaemum L. (*Bothriochloa ischaemum* Keng.), yellow bluestem

Warm-season, semiprostrate bunchgrass from U.S.S.R., China, Turkey, and India. Used primarily for pasture in Texas and north to southwestern Oklahoma.

A-1407

Increased at Plant Materials Center, SCS, Tucson, Ariz.—C. G. Marshall and L. P. Hamilton.

Source.—Introduced from U.S.S.R. as P.I. 107017 in 1934. Collected by Westover-Enlow expedition at Tajikistan, Turkestan.

Description.—Vigorous introduction. Appears more erect and more cold hardy than King Ranch. Looked promising in central Arizona. Persisted in field plantings established by former SCS Nursery, Albuquerque, N. Mex. Could be useful special-purpose grass in erosion control.

Released.—No. Distributed for field testing.

Breeder Seed.—Plant Materials Center, SCS, Tucson.

El Kan

Selected at Plant Materials Center, SCS, Manhattan, Kans.—D. R. Cornelius.

Source.—Seed collected in 1937 west of Howard, Elk County, Kans. Exact origin unknown, but thought to have come in with cattle or hay from Texas.

Method of Breeding.—Selected in comparison with other introductions of this Asiatic bluestem. Increased from original collection and tested as KG-495.

Description.—Most winter hardy strain of

Andropogon ischaemum tested at Manhattan. Fully winter hardy in Kansas and eastern Colorado. Bunchgrass of medium leafiness and forage production; more nearly equal in forage production to sideoats grama than to native bluestems in eastern Kansas; not equal in production to Caucasian bluestem where latter can be grown. Low in palatability compared with native bluestems, blue grama, and sideoats grama. Only fair seed production, but usually produces two seed crops a year. Free from disease. Easily established and spreads well from seed. Adapted in Kansas, Oklahoma, eastern Colorado, and northeastern New Mexico where annual precipitation is 15 inches or above. In South and Southwest not equal to King Ranch, and other strains of this species, but its use extends north where King Ranch is not winter hardy. Will grow on sandy, medium-textured, and clay soils. Used alone as summer pasture and for stabilization of earth structures, diversions, and critical areas.

Released.—Not formally. Very limited use from seed harvested from field test plantings.

Breeder Seed.—Plant Materials Center, SCS, Manhattan.

Certified Seed.—Not available.

King Ranch (KR)

Selected at Kingsville, Tex., by N. R. Diaz; then grown at SCS Nursery, San Antonio, Tex.

Source.—Original seed collected in weakened rhodesgrass pasture on King Ranch, Tex., where escaped bluestem had gained dominance. Coun-

try of origin unknown, but thought by some to be China. Increased for testing as T-3487.

Origin of King Ranch bluestem in America described by J. R. Harlan in Oklahoma Forage Leaflet No. 11, 1952, as follows: Material now generally in use was first noticed by Nico Diaz on King Ranch in 1937 and increased for distribution by SCS under T-3487. Recent inquiry into history of Texas yellow beardgrass, which is apparently indistinguishable from King Ranch bluestem in all respects, leaves little doubt as to original entry of grass into United States. History is briefly as follows:

January 11, 1917—Received by P. B. Kennedy, California Agricultural Experiment Station, Berkeley, from Amoy, China. Presented by H. Hoyle Sink, American consul, Amoy. Given California number T.O. 144 and later S.P.I. number 44096.

1924—S.P.I. 44096 introduced to Substation 3, Angleton, Tex., by V. E. Hafner, former Bureau of Plant Industry, Washington, D.C., and given Texas number T.S. 8413.

April 11, 1932—T.O. 144 received by former Division of Forage Crops and Diseases, Bureau of Plant Industry, Washington, D.C., from Agronomy Department, University of California, Davis, and given F.C. number 21785.

April 11, 1935—F.C. 21785 sent to B. F. Kiltz, Oklahoma Agricultural Experiment Station, Stillwater, from Beltsville, Md.

1937—F.C. 21785 obtained by U.S. Southern Great Plains Field Station, Woodward, Okla., from Stillwater.

1937—F.C. 21785 obtained by Texas Agricultural Experiment Station, College Station, from Woodward.

1939—T.S. 8413 given name "yellow beardgrass" in Texas Agricultural Experiment Station Bulletin No. 570 and its performance at Angleton described.

1949—F.C. 21785 given name "Texas yellow beardgrass" and released for certification in Texas by Texas Agricultural Experiment Station. All *Andropogon ischaemum* material furnished by Texas Agricultural Experiment Station to individuals or substations since 1941 originated from this source.

Since original Chinese material had been grown at Substation 3, Angleton, as early as 1924, little reason to suppose that King Ranch strain is any other than Chinese accession that found its way from Angleton to King Ranch sometime during 1924-37.

Description.—Midtall, perennial, warm-season bunchgrass. Forms semiprostrate leafy clumps in early stages of growth. Drought tolerant; able to withstand winter temperatures as far north as central Oklahoma. Produces seed indeterminately throughout season, volunteers aggressively, tends

to eliminate other competition. Adapted best for range seeding on clay soils and rocky, limestone hills. Forage attractive to cattle and sheep; plants can withstand heavy use for relatively long periods. Leaf growth very susceptible to damage from leaf rust, especially in spring. Weakness did not show up as major factor until grass had been in widespread use for several years.

Released.—Informally by SCS about 1941. Later certified and formally released by SCS and Texas Agricultural Experiment Station.

Breeder Seed.—Not available.

Certified Seed.—Not available. (In commercial production.)

Marash

Increased at Oklahoma Agricultural Experiment Station, Stillwater, ARS cooperating—J. R. Harlan.

Source.—Collected by J. R. Harlan in Maras, Turkey, in 1948 and introduced as P.I. 172720.

Description.—Belongs to common Eurasian type of *Bothriochloa ischaemum*, but is hexaploid rather than tetraploid. Apomictic. Considerably more robust than other accessions of this type. Resembles El Kan in general ecological behavior and gross appearance but larger, coarser, more robust, and bluish. Weedy. Produces seed abundantly and continuously through growing season and should volunteer readily. Winter hardy in Oklahoma. Resistant to leaf rust. Slow starter.

Released.—No.

Breeder Seed.—Oklahoma Agricultural Experiment Station.

P-15626

Increased at Plant Materials Center, SCS, Tucson, Ariz.—C. G. Marshall and L. P. Hamilton.

Source.—Origin cannot be established. Seed obtained from Texas as little bluestem. Looked promising in some Arizona plantings. Collected and sent to Tucson by F. Lavin. Distributed for testing as A-14207.

Description.—Similar to A-1407, appears higher producing in both forage and seed. Very cold hardy and a good reseeder. Adapted on wide range of soil textures and grows well in Arizona where precipitation exceeds 12 inches annually. Growth more erect than King Ranch.

Released.—No. Distributed for field testing.

Breeder Seed.—Plant Materials Center, SCS, Tucson.

Plains

Selected at Oklahoma Agricultural Experiment Station, Stillwater, ARS cooperating—J. R. Harlan and C. M. Taliaferro.

Source.—Introduction from Pakistan, Iran, Iraq, India, Turkey, and Afghanistan.

Method of Breeding.—Selections made in 1962 were composited in experimental variety OWB-M.

Description.—Erect, tufted perennial with narrow, mostly basal leaves; foliage color light green to bluish green; inflorescence consists of several unbranched racemes; and culm nodes glabrous to minutely pubescent. In Oklahoma tests, higher yielding and more resistant to foliar disease

organisms than King Ranch; somewhat less productive than Caucasian bluestem but superior in animal acceptance.

Released.—1970, cooperatively by Oklahoma Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Oklahoma Agricultural Experiment Station.

Certified Seed.—Limited quantities in 1972.

Andropogon nodosus (Willem.) Nash (*Dichanthium caricosum* A. Camus, *D. caricosum* complex)

Warm-season, semidecumbent bunchgrass from India. Used for pasture and hay in humid parts of the gulf coast plains of Texas.

Angleton

Increased at Substation 3, Angleton, Tex.

Source.—Received at Substation 3, Angleton, as S.P.I. 34934 in 1915. Plants provided by C. V. Piper, who obtained accession from W. Burns of Poona Agricultural College, Poona, India. Identified as *Andropogon annulatus*.

Method of Breeding.—Direct increase of original introduction.

Description.—Palatable grass. Fine stems; many slender, easily cured leaves; decumbent stems produce roots at nodes that are in contact with soil. High water requirement, some drought tolerance, and fair salt tolerance. Well adapted to coastal parts of Texas that receive at least 30 inches of annual rainfall.

Released.—Informally by Substation 3, Angleton, in 1924.

Breeder Seed.—Not available.

Certified Seed.—Not available (Limited commercial production.)

Gordo

Selected at SCS Nursery, San Antonio, Tex.—D. H. Foster.

Source.—Introduced from Union of South Africa as P.I. 190302, BN-6851. Received April 1951 as *Andropogon* sp.

Method of Breeding.—Selected after comparison with several similar accessions from Africa. Increased for testing as T-20062.

Description.—Unlike other forms of *A. nodosus* known in Texas. Seedlings prostrate until seed stems produced in fall; then plants grow erect. Seedlings vigorous, establish readily. Plants leafy, dark green; stems often 6 feet at seed maturity. Established stands commence growth late in

spring, but grow rapidly during summer and fall. Good seed producer. Forage relished by cattle. Adapted in Texas for pasture planting in heavy soils of coastal prairie, Rio Grande plain, and southern part of blackland prairie.

Released.—Informally by SCS in 1957.

Breeder Seed.—Plant Materials Center, SCS, San Antonio.

Certified Seed.—Not available. (Ample commercial supplies.)

Medio

Increased at SCS Nursery, San Antonio, Tex.—J. E. Smith, Jr.

Source.—Medio Creek, Bee County, Tex., near State Highway 202 bridge. Lines lower benches of Medio Creek from near Berclair to Copano Bay and evidently been in place for many years. All other except woody vegetation excluded by grass where it is established. Apparently first noticed by Dick Sentor, SCS, about 1940. Failed to reproduce it. In February 1951 S. E. Wolff, SCS Nursery, San Antonio, with Roy Boethel and Alfred Taylor, Beeville SCS Work Unit, collected five sod clumps, which were taken to San Antonio by Wolff, divided, set out in 2-rod rows, and given accession number T-20011. Country of origin unknown.

Method of Breeding.—Increase of bulk material from natural stand on Medio Creek.

Description.—Leafy, dark green, fine stemmed. Perennial form of *Andropogon nodosus*. Reproduces well by self-seeding; spreads rapidly by means of prostrate stems to form dense turf, with upright stems about 30 inches tall at seed maturity. Tolerant to alkaline soils and low rainfall. Good seed producer. Grows best in clay soils or sandy soils with shallow clay layer. Capable of very high forage production; both green and cured forage taken by cattle in preference to most native and other introduced grasses. Area of best adaptation for pasture and waterway is Rio Grande

plain, blackland prairie south and east of Austin, Tex., and coastal prairie.

Released.—Informally by SCS in 1954.

Breeder Seed.—Plant Materials Center, SCS, San Antonio.

Certified Seed.—Not available. (In commercial production.)

Andropogon scoparius Michx., little bluestem

Important warm-season bunchgrass. Widely distributed throughout Eastern and Central United States. Valuable range grass in Flint Hills of east-central Kansas and Oklahoma. More drought resistant and found in more westerly and drier parts of Great Plains than big bluestem.

Aldous

Selected at Kansas Agricultural Experiment Station, Manhattan—A. E. Aldous.

Source.—Accessions collected in 1935 from Flint Hills native grasslands south of Manhattan.

Method of Breeding.—Composite of progeny of these accessions made after several generations of selection. Distributed for testing as KG-1580.

Description.—Tall, leafy, vigorous, medium late in maturity, and more uniform than field-run accessions. Produces abundant forage and, under favorable conditions, good seed yield. Possesses some resistance to rust.

Released.—1966, cooperatively by Kansas Agricultural Experiment Station; Plant Science Research Division, ARS; and Plant Sciences Division, SCS.

Breeder Seed.—Kansas Agricultural Experiment Station.

Certified Seed.—Available.

Blaze (Reg. No. 3)

Selected at Nebraska Agricultural Experiment Station, Lincoln, ARS cooperating—L. C. Newell.

Source.—Domestic collections in 1953 from natural prairies in Nebraska and Kansas.

Method of Breeding.—Fifteen clones, selected for late maturity, leafiness, and seed production in space-planted nurseries polycrossed in isolation. Progenies selected for seedling vigor and a green-leaf character. Second generation of synthesis provided breeder seed.

Description.—Leafy, midtall, and late maturing in central latitudes; foliage bright to dull green, turning red in fall. In limited comparisons, produced better stands and was more productive than other selections and native ecotypes. Recommended for conservation plantings and permanent pasture mixtures of warm-season prairie grasses in central and eastern Nebraska and adjacent areas in bordering States. The area of reliable seed production is centered in southeast Nebraska.

Released.—1967, cooperatively by Nebraska

Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Nebraska Agricultural Experiment Station.

Certified Seed.—Available.

Pastura

Selected at Plant Materials Center, SCS, Los Lunas, N. Mex., and New Mexico Agricultural Experiment Station, University Park, cooperating—J. A. Downs, G. C. Niner, and J. E. Anderson.

Source.—Collections made in 1956 and 1957 near Rowe and Pecos, N. Mex., at elevation of 6,500–6,900 feet and average annual precipitation of 14 inches.

Method of Breeding.—Increase of original collection. Field tested as PM-NM-272.

Description.—True green, fairly uniform growth, excellent seedling vigor, and resistance to climatic adversities. Herbage production only average, but seed production high, with processing less of problem than with many strains because of less villous inflorescence. Widely scattered field tests show strain is well adapted for sites where species is recommended in central and eastern New Mexico and in eastern Colorado.

Released.—1963, cooperatively by New Mexico Agricultural Experiment Station and Plant Materials Center, SCS, Los Lunas.

Breeder Seed.—Plant Materials Center, SCS, Los Lunas.

Certified Seed.—Not available. (Limited commercial production.)

PM-K-152

Increased at Plant Materials Center, SCS, Manhattan, Kans.—R.D. Lippert.

Source.—Collected from many sites in southwest Kansas and Panhandle of Oklahoma by SCS personnel in 1959 at approximate elevation of 2,500 to 3,500 feet and precipitation of 15 to 20 inches.

Method of Breeding.—Collections bulked to establish increase field. Natural selection under combine harvesting for more uniform maturity.

Description.—Variable leafiness and forage and seed yields. More uniform in maturity than original source. Currently (1971) being evaluated in western Kansas, west of the adaptation of the 'Aldous' strain. Matures late in the season in west-central Nebraska.

Released.—Not formally. Increased for field testing in west-central Nebraska, western Kansas, western Oklahoma, and High Plains of Texas.

Breeder Seed.—Plant Materials Center, SCS, Manhattan.

***Arrhenatherum elatius* (L.) Presl, tall oatgrass**

Cool-season bunchgrass from Europe. Used for pasture, hay, and in forage mixtures in North-eastern and North-Central States and in parts of intermountain region and Pacific Northwest. Some tolerance to shade, rapid seedling development, short lived. Under irrigation, life cycle similar to that of red clover. Seed shatters at maturity.

1930 in attempt to develop strain for nonshattering seed characteristics.

Description.—Leafier, finer stemmed, and about 10 days later in heading than common tall oatgrass; not quite so tall. Forage yields equal under comparable growing conditions; seed yields considerably higher because of resistance to shattering. Highly resistant to head smut, which readily attacks commercial type.

Tualatin (Reg. No. 3)

Selected at Oregon Agricultural Experiment Station, Corvallis, ARS cooperating—H. A. Schoth.

Released.—1940, cooperatively by Oregon Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Oregon Agricultural Experiment Station.

Method of Breeding.—First selections made in

Certified Seed.—Available in quantity.

***Axonopus affinis* Chase, carpetgrass**

Warm-season, sod-forming grass indigenous to Central America and West Indies. Widely distributed in old permanent pastures in Southeastern United States. Used for lawns in Florida and

lowlands of Coastal Plain. Lacks drought resistance; makes best growth on lowland soils. Not highly nutritious, but quality and yield improved by fertilizer applications. Varieties not available.

***Bouteloua curtipendula* (Michx.) Torr., sideoats grama**

Major warm-season, slightly spreading, native bunchgrass. Distributed over much of Eastern and Central United States; important rangegrass in central and southern Great Plains from central Nebraska to southern Texas. Grows in association with bluestems; less drought resistant than blue grama.

In eastern Nebraska produces excellent seed crop, maturing in mid-August; matures seed before frost in western Nebraska. In Nebraska recommended for upland plantings in northcentral and western districts.

Butte (Reg. No. 2)

Selected at Nebraska Agricultural Experiment Station, Lincoln, ARS and SCS cooperating—E. C. Conard and L. C. Newell.

Source.—Native collections from Holt and Platte Counties, Nebr.

Method of Breeding.—Repeated field plantings revealed superiority of seedling vigor and establishment by native collections from Holt and Platte Counties as compared with other sources. Collections eventually combined and increased for further testing as Nebraska 37. Seed distributed for testing in 1948.

Released.—1958, cooperatively by Nebraska Agricultural Experiment Station; Plant Science Research Division, ARS; and Plant Sciences Division, SCS. Increased on limited generation basis; foundation, registered and certified, with no recertification of certified class.

Breeder Seed.—Nebraska Agricultural Experiment Station.

Certified Seed.—Available.

Coronado (Reg. No. 1)

Selected at U.S. Southern Great Plains Field Station, ARS, Woodward, Okla., in cooperation with Oklahoma Agricultural Experiment Station, Stillwater—J. R. Harlan.

Source.—Field collection made by J. R. Harlan in 1946. Collected in small, dry wash 1½ miles west of "Encinoso," N. Mex.

Description.—Winter hardy, long lived, relatively early maturing. Makes best growth response under long days; best adapted to areas with relatively short growing seasons. Has large caryopses; exhibits excellent seedling vigor for estab-

Method of Breeding.—Increased at Woodward. Some plants died during first two winters, but no evidence since of winter injury; presumed non-

hardy types have been eliminated. Seed distributed for testing under name "Encinoso."

Description.—Apomictic, rather robust, productive of both forage and seed, extremely uniform. Spikes tend to be straw colored at maturity; tips of inflorescences characteristically turn white as spikes ripen. Seed large; seed set under favorable conditions good; seedling vigor excellent. Two crops of seed per year may be expected, as in most apomictic varieties.

Released.—1955, cooperatively by Oklahoma Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Oklahoma Agricultural Experiment Station.

Certified Seed.—Not available.

El Reno

Increased at Plant Materials Center, SCS, Manhattan, Kans.—D. R. Cornelius.

Source.—Field seed collection from native range near El Reno, Okla., in 1934.

Method of Breeding.—Bulk material compared with many other collections at Manhattan. Increased for testing as KG-482.

Description.—Outstanding in leafiness, forage production, and vigor. Ranked well in disease resistance, seed production, and winter hardiness. Widely used in range seedings and widely adapted in Kansas, Oklahoma, and Texas.

Released.—1944, cooperatively by Kansas Agricultural Experiment Station and Plant Materials Center, SCS, Manhattan.

Breeder Seed.—Plant Materials Center, SCS, Manhattan.

Certified Seed.—Available.

Pierre

Increased at Plant Materials Center, SCS, Bismarck, N. Dak.—J. McDermand.

Source.—Composite of seed collected 5 miles west of Pierre, Stanley County, S. Dak., by SCS in 1954 from several plants with outstanding vigor and leafiness growing in native range on south slope of shale range site with average annual precipitation of approximately 16 inches.

Method of Breeding.—Compared with other field collections and selected for increase. Tested as PM-SD-251.

Description.—Outstanding in vigor, leafiness, and freedom from disease. Compares well with other accessions in forage and seed production. Seed-increase field with supplemental irrigation has a 3-year average of 170 pounds of pure live seed per acre. Showed promise in range seedings in western half of South Dakota and in adjoining areas of bordering States.

Released.—Yes. Plant Materials Center, SCS, Bismarck.

Breeder Seed.—Plant Materials Center, SCS, Bismarck.

Certified Seed.—Available in limited quantities.

Premier

Selected at Texas Agricultural Experiment Station, College Station, ARS and SCS cooperating—Judd Morrow and W. G. McCully.

Source.—Seed collected from single plant growing between Cuauhtemoc and Chihuahua, Mexico, in 1953.

Method of Breeding.—Increased at Big Spring Field Station, Big Spring, Tex., and evaluated at several research centers in State in comparison with many other collections. Increased for testing as G-433.

Description.—Upright, leafy type. Good seed yield. Individual spikes retained on plant make combine seed harvest practical. Germinates readily and seedlings develop rapidly after emergence. No major insect or disease problems noted. Considerable drought tolerance. Forage production equal to or slightly greater than that of other recognized varieties. Recommended for west-central Texas.

Released.—1960, cooperatively by Texas Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Texas Agricultural Experiment Station.

Certified Seed.—Not available.

Trailway (Reg. No. 3)

Selected at Nebraska Agricultural Experiment Station, Lincoln, ARS and SCS cooperating—L. C. Newell and E. C. Conard.

Source.—Hybrid population of sideoats grama found growing along abandoned roadway in northern Holt County, Nebr., by L. C. Newell in 1935.

Method of Breeding.—Spaced plants of collection grown at Nebraska Agricultural Experiment Station. Selection made in hybrid population for late maturity and freedom from rust. Selection carried through three generations, resulting in harvest and increase of seed from several groupings of selected clones. Seed from these groups combined for increase and testing as Nebraska 52.

Description.—Winter hardy, long lived, late maturing, comparable in growth type to more southerly varieties as to origin. Somewhat indeterminate as to heading and flowering responses, exhibiting considerable variability in maturity. Requires most of growing season to mature seed in eastern Nebraska; may fail to produce seed crops in regions with shorter seasons. In Nebraska

recommended for upland plantings in eastern and southern districts.

Released.—1958, cooperatively by Nebraska Agricultural Experiment Station; Plant Science Research Division, ARS; and Plant Sciences Division, SCS. Increased on limited generation basis; foundation, registered and certified, with no recertification of certified class.

Breeder Seed.—Nebraska Agricultural Experiment Station.

Certified Seed.—Available.

Tucson

Selected at U.S. Southern Great Plains Field Station, ARS, Woodward, Okla., in cooperation with Oklahoma Agricultural Experiment Station, Stillwater.

Source.—Field collection made near Douglas, Ariz., by SCS. Reached Woodward from Lincoln, Nebr., in 1937.

Method of Breeding.—Considerable mortality and much winter injury observed in population for first several years. Selection of surviving types resulted in material adequately hardy for most of Oklahoma.

Description.—Consists of group of apomictic clones that resemble each other very closely. Outstanding in ability to grow under hot, dry conditions; remains green when most sexual types dry up. Two seed crops harvested each year, but inferior to Coronado in seed set, seed size, and seedling vigor. Became obsolete in Oklahoma with release of Coronado, but used elsewhere in Southwest.

Released.—Cooperatively by Plant Science Research Division, ARS, and Oklahoma Agricultural Experiment Station.

Breeder Seed.—Oklahoma Agricultural Experiment Station.

Certified Seed.—Not available.

Uvalde

Increased at southwestern Plant Materials Centers, SCS—G. Mott.

Source.—Original seed collected from native stand along railroad right-of-way about 1½ miles west of Knippa, Tex. Seed first planted at Stillwater, Okla., and later put in production at SCS Nursery, Tucson, Ariz. Quantity of seed sent from Tucson to San Antonio, Tex., in 1952, and commercial production started. Named Uvalde for county of origin. Increased for testing as T-20285 (Tex.) and A-2969 (Ariz.).

Description.—Dark green, erect, very leafy. Heavy seed producer; superior to common forms of species in resistance to shattering at seed maturity. Represents first southern Texas variety to be produced commercially. Area of best adaptation probably within 100 to 150 miles of Uvalde, though plantings thriving as far away as Midland

and Spur, Tex. Proved less desirable than local sources in Arizona and New Mexico because of winter-stand loss at higher elevations there.

Released.—1950, cooperatively by Arizona Agricultural Experiment Station, Tucson, and Plant Sciences Division, SCS.

Breeder Seed.—Plant Materials Center, SCS, Tucson.

Certified Seed.—Not available. (In commercial production.)

Vaughn

Selected at former SCS Nursery, Albuquerque, N. Mex.

Source.—Collected from native stands near Vaughn, N. Mex., in 1935.

Method of Breeding.—Bulk increase of native collection. Distributed for testing as A-3603.

Description.—Population slightly variable, but all have erect leaf type. Good seedling vigor, easily established. More drought tolerant than El Reno, Uvalde, or Tucson for use in eastern Colorado and New Mexico.

Released.—1940, cooperatively by New Mexico Agricultural Experiment Station, University Park, and Plant Sciences Division, SCS.

Breeder Seed.—Plant Materials Center, SCS, Los Lunas.

Certified Seed.—Available.

Woodward Strains

Selected at U.S. Southern Great Plains Field Station, ARS, Woodward, Okla., in cooperation with Oklahoma Agricultural Experiment Station, Stillwater. Represent sources and experimental strains that have been distributed for testing purposes.

Block E

Sexual type from sources primarily south of Woodward. Based on 24 plants after several best-plant recurrent-selection cycles. Superior to El Reno in forage production and drought tolerance. Now (1971) undergoing extensive adaptation evaluation. Seed produced in limited amounts at Woodward, Okla.

Hope

Apomictic. Collected 15 miles northwest of Hope, N. Mex., by J. R. Harlan in 1946. Medium height, fine stemmed, leafy, very uniform. In several tests has been highest yielding variety, but seeds small and subject to shattering. Seedling vigor less than that of Coronado.

Temple

Fifty plants selected after four cycles of mass selection from material originating near Temple, Tex. Leafy, robust, sexual type.

W1

Fifty selected plants from line advanced three generations by selection and isolation. Original source composite of many sources. Vigorous, leafy, forage type. Good seed producer. Light-colored inflorescences predominating. Fairly uniform as to type.

W2

Fifty plants selected from three lines (74-6545, 74-6546, 74-6547), each of which had been ad-

vanced three generations by selection and isolation and here combined. Leafy, robust types. Somewhat less uniform as to type and more pigmented than W1.

W3

Fifty plants selected from four lines, each of which had been advanced two generations by selection and isolation. Original sources composited. Plants exceptionally tall and leaves coming well up stem.

Bouteloua eriopoda (Torr.) Torr., black grama

Major warm-season, native grass of arid and semiarid desert grasslands in Arizona, New Mexico, and Texas. Culms in contact with soil, with root of nodes under favorable conditions to form new plants. Excellent palatability and feeding value both summer and winter. High drought resistance.

NM-44

Increased at Plant Materials Center, SCS, Los Lunas, N. Mex., and New Mexico Agricultural Experiment Station, University Park, cooperating—G. C. Niner and J. E. Anderson.

Source.—Collected in 1957 along U.S. 85, about 45 miles south of Socorro, N. Mex., at elevation of 4,400 feet and with precipitation about 10 to 11 inches.

Method of Breeding.—Increase of original collection.

Description.—Considerable variation in individual spaced plants, but population as whole exhibits desirable characteristics intermediate between upright, fine-stemmed, confined types and decumbent, coarse, sprawling types. High yields of pure live seed.

Released.—No.

Breeder Seed.—Plant Materials Center, SCS, Los Lunas.

Sonora (Reg. No. 4)

Selected at Arizona Agricultural Experiment Station, Tucson, ARS and SCS cooperating—L. N. Wright.

Source.—Eleven vegetative and forty-seven seed accessions collected in Arizona and New Mexico.

Method of Breeding.—Source nursery of 2,067 spaced plants established and observed in 1959. Plants placed in nine types relative to seed production and forage characteristics. Seventy-nine selected plants vegetatively increased and reevaluated. Two crossing blocks established, A-4567-1 with 12 selections and A-56-1 with 7 selections. Polycross progenies of each selection evaluated for seed set and forage production. Based on progeny performance, 12 selections vegetatively established in crossing block. Tested as A-4567-2.

Description.—Sexual, $2n=20$, and diploid. Outstanding in leafiness, vigor, forage production, vegetative spread, seed set, and seed production. High seed set, germination percentage, and seed weight when growth initiated August 1, with 100 pounds per acre of nitrogen fertilizer applied.

Released.—1965, cooperatively by Arizona Agricultural Experiment Station, Plant Science Research Division, ARS; and Plant Materials Center, SCS, Tucson.

Breeder Seed.—Arizona Agricultural Experiment Station.

Certified Seed.—Available in limited quantities.

Bouteloua gracilis (H.B.K.) Lag. ex Steud., blue grama

Major warm-season, native grass throughout Great Plains. Used for grazing and erosion control. Characterized by creeping growth habit, forms dense sod, and produces high-quality forage. Hardy and drought resistant. Found on various soil types; well adapted on heavy, rolling upland soils.

Lovington

Increased at Plant Materials Center, SCS, Los Lunas, N. Mex., and New Mexico Agricultural Experiment Station, University Park, cooperating—J. A. Downs, G. C. Niner, and J. E. Anderson.

Source.—Field harvested in 1944 near Lovington.

ton, N. Mex., at elevation of 4,000 feet and with precipitation about 14 inches.

Method of Breeding.—Bulk increase of source material. Tested as A-12424.

Description.—Uniform, good leafiness, excellent seedling vigor, and fast establishment. Used as standard in evaluating other accessions of blue grama at Los Lunas, N. Mex. Seed production under irrigation and with insect control exceeds 200 pounds of pure live seed per acre. Extensive field testing showed it adapted over wide geographic area in Southwest.

Released.—1963, cooperatively by New Mexico Agricultural Experiment Station, University Park, and Plant Materials Center, SCS, Los Lunas.

Breeder Seed.—Plant Materials Center, SCS, Los Lunas.

Certified Seed.—Available in limited quantities.

NM-118

Increased at Plant Materials Center, SCS, Los Lunas, N. Mex., and New Mexico Agricultural Experiment Station, University Park, cooperating—G. C. Niner and J. E. Anderson.

Source.—Collected in 1957, 32 miles south of Hachita, N. Mex., at elevation of 4,400 feet and with precipitation about 10 inches annually.

Method of Breeding.—Increase of original collection.

Description.—At site of collection, plants vigorous and robust—culms 3 feet tall and leaves 6 to 8 inches long. Under irrigation, outstanding performance in rod-row comparison block—highest in seed and herbage production; culms 36 inches tall, leaves 18 to 20 inches long. Spikes considerably longer than average. Most drought tolerant of blue grama accessions tested.

Released.—No.

Breeder Seed.—Plant Materials Center, Los Lunas.

Woodward Strains

Selected at U.S. Southern Great Plains Field Station, ARS, Woodward, Okla., in cooperation with Oklahoma Agricultural Experiment Station, Stillwater.

Blue grama types extensively distributed in small-packet lots. No large-scale increases obtained because of difficulty of producing seed. Capitan and Synthetic 40 being produced on small scale at El Reno, Okla. Most other varieties now obsolete.

Capitan

Collection 174 from property of Don Gregorio Herrera, 3 miles north of Capitan, N. Mex., to which selected plants added from collections 173, 175, and 176, all within 15 miles of collection 174. Extremely leafy, vigorous, pure green. Late

flowering at Woodward; vegetatively most promising variant so far found. Original type apparently closely confined to one small watershed north of Capitan. Looked outstanding at Central Plains Experimental Range in Colorado and under irrigation at El Reno.

Caprock

Collections 92 and 113 within 10 miles of Caprock, N. Mex., plus collection 135 near Kenna, N. Mex. Vigorous strain from edge of Mescalero ridge; somewhat finer than more southern sources.

Davis

Selected plants from Davis Mountain collections 28 to 41, except collection 34. Low growing, very leafy, late flowering, blue, typical of most Davis Mountain types. Vigorous southern type of considerable promise.

Dunlap

Collections 120 and 121 near Dunlap, N. Mex., representing high rocky plains west of upper Pecos River. Outstanding forage type.

Hueco

Collection 55, 15 miles east of Hueco station, Tex., on lower slopes of Hueco Hills, plus collection 57, 14 miles east of Salt Flats, Tex., on lower slopes of Guadalupe Mountains. Vigorous, medium leafy, bluish, of some promise. High yielder in small plot tests at Woodward.

Marfa

Collection 34 from southern slopes of Davis Mountains, 2 miles north of Marfa, Tex., plus selected tall, early plants from Davis Mountain collections 28 to 41. Tall, leafy, vigorous, early flowering, representative of southern slopes of Davis Mountains. Looked good under grazing at Woodward.

Pecos

Collection 107, 26 miles northeast of Carlsbad, N. Mex., plus selected plants from collections 106 and 108 within 10 miles of collection 107. Vigorous, southern type; apparently adapted to dry, sandy conditions of mid-Pecos River Valley. Tall, robust, bluish.

Roy

Collection 201 from Red River Canyon west of Roy, N. Mex., plus collection 192 near Santa Rosa, N. Mex. Represents most promising material found in northeastern New Mexico, which area generally provides mediocre material for Woodward conditions. Rather coarse, bluish.

Ruidoso

Collections 143 and 145 selected individuals from collection 144, all in Rio Ruidoso watershed be-

tween Hondo and Ruidoso, N. Mex. Montane type, but quite different from Capitan, which comes from same mountains. Ruidoso rather coarse, bluish, shorter leaved, and taller stemmed than Capitan.

Synthetic 20

One hundred selected plants from sources known to have $2n=20$ chromosomes. These sources mostly from central New Mexico and western Texas. (See A Cytological Study of *Bouteloua gracilis* From Western Texas and Eastern New Mexico by L. A. Snyder and J. R. Harlan in Amer. Jour. Bot. 40:702-707, 1953.)

Synthetic 40

One hundred selected plants from sources known to have $2n=40$ chromosomes. Sources from central New Mexico at fairly high elevations. (See reference above.)

Van Horn

Collection 46 plus selected plants from collection 48, both within 10 miles of Van Horn, Tex. Vigorous, leafy, blue-green southern type. Promises to be good seed producer under good conditions.

W1

Fifty selected early plants from 1946 collection of blue grama. Wide range of vigorous early types; intercrossing to provide variable material for regional selection.

W2

Fifty selected late-flowering plants from 1946 blue grama collection. Wide range of vigorous late types; intercrossing to provide variable material for regional selection.

W3

Combining 25 plants of Betzen strain and 25 plants of Noble strain after advancing each three generations by selection and isolation. Betzen material originated on Betzen farm 8 miles south of Woodward. Noble strain came from Noble County, Okla. Strains similar; vigorous, leafy, and very late in flowering.

W4

Fifty selected F_4 derivatives from crosses of Mexican Springs (New Mexico) \times Fort Supply (Oklahoma) and reciprocal. Fairly uniform material intermediate between two original types. Finer, earlier, and greener than local Fort Supply material. Leafier, less spreading, and with better seeding habits than Mexican Springs.

Bouteloua hirsuta Lag., hairy grama

Warm-season, slightly spreading, native grass. Widely distributed in Western United States and south into Mexico and gulf coast region. Adapted to dry, sandy, and sandy-loam soils; drought re-

sistant. Palatable, good source of winter forage. Generally less productive than blue grama. No varieties available; ecotypes collected for seeding tests.

Bromus arvensis L., field brome

Cool-season bunchgrass introduced from Europe in late 1920's. Used as cover crop and for green manure in parts of northeastern and north-central

regions. Winter-hardy annual. Develops extensive fibrous root system. Varieties not currently available in United States.

Bromus biebersteinii Roem. and Schult., meadow brome

Little known cool-season grass native to southwestern Asia.

Regar

Selected at Plant Materials Center, SCS, Aberdeen, Idaho.

Source.—Accession PI 172390, collected near Zek, Kars Province, Turkey, in 1949, and received from Plant Introduction Station, Ames, Iowa, in 1957,

Method of Breeding.—Fifteen clones selected

from irrigated nursery in 1958. Seed multiplied for testing as P-14941.

Description.—Rapid seed germination and seedling establishment. Leaves numerous, lax, dominantly basal, mildly pubescent, and light green; erect seedstalks extend above leaf mass in an open panicle. Earlier heading than Manchar smooth brome. Some vegetative spreading, good drought tolerance, and excellent winter hardiness. Good regrowth and adapted for use as hay or pasture on irrigated land and on dryland that receives 16 or more inches annual precipitation. Susceptible to covered smut, *Ustilago bullata*.

Released.—1966, cooperatively by the Idaho and Washington Agricultural Experiment Stations and the Aberdeen and Pullman Plant Materials Centers, SCS.

Breeder Seed.—Plant Materials Center, SCS, Aberdeen.

Certified Seed.—Available.

***Bromus carinatus* Hook. and Arn., California brome**

Cool-season, short-lived bunchgrass indigenous to intermountain and Pacific coast regions. Palatable; used for grazing and erosion control. Considered by some botanists to be polymorphic species that includes *Bromus marginatus*.

Cucamonga (Reg. No. 13)

Selected at Plant Materials Centers, SCS, Pleasanton and San Fernando, Calif.—P. B. Dickey, P. E. Lemmon, and D. J. Vanderwal.

Source.—Collection by R. L. Forsyth from native stand near Cucamonga, Calif., in 1939.

Method of Breeding.—Mass phenotypic selection from small plot seeded at Pleasanton in 1941. Given accession number P-11117 and tested in comparison with other annual grasses.

Description.—Self-perpetuating winter annual; pale green, very rapid developing, early maturing, with long flexuous panicles. Sheaths and leaves sparsely pilose to nearly glabrous; awns long, requiring processing of seed before it can be drilled. Best suited as self-seeding cover crop and as quick cover on droughty, low fertility sites. Limited value for forage because of its short green-feed period. Susceptible to head smut.

Released.—1949, cooperatively by California Agricultural Experiment Station, Davis, and Plant Materials Center, SCS, Pleasanton.

Breeder Seed.—Plant Materials Center, SCS, Pleasanton.

Certified Seed.—Not available. (Some commercial production.)

***Bromus catharticus* Vahl, rescuegrass**

Cool-season bunchgrass from South America. Used primarily for winter pasture in Southern States. Palatable. Subject to head smut. Annual growth habit, but reseeds under favorable conditions; some plants biennial or short-lived perennials.

Chapel Hill

Increased at SCS Nursery, Chapel Hill, N.C.—F. J. LeClair, Paul Tabor, and L. R. Roof.

Source.—From commercial seed, Wyatt Seed Co., Raleigh, N.C.; originally from Nicholson Seed Co., Dallas, Tex.

Method of Breeding.—Natural selection for longevity and resistance to smut and mildew.

Description.—Vigorous strain, with strong tendency to be perennial at northern border of Cotton Belt. Considerable resistance to smut and mildew in States east of Alabama and Tennessee.

Released.—Not formally. Distributed from SCS Nursery, Chapel Hill, in fall of 1947.

Breeder Seed.—Not available.

Certified Seed.—Not available. (Seed in commercial trade channels often mixed. For pure seed, request names of growers from SCS.)

Method of Breeding.—Individual plants increased vegetatively and used to establish space-planted nursery. Clones screened in greenhouse for resistance to mildew. Seed harvested from nursery used to increase strain. Resistant to head smut in artificial inoculation tests.

Description.—Experimental strain characterized by resistance to mildew and smut. More uniform than common rescuegrass, having somewhat larger stems, wider and longer leaves, and longer, heavier panicles. Behaved as short-lived perennial under favorable conditions at Experiment.

Released.—1963, by Georgia Agricultural Experiment Station.

Breeder Seed.—Discontinued.

Certified Seed.—Not available.

Lamont (Reg. No. 7)

Selected at Delta Branch Experiment Station, Stoneville, Miss., ARS cooperating—H. W. Johnson.

Source.—La Estanzuela 157/49. Seed of this strain obtained by O. S. Aamodt from Uruguay and introduced as P.I. 193144 in 1950.

Method of Breeding.—Mass selection. Seed harvested in May 1953 from 2-year-old plants in plot seeded at Stoneville in 1951.

Description.—Appears to consist largely of biennials or short-lived perennials. Consequently, provides longer grazing season during second and subsequent years of stand than during year of establishment or when grown as winter annual

Gasel

Selected at Georgia Agricultural Experiment Station, Experiment—J. M. Elrod.

Source.—Plants found growing in old nursery at Experiment in 1950.

Highly resistant to head smut. In tests at Stoneville proved immune to head smut collections from Auburn, Ala., College Station, Tex., Raymond and Stoneville, Miss., and Watkinsville, Ga. Proved moderately susceptible to Baton Rouge, La., collection, which appears to represent different race of head smut fungus.

Released.—1957, cooperatively by Mississippi Agricultural Experiment Station, State College, and Plant Science Research Division, ARS.

Breeder Seed.—Mississippi Agricultural Experiment Station, State College.

Certified Seed.—Available in limited quantities.

Nakuru

Increased at Plant Materials Center, SCS, Americus, Ga.

Source.—Introduced from Nakuru, South Africa, as P.I. 195476, and carrying accession Nos. BN-7214 and AM-1359.

Method of Breeding.—Increase of original seed lot.

Description.—Weak perennial, or strong reseeding annual; somewhat more robust and possessing slightly larger leaves, stems, and seed than common types. Good seed producer; characterized by above-average seedling vigor, and resistance to rust. Requires high level of soil fertility.

Released.—No. Distributed for on-farm tests.

Breeder Seed.—Plant Materials Center, SCS, Americus.

Prairie

Selected at Imperial Valley Field Station, El Centro, Calif.—L. G. Goar.

Source.—Introduced from New Zealand by Wayne Fisher.

Bromus inermis Leyss., smooth brome

Major cool-season, sod-forming grass introduced from Hungary in 1884. Used for pasture, hay, silage, and erosion control in humid Northern States to eastern North Dakota, south to eastern Kansas, and extensively in northern part of intermountain region and Pacific Northwest. Grows well on fertile soils. Rated high in palatability and nutritive value. Two distinct types identified: Northern, which is adapted to western Canada and northern Great Plains, and southern, which is adapted to Corn Belt States and central Great Plains.

Achenbach

Source.—Old fields tracing to original planting made in 1895 by Achenbach brothers of Washington County, Kans.

Method of Breeding.—Mass selection at El Centro. Increased at Plant Materials Center, SCS, Pleasanton, Calif., for field-scale testing.

Description.—Rapid-developing, high-producing, short-lived, perennial bunchgrass. High fertility-level requirement. Very palatable to livestock. Tests showed it produced as much first-year feed in irrigated pasture mixtures as annual and perennial ryegrass and was less competitive to longer lived, slower developing perennial grasses in mixture. Under normal grazing practice disappears from mixture by end of second year.

Released.—1946, cooperatively by California Agricultural Experiment Station, Davis, and Plant Materials Center, SCS, Pleasanton.

Breeder Seed.—Discontinued.

Certified Seed.—Not available.

Texas 46

Selected at Texas Agricultural Experiment Station, College Station—G. C. Warner, R. L. Hensel, and R. C. Potts.

Source.—Plant introduction from Australia; P.I. number unknown.

Method of Breeding.—Individual plants selected from Australian introduction and increased for testing.

Description.—Good seedling vigor, mildew resistance, early growth, good yield of forage and seed.

Released.—1946, by Texas Agricultural Experiment Station.

Breeder Seed.—Discontinued.

Certified Seed.—Not available. (No commercial sources.)

Method of Breeding.—Some mass selection in early generations by Achenbach brothers.

Description.—Typical southern type of smooth brome. Leafy, vigorous, spreads rapidly by rhizomes to form dense, competitive sod. Heavy producer of both seed and forage. Far less susceptible to leaf diseases than northern types with which it has been compared in Kansas. Most smooth brome grown in Kansas is of this strain.

Released.—Named Achenbach in 1944 by Kansas Agricultural Experiment Station, Manhattan; old fields that could be traced to Achenbach brothers' plantings then declared eligible for certification. Have been source of all fields now grown for certification in Kansas.

Breeder Seed.—Not available.

Certified Seed.—Available in quantity.

Baylor

Selected at Rudy-Patrick Research Center, Ames, Iowa—R. R. Kalton.

Source.—Parental clones selected from southern varieties.

Method of Breeding.—Elite clones selected on basis of outcross progeny performance for forage and seed yield, recovery, seedling vigor, leafiness, and disease resistance. Seven-clone synthetic evaluated in north-central region and Canada as R.P. 101.

Description.—High-yielding, disease-resistant, southern type; leafy. Good in recovery and stand establishment. Improved production of high-quality seed. Same maturity as Lincoln.

Released.—Distributed for testing by Rudy-Patrick Co. in 1962.

Breeder Seed.—Rudy-Patrick Co.

Certified Seed.—Available.

Blair

Selected at Rudy-Patrick Research Center, Ames, Iowa.—R. R. Kalton.

Source.—Parental clones selected from southern varieties or origins.

Method of Breeding.—Selections evaluated in clonal and progeny tests for desirable forage and seed characteristics, with emphasis on leaf disease resistance, leafiness, seed quality, and stand-establishment ability. Eight-clone recombination evaluated in north-central region and in Canada as R.P. 100.

Description.—High-yielding, disease-resistant southern type; vigorous, hardy, and leafy. Good stand establishment. Good seed producer, with larger seed than standard southern varieties.

Released.—1964, by Rudy-Patrick Co. Distributed for testing in 1962.

Breeder Seed.—Rudy-Patrick Co.

Certified Seed.—Available.

Carlton

Selected at Canada Department of Agriculture Research Station, Saskatoon, Saskatchewan—R. P. Knowles.

Source.—Northern common smooth brome.

Method of Breeding.—Synthetic of four clones whose polycross progenies excelled in seed yield (S-4088). Enlarged in 1966 to a nine-clone synthetic (S-6324) on basis of polycross progeny tests.

Description.—Typical of northern type. Hay yields 5 to 10 percent and seed yields 20 to 30 percent above northern common.

Released.—1961, by Canada Department of Agriculture.

Breeder Seed.—Canada Department of Agriculture Research Station, Saskatoon.

Certified Seed.—Available in quantity.

Elsberry

Increased at Plant Materials Center, SCS, Elsberry, Mo.

Source.—Believed to be derived from old field located in either northwestern Missouri or south-eastern Iowa.

Description.—Southern early-maturing strain of smooth brome. Best of several accessions tested at SCS Nursery, Elsberry.

Released.—Cooperatively by Missouri Agricultural Experiment Station, Columbia, and Plant Sciences Division, SCS.

Breeder Seed.—Plant Materials Center, SCS, Elsberry.

Certified Seed.—Not available. (Some commercial production.)

Fischer

Increased at SCS Nursery, Ames, Iowa—M. E. Heath.

Source.—Original seed collected in 1939 from old field of smooth brome established in 1917 on E. A. Fischer farm near Shenandoah, Iowa.

Method of Breeding.—Original lot of seed planted at SCS Nursery, Ames, in 1940 for increase and subsequent testing by Iowa Agricultural Experiment Station, Ames, and SCS. Several generations of seed increase by SCS and Iowa Agricultural Experiment Station have followed.

Description.—Performance tests show Fischer to be aggressive, productive, hardy, and well adapted to better soils. In most respects similar to other southern strains—Lincoln and Achenbach.

Released.—1943, cooperatively by Iowa Agricultural Experiment Station and Plant Sciences Division, SCS.

Breeder Seed.—Iowa Agricultural Experiment Station.

Certified Seed.—Available from Canada.

Fox (Reg. No. 14)

Selected at Minnesota Agricultural Experiment Station, St. Paul, Minn.—H. L. Thomas.

Source.—Adapted varieties and long term stands in Minnesota.

Method of Breeding.—Individual clones studied during 1936-45. In 1945, 50 best appearing selections included in polycross nursery. Subsequent selections were progeny-tested in various polycross and synthetic combinations. In 1955, clones B-15, C-6, 2-25, and 8-81 were combined into a synthetic with clone 23-19, which was selected among second-generation selfed progenies of Fisher. Seed has been distributed for regional testing as Minn. Syn I.

Description.—Good seedling vigor, seedling resistance to root rot and leaf spot diseases. A southern type of medium maturity adapted throughout Minnesota.

Released.—1968, by Minnesota Agricultural Experiment Station.

Breeder Seed.—Minnesota Agricultural Experiment Station.

Certified Seed.—Not available (available in limited quantity by 1972).

Homesteader (Reg. No. 3)

Developed at South Dakota Agricultural Experiment Station, Brookings—J. G. Ross, W. W. Worzella, and C. J. Franzke.

Source.—Seed collected from South Dakota farms on which original plantings had been made some time during 1905–15.

Method of Breeding.—Sixteen collections compared in variety tests. Five strains found superior for forage yield, seed production, and palatability. Seed of five superior strains bulked and composite increased for further testing.

Description.—Intermediate in type between northern and southern varieties. Approved for distribution on basis of good forage yield, palatability, and adaptation to South Dakota conditions.

Released.—1951, by South Dakota Agricultural Experiment Station.

Breeder Seed.—Discontinued

Certified Seed.—Not available.

Lancaster (Reg. No. 4)

Selected at Nebraska Agricultural Experiment Station, Lincoln, ARS cooperating—L. C. Newell.

Source.—Clones collected from old fields of smooth brome in Nebraska.

Method of Breeding.—Produced in 1943 by field hybridization of clones from five unrelated sources. Selection of clones based on previous evaluation of their sibbed and open-pollinated progenies, studies beginning with selections from old fields in 1937. Distributed as Nebraska 44 for testing.

Description.—Leading smooth brome variety in forage and seed yields in tests at Lincoln, 1947–52. Showed immediate promise among several experimental synthetic varieties in early comparative tests at Nebraska Agricultural Experiment Station. On fertile soils is leafy, vigorous, with fine stems and somewhat drooping panicles.

Released.—1950, cooperatively by Nebraska Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Nebraska Agricultural Experiment Station.

Certified Seed.—Available.

Lincoln (Reg. No. 5)

Increased at Nebraska Agricultural Experiment Station, Lincoln, ARS cooperating—L. C. Newell and A. L. Frolik.

Source.—Old fields of smooth brome derived from early introductions of smooth brome prior to 1898; attributed to Hungarian origin (California introduction of 1884).

Method of Breeding.—Plot tests of farmer strains of smooth brome conducted in 1939–42; showed comparative superiority of locally grown southern strains as compared with strains of northern origin. Fields that showed superiority and that were traced to common origin first approved in 1941 for seed increase and later certified as Lincoln.

Description.—Cool-season grass; provides abundance of early-spring pasturage and fall regrowth under favorable conditions. Rhizomatous, sod-forming type. Well adapted for conservation purposes in central latitudes as compared with less aggressive northern types. Exhibits good seedling vigor and relative ease of establishment on critical planting sites.

Released.—1942, cooperatively by Nebraska Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Nebraska Agricultural Experiment Station.

Certified Seed.—Available.

Liso

Selected at Plant Materials Center, SCS, Pleasanton, Calif.—H. W. Miller and O. K. Hoglund.

Source.—Received in 1936 from A. E. Aldous, Kansas Agricultural Experiment Station, Manhattan.

Method of Breeding.—Mass selection for three generations.

Description.—Superior or equal in performance to other southern-type varieties. Vigorous under irrigation on high-fertility land. Performance erratic in field plantings. Best results obtained in southern California on variety of soils and variable grazing management. In central and northern California acceptable performance only on best sites and with careful management. Seed yields good and forage quality high.

Released.—No. Distributed for field-scale plantings in California.

Breeder Seed.—Plant Materials Center, SCS, Pleasanton.

Lyon (Reg. No. 6)

Selected at Nebraska Agricultural Experiment Station, Lincoln, ARS cooperating—L. C. Newell.

Source.—Developed from selections made in

farm strains of certified Lincoln smooth brome. Later progenies became outcrossed in selection nursery to broad source of germ plasm of southern type of smooth brome.

Method of Breeding.—Single clones of Lincoln smooth brome selected for seed quality and forage type and isolated; crossed seed composited and tested as B-9. Seed from progenies of these selections later outcrossed to large number of open-pollinated lines of southern type, bulked, and retested as Nebraska 36.

Description.—Maintains broad adaptation of Lincoln smooth brome parental stock combined with superior seed quality, seedling vigor, and more uniformly desirable plant type. Produced larger yields of forage and seed in Nebraska tests than Lincoln. As Nebraska 36, and later as Lyon, has been tested widely since 1947, showing promise over broad range of conditions. Named after Professor T. L. Lyon, who first worked with smooth brome at Nebraska Agricultural Experiment Station in 1897.

Released.—1950, cooperatively by Nebraska Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Nebraska Agricultural Experiment Station.

Certified Seed.—Not available.

Magna

Selected at Canada Department of Agriculture Research Station, Saskatoon, Saskatchewan—R. P. Knowles.

Source.—Parentage is 62 percentage Fischer, 7 percentage from B63 Wisconsin, and rest from unidentifiable outcrossed sources.

Method of Breeding.—Clones were polycross progeny tested for hay and seed yields at three Saskatchewan stations. Fourteen best clones selected for synthetic variety.

Description.—Intermediate in type between northern and southern varieties. Yields in Western Canada are similar to or above those of other southern varieties, but aftermath yields are somewhat lower. Variety is characterized by high seed quality and higher seed yields than southern varieties.

Released.—1968, by Canada Department of Agriculture.

Breeder Seed.—Canada Department of Agriculture Research Station, Saskatoon.

Certified Seed.—Available.

Manchar (Reg. No. 10)

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman, A. G. Law, A. L. Hafenrichter, and D. C. Tingey.

Source.—Original introduction in 1935 from

Kungchuling Experiment Station of South Manchurian Railway, Manchuria, China, as P.I. 109812.

Method of Breeding.—Grown in nurseries at SCS Plant Materials Centers since 1935; subjected to mass selection and tested in uniform nurseries and strain tests since 1937 as P-177.

Description.—Intermediate between weakly spreading northern types and aggressive sod-forming southern types. Maintains good balance with associated legumes; produces vigorous seedling; good yields of seed and forage; recovers rapidly after cutting. Its dark, purple-cast seeds thresh easily; seed generally heavier than that of common smooth brome.

Released.—1943, as P-177, cooperatively by Idaho and Washington Agricultural Experiment Stations at Moscow and Pullman, respectively, and Plant Materials Centers, SCS, Aberdeen, Idaho, and Pullman. Named "Manchar" in 1946.

Breeder Seed.—Plant Materials Center, SCS, Pullman.

Certified Seed.—Available in quantity.

Mandan 404

Selected at U.S. Northern Great Plains Research Center, ARS, Mandan, N. Dak.—G. A. Rogler.

Source.—From local field collection of northern material.

Method of Breeding.—Developed by selection within single-plant progeny after two generations of single-plant selection under open pollination. Both inbred and open-pollination progeny tests made of each of eight clones going into variety.

Description.—Short, fine, very high in quality, light green. Not aggressive and not high yielder, but higher in protein at Mandan at all stages of growth than Lincoln. Tests at Mandan show Mandan 404 to be higher in palatability than Lincoln.

Released.—No. Included in regional testing program.

Breeder Seed.—U.S. Northern Great Plains Research Center.

Martin

Selected at Minnesota Agricultural Experiment Station, St. Paul.

Source.—Seed obtained from old fields of smooth brome in Martin County, Minn.

Method of Breeding.—Eighty-eight plants selected from space-planted nursery, which had been studied over 2-year period. Selections cloned; on basis of yield, leafiness, and freedom from leaf spot, 21 clones allowed to reproduce by natural cross-pollination.

Description.—Somewhat intermediate in growth between southern and northern strains. Generally

classed as northern strain. Produced higher forage yields than Canadian common smooth brome in Minnesota.

Released.—Minnesota Agricultural Experiment Station.

Breeder Seed.—Not available.

Certified Seed.—Not available. (Was recommended and certified in Minnesota for several years, but has been discontinued.)

Minnesota Synthetics

Selected at Minnesota Agricultural Experiment Station, St. Paul, Minn.—H. L. Thomas.

Source.—Fischer, Lincoln, Parkland, foreign introductions, and naturalized stands in Minnesota.

Method of Breeding.—Polycross progenies studied for yield, vigor, resistance to leafspot, and maturity.

Syn H is a progeny-tested nine-clone synthetic consisting of C-3, D-110, D-114, 11-35, 11-62, 20-11, 20-28, 28-6, 28-13.

Syn J developed from 11 progeny-tested clones R25, R26, R44, R51, R52, R54, R63, R64, R65, R72, R75.

Syn K is an increase of a cross between the self-incompatible clones R25 and R37.

Description.—Growth characteristics similar to those of southern adapted varieties. In Minnesota forage yields of Syn H, Syn J, and Syn K are similar to that of Fox.

Released.—No. Included in testing programs.

Parkland

Selected at Canada Department of Agriculture Research Station, Saskatoon, Saskatchewan.

Source.—Increased progeny of third-generation inbred line descending from single plant selected in 1923 along roadway near Saskatoon.

Description.—Rhizomes present, but spread restricted to about 60 percent of that of Canadian common smooth brome. Considerably more sterile culms and lower seed yields (40-50 percent) than Canadian common smooth brome.

Released.—Canada Department of Agriculture.

Breeder Seed.—No longer available in original form. Type maintained in experimental synthetics S-5054, S-5563, and S-6400 at Canada Agriculture Research Station, Saskatoon.

Certified Seed.—Not available.

Polar

Selected at the Alaska Agricultural Experiment Station, Palmer, ARS cooperating—H. J. Hodg-

son, A. C. Wilton, R. L. Taylor, and L. J. Klebesadel.

Source.—Selections that trace back to hybrids between arctic brome (*Bromus pumpehianus*) and smooth brome (*B. inermis*) and smooth brome sources—Manchar, Mandan 404, Colorado 144, *B. inermis* 12, and Canadian commercial.

Method of Breeding.—Clonal selections made on basis of yield and winter hardiness of polycross progeny. The variety is a 16-clone synthetic (11 clones tracing to *B. pumpehianus* × *B. inermis* hybrids and five clones to the smooth brome varieties identified under Source).

Description.—Consistently superior to other northern types of smooth brome in both winter hardiness and yield. Other desirable attributes include superior lodging resistance, early-spring growth, early seed maturity, and a less aggressive spreading habit of growth. Variety characterized by very hairy nodes on about 10 percent of the plants and slight nodal hairiness on 60 percent of the plants. Seed of about 75 percent of the plants either slightly or very hairy. Only brome variety to survive the severe winter of 1961-62 in the Matanuska Valley without serious damage.

Released.—1965, cooperatively by the Alaska Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Alaska Agricultural Experiment Station.

Certified Seed.—Available.

Redpatch

Selected at Central Experimental Farm, Ottawa, Ontario, Canada—W. R. Childers.

Source.—Clones selected from seven standard varieties; seven clonal lines received from R. C. Murphy, Cornell University, Ithaca, N.Y.; seven experimental strains developed by R. P. Knowles, Saskatoon, Saskatchewan, Canada.

Method of Breeding.—Selections made over 4-year period from space-planted nursery; 142 open-pollinated lines evaluated in replicated test; 2-year average yields used to select highest yielding 21 clones; clones established in isolated polycross block and progeny tested. Synthetic 1 seed distributed for yield tests under designation "Ottawa Synthetic C."

Description.—Heads 3 to 4 days earlier than Saratoga, but otherwise similar in general characteristics. Selected for leafiness, aftermath recovery, and disease resistance. At some locations aftermath recovery is greater and at others less than Saratoga. Southern-type smooth brome; produced good yields in eastern Canada.

Released.—1963, Canada Department of Agriculture.

Breeder Seed.—Genetics and Plant Breeding Research Institute, Central Experimental Farm, Ottawa.

Certified Seed.—Available in limited quantity in 1964.

Sac (Reg. No. 12)

Selected at Wisconsin Agricultural Experiment Station, Madison, ARS cooperating—E. L. Nielsen, D. C. Smith, and P. N. Drolsom.

Method of Breeding.—First-cycle selections polycrossed were S₁ and S₂ plants from older varieties and strains. Polycross tested as spaced plants and as synthetic. Second-cycle polycross and synthetic based on 81 clones selected for foliage disease reaction, vigor, leafiness, and seed production. Distributed for testing as B-81.

Description.—Growth characteristics similar to those of southern-adapted strains; seed quality similar to that of northern-adapted strains. Good tolerance to foliage diseases and *Helminthosporium* and *Pythium* root rot diseases. Moderately coarse. Seed production adequate.

Released.—1962, cooperatively by Wisconsin Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Wisconsin Agricultural Experiment Station.

Certified Seed.—Available. (Produced through cooperation of Oregon and Washington State certification agencies and originating agencies.)

Sandburg

Selected in 1925-33 by Douglas Lytle, Montrose, Colo., from ordinary or Canadian common smooth brome.

Source.—Clarence Sandburg, Montrose, successor to Douglas Lytle.

Method of Breeding.—Selection of more robust plants, blending, and increasing in bulk.

Description.—Similar to Lincoln, but slightly earlier.

Released.—Seed sold by Lytle & Sandburg and tested by Colorado Agricultural Experiment Station, Fort Collins.

Breeder Seed.—Not available.

Certified Seed.—Not available.

Saratoga (Reg. No. 8)

Selected at New York Agricultural Experiment Station, Ithaca—R. P. Murphy and S. S. Atwood.

Source.—Wide collection of seed lots from plant breeders in United States. Parental clones: N.Y. 46-11, N.Y. 46-19, N.Y. 46-92, N.Y. 46-157, N.Y. 46-166.

Method of Breeding.—Synthetic variety developed from five selected, relatively self-incompatible clones. Breeder seed produced in isolated plot from randomly planted vegetative pieces of five clones in 100 or more replications. Equal amounts of seed from each parental clone mixed together for breeder seed. Foundation seed first advanced generation from breeder seed. Certified seed first advanced generation from foundation seed and not eligible for use as planting stock for production of any class of certified seed.

Description.—Vigorous, high seedling vigor, early-spring growth; quick recovery and high aftermath production after cutting. Yielded 8 percent more in total-season yield and 29 percent more in aftermath yield than Lincoln when grown alone; yielded same as Lincoln when grown in mixture with alfalfa, but higher proportion of mixture has been grass. Similar to Lincoln in yield and quality of seed and in resistance to brown spot and scald, but superior to Canadian common smooth brome and Manchar.

Released.—1955, by New York Agricultural Experiment Station.

Breeder Seed.—New York Agricultural Experiment Station.

Certified Seed.—Available in quantity.

Southland (Reg. No. 9)

Selected at Oklahoma Agricultural Experiment Station, Stillwater—W. B. Gernert, H. W. Staten, M. D. Jones, W. C. Elder, and R. A. Chessmore.

Source.—Small field of smooth brome (seed of Kansas origin) seeded on Agronomy Farm in 1936. Selections made from this field, and other selections obtained from additional introductions. Original source of seed of selections rather obscure.

Method of Breeding.—Five open-pollinated lines selected as showing superior characteristics and performance bulked for testing as Oklahoma Synthetic.

Description.—Differences that generally separate southern from northern types of smooth brome accentuated in Southland. Rather coarse, broad leaved, heavy stemmed. Individual plants average somewhat taller and somewhat later in maturity than average of other southern types. Somewhat greater resistance to leaf diseases than most standard southern strains, but its chief advantages are significantly greater yielding capacity, greater seedling vigor, and generally better adaptation to southern conditions.

Released.—1953, by Oklahoma Agricultural Experiment Station.

Breeder Seed.—Oklahoma Agricultural Experiment Station.

Certified Seed.—Available.

Bromus marginatus Nees, mountain brome

Cool-season, native bunchgrass closely related to *Bromus carinatus*; similar to it in soil and climatic adaptation. Short lived; but large seed and good seedling vigor. Deep, well-branched root system important in providing protection on erodible slopes.

Bromar (Reg. No. 1)

Selected at Plant Materials Center, SCS, Pullman, Wash.—A. L. Hafenrichter, A. G. Law, and J. L. Schwendiman.

Source.—Native collection made at Pullman in 1933 and assigned accession number WN-439. Selection P-3368 from this accession used in developing Bromar.

Method of Breeding.—Mass selection with screening for head smut resistance. Bromar was one of four ecotypes among 69 accessions of mountain brome tested.

Description.—Rapid-developing, late-maturing, perennial bunchgrass. Tall, erect, vigorous, with medium-coarse stems and abundant, broad, well-distributed leaves. When compared with commercial strain, Bromar is taller, leafier, and 2 weeks later in maturity; has more seeding vigor; is earlier in spring recovery. Heavy seed and forage producer; compatible in rate of growth with sweetclover; seed readily deawned. Outstanding in performance in mixtures with sweetclover or red clover for pasture or green manure in short rotations.

Released.—1946, cooperatively by Washington, Idaho, and Oregon Agricultural Experiment Stations at Pullman, Moscow, and Corvallis, respectively; Plant Materials Center, SCS, Pullman; and Plant Science Research Division, ARS.

Breeder Seed.—Plant Materials Center, SCS, Pullman.

Certified Seed.—Not available.

Bromus mollis L., soft chess

Cool-season, annual bunchgrass from Europe. Widely distributed, weedy grass. Important forage species in annual ranges of California.

Blando (Reg. No. 11)

Selected at Plant Materials Center, SCS, Pleasanton, Calif.—H. W. Miller and O. K. Hoglund.

Source.—Collected May 21, 1940, from winter-annual rangeland near San Ramon, Calif., by D. J. Vanderwal.

Method of Breeding.—Tested in comparison with 27 other collections of *Bromus mollis* by Pleasanton Plant Materials Center and San Fernando Nursery, SCS, Calif., since fall of 1940 as P-11657.

Description.—Winter-growing, self-seeding annual grass; produces many roots. Well adapted for

range, brush-burn seeding, conversion of abandoned grainland to range, stabilization of critical areas, and as a self-perpetuating cover crop in orchards and vineyards. Primary advantage over other strains is its consistent forage and seed production from year to year. During unfavorable years demonstrated its superiority by outperforming all other strains. Although well adapted to low-fertility sites, responds exceptionally well to applications of fertilizer. In relation to other strains tested, is intermediate in time of maturity and suberect in growth habit.

Released.—Cooperatively by California Agricultural Experiment Station, Davis, and Plant Materials Center, SCS, Pleasanton.

Breeder Seed.—Plant Materials Center, SCS, Pleasanton.

Certified Seed.—Available in limited quantities (commercial sources).

Bromus tectorum L., cheatgrass

Cool-season, winter-annual bunchgrass from Europe. Aggressive, weedy, covering extensive areas in West, and widely distributed in United States. Produces good forage when young, but yields fluctuate widely and quality declines rap-

idly with maturity. Awns cause physical injury to stock; mature forage constitutes serious fire hazard throughout West. No attempts made to improve this species.

Buchloë dactyloides (Nutt.) Engelm., buffalograss

Warm-season, sod-forming, native grass. Spreads by stolons. Occurs mainly in short-grass associations in Great Plains. Drought resistant;

often indicative of overgrazing; adapted to grazing and erosion control on heavy soils.

Mesa

Selected at U.S. Southern Great Plains Field Station, ARS, Woodward, Okla., in cooperation with Oklahoma Agricultural Experiment Station, Stillwater—J. R. Harlan.

Source.—Female plant (1-2022) obtained from Wildorado, Tex., by M. L. Peterson in 1940. Male plant (2×2232-3) selected in 1944 from progeny of cross 35-17-c (from Hays, Kans.) × 0-1 (from Chillicothe, Tex.).

Method of Breeding.—Selection for superior combining ability.

Description.—F₁ progeny of cross between clones 1-2022 and 2×2232-3. Seed fields must be established from sod. F₁ variable, but as population is vigorous, spreads rapidly, and has apparently high yield of forage. Female and male parents will be planted in seed-production fields at ratio of 4 to 1. Female parent vigorous and characterized by exceptional height of bur and outstanding shatter resistance.

Released.—Cooperatively by Oklahoma Agricultural Experiment Station and Plant Science

Research Division, ARS.

Breeder Stock.—Oklahoma Agricultural Experiment Station.

Certified Seed.—Not available.

W2

Selected at U.S. Southern Great Plains Field Station, ARS, Woodward, Okla., in cooperation with Oklahoma Agricultural Experiment Station, Stillwater—J. R. Harlan and W. R. Kneebone.

Source.—Collections from native range.

Method of Breeding.—Clonal selection and evaluation in progeny tests. Four female and six male clones selected for high percentage of female plants in resulting progenies. Original increase block planted with these 10 clones.

Description.—Good vegetative growth, and above average seed yield from high percentage of female plants.

Released.—No. Included in field evaluation trials and comparative tests.

Breeder Seed.—Oklahoma Agricultural Experiment Station.

Calamovilfa longifolia* (Hook.) Scribn., prairie sandreed*P-15589**

Increased at Plant Materials Center, SCS, Bridger, Mont.—A. A. Thornburg and J. R. Stroh.

Source.—Commercial harvest from native stand near Torrington, Wyo. 1959.

Method of Breeding.—Direct increase of field collection. Selected from among 53 collections for superior forage and seed production.

Description.—Drought hardy, leafy, mildly rhizomatous, coarse-stemmed. Capable of producing seed with the caryopsis threshing free from the lemma and palea. Seed production good for this species.

Released.—No. Distributed for field testing.

Breeder Seed.—Plant Materials Center, SCS, Bridger.

***Cenchrus ciliaris* L. (*Pennisetum ciliare* (L.) Link), buffelgrass**

Warm-season grass from Union of South Africa. Includes bunch and spreading types. Used for pasture in southern Texas and to limited extent in parts of Gulf Coast States. Adapted to lighter sandy soils; responds to fertilizer. Good seedling vigor. Drought resistant; not cold tolerant; withstands fairly heavy grazing. Nutritious.

For use as female parent in crosses with apomictic strains or production of segregating selfed progeny. Crosses readily with other buffelgrass or birdwoodgrass (*C. setigerus*).

Released.—1966, cooperatively by Texas Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Stock.—Selfed seed and vegetative material, Texas Agricultural Experiment Station.

B-1S (Reg. No. GP1)

Selected at Texas Agricultural Experiment Station, College Station, ARS cooperating—E. C. Bashaw.

Source.—A variant plant on Pat Higgins ranch, Southerland Springs, Tex. Presumed to be a sexual mutant of apomictic Blue buffelgrass.

Method of Breeding.—Vegetative increase of original plant.

Description.—A vigorous, rhizomatous sexual plant heterozygous for method of reproduction.

Blue

Selected at SCS Nursery, San Antonio, Tex.—James E. Smith, Jr.

Source.—Pretoria, Union of South Africa, P.I. 133898. Received March 1940.

Method of Breeding.—Selected as most vigorous and productive of 21 similar accessions from Union of South Africa. Increased for testing as T-3782.

Description.—Selected over other similar accessions because of early spring growth recovery (about 3 weeks ahead of T-4464 buffelgrass), vigorous summer growth, high forage production, rapid spread by means of short rhizomes, drought tolerance, resistance to injury by leafhoppers and aphids, and tolerance to light frost (active growth continues in fall about 3 weeks longer than for T-4464 buffelgrass). Best adapted to clay soils in Texas from Sonora eastward and Waco southward. Relatively low seed producer; limited in use within its area of adaptation by chronic shortage of commercial seed supplies. Both green and cured forage readily eaten by cattle.

Released.—Informally by SCS in 1952.

Breeder Seed.—Not available.

Certified Seed.—Not available. (In limited commercial production.)

HA-333

Increased at Plant Materials Center, SCS, Wailuku, Hawaii—E. A. Lewis.

Source.—PI-253725 from Tanganyika via Australia. Received from National Plant Materials Center, Beltsville, Md., as BN-9852.

Method of Breeding.—Selected from 80 accessions in 1960-61, and increased by seed from original rod now.

Description.—Large, blue-green type with short stout rhizomes; high forage producer; good recovery; good seed producer; stands up well under grazing.

Released.—No. Distributed for field-scale plantings in Hawaii.

Breeder Seed.—Plant Materials Center, SCS, Wailuku.

Higgins (Reg. No. 14)

Selected at Texas Agricultural Experiment Station, College Station, ARS cooperating—E. C. Bashaw.

Source.—A single sexual plant found at Southland Springs, Tex., and identified as B-1s.

Method of Breeding.—Selections made in first generation selfed progeny of B-1s. Progeny from selections evaluated for agronomic characteristics in rows and solid seedlings.

Description.—Green foliage, brownish-wine inflorescence, and a rhizomatous root system. Typical involucre of the inflorescence contain a single spikelet, but basal members may have one to four spikelets. Resembles the T-4464 (Common) variety in foliage and inflorescence color but may be identified by presence of rhizomes and more compact inflorescence. Distinct from Blue buffelgrass that

has bluish foliage and tan-colored inflorescences. Produces somewhat less forage than Blue buffelgrass but far superior in seed production. Adapted to southern Texas.

Released.—1968, cooperatively by Texas Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Texas Agricultural Experiment Station.

Certified Seed.—Available.

P.I. 155084

Increased at SCS Nursery, Brooksville, Fla.

Source.—Obtained from Van Rensburg Pretoria, Union of South Africa, in 1947 as P.I. 155084. This accession represents Equator strain originally from British East Africa.

Description.—Light-bluish foliage. Makes only few seedheads as compared with *Pennisetum ciliare* sold commercially. Viable seed. Tillers and spreads by rather stout, sharp-pointed, round, smooth rhizomes. Culms grow to be about 4 feet tall under moderate fertilization. Leaves longer and stiffer than those of commercial buffelgrass. Stems become woody upon maturity. Foliage palatable and nutritious. Grass has odor of molasses similar to that emitted by molassesgrass (*Melinis minutiflora* Beauv.).

Released.—No. Increased for testing.

Breeder Seed.—Plant Materials Center, SCS, Arcadia, Fla.

T-4464

Selected at SCS Nursery, San Antonio, Tex.—D. H. Foster.

Source.—Pretoria, Union of South Africa. P.I. 153671, BN-4112. Received April 1946; increased for testing as T-4464.

Method of Breeding.—Selected as most vigorous and productive of large number of similar accessions from Union of South Africa and other countries.

Description.—Leafy, perennial, bunchgrass, especially well adapted to deep sandy soils in section of Texas where winter temperatures seldom fall as low as 0° F. Heavy seed producer, with yields of 300-600 pounds per acre not uncommon under irrigation. Plants characteristically light green, with good seedling vigor, good drought tolerance, and ability to grow rapidly from early spring through hot summer. Stems may reach 48 inches in height at seed maturity.

Released.—Informally by SCS in 1949.

Breeder Seed.—Not available.

Certified Seed.—Not available. (Ample commercial supplies.)

Chloris gayana Kunth, rhodesgrass

Warm-season, sod-forming grass introduced from Africa in 1902. Used for pasture and hay in southern Texas, to limited extent elsewhere along gulf coast to Florida, and under irrigation in southern Arizona and California. Although valuable forage species that tolerates saline or alkaline conditions, distribution and use restricted by lack of winter hardiness and susceptibility to rhodesgrass scale (*Antonina graminis* (Mask.)).

Bell

Selected at Texas A&M University Research and Extension Center, Weslaco, Tex.

Source.—Plant collections from old stands in southern Texas and plant introductions.

Method of Breeding.—Individual plants with a high degree of tolerance to rhodesgrass scale, based on evaluations over a period of years, were bulked and increased.

Description.—Warm-season grass; upright, vigorous plants. High degree of tolerance to rhodesgrass scale as demonstrated by persistence under scale infestation.

Released.—1966, by Texas Agricultural Experiment Station.

Breeder Seed.—Texas Agricultural Experiment Station.

Certified Seed.—Available.

Cynodon spp., bermudagrasses

Cynodon dactylon (L.) Pers. (bermudagrass) is major warm-season, sod-forming grass introduced from Africa in 1751 or earlier. Used for pasture, hay, lawns, general-purpose turf, and erosion control. Best adapted to relatively fertile soil in humid Southern States, but found as far north as Maryland and southern part of Central Corn Belt States. Giant bermudagrass found in irrigated areas in Southwestern United States appears to be diploid form of *C. dactylon*. Distinguished from common bermudagrass by greater vigor and lack of pubescence. *C. plectostachyus* (K. Schum.) Pilg. (stargrass) is warm-season, stoloniferous grass from Africa. Robust, pubescent, and non-hardy. Used to limited extent in southern Texas and Southwestern United States. Several other species introduced for turf purposes, including *C. transvaalensis* Burt-Davy (transvaalensis or floridagrass), *C. magennisii* Hurcombe (magenensis), and *C. bradleyi* Stent (bradley). Interspecific hybridization, as noted in following descriptions, has been important factor in development of improved varieties.

Bayshore (Gene Tift)

Selected from Bayshore Golf Club, Miami Beach, Fla.

Source.—Selected vegetatively from Bayshore Golf Club, Miami Beach, by R. A. Bair in 1945, and placed in evaluation nursery at Everglades Experiment Station, Belle Glade, Fla., as Bayshore. At about same time name "Gene Tift" suggested for this grass in tribute to man of same name who propagated considerable quantities for distribution to golf courses in area. This synonymy continued among golf circles. This selection among group transferred to Florida Agricultural Experiment Station, Gainesville, when present turf re-

search program initiated in 1952. Under new program established for further evaluation and classification as FB 3.

Method of Breeding.—Reported to be by natural crossing of native Florida turf-type bermudagrass selections with selections of *Cynodon* species from Union of South Africa supplied by J. Monteith, Jr., then director of U.S. Golf Association Green Section. Plots of various introductions planted vegetatively among native selections in test nursery at Bayshore Golf Club just prior to World War II by F. Hurger, then superintendent of golf course. Golf course closed during war and grasses grew unattended. Golf course reopened after war and number of plant types visible. This particular selection one of several collected by R. A. Bair for testing and evaluation. Selection maintained vegetatively, producing no appreciable quantity of viable seed. Records on African introductions not available, but Bayshore is believed to have been African bermudagrass (*Cynodon transvaalensis* Davy).

Description.—Light-green, fine-textured, putting-green type of bermudagrass. Seems more adapted to southern than to northern Florida. More upright in growth, produces more clippings, yet inferior in turf quality to Everglades 1 in tests at Gainesville. Still marked improvement in putting-green quality over common bermudagrass. Shows distinct resistance to certain leaf spot diseases compared with common bermudagrass.

Released.—Not officially, although has been distributed in golf-turf industry.

Breeder Stock.—Not available.

Coastal (Reg. No. 1)

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—G. W. Burton.

Source.—F₁ hybrid between Tift bermudagrass (discovered by J. L. Stephens in old cotton patch near Tifton in 1929) and tall-growing introduction from Union of South Africa.

Method of Breeding.—Parents interplanted to allow for maximum natural crossing. Over 5,000 seedling plants carefully screened for many traits. Few of best clones subjected to numerous replicated tests giving measures of their palatability, efficiency, yield potential, management requirements, production under grazing, etc. Tested as selection 35.

Description.—When compared with common bermudagrass, Coastal has larger and longer stems, stolons, and rhizomes; grows much taller; is lighter green; has deeper and more efficient root system; is more resistant to foliage diseases, root knot nematode, frost, and drought; is much more efficient in nutrient and water use; is more palatable and produces nearly twice as much forage and animal products. This superiority holds throughout most of Bermudagrass Belt, demonstrating wide adaptation. Produces few seed heads that rarely contain viable seed; must be propagated vegetatively.

Released.—1943, cooperatively by Georgia Coastal Plain Experiment Station and Plant Science Research Division, ARS.

Breeder Stock.—Georgia Coastal Plain Experiment Station.

Certified Stock.—Available in quantity.

Coastcross-1

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—G. W. Burton.

Source.—Coastal bermudagrass and P.I. 255445, obtained from A. V. Bogdan, Grassland Research Station, Kitale, Kenya, in 1958.

Method of Breeding.—Thousands of controlled hybrids attempted in the greenhouse between the self-incompatible parents produced 381 seedlings. These were space-planted in droughty, deep sand and were carefully screened for many traits. Ten of the best selections included in replicated tests, giving measures of yield, digestibility (NBDMB), winter hardiness, management requirements, and quality when fed to cattle.

Description.—A completely sterile F₁ hybrid between Coastal bermudagrass and P.I. 255445, previously described as Coastal × Kenya #14; grows taller and has broader, softer leaves than Coastal; highly resistant to foliage diseases and the sting nematode; aboveground stolons spread rapidly, few, if any, rhizomes. It yields about the same as Coastal but grows better in fall; it is 11 to 12 percent more digestible than Coastal bermuda in comparisons with nylon-bag technique. Cattle fed chopped hay or grazing Coastcross-1 have made up to 30 percent better daily gains than on

Coastal bermuda. Coastcross-1 is less winter-hardy than Coastal bermuda and is not recommended north of an isotherm going through Macon, Ga.

Released.—1967, cooperatively by Georgia Coastal Plain Experiment Station and Plant Science Research Division, ARS.

Breeder Stock.—Georgia Coastal Plain Experiment Station.

Certified Stock.—Available in quantity.

Everglades

Selected at Everglades Experiment Station, Belle Glade, Fla.

Source.—Vegetative collection from Bayshore Golf Club, Miami Beach, by R. A. Bair in 1945; placed in evaluation nursery at Everglades Experiment Station as Everglades 1. Turf work at this station discontinued in 1950; plant material transferred to Florida Agricultural Experiment Station, Gainesville, in 1952.

Method of Breeding.—Reported to be natural cross between native Florida turf-type bermudagrass selections with selections of *Cynodon* species from Union of South Africa supplied by John Monteith, Jr., then director of U.S. Golf Association Green Section. Plots of various introductions planted vegetatively among native selections in test nursery at Bayshore Golf Club just prior to World War II by Fred Hurger, then superintendent of golf course. Golf course closed during war and grasses grew unattended. Golf course reopened after war and number of plant types visible. This particular selection one of several collected by R. A. Bair for testing and evaluation. Selection maintained vegetatively, producing no appreciable quantity of viable seed. Records on African introductions not available, but believed to have been *C. transvaalensis*. Included in testing program as FB-4.

Description.—Medium-green, uniform, fine-textured bermudagrass of good quality; close-growing, vigorous, putting green type. Appears best adapted to southern Florida. Much superior in turf quality to common bermudagrass and resistant to certain leaf spot diseases associated with common type.

Released.—1962, by Florida Agricultural Experiment Station.

Breeder Stock.—Florida Agricultural Experiment Station.

Certified Stock.—Not available. (Available commercially.)

Greenfield

Selected at Oklahoma Agricultural Experiment Station, Stillwater.

Source.—Selected from among large number of

common strains collected from all parts of Oklahoma. This particular selection found on station farm.

Description.—Intermediate between coarse and very fine types of common bermudagrass. Exposed stolons purple; rhizomes short, crooked, numerous, forming dense mat. Winter-hardy. Requires fertile soil especially high in nitrogen, but one of chief advantages is its ability to grow on less fertile soils. Propagated vegetatively.

Released.—1954, by Oklahoma Agricultural Experiment Station.

Breeder Stock.—Oklahoma Agricultural Experiment Station.

Certified Stock.—Available.

Midland (Reg. No. 2)

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—G. W. Burton.

Source.—F₁ hybrid between cold-resistant common bermudagrass from Indiana, supplied by G. O. Mott, and Coastal bermudagrass.

Method of Breeding.—In 1942 enough seed of cross—Indiana bermudagrass × Coastal bermudagrass—made to give 66 F₁ hybrids evaluated for many characteristics beginning in 1943. Selection 13 most productive, more cold resistant than Coastal, surviving two winters at Lafayette, Ind., where Coastal bermudagrass winterkilled.

Description.—Taller, larger, leafier, more disease resistant, producing more open sod than common bermudagrass. Superior to common bermudagrass in most of good traits that characterize Coastal. Midland (selection 13) less productive than Coastal where latter does not suffer stand loss because of winter-injury. Darker green, tends to produce more heads, starts growth earlier in spring than Coastal. Superiority over Coastal in tests at Stillwater, Okla., led to its release in that State. Recommended for northern part of Bermudagrass Belt.

Released.—1953, cooperatively by Oklahoma Agricultural Experiment Station, Stillwater; Georgia Coastal Plain Experiment Station; and Plant Science Research Division, ARS.

Breeder Stock.—Georgia Coastal Plain Experiment Station. Foundation stock maintained at Oklahoma Agricultural Experiment Station.

Certified Stock.—Available in quantity.

Midway

Selected at Kansas Agricultural Experiment Station, Manhattan—R. A. Keen.

Source.—Hybrid between *C. transvaalensis* and *C. dactylon*.

Method of Breeding.—Single plant selected for winter hardiness and desirable turf characteristics from over 20,000 polycross progenies.

Description.—A sterile triploid. Medium-textured lawn grass that produces relatively few seedheads; ascending habit contributes to slower development of thatch; more winter-hardy in Kansas than U-3; and rated as tolerant to mites and leaf spot in Arizona tests. Adapted for lawn use in southwestern Kansas.

Released.—1965, by Kansas Agricultural Experiment Station.

Breeder Stock.—Kansas Agricultural Experiment Station.

Certified Stock.—Not available. (Available commercially.)

NK-37

Selected at Phoenix, Ariz., by Northrup, King & Co.—Dale Grissom.

Source.—Seed harvested in about 1938 from giant strain observed growing on island in Colorado River near Yuma, Ariz. This seed collection increased and tested in Hawaii, where it performed very satisfactorily. Seed produced for several years, but production eventually discontinued.

Method of Breeding.—Superior plants selected from old, established production field were moved to clonal nursery at Phoenix. Plants selected on basis of superior growth habit, vigor, disease resistance, and seed productiveness. Bulk seed from selected plants identified as NK-37 bermudagrass.

Description.—Tall, giant strain; double size of common bermudagrass in Yuma area.

Released.—Seed distributed for testing in 1957 and 1958.

Breeder Seed.—Northrup, King & Co.

Certified Seed.—Not available. (Limited amount available commercially.)

No Mow

Increased at the Florida Agricultural Experiment Station, Gainesville—G. C. Horn.

Source.—Selected at the Mobile Country Club by B. Norrie, Sr., superintendent. Sprigs provided to the Bellingrath Gardens, Mobile, Ala. and sprigs from this source planted on grounds of Prudential Insurance Building, Jacksonville, Fla. Sprigs from the Jacksonville planting collected by G. C. Horn in 1960.

Method of Breeding.—Vegetative increase of original clone. Repeated tests to germinate seed have failed.

Description.—Low growing, medium-coarse texture, dark green; superior shade tolerance, reported to compare favorably with St. Augustinegrass; fair rate of spread. Unmowed and fertilized lightly grows about 3 inches tall with very uneven top growth. Heavy growth of dark seed heads during seedhead production, giving turf unsightly appearance unless mowed. Susceptible to *Helmintho-*

sporum leafspot but disease does not cause serious damage. Bermudagrass mites and nematodes may cause extensive damage. Responds to heavy fertilization and close mowing. Desirable lawn grass and good variety for golf tees. Adapted in North Florida and adjacent states.

Released.—No. Distributed informally throughout Florida and westward to Texas.

Breeder Stock.—Florida Agricultural Experiment Station, Gainesville.

Certified Stock.—Not available (noncertified stock available).

Ormond

Selected from Ellinor Village Country Club, Ormond Beach, Fla.

Source.—Selected vegetatively by R. A. Bair in about 1946 from long-established fairway showing superior turf performance at Ellinor Village Country Club. When entered in testing nursery at Everglades Experiment Station, Belle Glade, Fla., selection designated as Ormond.

Method of Breeding.—As far as can be determined, appears to have been natural selection. Quite possibly it developed from natural crossing of native and Arizona common bermudagrasses during World War II when golf course was inactive and unattended. As with most golf courses, maintenance records not complete enough to show practices that might shed further light on history of this selection. Tested as FB 25.

Description.—Attractive blue green, vigorous, competitive, well adapted throughout Florida. Medium texture, making it suitable for golf tees and fairways as well as recreational areas. Grows uniformly, somewhat more prostrate in habit than Tiflawn, less tendency to produce thatch. Much superior to common bermudagrass in turf performance. Resistant to certain leaf spot diseases associated with common bermudagrass, but marked susceptibility to dollar spot disease.

Released.—1962, by Florida Agricultural Experiment Station, Gainesville.

Breeder Stock.—Florida Agricultural Experiment Station.

Certified Stock.—Not available. (Available commercially.)

Pee Dee 102

Increased at the Pee Dee Experiment Station, Florence, S.C.

Source.—Mutant from early planting of Tifgreen.

Method of Breeding.—Increase of mutant clone.

Description.—See Tifdwarf.

Released.—1968, by South Carolina Agricultural Experiment Station, Clemson.

Breeder Stock.—South Carolina Foundation Seed Association, Clemson.

Certified Stock.—Available.

Royal Cape

Increased at Southwestern Irrigation Field Station, Brawley, Calif.—H. P. Ford and K. R. Stockinger.

Source.—Original planting stock obtained by J. L. Stephens at Frankenwald Experiment Station, Johannesburg, Union of South Africa, March 3, 1955. Represents direct increase of Royal Cape selected by C. M. Murray on Royal Cape Golf Course near Mowbray, Cape Province, Union of South Africa, in 1930. Introduced as P.I. 224147. Previous collection of Royal Cape, identified as P.I. 213387, received from Union of South Africa in February 1954.

Method of Breeding.—Compared with named varieties and other introductions in salt basins and under mowing.

Description.—Dark-green, fine-leaved variety. Forms dense, wear-resistant sod and tolerates high salt concentrations. In Imperial Valley, Calif., it remains green well into winter and starts growth very early in spring. Produces few, if any, seed heads in spring and none during remainder of year. Disease has not been problem in Imperial Valley, but variety is susceptible to some leaf diseases in humid Southeastern United States.

Released.—1960, cooperatively by University of California, Los Angeles, and Plant Science Research Division, ARS.

Breeder Stock.—Southwestern Irrigation Field Station.

Certified Stock.—Not available. (Available commercially.)

Santa Ana

Selected at University of California, Riverside, Calif.—V. B. Youngner.

Source.—P.I. 213387 from Union of South Africa.

Method of Breeding.—Seedling selected at UCLA in 1956 from P.I. 213387. Testing at locations throughout California and in several other States as RC-145.

Description.—A triploid ($2n = Ca\ 27$) that does not produce viable seed as a rule. Characterized by deep blue-green color, medium-fine texture, good color retention in cool weather, and early spring growth; with good maintenance has maintained good color throughout winter in mild frost-free areas of California. Exhibits excellent tolerance to smog and to Eriophyid mite, and rates above average in tolerance to soil salinity. Rapid

establishment, produces smooth even surface, and resistant to heavy foot traffic.

Released.—1966, by California Agricultural Experiment Station.

Breeder Stock.—California Agricultural Experiment Station, Riverside.

Certified Stock.—Available.

Sunturf

Increased at several experiment stations in Southeastern United States.

Source.—P.I. 184339, *Cynodon magennisii* Hurcombe. Stolons presented by Mildred Wilman, Kimberley, Union of South Africa, in 1949.

Description.—Perennial, fine leaved, dark green. Low-growth habit, creeping stolons, spreads rapidly. Drought resistant, not shade tolerant. Produces few seed heads—so far no seed found. Sometimes has rust.

Released.—1956, cooperatively by Alabama, Arkansas, Oklahoma, and South Carolina Agricultural Experiment Stations at Auburn, Fayetteville, Stillwater, and Clemson, respectively.

Breeder Stock.—Alabama, Arkansas, Oklahoma, and South Carolina Agricultural Experiment Stations;

Certified Stock.—Available.

Suwannee (Reg. No. 6)

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—G. W. Burton.

Source.—F₁ hybrid between Tift bermudagrass (discovered by J. L. Stephens in old cotton patch near Tifton in 1929) and tall-growing introduction from Union of South Africa.

Method of Breeding.—Parents interplanted to allow for maximum natural crossing. Over 5,000 seedling plants carefully screened for many traits. Few of best clones subjected to numerous replicated tests giving measures of their palatability, efficiency, yield potential, management requirements, production under grazing, etc. Tested as selection 99.

Description.—Similar to Coastal, except more erect, makes more open sod, less weed resistant, less tolerant of close grazing, but more drought resistant and definitely superior in productivity and efficiency of nutrient and water use on deep sands. Released for use on several million acres of these soils in South.

Released.—1953, cooperatively by Georgia Coastal Plain Experiment Station and Plant Science Research Division, ARS.

Breeder Stock.—Georgia Coastal Plain Experiment Station.

Certified Stock.—Available.

Texturf 1F

Selected at Texas Agricultural Experiment Station, College Station—J. R. Watson and E. C. Holt.

Source.—Golf course in Dallas-Fort Worth, Tex., area.

Method of Breeding.—Vegetative increase of original collection. Tested as T-35A.

Description.—Fine-textured, light-green grass. Produces dense ground cover that tends to be free of weeds; relatively free of unsightly seed stems. Makes good spring recovery. Susceptible to leaf diseases; for this reason plantings in gulf coast and eastern Texas areas not recommended. Since it lacks extensive root system, more susceptible to drought than common bermudagrass.

Released.—1957, by Texas Agricultural Experiment Station.

Breeder Stock.—Not available.

Certified Stock.—Not available. (Some commercial production.)

Texturf 10

Selected at Texas Agricultural Experiment Station, College Station—J. R. Watson and E. C. Holt.

Source.—Corsicana Country Club, Corsicana, Tex.

Method of Breeding.—Vegetative increase of original collection. Tested as T-47.

Description.—Medium-textured, dark-green grass. Produces dense turf; relatively free of seed stems. Makes early-spring recovery and tends toward closer and shorter growth than common bermudagrass. Better leaf-disease resistance, resulting in better color in autumn. Sensitive to chlorinated hydrocarbon insecticides, turning straw color after application of these materials. Recovers in 5 to 7 days with no permanent damage. Slower in producing cover than common bermudagrass.

Released.—1957, by Texas Agricultural Experiment Station.

Breeder Stock.—Not available.

Certified Stock.—Not available. (Some commercial production.)

Tifdwarf (Reg. No. 8)

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—G. W. Burton, J. B. Moncrief, and J. E. Elsner.

Source.—Observed in 1962 growing in small patch about 18 inches in diameter on golf green at Country Club, Florence, S.C., that had been planted to experimental Tifgreen received some 8 years earlier from the Georgia Coastal Plain Experiment Station. Also found on greens of Coun-

try Clubs at Sea Island, Ga., and Thomasville, Ga., planted to same lot of Tifgreen some 8 years earlier.

Method of Breeding.—Believed to be a natural dwarf mutant that occurred in Tifgreen while it was being tested at the Georgia Coastal Plain Experiment Station. Apparently, each of the three golf courses mentioned above obtained a few dwarf sprigs, along with the Tifgreen (Tifton 328), sent out in 1954 for preliminary evaluation. Thoroughly evaluated in comparison with Tifgreen and Tifway.

Description.—Darker green; purple basic plant color that turns purple with near-freezing temperature, smaller leaves and stems, and shorter internodes than Tifgreen. Tolerates closer mowing and makes a better putting surface than Tifgreen but otherwise similar to Tifgreen. Used on golf greens and for very fine, closely mowed lawns.

Released.—1965, cooperatively by Georgia Coastal Plain Experiment Station and Plant Science Research Division, ARS.

Breeder Stock.—Georgia Coastal Plain Experiment Station.

Certified Stock.—Available in quantity.

Tifflawn (Reg. No. 4)

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—G. W. Burton and B. P. Robinson.

Source.—F₁ hybrid between *Cynodon dactylon* (L.) Pers. and *C. transvaalensis* from East Lakes Golf Course in Atlanta, Ga.

Method of Breeding.—Out of extensive crossing efforts involving Tifflawn bermudagrass (2n=36) and African bermudagrass (2n=18) came eight F₁ hybrids (triploids, 2n=27). Thoroughly screened under lawn and golf-green management and compared with superior selections of *C. dactylon* from golf courses. Distributed for testing as Tifton 127.

Description.—Lighter green, more disease resistance, and much finer texture than common bermudagrass. Superior for putting greens and fine lawns. Completely male sterile, sheds no pollen to annoy hay fever victims, and must be propagated vegetatively.

Released.—1953, cooperatively by Georgia Coastal Plain Experiment Station and Plant Science Research Division, ARS.

Breeder Stock.—Georgia Coastal Plain Experiment Station.

Certified Stock.—Not available. (Available commercially.)

Tifgreen (Reg. No. 5)

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—G. W. Burton, Jim Latham, and B. P. Robinson.

Source.—F₁ hybrid between superior clone from golf green at Charlotte Country Club, Charlotte, N.C., and *Cynodon transvaalensis* from East Lakes Golf Course in Atlanta, Ga.

Method of Breeding.—Best of several F₁ hybrids (triploids, 2n=27), involving Charlotte bermudagrass (*C. dactylon*) (2n=36) and African bermudagrass (2n=18). Thoroughly evaluated in comparison with number of bermudagrasses under golf-green management. Tested as Tifton 328.

Description.—Darker green and produces better putting surface than Tifflawn; similar in other respects. Also used for fine lawns.

Released.—1956, cooperatively by Georgia Coastal Plain Experiment Station and Plant Science Research Division, ARS.

Breeder Stock.—Georgia Coastal Plain Experiment Station.

Certified Stock.—Available in quantity.

Tiflawn (Reg. No. 4)

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—G. W. Burton.

Source.—F₁ hybrid between two selections of bermudagrass from pasture-breeding research at Georgia Coastal Plain Experiment Station.

Method of Breeding.—Several hundred F₁ hybrids between short, dense, dwarf selection and larger disease-resistant type subjected to thorough screening, which involved finally evaluating best under lawn and golf-green management. Tested as Tifton 57.

Description.—When compared with common bermudagrass, Tiflawn spreads faster, makes denser weed-free turf, more disease- and frost-resistant, requires less fertilization, and tolerates more wear. Particularly well suited for heavy-duty turf and used on many university football fields in South.

Released.—1956, cooperatively by Georgia Coastal Plain Experiment Station and Plant Science Research Division, ARS.

Breeder Stock.—Georgia Coastal Plain Experiment Station.

Certified Stock.—Available in quantity.

Tifway (Reg. No. 7)

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—G. W. Burton, Jim Latham, and B. P. Robinson.

Source.—Chance F₁ hybrid between *Cynodon transvaalensis* and *C. dactylon* in lot of *C. transvaalensis* seed received from D. Meredith, Johannesburg, Union of South Africa, in 1954.

Method of Breeding.—Thoroughly screened under lawn and golf-green management and compared with superior selections of *C. dactylon* currently available. Tested as Tifton 419.

Description.—Darker green, greater frost resistance, earlier spring growth, greater sod web-worm and mole cricket resistance, better herbicide tolerance, and stiffer leaf blades than Tiffine or Tifgreen. Sheds no pollen to annoy hay fever victims. Well suited for fine lawns, fairways, and tees. Must be propagated vegetatively.

Released.—1960, cooperatively by Georgia Coastal Plain Experiment Station and Plant Science Research Division, ARS.

Breeder Stock.—Georgia Coastal Plain Experiment Station.

Certified Stock.—Available in quantity.

Tufcote

Increased at National Plant Materials Center, SCS, Beltsville, Md.—R. B. Thornton.

Source.—Introductions received from Union of South Africa in 1942.

Method of Breeding.—Single-plant survivor selected from original source nursery; only plant that survived—17° F.

Description.—Medium texture, medium dark green, low growth habit, and fair to good tolerance to heavy traffic. Good winter hardiness, some tolerance to leaf diseases, and remains green longer in fall than common.

Released.—1962, cooperatively by Maryland Agricultural Experiment Station, College Park; National Plant Materials Center, SCS, Beltsville; and Plant Science Research Division, ARS. Released originally as Tuffy and renamed Tufcote in May 1963.

Breeder Stock.—National Plant Materials Center, SCS, Beltsville.

Certified Stock.—Available.

Dactylis glomerata L., orchardgrass

Cool-season bunchgrass from central and western Europe. Used for hay, pasture, and silage in Northeastern States south to northern part of Gulf Coast States and west to eastern edge of Great Plains. Valuable species in irrigated and high-rainfall areas of intermountain region and Western States. Less winter hardy than timothy and smooth brome. Major forage grass from Pennsylvania to North Carolina and west to Iowa and Missouri.

U-3

Received at Beltsville, Md., by U.S. Golf Association Green Section, ARS cooperating—F. V. Grau.

Source.—Selected in early 1930's from numerous fine strains of bermudagrass found on golf greens by D. Lester Hall, Savannah, Ga.

Method of Breeding.—Vegetative increase of original collection followed by comparative testing.

Description.—Moderately fine leaved. Cold hardy; adapted for use on lawns, fields, park areas, and golf-course tees and fairways. Rapid spreading; produces durable turf and has wide adaptation to soil and climatic conditions.

Released.—Distributed in 1946-47 by Plant Science Research Division, ARS, and U.S. Golf Association Green Section.

Breeder Stock.—Plant Industry Station, Beltsville.

Certified Stock.—Available. (U-3 bermudagrass seed offered for sale, but produces variable turf as would be expected.)

Uganda

Increased by F. V. Grau, College Park, Md.; Plant Industry Station, Beltsville, Md.; and several State agricultural experiment stations.

Source.—P.I. 183551. Introduced through efforts of John Plant, Cairo, Egypt, and R. T. Jones, Atlanta, Ga., from Gezira Club in Cairo.

Description.—Fine-bladed, low-growing bermudagrass. Suitable for putting greens and tennis courts. Very fine textured, relatively slow spreading; tends to assume reddish-purple cast after first cool nights in fall.

Released.—Not officially. (Distributed for testing.)

Breeder Stock.—F. V. Grau, College Park.

Certified Stock.—Not available. (Available commercially.)

Able

Selected at Farmers Forage Research Cooperative, West Lafayette, Ind.—J. R. Thomas and R. J. Buker.

Source.—Diverse sources. Three parental clones trace to University of Illinois and one to Masshardy.

Method of Breeding.—Clones selected from spaced-plant nurseries. Four parental clones iden-

tified on basis of performance in forage-yield tests in Indiana and seed-yield tests in Oregon. Tested as FFR Synthetic C.

Description.—Late maturity; good persistence in forage-yield tests; and acceptable forage yield, seed yield, and resistance to leaf diseases.

Released.—1970, by Farmers Forage Research Cooperative.

Breeder Seed.—Farmers Forage Research Cooperative.

Certified Seed.—Available.

Akaroa

Increased at Plant Materials Center, SCS, Pleasanton, Calif.—A. L. Hafenrichter, W. E. Chapin, and R. L. Brown.

Source.—Introduced from New Zealand.

Method of Breeding.—Comparative tests in Washington, Oregon, and California.

Description.—In contrast to commercial, later maturing, finer stemmed, leafier, and shorter growing. Seed fields appear rather variable until heading. Winter hardy under irrigation in northern California and adjacent Nevada, but occasionally suffers from winter injury in other Inter-mountain States.

Released.—1953, cooperatively by California Agricultural Experiment Station, Davis, and Plant Materials Center, SCS, Pleasanton.

Breeder Seed.—Plant Materials Center, SCS, Aberdeen, Idaho.

Certified Seed.—Not available.

Avon

Selected at Macdonald College, Quebec, Canada.

Source.—Obtained from Sweden through Swedish Farmers' Association in 1911.

Method of Breeding.—Mass selection for winter hardiness.

Description.—Early maturing; high level of winter hardiness. Performed well in areas having severe winters.

Released.—Macdonald College.

Breeder Seed.—Macdonald College.

Certified Seed.—Not available.

Boone (Reg. No. 4)

Selected at Kentucky Agricultural Experiment Station, Lexington—R. C. Buckner.

Source.—Kentucky naturalized strains.

Method of Breeding.—Plants selected in 1952 from surviving plants of seven naturalized strains that had been subjected to intensive clipping treatments for 3 years. Seven strains were highest yielding entries in tests, including approximately 25 naturalized strains. About 400 plants removed from plots and isolated for seed increase. Prog-

ny performance of these plants equal or superior to best of naturalized strains in yield and agronomic performance. Increased as Kentucky 79G23-297, and distributed for regional testing as Kentucky Synthetic.

Description.—Superior in yield and general agronomic performance to all named varieties in Kentucky. Yields well in new stands, but particularly outstanding in yield and persistence in older sods. Some resistance to rust, but not so resistant as Potomac. About 3 to 5 days later in maturity than most naturalized and common orchardgrasses.

Released.—1961, cooperatively by Kentucky Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Kentucky Agricultural Experiment Station.

Certified Seed.—Available.

Brage

Developed by Swedish Seed Association, Svalof, Sweden.

Source.—Single-plant selection in material from Germany.

Description.—Late, leafy strain. Good winter hardiness and drought resistance in Sweden.

Released.—Swedish Seed Association. Included in regional testing program.

Certified Seed.—Available.

Chinook

Selected at Canada Department of Agriculture Research Station, Lethbridge, Alberta—R. W. Peake.

Source.—Seed collected from 30-year-old planting near Lethbridge and from field on Hatfield Ranch, Twin Butte, Mont.

Method of Breeding.—Superior plants selected from space-plant nursery used to develop synthetic variety.

Description.—Early-maturing variety possessing a high level of winter hardiness. Characterized by vigorous early spring growth and early fall dormancy.

Released.—1959, by Canada Department of Agriculture.

Breeder Seed.—Canada Department of Agriculture Research Station, Lethbridge.

Certified Seed.—Available. (Distributed in Canada by K. C. Long Seeds Ltd., Cardston, Alberta.)

Clatsop

Selected at Oregon Agricultural Experiment Station, Corvallis, ARS cooperating—H. A. Schoth and H. H. Rampton.

Source.—"Selected grazing strain No. 233" obtained from Gartons, Ltd., Warrington, England, in 1936 as F.C. 22364.

Method of Breeding.—Increase of original accession. Distributed for testing as Oregon 233.

Description.—Differs from common orchard-grass in having finer, denser leaves, higher forage yield, and lower seed yield. Resistant to leaf disease (*Mastigosporium rubricosum* (Dearn. & Barth.) Sprague). Shows some promise in coastal sections of Pacific Northwest.

Released.—Included in regional testing program for several years. Suggested for release in Oregon as Clatsop.

Breeder Seed.—John Jacob Astor Branch Experiment Station, Astoria, Oreg.

Certified Seed.—Available in limited amounts.

Dayton

Selected at Rudy-Patrick Research Center, Ames, Iowa—R. R. Kalton.

Source.—Clones selected from adapted varieties and long term stands in Iowa.

Method of Breeding.—Selections evaluated in clonal and progeny tests for desirable forage and seed attributes, with emphasis on rust and leaf blight resistance, winter hardiness, and yield. Six-clone synthetic evaluated in north-central region and Pacific Northwest as R.P. 200.

Description.—High yielding, good recovery, and drought tolerant. Similar to Sterling in maturity, winter hardiness, and stand-establishment ability, but with improved rust and leaf blight resistance. Good seeder.

Released.—Distributed for testing by Rudy-Patrick Co. in 1963.

Breeder Seed.—Rudy Patrick Co.

Certified Seed.—Available.

Frode

Selected at Swedish Seed Association, Svalof, Sweden.

Source.—Collections from central Sweden in 1908.

Method of Breeding. One generation of mass selection within open-pollinated progeny from single superior plant in 1908 collection. Three generations of pedigree selections followed with final selection made within best family in 1942.

Description.—Similar in general appearance, winter hardiness, and yield to Danish orchard-grass. Approximately 5 to 7 days later in maturity and superior in leafiness to Danish.

Released.—1954, by Swedish Seed Association.

Breeder Seed.—Swedish Seed Association.

Certified Seed.—Available under OECD scheme. (Distributed in Canada by Hogg and Lytle Seeds, Oakwood, Ontario.)

Hallmark

Selected at Farmers Forage Research Cooperative, West Lafayette, Ind.—J. R. Thomas and R. J. Buker.

Source.—Diverse sources. Five clones trace to the following: Boone (1), Potomac (1), Univ. of Illinois (2) and Eastern States Farmers Exchange (1).

Method of Breeding.—Superior clones selected from spaced-plant nurseries. Five parental clones identified on basis of forage-yield tests in Indiana and seed-yield tests in Oregon. Tested as FFR Synthetic E.

Description.—Vigorous, high yielding, good recovery after mowing, good seeding vigor, and superior to Boone in resistance to leaf disease; 2 to 4 days later in maturity than Potomac and 3 to 5 days later than Boone. Good seed yields.

Released.—1969, by Farmers Forage Research Cooperative.

Breeder Seed.—Farmers Forage Research Cooperative.

Certified Seed.—Available.

Hercules

Selected at Canada Department of Agriculture Research Station, Ottawa, Ontario—R. M. MacVicar.

Source.—Parent material of Russian origin.

Method of Breeding.—Line breeding originating from single-plant selection.

Description.—Erect, tall growing, somewhat later in maturity than common. Comparatively leafy, with marked uniformity in comparison with other types in same maturity class. Considered to be more winter hardy than most other named varieties. Where hardiness is problem, Hercules likely to be more productive than most other types. Where less hardy varieties survive, Hercules will not prove to be superior in forage production.

Released.—1938, by Canada Department of Agriculture.

Breeder Seed.—Canada Department of Agriculture Research Station, Ottawa.

Certified Seed.—Not available.

Jackson

Selected at Virginia Agricultural Experiment Station, Blacksburg—L. H. Taylor.

Source.—Domestic collections and experimental and named varieties.

Method of Breeding.—Selection in spaced-plant nurseries and polycross progeny tests. Experimental synthetic tested as Va. 58-V-1.

Description.—Late maturing—7 to 10 days later than Virginia common. Vigorous, upright growth habit, resistance to leaf diseases, good seed yield, and acceptable persistence. Combines well

with alfalfa and red clover.

Released.—1969, by Virginia Agricultural Experiment Station.

Breeder Seed.—Virginia Agricultural Experiment Station.

Certified Seed.—Available in limited quantity.

Kay

Selected at the Canada Department of Agriculture Research Station, Ottawa, Ontario—W. R. Childers.

Source.—Plant introductions obtained from Academy of Science, Moscow, U.S.S.R. in 1958.

Method of Breeding.—Selection in large single-plant nurseries for vigor, yield, rust resistance, and late maturity. Ninety-three plants selected and progeny tested. No significant differences were obtained for plant yield, so all plants used to produce breeder seed.

Description.—Tall growing with large panicles, large stems, broad and long leaves; some resistance to rust, and extremely winter hardy. Exhibits excellent spring vigor and good growth in cool, wet springs; does less well under dry, hot conditions.

Released.—1970, by Canada Department of Agriculture.

Breeder Seed.—Canada Department of Agriculture Research Station, Ottawa, Ontario, Canada.

Certified Seed.—Available.

Latar (Reg. No. 2)

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman, R. J. Olson, and A. G. Law.

Source.—Original introduction from Institute of Plant Industry, Leningrad, U.S.S.R., as P.I. 111536, by Westover-Enlow expedition in 1934.

Method of Breeding.—Grown for three generations in nurseries at Plant Materials Center; mass selection jointly by SCS, ARS, and staff of Washington Agricultural Experiment Station, Pullman, from spaced plantings in fourth generation. Tested in uniform nurseries since 1951 as P-2453.

Description.—Late-maturing, hay-type orchardgrass. Blooms and matures seed on average of 10 to 14 days later than commercial varieties. Leaves abundant, broad, well distributed, and noticeably light green. Vigorous and high in vegetative production. Seed production good. Lowest among seven orchardgrass varieties in lignin content and significantly higher in digestibility.

Released.—1957, cooperatively by Washington and Idaho Agricultural Experiment Stations at Pullman and Moscow, respectively, and Plant Materials Centers, SCS, Aberdeen, Idaho, and Pullman.

Breeder Seed.—Plant Materials Center, SCS, Pullman.

Certified Seed.—Available in quantity.

Masshardy

Selected at Massachusetts Agricultural Experiment Station, Amherst—W. C. Colby and H. M. Yegian.

Source.—Obtained from commercial seedsman in Turku, Finland, in 1939.

Method of Breeding.—Limited inbreeding of selected plants; selection based on polycross progeny performance. Distributed for testing as Finnish Late Hay.

Description.—Late maturing (7 to 10 days later than common orchardgrass), upright growth habit, leafy (if adequately fertilized with nitrogen), and winter hardy.

Released.—Massachusetts Agricultural Experiment Station.

Breeder Seed.—Massachusetts Agricultural Experiment Station.

Certified Seed.—Not available. (In commercial production.)

Napier

Selected at Rudy-Patrick Research Center, Ames, Iowa—R. R. Kalton.

Source.—Parental clones selected from adapted varieties and long term stands in Iowa.

Method of Breeding.—Selections evaluated in clonal and progeny tests for desirable forage and seed attributes, with emphasis on rust and leaf blight resistance, winter hardiness, and yield. Eight-clone synthetic evaluated in north-central region as experimental strain R.P. 300.

Description.—Vigorous, high yielding, and good recovery. Equal to Sterling in winter hardiness, with improved rust and leaf blight resistance. Good seed production, stand establishment, and drought tolerance. Blooms 2 to 4 days later than Potomac and common seed lots.

Released.—Distributed for testing by Rudy-Patrick Co. in 1963 and 1964.

Breeder Seed.—Rudy-Patrick Co.

Certified Seed.—Available.

Nordstern

Selected at Northrup, King & Co., Minneapolis, Minn.—H. E. Kaerwer.

Source.—Survivors from nursery including U.S. and foreign varieties were allowed to outcross after the severe winter of 1960-61. Seed from surviving plants provided the base population.

Method of Breeding.—Progeny selection through two generations for winter survival, disease resistance, growth habit and maturity. Poly-

cross test for forage-yielding ability. Forty-one plants combined to produce the synthetic variety. Tested as N1-77.

Description.—Tall, upright, late maturing (about 2 weeks later than Sterling); leaves broad, medium green; winter hardy and adapted to Northern United States.

Released.—1970, by Northrup, King & Co.

Breeder Seed.—Northrup, King & Co.

Certified Seed.—Not available (available commercially).

Palestine (Reg. No. 7)

Increased at California Agricultural Experiment Station, Davis.

Source.—Accession number T.O. 1638 received from G. L. Stebbins in 1947. Seed received from Samaria, Palestine.

Description.—Under nonirrigated conditions in California, stronger winter grower than common. Drought resistant, but lacking in winter hardiness. Susceptible to rust, but not serious problem on range.

Released.—1968, by California Agricultural Experiment Station.

Breeder Seed.—California Agricultural Experiment Station.

Certified Seed.—Available.

Pennlate (Reg. No. 3)

Selected at Pennsylvania Agricultural Experiment Station and U.S. Regional Pasture Research Laboratory, University Park, Pa., ARS cooperating—H. R. Fortmann and H. L. Carnahan.

Source.—Two parents derived from Tammisto and Tardus 2, varieties bred in Finland and Sweden, respectively. Other parents selected from open-pollinated progenies of introductions grown at SCS Nursery, Big Flats, N.Y. Geographical origin of these clones cannot be traced. Clones designated MIV-5, MIV-17, XLI-8, and XLI-17.

Method of Breeding.—Best clones selected from three late-maturing Pasture Laboratory synthetics used to develop new four-clone synthetic. Tested under designation Pennsylvania Late Synthetic III.

Description.—Late maturing, compatible in alfalfa mixtures, and competes well with associated legume. Produces higher total seasonal forage yields and higher first-cutting yields than S-37. Average heading date comparable to that of S-37, although S-37 is slightly later in many years; about 7 to 10 days later than Potomac. Comparable to common orchardgrass in winter hardiness; less susceptible to winter injury than S-37 in Pennsylvania.

Released.—1957, by Pennsylvania Agricultural Experiment Station.

Breeder Seed.—Pennsylvania Agricultural Experiment Station.

Certified Seed.—Available.

Pennmead (Reg. No. 6)

Selected at Pennsylvania Agricultural Experiment Station and U.S. Regional Pasture Research Laboratory, University Park, Pa., ARS cooperating—H.R. Fortmann and H. L. Carnahan.

Source.—Three clones originated from domestic collections made in New York, Pennsylvania, and Maryland. Fourth clone selected from Roskilde, Danish variety. Clones designated MIII-8, MIII-18, MIII-20, and MIII-24.

Method of Breeding.—Four-clone synthetic; developed from tests including seven Pasture Laboratory experimental synthetics and polycross progenies of component clones. Restricted polycross progenies tested in New York and Pennsylvania. Tested under designation Pennsylvania Medium Synthetic II.

Description.—High yielding, compatible in alfalfa mixtures, competitive, and leafy. Moderately superior in aftermath production to other currently available varieties. Recommended particularly for use in mixture with Flemish alfalfas and in other plantings where early orchardgrasses would ordinarily be used. First harvest must be cut early to insure high quality forage. Grows late in fall; makes good recovery in spring; matures about 5 days later than Potomac.

Released.—1963, by Pennsylvania Agricultural Experiment Station.

Breeder Seed.—Pennsylvania Agricultural Experiment Station.

Certified Seed.—Available.

Pomar

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

Source.—Introduced from Russia as P.I. 111537 through Westover-Enlow collection of 1934.

Method of Breeding.—First selected at the SCS, Plant Materials Center, Pullman, Wash., and tested as P-2454. It has since been tested as an orchard cover crop by the PMC, SCS, Aberdeen, Idaho.

Description.—Late-maturing, rapid-developing, long-lived, dwarf-type orchardgrass. Leaves numerous, predominantly basal, narrow, short, and light-green. Stems abundant, medium-fine, erect, and normally less than 24 inches tall in solid stands. Few seedstalks are formed after the first crop is cut each year. Flowers about the same time as alfalfa. Tolerance to shade, drouth, insects, and diseases equal to other orchardgrass varieties. Adapted for orchard cover crop and erosion control. Clippings decompose rapidly in orchards and

vineyards. Seed difficult to thresh; does not shatter.

Released.—1966, cooperatively by Idaho Agricultural Experiment Station and Plant Materials Center, SCS, Aberdeen, Idaho.

Breeder Seed.—Plant Materials Center, SCS, Aberdeen.

Certified Seed.—Available in 1971 in limited quantity.

Potomac (Reg. No. 1)

Selected at Plant Industry Station, Beltsville, Md.—R. E. Wagner, M. A. Hein, and P. R. Henson.

Source.—Plants collected in 1935 from old pastures in Maryland, Virginia, West Virginia, and Pennsylvania and from strain tests conducted at Plant Industry Station.

Method of Breeding.—Collections screened on basis of type, rust resistance, leafiness, persistence, and vigor; in 1940, eight plants of predominantly pasture type placed in one isolation block (Maryland pasture strain) and six plants representing erect hay types placed in another (Maryland hay strain). In 1945 plants selected from 3-year-old broadcast plots of these two strains and established in space-planted nursery together with equal number of seedlings from each of two strains. Nursery rogued and bulk seed collected for testing as Beltsville orchardgrass. Potomac represents third cycle of mass selection from 1945 nursery.

Description.—Dark green, leafy, erect, similar to commercial lots in height. Productive, superior persistence, rust resistance.

Released.—1954, by Plant Science Research Division, ARS, and cooperating experiment stations.

Breeder Seed.—Plant Industry Station.

Certified Seed.—Available.

Rideau

Selected at Canada Department of Agriculture Research Station, Ontario—W. R. Childers.

Source.—Two clones from introductions from Estonia and Sweden and two late hardy clones of unknown origin.

Method of Breeding.—Clones from open-pollinated, progeny-tested plants further evaluated in polycross nursery. Final synthetic has four clones. Original clones maintained.

Description.—Leafy, late, winter-hardy hay type. In late boot stage when Vernal alfalfa in bud stage at Ottawa; makes leafy, nutritious forage. Less vigorous than early commercial types, but yield well spread out over season. Seed yields satisfactory.

Released.—1963, by Canada Department of Agriculture.

Breeder Seed.—Canada Department of Agriculture Research Station, Ottawa.

Certified Seed.—Available.

S-37

Selected at Welsh Plant Breeding Station, Aberystwyth, Wales, United Kingdom.

Source.—Initial plant material selected on basis of type rather than origin.

Description.—Hay type. Basic-type plants relatively erect and well leaved up stems, giving more leafy hay than common Danish orchardgrass. Late maturing. Performs very satisfactorily in association with legumes. Some evidence of lack of persistence in Eastern United States.

Released.—Welsh Plant Breeding Station. Included in regional testing program and recommended for use in certain States.

Certified Seed.—Available from United Kingdom. (Available commercially.)

S-143

Selected at Welsh Plant Breeding Station, Aberystwyth, Wales, United Kingdom.

Source.—Based on indigenous plant of rather extreme type, which was designated “mop” cocksfoot owing to dense, broad cushions produced by individual spaced plants.

Method of Breeding.—Reselected. New lots exhibit greater uniformity with respect to late maturity and prostrate growth habit.

Description.—Late-maturing pasture type; plants relatively spreading, with profusion of tillers and broad leaves.

Released.—Welsh Plant Breeding Station.

Certified Seed.—Available from United Kingdom. (Available commercially.)

Sandia

Selected at former SCS Nursery, Albuquerque, N. Mex.

Source.—A-10655. Selected plants from “Brage” NY-NI-2569, SCS Nursery, Big Flats, N.Y.

Method of Breeding.—Selected more robust, disease-free plants from row planting. Plants dug and isolated for seed increase.

Description.—Large, robust. Grows well with alfalfa. Good seed producer and apparently rust free.

Released.—1953, cooperatively by New Mexico Agricultural Experiment Station, University Park, and Plant Materials Center, SCS, Los Lunas, N. Mex.

Breeder Seed.—Not available.

Certified Seed.—Not available.

Sterling (Reg. No. 5)

Selected at Iowa Agricultural Experiment Station, Ames—R. R. Kalton and M. G. Weiss.

Source.—Clonal collections made in Iowa and southern Minnesota in 1941 and 1943.

Method of Breeding.—Synthetic variety developed from five selected clones (Iowa 64, 120, 121, 123, and 160, all from central Iowa). Parental clones selected for superior hardiness, forage and seed yields, recovery, leafiness, and disease resistance based on performance of clones and inbred and outcross progenies. Seed being increased on limited generation basis. Breeder seed produced by natural pollination of five parent clones in planting isolated from other orchardgrass. Equal quantities of seed from each parent clone mixed for breeder seed. Certified seed is second advanced generation from breeder seed and not eligible for producing any class of certified seed.

Description.—Superior in stand establishment, winter hardiness, and forage and seed yields under Iowa conditions. Particularly outstanding in seed yield. Midearly in maturity. Moderately susceptible to rust and leaf streak. Included in regional testing program as Iowa 6.

Released.—1960, by Iowa Agricultural Experiment Station.

Breeder Seed.—Iowa Agricultural Experiment Station.

Certified Seed.—Available.

Tardus II

Selected at Weibullsholm Plant Breeding Institute, Landskrona, Sweden.

Source.—Skandia.

Method of Breeding.—Repeated selection from variety Skandia.

Description.—Winter hardy; similar in general appearance to variety Frode. Several days later in maturity and leafier than Danish.

Released.—Weibullsholm Plant Breeding Institute.

Breeder Seed.—Weibullsholm Plant Breeding Institute.

Certified Seed.—Available. (Distributed in Canada by Ontario Seed Cleaners and Dealers, Ltd., Brampton.)

Virginia 70

Identified by Virginia Agricultural Experiment Station, Blacksburg, Va.

Source.—From orchardgrass fields in northern Virginia.

Method of Breeding.—Objective was preservation of adapted orchardgrass ecotype found in northern Virginia. Nine fields selected on basis that they (1) typified the Virginia type, (2) had been seeded to orchardgrass grown on the same farm for 20 years or longer, and (3) were relatively free of objectional weeds or other crop species. Seed from nine fields blended for production of certified seed.

Description.—Typical of northern Virginia ecotypes of orchardgrass.

Released.—1969, by Virginia Agricultural Experiment Station.

Breeder Seed.—Virginia Crop Improvement Association, Blacksburg.

Certified Seed.—Available.

Digitaria spp., slenderstem digitgrass

Warm-season, stoloniferous grass from Republic of South Africa. A high-yielding species well adapted for pasture use in central and southern Florida. Propagated vegetatively.

Increased at Range Cattle Experiment Station, Ona, Florida—J. E. McCaleb and E. M. Hodges.

Source.—Vegetative planting material received in 1953 as "Leesburg 5" from Watermelon and Grape Investigations Laboratory, Leesburg, Fla. Designated as P.I. 300935 from sample sent to New Crops Research Branch, Plant Science Research Division, Beltsville, Md., in 1959. Closely resembles *Digitaria serriata* (P.I. 106657) that was planted by G. E. Ritchey at Gainesville, Fla., in 1936. Some 70 grasses were taken to Leesburg in 1950, and it is probable that P.I. 106657 was included in this group.

Method of Breeding.—Direct increase of accession and thorough evaluation in grazing tests.

Description.—Stolons produced in large numbers, similar to pangolagrass in prostrate growth habit and production of roots at each node; forms denser sod than pangolagrass; topkills at about same temperature as pangolagrass but starts regrowth earlier and more productive than pangolagrass and the bahiagrasses from October to May. Characterized by slender stems, scarcity of seedheads, dense upright growth in established pastures, and dusty bluish tinge (glaucous) on dense undisturbed growth. Tests on seed viability have not been made.

Released.—1969, by Florida Agricultural Experiment Station.

Breeder Stock.—Range Cattle Experiment Station, Ona.

Certified Stock.—Not available. (Available commercially.)

Digitaria decumbens Stent, pangolagrass

Warm-season, stoloniferous grass from Republic of South Africa. Used primarily for pasture in central and southern Florida and Caribbean region. Productive, nutritious, tolerates grazing, not frost resistant. Must be propagated vegetatively.

Increased at Florida Agricultural Experiment Station, Gainesville, ARS cooperating—George Ritchey.

Source.—P.I. 11110 vegetative planting material received from Republic of Africa in 1935.

Method of Breeding.—Comparative tests and pasture plots, 1941–42.

Description.—Similar to crabgrass (*Digitaria sanguinalis* (L.) Scop.), except perennial and vigorously stoloniferous. Susceptible to winter-killing in northern Florida.

Released.—1944, cooperatively by Florida Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Stock.—Florida Agricultural Experiment Station.

Certified Stock.—Not available. (Available commercially.)

Echinochloa colonum (L.) Link., jungle ricegrass

Warm-season annual bunchgrass introduced from tropical regions. Grows in moist places from New Jersey to Missouri and south to Florida and Texas, also from Oregon to southern California. Seeds eaten by birds. Leaves tender; provides good grazing.

Baldwin

Increased at Plant Materials Center, SCS, Americus, Ga.

Source.—Collection from Baldwin County, Ala.

Method of Breeding.—Direct increase of original collection, identified by accession numbers AM-430, MS-180, F-1210, and F-1459.

Description.—More robust than most accessions tested, grows to a height of 20 to 24 inches. Self-seeding, produces seed in about 90 days. Adapted throughout southern region where water supplies are plentiful. Used primarily as source of food for waterfowl when grown where shattered seed will be flooded. May be used as a catch crop for forage production.

Released.—Not formally. Distributed for testing.

Breeder Seed.—Plant Materials Center, SCS, Americus.

Certified Seed.—Not available.

Echinochloa crusgalli var. *frumentacea* (Ronb.) W. F. Wight, Japanese millet

Warm-season annual from India and Japan. Limited use for green feed, silage, and hay in cooler parts of Northeastern United States. Grows better under cool conditions than sudangrass or foxtail millet.

Chiwapa

Increased at Plant Materials Center, SCS, Coffeeville, Miss.—R. S. Thornton, V. E. Aldrich, W. C. Young, and M. Byrd.

Source.—Contaminant in accession of *Setaria italica* (P.I. 196293) received from India.

Method of Breeding.—Increase of single plant found in original accession.

Description.—Tall growing (5 to 6 feet on most upland sites), leaves wide, stems heavy and coarse,

tillering fair, heads large and somewhat dense, foliage dark-green, seeds awnless. Prefers moist sites, on uplands requires well-distributed rainfall. Seed does not germinate under water, but once sprouted will tolerate wet land. Valuable wildlife-food plant, primarily for ducks. May be grown on many sites too wet for some other food plants. Makes good temporary grazing and hay on suitable sites.

Released.—1965, by Plant Materials Center, SCS, Coffeeville.

Breeder Seed.—Plant Materials Center, SCS, Coffeeville.

Certified Seed.—Not available. (Foundation Seed available from Plant Materials Center, SCS, Coffeeville.)

Ehrharta calycina Sm., perennial veldtgrass

Cool-season bunchgrass indigenous to Union of South Africa. Used in range reseeding in California.

Increased at California Agricultural Experiment Station, Davis.

Source.—California accession number T.O. 1359; received from Australia in 1929.

Description.—Highly palatable, drought-resistant bunchgrass. Adapted to light soils; does particularly well on sandy coastal soils in California. Seed production limited by shattering, but volunteers well.

Released.—1947, by California Crop Improvement Association.

Breeder Seed.—California Agricultural Experiment Station.

Certified Seed.—Not available. (Available commercially.)

MISSION (Reg. No. 10)

Selected at California Agricultural Experiment Station, Davis—R. M. Love.

Source.—Received from R. C. Rossiter, Perth, Western Australia, under accession number T.O.

1883 (P.I. 187309). Mission accession number T.O. 3051.

Method of Breeding.—Original panicle selections reduced to polycross consisting of 25 clones. Distributed for testing as “Nonshedding perennial veldtgrass.”

Description.—Differs from typical *Ehrharta calycina* in having contracted panicles and retaining larger part of seed to maturity. Little shorter than typical perennial veldtgrass, but otherwise has same range of variation in flowering date, growth habit, and fineness of foliage. Superior with respect to both seed yield and seed quality.

Released.—1962, cooperatively by California Agricultural Experiment Station and Plant Materials Center, SCS, Pleasanton, Calif.

Breeder Seed.—California Agricultural Experiment Station and Plant Materials Center, SCS, Pleasanton.

Certified Seed.—Available in limited quantities.

Elymus canadensis L., Canada wildrye

Cool-season, native bunchgrass widely distributed in United States, especially in Great Plains, intermountain region, and Pacific Northwest. Large, coarse, short lived. Should be cut in boot stage for best quality hay. Fair palatability. Not very competitive in mixtures.

Mandan

Selected at U.S. Northern Great Plains Research Center, ARS, Mandan, N. Dak.—G. A. Rogler.

Source.—Field collection made near Mandan in 1935.

Method of Breeding.—Mass selection within two single-plant progenies and distributed as Mandan 419.

Description.—More and softer textured leaves, shorter culms, and longer lived than common Canada wildrye.

Released.—1946, cooperatively by North Dakota Agricultural Experiment Station, Fargo, and Plant Science Research Division, ARS.

Breeder Seed.—U.S. Northern Great Plains Research Center.

Certified Seed.—Not available.

Elymus cinereus Scribn. and Merr., basin wildrye

Cool-season, slightly spreading, native grass. Distributed throughout much of Western United States; common on alkaline soils. Tall, coarse, long lived. Relatively poor in palatability and seed set.

P-5797

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

Source.—University of Saskatchewan, Saskatoon, Saskatchewan, Canada, in 1938.

Method of Breeding.—Selection of vigorous types during several generations.

Description.—Robust, vigorous, blue, tall growing, leafy. Broad, coarse leaves. Large stems and seedheads; good seed production; seed grows

readily. Good seedling vigor. Grows well on saline soils.

Released.—No. In production for testing in field plantings.

Breeder Seed.—Plant Materials Center, SCS, Aberdeen, Idaho.

P-15590

Increased at Plant Materials Center, SCS, Bridger, Mont.—A. A. Thornburg.

Source.—Collected near Roundup, Mont., on a subirrigated range site by Sterle Dale in 1960.

Method of Breeding.—Direct increase of field collection. Selected from among 125 accessions representing native collections in Montana and Wyoming.

Description.—Vigorous, disease-free, dark

green, excellent early-spring forage production. Abundant broad, semilax, leaves. Judged as palatable to livestock. Good seeding vigor. Seed production fair; seed exhibits postharvest dormancy

for a year.

Released.—No. Distributed for field testing.

Breeder Seed.—Plant Materials Center, SCS, Bridger.

Elymus condensatus Presl, giant wildrye

Cool-season, slightly spreading, native grass in Western United States, especially on saline soils. Tall, coarse. Grazed readily while young; produces

fair hay when harvested early. Varieties not available.

Elymus giganteus Vahl, mammoth wildrye

Cool-season, sod-forming grass from U.S.S.R. Used for inland dune stabilization in Pacific Northwest and occasionally for ornamental purposes. Drought resistant, coarse. Unpalatable; not adapted for forage.

Description.—Tall, coarse, green, creeping. Nonpalatable to livestock. Long lived on inland sand dunes, where it will stop sand movement and provide permanent cover. Grown from seed or propagated vegetatively. Rate of increase from culms under proper cultural conditions 15 to 1 in first year. When established from seed, seedlings show excellent vigor.

Released.—Vegetative material distributed in 1949 for inland dune control by Plant Materials Center, SCS, Pullman. Seed not released.

Breeder Seed.—Vegetative material and seed from bulked selections, Plant Materials Centers, SCS, Aberdeen, Idaho, and Pullman.

Certified Seed.—Not available. (Material available for vegetative plantings.)

Volga (Reg. No. 9)

Selected at Plant Materials Center, SCS, Pullman, Wash.

Source.—P.I. 108491. Lower Volga region, U.S.S.R.; introduced by Westover-Enlow expedition in 1934.

Method of Breeding.—Selection of most vigorous plants from above introduction during several generations followed by vegetative reproduction of most desirable type. Tested as P-208.

Elymus glaucus Buckl., blue wildrye

Cool-season, native bunchgrass found from north-central region to Pacific coast. Shade tolerant, short lived. Relatively common on cut-over or burned-over land in Pacific Northwest.

with 260 accessions. Mass increase after selection to eliminate offtype plants. Self-pollinated.

Description.—Tall growing, erect, leafy, robust, medium coarse, heads pure purple and erect, ecotype. Loosely tufted, with lightly pubescent sheaths. Susceptible to stripe rust. A heavy seed producer; seed shatters and volunteers readily. Shade tolerant, provides excellent cover under tree plantings and in burned-over forest areas.

Released.—No. Increased for testing in field plantings.

Breeder Seed.—Plant Materials Center, SCS, Pullman.

P-2662

Selected at the Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

Source.—Collected from native stand, Stampede Lookout, Wenatchee National Forest, Wash.

Method of Breeding.—Selected in comparison

Elymus junceus Fisch., Russian wildrye

Cool-season bunchgrass introduced in 1927 from U.S.S.R. Used primarily for pasture over general area where crested wheatgrass is adapted. Performed well in northern Great Plains and parts of intermountain region. Starts growth early. Leafy, nutritious, with dense basal leaves. Relatively low seedling vigor, deep rooted, drought resistant, salt tolerant. Exacting conditions required for successful seed production.

Idaho 100

Selected at Idaho Agricultural Experiment Station, Moscow—A. Slinkard.

Source.—Collection of available germplasm.

Method of breeding.—Maternal line selected for seed set. Eleven clones selected for inclusion in experimental synthetic variety.

Description.—Selected for superior seed yield. Lacks other distinguishing characteristics.

Released.—No. Distributed for testing.

Breeder Seed.—Idaho Agricultural Experiment Station.

Mandan D-19

Increased at U.S. Northern Great Plains Research Center, ARS, Mandan, N. Dak.—G. A. Rogler.

Source.—Increase of P.I. 75737 received in 1927 from Western Siberian Experiment Station, Omsk, U.S.S.R. (Original recorded introduction received through H. N. Vinall.)

Method of Breeding.—Best among several introductions received up to 1940.

Description.—Typical of *Elymus junceus* introduced from U.S.S.R. Will probably be replaced by newer varieties.

Released.—Distributed to other experiment stations; widely grown in United States.

Breeder Seed.—Not available.

Certified Seed.—Available. (Most often certified as commercial.)

Mayak

Selected at the Canada Department of Agriculture Research Station, Swift Current, Saskatchewan—Tom Lawrence.

Source.—Four strains from the Northern Great Plains Research Center, Mandan, N. Dak., and commercial seed lots.

Method of Breeding.—Several cycles of selection and open-pollinated progeny evaluation.

Description.—Superior to Sawki in forage and seed yield; good resistance to leaf spot. In western Canada, yielded 6 percent more dry matter and 16 percent more seed than Sawki.

Released.—1971, by Canada Department of Agriculture.

Breeder Seed.—Canada Department of Agriculture Research Station, Swift Current.

Certified Seed.—Not available.

Sawki

Selected at Canada Department of Agriculture Research Station, Saskatoon, Saskatchewan—Tom Lawrence.

Source.—Commercial seed of unknown origin.

Method of Breeding.—Synthetic of 10 clones developed after several cycles of selection and open-pollinated progeny evaluation.

Description.—Lacks special characteristics that distinguish it from other varieties of Russian wildrye. Superior to common in having slightly more erect growth habit, higher seed yield, and slightly higher forage yield. Under Canadian conditions it is equal to or slightly superior to Vinall in seed and forage yields.

Released.—1963, by Canada Department of Agriculture.

Breeder Seed.—Canada Department of Agriculture Research Station, Swift Current.

Certified Seed.—Available in quantity.

Vinall (Reg. No. 5)

Selected at U.S. Northern Great Plains Research Center, ARS, Mandan, N. Dak.—G. A. Rogler and H. M. Schaaf.

Source.—Three parental clones derived from P.I. 75737 and one each from P.I. 108493 and P.I. 111549.

Method of Breeding.—Synthetic of five clones. At least four generations of selection on single-plant basis in open-pollinated and inbred lines preceded choice of each parent. Progeny tests in yield plots and as spaced plants used to measure effects of outcrossing with other four plants for each plant in synthetic. All five clones good seed producers; three of them produce exceptionally large seed. Distributed for testing as Mandan 2355.

Description.—Forage yields equal to those of commercial. Yielded 75 percent more seed than commercial in tests conducted over 5-year period. Weight per bush of seed and weight of 200 seeds slightly higher than weight of commercial.

Released.—1960, cooperatively by North Dakota (Fargo), South Dakota (Brookings), Montana (Bozeman), Wyoming (Laramie), Nebraska (Lincoln), Colorado (Fort Collins), and New Mexico (University Park) Agricultural Experiment Stations and Plant Science Research Division, ARS.

Breeder Seed.—U.S. Northern Great Plains Research Center.

Certified Seed.—Available in quantity.

Elymus triticoides Buckl., beardless wildrye

Cool-season, sod-forming native grass. Distributed at low and medium elevations from Montana to Washington and south to west Texas and California. Important rangegrass.

P-15594

Increased at Plant Materials Center, SCS, Bridger, Mont.—A. A. Thornburg.

Source.—Collected in 1958 at Riverton, Wyo., fairgrounds by J. L. McWilliams and Aubry Stanton. Possibly a seeded stand established in the 1940's from an unknown source.

Method of Breeding.—Direct increase of field collection.

Description.—An exceptionally leafy, fine-stemmed, high forage producer; rhizomes especi-

ally vigorous extending 6 feet in one season; leaves broad, lax, and dark green. Comparatively high seed production for this species; seed plump and heavy. Seed dormancy problem precludes consistent sand establishment.

Released.—No. Distributed for field testing.

Breeder Seed.—Plant Materials Center, SCS, Bridger.

Eragrostis atherstonei Stapf, atherstone lovegrass

Warm-season perennial that includes both bunchgrass and stoloniferous forms. Widely distributed from Republic of South Africa to south tropical Africa.

P-15608

Increased at Plant Materials Center, SCS, Tucson, Ariz.—L. P. Hamilton and T. F. Spaller.

Source.—P.I. 276,033 introduced from Pretoria, Africa, via Australia.

Method of Breeding.—Bulk increase of seed

from initial observation block. First increase block planted in 1964. Tested as A-16753.

Description.—Large, vigorous bunchgrass with characteristics of both Lehmann and weeping lovegrasses. Larger, more productive than Lehmann, with longer green period; finer stems and leaves than weeping. Very good seedling vigor and cold hardiness.

Released.—No. Distributed for testing.

Breeder Seed.—Plant Materials Center, SCS, Tucson.

Eragrostis chloromelas Steud., Boer lovegrass

Warm-season bunchgrass introduced from Union of South Africa in 1932. Adapted to warm semidesert areas in Southwestern United States. Palatable, drought resistant, lacks cold tolerance. Longer lived than Lehmann lovegrass.

E. chloromelas grades completely into *E. curvula* (see description of *E. curvula*). Typical specimens of *E. chloromelas* represent one extreme in the range in variation and can be distinguished with some degree of accuracy from the great majority of "forms" of *E. curvula*. It is indicative of this problem that Catalina weeping lovegrass was identified first as *E. curvula*, changed to *E.*

chloromelas, then to *E. curvula* var. *conferta*, and back to *E. curvula*.

A-84

Increased at Plant Materials Center, SCS, Tucson, Ariz.—C. G. Marshall and L. P. Hamilton.

Source.—Union of South Africa.

Released.—1950, cooperatively by Arizona Agricultural Experiment Station, Tucson, and Nursery Division, SCS.

Breeder Seed.—Plant Materials Center, SCS, Tucson.

Certified Seed.—Not available.

Eragrostis curvula (Schrad.) Nees, weeping lovegrass

Warm-season bunchgrass introduced from Africa in 1927. Used for erosion control and pasture throughout much of the Southern United States. Well adapted in parts of southern Great Plains. Productive, drought resistant, relatively easy to establish, grows on low-fertility soils. Palatability low except when young. Subject to winterkilling in northern part of range in adaptation.

A variable species that includes many different "forms." These "forms" are linked by intermediates, and this extends to *E. chloromelas* that represents one extreme in the range in variation.

A-67

Increased at SCS Nursery, Tucson, Ariz.—C. G. Marshall.

Source.—Seed sent to F. J. Crider by L. W. Kenhart and R. L. Piemeisel from North Central Tanganyika, Africa.

Method of Breeding.—Selected in initial observation plots from original seed collection and seed bulked for initial increase.

Description.—Vigorous-growing, leafy, densely tufted, long-lived bunchgrass with extensive root system and long, lax leaves. Forage and seed pro-

duction greater than Lehmann or Boer lovegrass. Also, more cold tolerant than those two species. Utilized for range, pasture, and soil protection on a wide range of soil textures where annual precipitation exceeds 16 inches.

Released.—Informally by SCS.

Breeder Seed.—Plant Materials Center, SCS, Tucson.

Certified Seed.—Not available.

Catalina

Selected at Arizona Agricultural Experiment Station, Tucson, ARS and SCS cooperating—L. N. Wright.

Source.—P.I. 203347, received in 1952 from Pretoria, Union of South Africa, as *E. curvula*. Classified in evaluation program as *E. chlorome-las*.

Method of Breeding.—A single line, 3-17, selected from 16 accessions of Boer lovegrass and tested for seedling drought tolerance under controlled environmental conditions in a growth chamber. Final evaluation on Arizona rangelands in comparison with A-84 Boer lovegrass and Lehmann lovegrass.

Description.—An apomictic line that is superior to A-84 and equal to Lehmann lovegrass in stand establishment. Under range conditions, forage yield has been 30 percent higher and of better quality than Lehmann lovegrass. Should be adapted in semiarid and arid areas of the Southwest, particularly at elevations below 4,600 feet with a minimum annual rainfall of 12 inches.

Released.—1969, cooperatively by Arizona Agricultural Experiment Station; Plant Science Research Division, ARS; and Plant Sciences Division, SCS.

Breeder Seed.—Arizona Agricultural Experiment Station.

Certified Seed.—Limited supplies available in 1970.

Ermelo

Seed collected in 1944 from native stand in Ermelo district of South Africa.

Source.—Several accessions from South Africa including P.I. 232831 supplied by G. A. Van Dom Heever, Nigel, Transvaal, Republic of South Africa.

Method of Breeding.—Increase of original accessions.

Description.—Comparatively leafy; has performed well in plot tests and under grazing in southern Oklahoma and adjacent parts of Texas.

Released.—Informally from several different sources.

Breeder Seed.—Not available.

Certified Seed.—Not available. (Some commercial supplies.)

Morpa

Selected at U.S. Southern Great Plains Field Station, ARS, Woodward, Okla., in cooperation with Oklahoma Agricultural Experiment Station, Stillwater—W. R. Kneebone and P. W. Voigt.

Source.—P.I. 208994, received in 1953 from Rietvlei Research Station, Transvaal, Union of South Africa.

Method of Breeding.—A bulk increase of surviving winter-hardy plants, after winter of 1955-56. Identified as possessing superior acceptability in replicated animal screening tests.

Description.—About 3 inches taller, panicles darker, leaves slightly wider, and 7 to 10 days later than common weeping lovegrass. In Oklahoma tests, yields equal to or higher than those of other weeping lovegrass. Less lignin relative to cellulose as compared with a less palatable experimental variety; produced 12 to 13 percent higher live-weight gains than common and P.I. 206673 weeping lovegrass; and much superior to common lovegrass in average daily gains for both winter and summer grazing.

Released.—1970, cooperatively by Oklahoma Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Oklahoma Agricultural Experiment Station.

Certified Seed.—Limited quantities available in 1971.

Eragrostis lehmanniana Nees, Lehmann lovegrass

A-68

Increased at SCS Nursery, Tucson, Ariz.—C. G. Marshall.

Source.—Seed sent to F. J. Crider by M. Willman, Kimberley, Union of South Africa.

Warm-season, slightly spreading grass introduced from Union of South Africa in 1932. Used for range reseeding in warm semideserts of Southwestern United States. Easily established. Prostrate stems root at nodes. Smaller and less cold tolerant than Boer and weeping lovegrass.

Description.—Seedlings volunteer and tolerate adverse conditions better than other lovegrasses. More drought tolerant but less cold tolerant than Boer or weeping lovegrass.

Released.—1950, cooperatively by Arizona Agricultural Experiment Station, Tucson, and Nursery Division, SCS.

Breeder Seed.—Plant Materials Center, SCS, Tucson.

Certified Seed.—Not available.

NM-317

Selected at Plant Materials Center, SCS, Los Lunas, N. Mex., and New Mexico Agricultural Experiment Station, University Park, cooperating.

Source.—Collection by J. A. Downs in 1959 from SCS field-evaluation planting on Berry Ranch near Tucumcari, N. Mex. Seed used in

this particular field supplied by former SCS Nursery, Albuquerque, N. Mex., and presumed to be from initial increase of *Eragrostis* spp., P.I. 184805, and BN-6185 from Basutoland, Union of South Africa.

Method of Breeding.—After observing row in *Eragrostis* comparison block planted in 1960, remainder of original collection planted following year for increase.

Description.—Intermediate type of Lehmann lovegrass, attaining height of 30 inches. Lower growing than some introductions, but produces abundant stolons and herbage, as represented by A-68. Superior in cold hardiness to other strains tested at Los Lunas. Seedling vigor equals that of A-68, and produces good seed crop first year of establishment if moisture adequate.

Released.—No.

Breeder Seed.—Plant Materials Center, SCS, Los Lunas.

Eragrostis superba Peyr., Wilman lovegrass

Warm-season bunchgrass introduced from South Africa. Occurs throughout much of South Africa and also in tropical Africa. Comparatively palatable lovegrass, adapted to much the same area as Lehmann lovegrass. Starts growth later, competes less well with weeds, and seed does not ripen so uniformly as weeping lovegrass.

P-15628

Increased at SCS Nursery, Tucson, Ariz.—L. P. Hamilton and T. F. Spaller.

Source.—P.I. 276,055 introduced from South Africa.

Method of Breeding.—Bulk increase of original accession that was planted in 1962.

Description.—A vigorous, leafy type with outstanding seedling vigor and good seed production. Better stand establishment obtained in range seeding trials in southern Arizona than with other lovegrasses.

Released.—No. Distributed for testing.

Breeder Seed.—Plant Materials Center, SCS, Tucson.

Eragrostis trichodes (Nutt.) Wood, sand lovegrass

Important warm-season bunchgrass. Occurs on sandy soils of central and southern Great Plains. Palatable and nutritious range grass, with deep root system and good drought resistance. Lacks persistence under heavy grazing. Starts growth in early spring and remains green until late fall.

Bend

Selected at Kansas Agricultural Experiment Station, Manhattan, ARS and SCS cooperating—F. L. Barnett.

Source.—Collections from the Arkansas and Cimarron river basins in southcentral Kansas and adjacent areas in Oklahoma.

Method of Breeding.—Two cycles of selection for vigor and persistence on unirrigated sandy soils. Approximately 200 selections, tracing to 11

accessions, composited to produce variety. Tested as Kansas Experimental 3.

Description.—Uniform in maturity, good seed producer, good establishment, and relatively free of disease. Similar in appearance to local strains found in southcentral Kansas. Acceptable dry matter yield and good vigor in comparative tests.

Released.—1971, cooperatively by Kansas Agricultural Experiment Station; Plant Science Research Division, ARS; and Nursery Division, SCS.

Breeder Seed.—Plant Materials Center, SCS, Manhattan.

Certified Seed.—Available in limited quantity.

Nebraska 27

Increased at Nebraska Agricultural Experiment Station, Lincoln, ARS and SCS cooperating—L. C. Newell and E. C. Conard.

Source.—Collection from native meadow in northern Holt County, Nebr.

Method of Breeding.—Selections moved to Lincoln in 1935 by L. C. Newell and Elver Hodges. Seed from these plants later increased at North Platte and Waterloo, Nebr., by E. C. Conard.

Description.—Winter-hardy, relatively long-lived strain of sand lovegrass. In Nebraska, plantings survived and maintained stands superior to plantings made with seed from more southern sources. Well adapted to range of soil types. Application of phosphorus fertilizers to sandy soils of low fertility usually increase yields of forage and seed. Produces highly palatable, nutritious forage. Best used in mixtures with other warm-season, native grasses, such as grammas or bluestems.

Released.—1949, cooperatively by Nebraska Agricultural Experiment Station; Plant Science Research Division, ARS; and Nursery Division, SCS.

Breeder Seed.—Nebraska Agricultural Experiment Station.

Certified Seed.—Available.

PMT-338

Selected from early SCS studies at Spur, Tex.—J. E. Smith, Jr.

Source.—Collected in 1957 by SCS personnel from native stand near Mason, Tex.

Method of Breeding.—Increase of original collection. Seed was produced first at Spur, Tex., and later at J. E. "Bud" Smith Plant Materials Center, SCS. Evaluated at this location during 1965-69.

Description.—Leafy, perennial warm-season bunchgrass, 3 to 4 feet tall at maturity. Earlier than commercial seed lots from northwest Oklahoma (in field plantings it has initiated growth 2 to 3 weeks earlier). Produces more forage and matures seed about 1 week later than commercial. Attractive to livestock and produces abundant seed. Well adapted to range seeding mixtures on the medium- to coarse-textured sands of the southern High Plains and Edwards Plateau.

Released.—No. Distributed for field testing.

Breeder Seed.—J. E. "Bud" Smith Plant Materials Center, SCS, San Antonio.

Eremochloa ophiuroides (Munro) Hack., centipedegrass

Warm-season, sod-forming grass from China. (Seed found in baggage of Frank N. Meyer, USDA plant explorer who disappeared on his fourth trip to China in 1916.) Well adapted to soils and climatic conditions of Southern United States; survives as far north as northern Alabama and Raleigh, N.C.; grows well on poor soils. Adapted for use as low-maintenance, general-purpose turf and lawn grass. Propagated vegetatively or by seed. Not desirable as pasture plant.

Oklawn

Selected at the Oklahoma Agricultural Experiment Station, Stillwater—W. W. Huffine and W. C. Elder.

Source.—Thought to have been included in test of lawn grasses planted at Stillwater, Okla., before the drought of the thirties.

Method of Breeding.—In about 1935, vegetative material from lawn grass test used for erosion con-

trol on Agronomy Research Station. In 1949 a collection from this planting included in the turf-grass nursery, and subsequently identified as a well-adapted centipedegrass.

Description.—Bluish green, medium textured, slow growing; forms relatively dense sod resistant to bermudagrass encroachment and weed invasion. Maximum height of growth about 3 or 4 inches. Normally established with sprigs or sod but can be established from seed. Exhibits tolerance to heat, drought, insects, and diseases. Grows in partial shade and full sun; adapted to soils that are moderately acid and of medium fertility. Produces satisfactory turf without high-level maintenance.

Released.—1965, by Oklahoma Agricultural Experiment Station.

Breeder Stock.—Oklahoma Agricultural Experiment Station.

Certified Stock.—Limited supplies. (Available commercially.)

Festuca arundinacea Schreb., tall fescue

Major cool-season bunchgrass from Europe. Used for pasture, hay, general-purpose turf, and erosion control throughout humid parts of Northern United States and under irrigation in arid regions. Adapted in Southern States, but of limited value in southern Coastal Plain. Vigorous; grows well on both wet and dry sites; does best on heavy soils. Palatability often problem in

mixtures; should be grazed close for best animal acceptance and feeding value.

Alta (Reg. No. 1)

Selected at Oregon Agricultural Experiment Station, Corvallis, ARS cooperating—H. A. Schoth.

Source.—In 1918 some of more promising lines of tall fescue from nursery at Pullman, Wash., established at Corvallis. Seed obtained from M. Heinrichs, Pullman. Three lines used—P.I. 19728, P.I. 24838, and P.I. 25206. P.I. 19728 received January 24, 1907, from A. LeCoq & Co., Darmstadt, Germany. P.I. 24838 from commercial lot of about 500 pounds of seed purchased from Peppard Seeds, Inc., Kansas City, Mo., March 9, 1909. P.I. 25206 from lot of seed presented by G. Bitter, director of Botanic Garden, Bremen, Germany. This lot received by Plant Introduction Section, USDA, March 26, 1909.

Method of Breeding.—Evolved as ecotype selection. Material mentioned above planted in spring of 1918. Noted to have made exceptionally fine growth during first season. Received special mention in annual reports during 1919, 1920, 1921, and 1922. In winter of 1922–23 it suffered severe winterkilling. Surviving plants put together and became source seed of Selection 7. In 1927 designation of Selection 7 changed to FC 29366. Remained under this selection number until given name "Alta" in 1940. Selected for ability to remain green during dry summers in western Oregon and for high yields of forage.

Released.—1940, cooperatively by Oregon Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Oregon Agricultural Experiment Station.

Certified Seed.—Available in quantity.

Asheville

Increased at SCS Nursery, Americus, Ga.—Paul Tabor and J. D. Powell.

Source.—Collection from naturalized stand 5 miles southwest of Asheville, N.C. Grown under experimental number SC 20-764.

Description.—Considered more stable to adverse changes in environment than Kentucky 31 or Alta. Yield not greater than that of Kentucky 31 or Alta. Observed superior to other sources of tall fescue on soils that become too wet in winter and on rich soils during cold winter.

Released.—Not formally. Seed distributed by SCS in 1952.

Breeder Seed.—Plant Materials Center, SCS, Americus.

Fawn

Selected at Oregon Agricultural Experiment Station, Corvallis—R. V. Frakes and J. R. Cowan.

Source.—Named varieties and foreign introductions.

Method of Breeding.—Selection conducted in space-planted introduction nursery and clonal

tests. Progenies evaluated, and eight parental clones selected for high chromogen content, high crude protein, high seed yield, low self-fertility, and desirable phenotypic appearance. Included in comparative tests as Oregon Synthetic E.

Description.—More spring vigor, earlier maturity, and greater height in spring than Alta and Kentucky 31. In 1962 and 1963 produced 22 and 15 percent more forage, respectively, than Alta. Average seed yield for these 2 years exceeded that of Alta by 36 percent. Adapted for seed and forage production in Willamette Valley, Ore.

Released.—1964, by Oregon Agricultural Experiment Station.

Breeder Seed.—Oregon Agricultural Experiment Station.

Certified Seed.—Available in quantity.

Fortune

Selected at Oregon Agricultural Experiment Station, Corvallis—R. V. Frakes.

Source.—P.I. 231563 and P.I. 231564.

Method of Breeding.—Phenotypic selection from spaced-plant introduction nursery, followed by bulk progeny tests in turf plots of certain multiple-clone combinations. Experimental synthetic included six clones that traced to P.I. 231563 and one clone from P.I. 231564. Tested as Oregon-B tall fescue.

Description.—Turf type, dark green, fine leaves, and short-growing habit. Responds to 1½-inch clipping height and to high fertility. Shorter in height than other tall fescue varieties. Poor seedling vigor and lacking in persistence.

Released.—1968, by Oregon Agricultural Experiment Station.

Breeder Seed.—Oregon Agricultural Experiment Station.

Certified Seed.—Not available.

Goar

Selected at Imperial Valley Field Station, El Centro, Calif.—L. G. Goar.

Source.—Original material came from D. Dagen of Budapest, Hungary, to Professor Southworth of University of Manitoba, Winnipeg, Canada. Received by P. B. Kennedy of California Agricultural Experiment Station, Davis, in March 1925. Accession number T.O. 899.

Method of Breeding.—Planted at El Centro in 1941; tall fescue types selected. Seed of this type received from L. G. Goar by Plant Materials Center, SCS, Pleasanton, Calif., and assigned accession number P-13847. Tested there in cooperation with California Agricultural Experiment Station since 1946.

Description.—Early-maturing, vigorous, rather coarse bunchgrass, with high fertility level. Strong seedling vigor. Well adapted to heavy-textured alkaline soils. Grows better during periods of high summer temperature than do other strains of tall fescue.

Released.—Certified by California Crop Improvement Association in 1946.

Breeder Seed.—Plant Materials Center, SCS, Pleasanton, Calif.

Certified Seed.—Available in quantity.

Kenmont

Increased at Kentucky Agricultural Experiment Station, Lexington—E. N. Fergus and R. C. Buckner.

Source.—Naturalized variety from southeastern Kentucky. Distributed by Kentucky Agricultural Experiment Station for testing as Kentucky 59G1-32.

Description.—Similar in appearance to Kentucky 31, but appears to develop somewhat more dense sod; produced slightly higher yields, especially in older stand. Performed better than other varieties tested in Montana, particularly in mid-season.

Released.—1963, by Montana Agricultural Experiment Station, Bozeman.

Breeder Seed.—Montana Agricultural Experiment Station.

Certified Seed.—Available.

Kentucky 31

Increased at Kentucky Agricultural Experiment Station, Lexington—E. N. Fergus.

Source.—William Suiter's farm in Menifee County, Ky. Collected by E. N. Fergus in 1931 for testing at Kentucky Agricultural Experiment Station. Apparently grown on Suiter's farm since 1887.

Description.—Wide adaptation to soil types and temperature extremes. Suited to upper South, where remains green all year with occasional exception of midsummer months. Very productive, but not too palatable. Excellent for erosion control.

Released.—Kentucky Agricultural Experiment Station.

Certified Seed.—Available in quantity.

Kenwell (Reg. No. 5)

Selected at Kentucky Agricultural Experiment Station, Lexington, ARS cooperating—R. C. Buckner.

Source.—Naturalized strains collected in Kentucky.

Method of Breeding.—Selectively grazed plants selfed, and progenies evaluated in spaced-plant nurseries. Selections included in polycross nurseries, and progenies evaluated in sod plots for palatability. Synthetic based on three S₃ families 45-50, 42-33, and 61-48.

Description.—Characterized by improved palatability to livestock during summer and fall months and increased tolerance to leaf diseases. Although not so robust nor as strongly competitive as Kentucky 31 variety, it is considered to be satisfactory for vigor and forage yield; approximately 5 to 7 days later in flowering than Kentucky 31. Appears to be more compatible in mixtures with legumes than other named varieties.

Released.—1965, cooperatively by Kentucky Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Kentucky Agricultural Experiment Station.

Certified Seed.—Available in quantity.

Pennington 63-70

Selected by Pennington Grain & Seed, Inc., Madison, Ga.

Source.—Collection from 10-year-old stand of Alta tall fescue.

Method of Breeding.—Original collection grown in isolation nursery on the Pennington Grain & Seed, Inc., Research Farms in Morgan County, Ga. Superior plants were selected continually and increased from 1963 to 1970. Tested as 63-70 tall fescue.

Description.—Very stable to adverse changes in environment. Seed yield equal to Atla variety. Early maturing, vigorous; finer leaves than Alta or Kentucky 31; more luxurious green than Kentucky 31. Resistant to several foliar diseases. Appears well adapted to sod-type operations in Piedmont section of the Southeastern United States. Tends to have a shorter dormant season than Kentucky 31.

Released.—No. Distributed for testing. Consideration given to naming this variety, "Lawnpen."

Breeder Seed.—Pennington Grain & Seed, Inc.,

Festuca elatior L., meadow fescue

Cool-season bunchgrass from Europe. Used for pasture and erosion control in humid parts of Northern United States. Grows well on moist, fertile soils, but subject to rust damage. Neither

so high yielding nor so persistent as tall fescue. Varieties developed in Europe and elsewhere not generally adapted in United States.

Barbarossa

Developed by Barenbrug Holland N.V., Arnhem, Holland.

Source.—Collections from lawns, pastures, and other uncultivated areas.

Method of Breeding.—Selection and evaluation of individual plants, clones, and families.

Description.—Intermediate in maturity; rather broad leaves; persistent. Suitable for pastures on moist sites.

Released.—1956. Agency for U.S. and Canada—Steven J. R. Frohlich and Co., Princeton, N.J.

Breeder Seed.—Barenbrug Holland N.V.

Certified Seed.—Available.

Barkas

Developed by Barenbrug Holland N.V., Arnhem, Holland.

Source.—Collections from lawns, pastures, and other uncultivated areas.

Method of Breeding.—Selection and evaluation of individual plants, clones, and families.

Description.—Early heading, broad leaves, good tillering and yield. Suitable for meadows on moist sites.

Released.—1951. Agency for U.S. and Canada—Steven J. R. Frohlich & Co., Princeton, N.J.

Breeder Seed.—Barenbrug Holland N.V.

Certified Seed.—Available.

Ensign

Selected at Canada Department of Agriculture Research Station, Ottawa, Ontario—R. M. MacVicar.

Source.—Basic nursery established from seed lots obtained from various European sources.

Method of Breeding.—Synthetic variety built up by combining several desirable clones selected in selfed-line breeding program.

Description.—Tall, upright, uniform growth, leafy basal growth. Considered equal to most other strains in forage production; outstanding in seed production.

Released.—1944, by Canada Department of Agriculture.

Breeder Seed.—Canada Department of Agriculture Research Station, Ottawa, Ontario.

Certified Seed.—Available in quantity.

Festina

Developed by J. Joordens' Zaadhandel N.V., Venlo-Blerick, Holland.

Source.—Several varieties of meadow fescue.

Method of Breeding.—Doubling of chromosome number by treatment with colchicine.

Description.—Tetraploid; very dark green,

heavy seeds, and good rust resistance. A slow starter but grows rapidly 3 to 4 weeks after cutting; green yields and dry matter yields very good. Suitable for hay production for 2 to 3 years, but less suitable for pasture use.

Released.—J. Joordens' Zaadhandel N.V.

Breeder Seed.—J. Joordens' Zaadhandel N.V.

Certified Seed.—Distributed in United States by The Landis Co., Inc., Waupaca, Wis.

Mimer

Developed by Plant Breeding Institute, Weibullsholm, Landskrona, Sweden.

Source.—Indigenous plants.

Method of Breeding.—Mass selection. Breeder seed produced generation after generation in isolation under natural conditions. Considered to be in genetic equilibrium under these conditions. Undesirable plants rogued prior to anthesis. Seed of remaining plants bulked to form breeder seed.

Description.—Similar to Ensign and common in growth pattern; similar to Ensign in maturity, but more resistant to leaf rust; higher yielding than Ensign or common; although not as leafy as common, almost as high in percent protein.

Released.—Plant Breeding Institute, Weibullsholm. Introduced into Canada by Ontario Seed Cleaners and Dealers, Ltd., Toronto.

Breeder Seed.—Plant Breeding Institute, Weibullsholm.

Certified Seed.—Available.

S-215

Selected at the Welsh Plant Breeding Station, Aberystwyth, Wales, United Kingdom.

Source.—European accessions and Buckinghamshire stock.

Method of Breeding.—Mass selection.

Description.—Plants erect, fairly dense, broad leaves, slightly earlier in maturity than common types. Flowering stems are leafy and leaves retain green color well into flowering period. Hay type that furnishes fairly early spring grazing.

Released.—Welsh Plant Breeding Station.

Breeder Seed.—Welsh Plant Breeding Station.

Certified Seed.—Available.

Sturdy

Selected at University of Manitoba, Winnipeg—G. P. McRostie.

Source.—Introduction at Ontario Agricultural College, University of Guelph.

Method of Breeding.—Mass selection.

Description.—Selected for improved winter hardiness and yield. Somewhat taller than common types, but similar in maturity.

Released.—1936, by University of Manitoba.

Breeder Seed.—University of Manitoba.

Certified Seed.—Not available.

Trader

Selected at Canada Department of Agriculture Research Station, Ottawa, Ontario—R. M. MacVicar and D. R. Gibson.

Source.—Basic nursery established from European varieties and strains.

Method of Breeding.—Synthetic variety developed from 15 progeny-tested clones.

Description.—Leafy, somewhat later in maturity than common types. Good basal growth and recovery characteristics. Considerable resistance to leaf rust in comparison with common.

Released.—1963, by Canada Department of Agriculture.

Breeder Seed.—Canada Department of Agriculture Research Station, Ottawa, Ontario.

Certified Seed.—Available in limited quantity.

Festuca idahoensis Elmer, Idaho fescue

Cool-season, native bunchgrass found from Washington and Montana south to central California and Colorado. Prevalent at higher elevations in Montana, Idaho, and Utah. Valuable range grass, palatable in spring, cures well on stem, and makes good fall forage.

P-6435

Selected at Plant Materials Center, SCS, Pullman, Wash.—R. J. Olson and J. L. Schwendiman.

Source.—Collected from native Ponderosa pine-grassland association near Winchester, Idaho, by D. Hedrick in 1938.

Method of Breeding.—Accession outstanding among 61 collections. Improved by mass selection during several generations.

Description.—Vigorous, long-lived perennial; bunch-type fescue. Excellent seedling vigor, strong root system. Dark-green, basal, abundant leaves. Seed culms spreading, abundant, up to 36 inches in height. Large, awned seeds. Seed production much better than that of any strain previously found.

Released.—No. Distributed for testing.

Breeder Seed.—Plant Materials Center, SCS, Pullman.

Festuca ovina L., sheep fescue

Cool-season bunchgrass indigenous in Northern Hemisphere. Used as durable turfgrass on sandy soils and for erosion control in Northern States. Cold and drought tolerant; succeeds better than most grasses on sandy, gravelly soils. Grazed well in early spring, but not widely used for pasture.

P-274

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

Source.—P.I. 109497; south of Konya, Turkey; introduced by Westover-Enlow expedition in 1934.

Method of Breeding.—Selections from spaced plantings in which aberrant types eliminated.

Description.—Dwarf, blue green, densely tufted, erect growing, with abundant fine stems. Leaves dense, short, stiff, harsh, abundant, basal. Adapted to dry sites in 8- to 14-inch rainfall areas and at high altitudes.

Released.—No.

Breeder Seed.—Plant Materials Center, SCS Pullman.

Festuca ovina var. *duriuscula* (L.) Koch, hard fescue

Cool-season bunchgrass from Europe. Useful in erosion control and soil improvement in parts of Pacific Northwest. Tougher leaves and less drought tolerant than sheep fescue.

C-26

Selected at NVH Mommersteegs, Vlijmen, Holland—W. A. Eschauzier.

Source.—Plant collections made in Europe.

Method of Breeding.—Selections screened for uniformity of texture and flowering and growth

habit. Fourteen clones selected on the basis of performance in polycross progeny tests.

Description.—Synthetic with moderate to high resistance to *Sclerotinia homeocarpa* and *Helminthosporium* spp. Seedling development slower than red and Chewings fescue. Forms low growth profile, has good tolerance to shade and high summer temperatures.

Released.—NVH Mommersteegs.

Breeder Seed.—NVH Mommersteegs.

Certified Seed.—Not available. (Distributed in the United States by O. M. Scott & Sons Co.)

Durar (Reg. No. 4)

Selected at Plant Materials Center, SCS, Pullman, Wash.—V. B. Hawk and J. L. Schwendiman.

Source.—Collected from old planting on Eastern Oregon Branch Experiment Station, Union, in 1934 by V. B. Hawk.

Method of Breeding.—Mass selection for several generations. Increased for field testing as P-2517.

Description.—Tall, semierect, densely tufted, perennial bunchgrass. Differs from sheep fescue in its smoother, wider, longer, firmer leaf blades. Large form of sheep fescue; closely related to Chewings fescue, but more drought resistant and more densely tufted. Heavy root producer, shade

tolerant. Basal, harsh foliage. Consistently high seed production. Primary use is for soil protection on roadsides and ditchbanks and as soil-improvement understory grass in orchards. In mixtures with alfalfa for hay, it is very heavy root producer. Widely adapted to rainfall areas of 14 to 30 inches and to well-drained irrigated soil.

Released.—1949 as P-2517, cooperatively by Washington, Idaho, and Oregon Agricultural Experiment Stations at Pullman, Moscow, and Corvallis, respectively, and Plant Materials Center, SCS, Pullman. Named "Durar" in 1963.

Breeder Seed.—Plant Materials Center, SCS, Pullman.

Certified Seed.—Available in quantity.

Festuca rubra L., red fescue

Important cool-season, sod-forming grass introduced from Europe. Used for lawns, general-purpose turf, and erosion control. Occurs in pastures in Northern States and Pacific Northwest in relatively moist, cool areas. Grows over wide range of soil types; valued for its shade tolerance. Not highly palatable.

Description.—Rather late maturing; soft, green-colored leaves; suitable for lawns.

Released.—1965. Agency for U.S. and Canada—Steven J. R. Frohlich & Co., Princeton, N.J.

Breeder Seed.—Barenbrug Holland N.V.

Certified Seed.—Available.

Arctared

Selected at Alaska Agricultural Experiment Station, ARS cooperating.

Source.—Single plant collected in 1957 from Matanuska Valley near Palmer.

Method of Breeding.—Open-pollinated seed harvested from superior plants in space-plant progeny test of collections; used to establish turf evaluation test. Variety traces to open-pollinated seed from a number of plants within single progeny.

Description.—Outstanding winter hardiness—surviving without injury when all introduced varieties were damaged very seriously or completely eliminated. Produces dense, medium-textured turf; medium green. Good establishment, excellent seedling vigor, and early spring growth; no disease problems observed at Palmer.

Released.—1965, cooperatively by University of Alaska and Plant Science Research Division, ARS.

Breeder Seed.—Alaska Agricultural Experiment Station.

Certified Seed.—Available in limited quantities.

Bargena

Developed by Barenbrug Holland N.V., Arnhem, Holland.

Source.—Collections from lawns, pastures, and other cultivated areas.

Method of Breeding.—Selection and evaluation of individual plants, clones, and families.

Boreal (Reg. No. 6)

Selected at Canada Department of Agriculture Research Station, Beaverlodge, Alberta—C. R. Elliott.

Source.—Commercial seed fields in Peace River region of Alberta, that were seeded 10 to 15 years earlier to Olds variety.

Method of Breeding.—Open-pollinated seed of 300 lines used to establish progeny test. Ratings taken on seedling vigor, winter injury, uniformity, disease resistance (primarily leaf rusts), and seed and herbage yields. The 36 top-yielding clones with similar maturity included in polycross nursery. Equal quantities of seed from each clone used to establish breeder seed plot.

Description.—More uniform and stronger creeper than Olds and Duraturf varieties. In western Canada produces 12 percent more seed and 11 percent more herbage than Olds. Good seedling vigor, early spring growth, recommended for turf and pasture.

Released.—1966, by Canada Department of Agriculture.

Breeder Seed.—Canada Department of Agriculture Research Station, Beaverlodge, Alberta.

Certified Seed.—Available.

Clatsop

Selected at Astoria Nursery Unit, SCS, Warrenton, Oreg., in cooperation with Oregon Agricultural Experiment Station, Corvallis—R. L. Brown.

Source.—Maritime race collected from sandy plain at Florence, Oreg., in 1939.

Method of Breeding.—Seed collected from single plant in space-planted nursery. Increased under isolation as P-7153.

Description.—Narrow leaved, dark green, moderately tall, moderately rhizomatous. High forage and seed yield. Remains green throughout summer, hence fire resistant. No evidence of susceptibility to common diseases; cold tolerant.

Released.—No. Used in comparative strain tests in Western States. Used for permanent grass cover on stabilized coastal dunes in Oregon.

Breeder Seed.—Plant Materials Center, SCS, Corvallis.

Dawson

Developed by the Sports Turf Research Institute, Bingly, England.

Source.—Old English lawn.

Method of Breeding.—Selection of plants from old turf. Progeny from selected plants tested for turf quality.

Description.—Short-rhizome type, with open-bladed, dark-green leaves. In lawns, forms fine-leaved, dense turf.

Released.—1968, by D. J. van der Have.

Breeder Seed.—D. J. van der Have, Netherlands.

Certified Seed.—OECD certified (Northrup, King & Co.).

Duraturf

Selected at Canada Department of Agriculture Research Station, Ottawa, Ontario.—R. M. MacVicar.

Source.—Scandinavian material.

Method of Breeding. Mass selection.

Description.—Comparatively uniform, with dense bottom growth. Outstanding attribute is seed-producing ability. Because of uniformity, somewhat easier to harvest than more variable varieties.

Released.—1943, by Canada Department of Agriculture.

Breeder Seed.—Canada Department of Agriculture Research Station, Ottawa, Ontario.

Certified Seed.—Available.

Durlawn

Selected at Canada Department of Agriculture Research Station, Ottawa, Ontario.—R. M. MacVicar and D. R. Gibson.

Source.—European collections.

Method of Breeding.—A 20-clone synthetic de-

rived from an initial group of some 200 selections. Final testing and evaluation was on second- and third-generation material.

Description.—A leafy variety with a relatively strong creeping habit. Leaves wide, deep-green color held throughout growing season; good resistance to leaf spot; acceptable seedling growth and establishment. Recovers well after defoliation; forms dense sod, especially in combination with other grasses.

Released.—1970, by Canada Department of Agriculture.

Breeder Seed.—Canada Department of Agriculture Research Station, Ottawa, Ontario.

Certified Seed.—Not available. Projected for 1974.

Q

Illahoe (Reg. No. 2)

Selected at Oregon Agricultural Experiment Station, Corvallis, ARS cooperating—H. A. Schoth.

Source.—Seed lot imported in 1937 from England by Oscar Loe, Silverton, Oreg.

Method of Breeding.—Comparative tests at Corvallis and Beltsville, Md.

Description.—Turf variety, with fine stems and leaves, slow rate of spread. Produces dense, uniform, fine-textured turf. At Beltsville established more rapidly from fall seeding and more cold tolerant than five varieties of red fescue, including Oregon-grown commercial, with which it was compared.

Released.—1950, cooperatively by Oregon Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Oregon Agricultural Experiment Station.

Certified Seed.—Available in quantity.

Olds

Selected at School of Agriculture, Olds, Alberta, Canada—James Murray.

Source.—Introduction received in 1932 from Czechoslovakia.

Description.—Growth habit erect to spreading; perennial with short rootstalks. Few fertile shoots 35 to 60 cm. tall; relatively numerous long-leaved sterile shoots. Hardy to temperatures common throughout western Canada. Moderately drought tolerant. Not subject to disease in Alberta. Recommended for use in lawns, fairways, pastures, and for soil conservation.

Released.—School of Agriculture, Olds.

Breeder Seed.—Not available. (Discontinued 1967.)

Certified Seed.—Available.

Pennlawn (Reg. No. 3)

Selected at Pennsylvania Agricultural Experiment Station, University Park—H. B. Musser.

Source.—Individual plants selected from university golf-course fairways. This turf seeded approximately 30 years previously with seed of European origin.

Method of Breeding.—Screening tests of source material received from England, Hungary, Canada, and United States. Sod plugs collected from established turf and included in tests. Turf-quality tests of approximately 50 strains established at University Park and Beltsville, Md. Three superior strains (on basis of data from two locations) isolated for increase. Strains identified as F-55(38), F-74(38), and F-78(38).

Description.—Synthetic variety; produces better turf than any of original parents. Not immune to leaf spot diseases, but decidedly tolerant of them; not attacked severely and recovers rapidly. Good foliage density, rapid spread, ability to withstand close clipping.

Released.—1954, by Pennsylvania Agricultural Experiment Station.

Breeder Seed.—Pennsylvania Agricultural Experiment Station.

Certified Seed.—Available in quantity.

Rainier

Selected at Oregon Agricultural Experiment Station, Corvallis, ARS cooperating—H. A. Schoth.

Source.—Accession received in 1938.

Description.—High seed yielder, stiff stems, good turf developer, long lived, uniform dark green, rapid grower. Resistant to common leaf, stem, and head diseases in Pacific Northwest.

Released.—1944, cooperatively by Oregon Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Not available.

Certified Seed.—Available in quantity.

Reptans

Developed by Plant Breeding Institute, Weibullsholm, Landskrona, Sweden.

Source.—Collections from southern Sweden.

Method of Breeding.—Mass selection.

Description.—Dark green, good spread, and reported as resistant to *Helminthosporium* and *Fusarium* in Sweden. In Canada, equal to Olds variety in hardiness, recovery after cutting, color, and

disease resistance and superior in seedling vigor. Apparently well adapted in northern Alberta and British Columbia.

Released.—Plant Breeding Institute, Weibullsholm. (Distributed in Canada by Ontario Seed Cleaners and Dealers, Ltd.)

Breeder Seed.—Plant Breeding Institute, Weibullsholm.

Certified Seed.—Available in Canada.

Ruby

Developed by D. J. van der Have, Netherlands.

Source.—Collection of Western European varieties.

Method of Breeding.—Plants evaluated for creeping character and plant type, and polycross progeny evaluated under turf conditions. Plants screened for rust resistance, summer color, and turf quality. Six clones selected to form synthetic variety.

Description.—Vigorous growth, rather broad leaves, long rhizomes. Open, creeping habit produces a more open sod than Pennlawn and comparable varieties. Characterized by rapid seedling establishment and excellent shade tolerance.

Released.—1967, by D. J. van der Have.

Breeder Seed.—D. J. van der Have.

Certified Seed.—Not available. (Available through Northrup, King & Co.)

Wintergreen

Selected at Michigan Agricultural Experiment Station, East Lansing—F. C. Elliott.

Source.—Plant introductions from the Netherlands.

Method of Breeding.—Original clones selected for vigor, adaptation, and good color and established in polycross nursery. Polycross progeny evaluated in experimental turf tests. A four-clone synthetic developed on basis of progeny performance.

Description.—Not strong creeper; creeping tendency similar to Pennlawn. Deep, dark green in color especially striking during late fall. Texture finer than that of Pennlawn. Comparable with Pennlawn in disease resistance, but produces better turf with less fertilizer and water.

Released.—1968, by Michigan Agricultural Experiment Station.

Breeder Seed.—Released exclusively to Northrup, King & Co.

Certified Seed.—Available in 1971 or 1972.

Festuca rubra var. *commutata* Gaud., Chewings fescue

Cool-season bunchgrass from Europe. Used for lawns and general-purpose turf in humid Northern States. Growth habit more erect than red fescue.

Barfalla

Developed by Barenbrug Holland N.V., Arnhem, Holland.

Source.—Collections from lawns, pastures, and other uncultivated areas.

Method of Breeding.—Selection and evaluation of individual plants, clones, and families.

Description.—Very narrow leaves, leaf sheath red, very dense turf. Resistant to *Corticium fuci-forme* and rust. Requires less mowing than other varieties. Suitable for lawns and roadsides.

Released.—1968. Agency for U.S. and Canada—Steven J. R. Frohlich & Co., Princeton, N.J.

Breeder Seed.—Barenbrug Holland N.V.

Certified Seed.—Available.

Cascade

Increased at Oregon Agricultural Experiment Station, Corvallis—R. V. Frakes.

Source.—Oregon-grown common Chewings fescue.

Method of Breeding.—Seed selected from 16 fields of common Chewings, tracing to the New Zealand source, and carefully examined for Chewings seed characteristics. Equal amounts of seed from 12 sources used to establish basic seed for authentic source of Chewings fescue.

Description.—Does not creep, dark green, fine leaved; responds to 1½-inch clipping height and high soil fertility. Produces desirable, durable, high-quality turf that is comparable with authentic sources of Chewings fescue.

Released.—1966, by Oregon Agricultural Experiment Station.

Breeder Seed.—Oregon Agricultural Experiment Station.

Certified Seed.—Available in quantity.

Golfrood

Developed by D. J. van der Have, Kapelle-Biezeling, Holland.

Source.—Original material collected from saline soil areas along the North Sea coast of the islands in southwestern Holland.

Method of Breeding.—Plants selected for resistance to rust, narrow leaves, fresh green color, and superior turf quality. Evaluated on basis of clonal tests and progeny performance.

Description.—Develops dense turf through high tillering capacity and development of short

rhizomes. Fine leaved with slightly improved mowing characteristics; retains green color under mild winter conditions; and salt tolerant.

Released.—1940, by D. J. van der Have.

Breeder Seed.—D. J. van der Have.

Certified Seed.—Available. (Distributed by Northrup, King & Co.)

Highlight

Developed by Gebr. van Engelen, Zaadteelt en Zaadhandel N.V., Vlijmen, Holland.

Description.—An attractive variety, well adapted for turf purposes in western Europe.

Released.—Gebr. van Engelen.

Breeder Seed.—Gebr. van Engelen.

Certified Seed.—Available.

Jamestown

Selected at Rhode Island Agricultural Experiment Station, Kingston—J. A. Defrance and C. R. Skogley.

Source.—Selection from abandoned green, Beavertail Golf and Country Club, Jamestown, R.I., October 1945.

Method of Breeding.—Comparative tests from first-generation seed. Parent material maintained vegetatively. Distributed for testing as Rhode Island 6.

Description.—Fine leaves and stems, dark green, uniform appearance, good vigor. Will tolerate closer mowing than red fescues. Has maintained excellent density in pure stand for many seasons at cutting heights from ¾ to 1½ inches. Widely adapted.

Released.—1966, by Rhode Island Agricultural Experiment Station.

Breeder Seed.—Rhode Island Agricultural Experiment Station.

Certified Seed.—Available.

Menuet

Developed by J. Joordens' Zaadhandel, Venlo-Blerick, Holland.

Source.—Plants collected from old pastures.

Method of Breeding.—Mass selection.

Description.—Very fine leaves, light green, and disease resistant. Forms dense turf that holds its color throughout growing season and into the winter.

Released.—J. Joordens' Zaadhandel.

Breeder Seed.—J. Joordens' Zaadhandel.

Certified Seed.—Available. (Distributed by The Landis Co., Inc., Waupaca, Wis.)

***Festuca tenuifolia* Sibth.**
[*F. ovina* var. *tenuifolia* (Sibth.) Dum.], slender fescue

Cool-season bunchgrass from Europe. Fine, hairlike leaves, dense growth, adapted to dry, poor soils. Adapted for use in shady lawns.

Barok

Developed by Barenbrug Holland N.V., Arnhem, Holland.

Source.—Collections from lawns, pastures, and other uncultivated areas.

Method of Breeding.—Selection and evaluation of individual plants, clones, and families.

Description.—Very narrow leaved, drought resistant, requires minimum mowing. Suitable for roadsides on sandy soils.

Released.—1964. Agency for U.S. and Canada—Steven J. R. Frohlich & Co., Princeton, N.J.

Breeder Seed.—Barenbrug Holland N.V.

Certified Seed.—Available.

***Hilaria belangeri* (Steud.) Nash, curly mesquite**

Warm-season, stoloniferous, native grass. Distributed from central Texas to Arizona and south to Central America. Valuable range grass in Texas; grows on dry, deep clay to gravelly or

rocky soils. Drought resistant; tolerates close grazing. Palatable; cures well on stem. Varieties not available.

***Hilaria jamesii* (Torr.) Benth., galleta**

Slightly spreading, native grass. Found from Wyoming and Nevada south to California and western Texas. Produces good forage yields in New Mexico and Arizona. Palatable during sum-

mer growing season, but harsh and unpalatable after growth ceases. Spreads by rhizomes under favorable conditions. Drought resistant; tolerant to heavy grazing. Varieties not available.

***Hilaria mutica* (Buckl.) Benth., tobosa**

Warm-season, slightly spreading, native grass. Distributed from western Texas to Arizona and south into Mexico. Most abundant in southern New Mexico and Arizona, especially on heavy soils

subject to flooding in rainy season. Moderately palatable during growing season, but dry and tough after growth ceases. Varieties not available.

***Lolium-Festuca* derivatives**

Hybrids derived from crosses involving *Lolium multiflorum* × *Festuca arundinacea*, *L. perenne* × *F. arundinacea*, and *L. perenne* × *F. elatior* outcrossed to *F. arundinacea*. Other combinations may be used in producing hybrids between these two genera.

genies of amphiploids segregating for chromosome number were screened for stable 42-chromosome plants that exhibited hybrid characteristics. The experimental variety is a synthetic of the polycross progenies of eleven 42-chromosome derivatives.

Ky. Experimental 06G1-296

Selected at Kentucky Agricultural Experiment Station, Lexington, ARS cooperating—R. C. Buckner and P. B. Burrus II.

Source.—F₁ hybrids between *Lolium multiflorum* (2n=14) × *Festuca arundinacea* (2n=42).

Method of Breeding.—Amphiploids (2n=56) were produced by colchicine treatment of the F₁ hybrid (2n=28) of annual ryegrass × tall fescue. Additional 56-chromosome plants were developed by pollinating the F₁ hybrid with pollen from colchicine-induced amphiploids (2n=56). Pro-

Description.—The hybrid derivative has seedling vigor about equal to annual ryegrass, good drought tolerance, and better winter color than tall fescue. It produced about 30 percent more dry matter than Kentucky 31 during both summer and fall of 1969, and was 35 percent better grazed by cattle than Kenwell during this same period. Preliminary studies indicate that it is superior to tall fescue in crude protein, total sugar content, and in vitro digestibility.

Released.—No. Included in regional testing program.

Breeder Seed.—Kentucky Agricultural Experiment Station.

***Lolium multiflorum* Lam., Italian ryegrass**
(also *L. multiflorum* × *L. perenne* and *L. multiflorum* × *L. rigidum* Gaud.)

Major cool-season annual from Europe. Grown principally in Pacific Coast States west of Cascades and as winter annual in Southern United States. Used for pasture, hay, silage, cover crop, temporary lawns, and overseeding warm-season turfgrasses in Southern United States. Yields well on productive soils; palatable; tolerates heavy grazing. Subject to winterkilling in Northern States. Some common seed sources represent genetic mixtures of Italian and perennial ryegrass; hybrids between these two species used in developing improved varieties, which behave as short-lived perennials.

Astor

Selected at John Jacob Astor Branch Experiment Station, Astoria, Oreg.

Source.—Roskilde from Danish Farmers Seed Growers Association in Otoftgaard, Taastrup, Denmark.

Method of Breeding.—Seed obtained in 1954 was planted in 1955. Superior surviving plants in original planting increased vegetatively in 1959 and seed harvested for testing.

Description.—Superior in forage yield to other varieties of *Lolium multiflorum* at John Jacob Astor Branch Experiment Station. Considered to be well adapted to coastal areas of Oregon and southwestern Washington. Seed will be increased on limited generation basis.

Released.—1964, by Oregon Agricultural Experiment Station, Corvallis.

Breeder Seed.—Oregon Agricultural Experiment Station.

Certified Seed.—Available in limited amounts.

Aubade

Developed by J. Joordens' Zaadhandel N.V., Venlo-Blerick, Holland.

Source.—Old variety Landras.

Method of Breeding.—Doubling the number of chromosomes with colchicine.

Description.—Early-heading tetraploid; very dark green, abundant leaves, and heavy, thick and rather short seeds. Very high green- and dry-matter yields, good recovery, and good rust resistance.

Released.—J. Joordens' Zaadhandel N.V.

Breeder Seed.—J. Joordens' Zaadhandel N.V.

Certified Seed.—Available. (Distributed by The Landis Company, Inc., Waupaca, Wis.).

Barmultra

Developed by Barenbrug Holland N.V., Arnhem, Holland.

Source.—Collections from lawns, pastures, and other uncultivated areas.

Method of Breeding.—Selection and evaluation of individual plants, clones, and families.

Description.—Late-heading tetraploid; extensive and fibrous root system; quick recovery after grazing or cutting; resistant to mildew and various races of rust. High digestibility and high soluble carbohydrate content.

Released.—1963. Agency for U.S. and Canada—Steven J. R. Frohlick & Co., Princeton, N.J.

Breeder Seed.—Barenbrug Holland N.V.

Certified Seed.—Available.

Florida Rust Resistant

Selected at North Florida Experiment Station, Quincy—T. E. Webb and W. H. Chapman.

Source.—Selections from domestic ryegrass and introductions.

Method of Breeding.—Mass selection.

Description.—Rapid developing. Rust resistant, with about 90 percent of plants highly resistant to rust. Earlier in maturity than Gulf and much earlier than common ryegrass. Good seed producer, possessing slender seedheads that are unusually weak, as is typical of many improved varieties.

Released.—1965, by Florida Agricultural Experiment Station.

Breeder Seed.—North Florida Experiment Station, Quincy.

Certified Seed.—Available.

Gulf (Reg. No. 8)

Increased at Texas A&M University Agricultural Research and Extension Center, Beaumont, Tex., ARS cooperating—R. M. Weihing.

Source.—P.I. 193145, introduction of La Estanzuela 284 received from Uruguay.

Method of Breeding.—Comparative tests.

Description.—See La Estanzuela 284. Introductions varied in percentage of rust-resistant plants and in earliness. P.I. 193145 performed very well at Beaumont; relatively uniform as to maturity; relatively high percentage of rust-resistant plants.

Released.—1958, cooperatively by Texas Agricultural Experiment Station, College Station, and Plant Science Research Division, ARS.

Breeder Seed.—Agricultural Research and Extension Center, Beaumont.

Certified Seed.—Available.

Jolanda

Developed by J. Joordens' Zaadhandel N.V., Venlo-Blerick, Holland.

Method of Breeding.—Selection in tetraploid material.

Description.—Medium-late heading; tetraploid; rather dark green; good rust resistance; and heavy, normal-shaped seeds. Gives high green yield and good dry-matter yield in first, second, and third cut.

Released.—J. Joordens' Zaadhandel N.V.

Breeder Seed.—J. Joordens' Zaadhandel N.V.

Certified Seed.—Not available. (Distributed by The Landis Co., Inc., Waupaca, Wis.)

La Estanzuela 284

Selected at La Estanzuela Experiment Station, Colonia, Uruguay.

Description.—Annual. Exhibits appreciable amount of rust resistance. Relatively early. More susceptible to cold injury than domestic ryegrass.

Released.—In commercial production in Uruguay. Several accessions important in ryegrass-breeding programs in United States. These include T.O. 1882, obtained by R. M. Love, California Agricultural Experiment Station, Davis; P.I. 193145, obtained by O. S. Aamodt, Plant Science Research Division, ARS, Beltsville, Md.; and P.I. 201980, presented by Albert Boerger, La Estanzuela, Colonia.

Certified Seed.—Not available in United States.

Magnolia (Reg. No. 15)

Selected at Delta Branch Experiment Station and Mississippi Agricultural Experiment Station, State College, ARS cooperating—H.W. Bennett and H. W. Johnson.

Source.—P.I. 194395 introduced from Uruguay (contained 35 percent rust-resistant plants when random population of seedlings inoculated in greenhouse). P.I. 201980, introduction of La Estanzuela 284, obtained from Uruguay (contained 51 percent rust-resistant plants). Other accessions were P.I. 194394 and 193145, and T.O. 1882.

Method of Breeding.—Selfing and progeny testing after artificial inoculation with crown rust was conducted at Stoneville and State College, Miss. Seedlings that remained rust-free were transplanted to the field, and the cycle continued with selections resistant to rust and leaf spot. Several rust-resistant experimental synthetics were developed at both locations. State College No. 7 and

Stoneville No. 3 were selected on the basis of yield, comparable maturity, and rust resistance, and equal quantities of seed blended for production of breeder seed. State College No. 7 and Stoneville No. 3 are maintained as separate entities, and equal quantities of seed are blended to provide new plantings for breeder-seed production.

Description.—Similar in appearance to common annual ryegrass and comparable in maturity; high yielding and highly resistant to rust; well adapted in Mississippi and adjacent States. Roots of one-quarter to one-half of the seedings give negative reaction when tested for fluorescence; this suggests inclusion in the original introductions of natural crosses between annual and perennial ryegrass.

Released.—1965, cooperatively by Mississippi Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Mississippi Agricultural Experiment Station.

Certified Seed.—Available.

NK-T2

Developed by Northrup, King & Co.

Source.—Gulf ryegrass.

Method of Breeding.—Chromosome number doubled with colchicine. Selection began in the C3 generation for early winter and total forage yield, resistance to rust and *Helminthosporium* leaf spot. Superior families combined to form synthetic variety.

Description.—Semiupright, dark-green, broad-leaved plants. Increased winter hardiness and leaf-disease resistance in comparison with Gulf. Approximately 2 weeks later flowering than Gulf in Southeastern United States.

Released.—1969, by Northrup, King & Co.

Breeder Seed.—Northrup, King & Co.

Certified Seed.—Not available.

NK-T3

Developed by Northrup, King & Co.

Source.—Gulf ryegrass.

Method of Breeding.—Chromosome number doubled with colchicine. Selection began in the C3 generation for forage yield, resistance to rust and *Helminthosporium* leaf spot and vigor. Most winter-hardy plants combined as the basis for a synthetic variety.

Description.—Semiupright, dark-green, wide-leaved plants. Increased winter hardiness and winter growth. Good resistance to rust and *Helminthosporium* leaf spot. Flowering about 2 weeks later than Gulf.

Released.—1969, by Northrup, King & Co.

Breeder Seed.—Northrup, King & Co.

Certified Seed.—Not available.

NK-T4

Developed by Northrup, King & Co.

Source.—Dutch Westerwolths ryegrass.

Method of Breeding.—Tetraploid material developed through the use of colchicine. Selection began in the C3 generation for early winter growth and total forage yield. Also for very leafy plant type.

Description.—Lax leaved, leafy, semidecumbent growth habit. Leaves broad, dark green, and rather soft. Characterized by vigorous establishment and early growth; about 3 weeks later flowering than Gulf in the Southeastern United States.

Released.—1969, by Northrup, King & Co.

Breeder Seed.—Northrup, King & Co.

Certified Seed.—Not available.

Pennington 69-10

Developed by Pennington Grain and Seed Inc., Madison, Ga.—Brooks Pennington.

Source.—Collection made in 1963 from volunteer stand of annual ryegrass in Ciudad Mante area, Tamaulipas, Mexico.

Description.—Exhibits great tolerance to rust. No more susceptible to cold injury than Oregon-grown annual ryegrass. Uniform as to maturity; maturing about 7 days earlier than Gulf. Excellent seedling vigor, bright green, leaves slightly finer than Gulf. Adapted for overseeding golf courses and lawns, as it tends to give less competition to permanent grasses in spring.

Released.—No. Included in testing programs.

Breeder Seed.—Pennington Grain and Seed Inc.

Promenade

Developed by J. Joordens' Zaadhandel N.V., Venlo-Blerick, Holland.

Method of Breeding.—Selection in tetraploid material.

Description.—Late-heading tetraploid that is very leafy and dark green; resistant to rust. Seeds heavy and normal in shape. Produces high green and good dry-matter yields. The second and third cuts are relatively better than the first.

Released.—J. Joordens' Zaadhandel N.V.

Breeder Seed.—J. Joordens' Zaadhandel N.V.

Certified Seed.—Not available. (Distributed by The Landis Company, Inc., Waupaca, Wis.)

Tetrone

Developed by D. J. van der Have, The Netherlands.

Source.—Superior diploid families previously selected from a collection of western European varieties.

Method of Breeding.—Seed of good diploid families treated with colchicine to develop basic tetraploid material. During C1 through C4 generations, families established as spaced plants. Forage-yield trials conducted on C5 families, and best 33 families selected for production of breeder seed.

Description.—Upright growth habit; broad dark-green leaves; good resistance to rust and *Helminthosporium* leaf spot. Rather slow early season growth; tends to go dormant during cold weather; very winter hardy. Produces substantial growth during spring and is about 4 weeks later flowering than Gulf in the Southeastern United States.

Released.—1963, by D. J. van der Have.

Breeder Seed.—D. J. van der Have.

Certified Seed.—OECD Certified.

Tifton 1

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—Homer Wells.

Source.—Westerwold's ryegrass.

Method of Breeding.—Five plants that appeared to be immune to rust selected from artificial inoculation tests. Progenies screened for rust in artificial tests; selections made to repeat cycle. Field selection for resistance to leaf spot diseases.

Released.—No. Included in regional testing program.

Breeder Seed.—Georgia Coastal Plain Experiment Station.

Wimmera 62 (Reg. No. 11)

Selected at Plant Materials Center, SCS, Pleasanton, Calif.—H. W. Miller and O. K. Hoglund.

Source.—Naturalized in Wimmera-Mallee areas of Victoria, Australia. Possibly hybrid between *Lolium rigidum* and *L. multiflorum*. Seed obtained from F. H. Brunning, Ltd., Melbourne, Australia.

Method of Breeding.—Natural selection and roguing for 13 generations at Plant Materials Center, SCS, Pleasanton. Increased at Plant Materials Center, SCS, Pleasanton, and SCS Nursery, San Fernando, Calif., as P-11419.

Description.—Awnless, deep bright green, erect, early-maturing annual. Tends to lodge first year in brush-burn seedings. Uniform in appearance, leafy, with numerous culms. Provides rapid temporary cover for erosion control. Useful as self-perpetuating cover crop in irrigated orchards and vineyards. No advantage over common ryegrass in areas of high humidity, on fertile soils where rainfall exceeds 12 inches annually, or above 2,000 feet in elevation.

Released.—1962, cooperatively by California Agricultural Experiment Station, Davis, and Plant Materials Center, SCS, Pleasanton.

Breeder Seed.—Plant Materials Center, SCS, Pleasanton.

Certified Seed.—Available.

Lolium perenne L., perennial ryegrass

Important cool-season bunchgrass from Europe. Well adapted in Pacific Northwest. Widely used in mixtures for pasture, hay, lawns, and erosion control. Does best in cool, moist regions with mild winters; grows well on heavy soils; tolerates heavy grazing. Nutritious, palatable. Not recommended as lawngrass.

Barenza

Developed by Barenbrug Holland N.V., Arnhem, Holland.

Source.—Collections from lawns, pastures, and other uncultivated areas.

Method of Breeding.—Selection and evaluation of individual plants, clones, and families.

Description.—Very late heading; good tillering; high-yielding diploid; good persistence and winter hardiness. Used in many countries for pasture, athletic fields, and coarse turf.

Released.—1949. Agency for U.S. and Canada—Steven J. R. Frohlich & Co., Princeton, N.J.

Breeder Seed.—Barenbrug Holland N.V.

Certified Seed.—Available.

Game

Developed by J. Joordens' Zaadhandel N.V., Venlo-Blerick, Holland.

Source.—Collections from old pastures.

Method of Breeding.—Selections made following 3 years of cutting with a lawnmower.

Description.—Fine leaved, dense growing, and early heading; holds green color under dry conditions and close mowing.

Released.—J. Joordens' Zaadhandel N.V.

Breeder Seed.—J. Joordens' Zaadhandel N.V.

Certified Seed.—Not available. (Distributed by The Landis Co., Inc., Waupaca, Wis.)

Linn

Selected at Oregon Agricultural Experiment Station, Corvallis.

Source.—Introduced from New Zealand in 1928. Original introduction grown on one farm for 4 years; seed harvested to establish plantings on two farms where this particular source grown since 1932.

Method of Breeding.—Source identified and selected for certification on basis of field inspections and comparative tests. Linn 1 and Linn 2

refer to two experimental seed lots subsequently bulked for seed production because they were comparable in seed-producing potential.

Description.—Representative of best Oregon perennial types. Good seed yield and typical perennial characteristics. Increased on limited generation basis with two classes of seed—registered and certified.

Released.—1961, by Oregon Agricultural Experiment Station.

Breeder Seed.—Oregon Agricultural Experiment Station. (Registered seed class produced on approved farms.)

Certified Seed.—Available.

Manhattan (Reg. No. 18)

Selected at New Jersey Agricultural Experiment Station, New Brunswick—C. R. Funk, R. E. Engel, and P. M. Halisky.

Source.—Primarily plants collected in Central Park, New York City, N.Y.

Method of Breeding.—Polycross progenies of clones selected from old turf areas and spaced-plant nurseries evaluated under turf maintenance. Sixteen plants selected to produce synthetic variety.

Description.—Leafy, late-flowering, persistent, turf-type that produces an attractive, moderately dark-green turf of finer texture and greater density than common perennial ryegrass.

Released.—1967, by New Jersey Agricultural Experiment Station.

Breeder Seed.—New Jersey Agricultural Experiment Station.

Certified Seed.—Available in quantity.

Massa

Developed by J. Joordens' Zaadhandel N.V., Venlo-Blerick, Holland.

Source.—Late-maturing varieties.

Method of Breeding.—Selection among colchicine-induced tetraploids.

Description.—Late-heading, rust-resistant tetraploid with a rather erect growth habit and very dark green color. Produces abundant growth and very good regrowth. Not suitable for lawns.

Released.—J. Joordens' Zaadhandel N.V.

Breeder Seed.—J. Joordens' Zaadhandel N.V.

Certified Seed.—Not available. (Distributed by The Landis Co., Inc., Waupaca, Wis.)

NK Experimental K9-124

Developed by Northrup, King & Co., Minneapolis, Minn.

Source.—From old lawn consisting primarily of 01-56 perennial ryegrass.

Method of Breeding.—Three cycles of selection in spaced-plant nursery for winter persistence and freedom from crown rust and leaf diseases. Turf evaluations conducted by families. Four semiupright, narrow-leaved plants selected for synthetic.

Description.—Uniform, dark green, semiupright, with improved summer turf quality and mowing characteristics. Produces fine-textured, winter-hardy turf.

Released.—No.

Breeder Seed.—Northrup, King & Co.

NK-100

Developed by Northrup, King & Co., Minneapolis, Minn.

Source.—S-23 × Oregon perennial ryegrass.

Method of Breeding.—Mass selection for persistence, leafy growth habit, and seed production, with some selection for rust tolerance. Tested under turf conditions with emphasis on winter and summer persistence, turf quality, and color. Synthetic variety maintained by harvesting seed from approximately 100 typical plants out of breeder's field.

Description.—Heavy tillering, leafy, medium-late variety. Leaves slightly narrower than those of Oregon perennial ryegrass and bright green. Very good tolerance to summer heat and improved tolerance to drought and winter injury. Produces above-average turf in areas where perennial ryegrass is adapted.

Released.—1962, by Northrup, King & Co.

Breeder Seed.—Northrup, King & Co.

Certified Seed.—Not available. (Available commercially.)

NK-101

Developed by Northrup, King & Co., Minneapolis, Minn.

Source.—NK-100 perennial ryegrass.

Method of Breeding.—Three cycles of selection as spaced plants for winter persistence and freedom from leaf diseases. Turf evaluations conducted by families. Four semiprostrate, leafy, narrow-leaved plants selected for synthetic.

Description.—Fine textured, winter hardy, good color, and improved mowing characteristics; improved resistance to rust and leaf diseases. Semiprostrate with narrower leaves with broader adaptation and greater persistence than NK-100. Few days later in maturity than NK-100.

Released.—Expected release in 1971.

Breeder Seed.—Northrup, King & Co.

Norlea

Selected at Canada Department of Agriculture Research Station, Ottawa, Ontario—R. M. MacVicar.

Source.—Worldwide collection of seed lots.

Method of Breeding.—Repeated selection and progeny evaluation through six generations; in final synthesis 12 proven clones included in synthetic variety.

Description.—Sufficient hardiness to survive and to be productive in areas where species had been of little or no value. Leafy, somewhat later in maturity than short-ley ryegrass strains. Susceptible to leaf rust in some areas, but susceptibility does not appear to affect yield, since it consistently out-yielded other varieties in forage and seed production. Useful as a turf species.

Released.—1958, by Canada Department of Agriculture.

Breeder Seed.—Canada Department of Agriculture Research Station, Ottawa, Ontario.

Certified Seed.—Available in quantity.

P-312

Increased at Plant Materials Center, SCS, Pullman, Wash.

Source.—P.I. 107071 from Turkestan, U.S.S.R.; introduced by Westover-Enlow expedition in 1934. Labeled "*Lolium rigidum*"; reidentified in 1938 as *L. remotum* Schrank; subsequently classed as *L. perenne*.

Method of Breeding.—Mass selection for several generations.

Description.—Consistently more winter hardy, more productive, and longer lived than other strains of perennial ryegrass at Pullman. Uniform; free from annual and short-lived plants. Erect growing, leafy, completely awnless.

Released.—No. Included in regional testing program.

Breeder Seed.—Plant Materials Center, SCS, and Washington Agricultural Experiment Station, Pullman. (Will be discontinued, but some seed is still available.)

Pelo

Developed by D. J. van der Have, Kapelle-Biezelinge, Netherlands.

Source.—Collection of plants from old pastures in eastern parts of Holland.

Method of Breeding.—Plants selected for tillering capacity, hardiness, and late flowering. Polycross tested with selection based on weekly and five-harvests-per-year treatments. Four plants selected to produce synthetic variety. Evaluated for turf purposes in United States beginning in 1957.

Description.—Leafy, late flowering, with good tillering capacity and persistence under both field

and turf management. Better winter hardiness than Linn perennial ryegrass. Improved heat and drought tolerance. Good tolerance to rust. Produces above-average turf in areas where perennial ryegrass is adapted.

Released.—Holland, 1959, by D. J. van der Have; in United States, 1964, by Northrup, King & Co.

Breeder Seed.—D. J. van der Have.

Certified Seed.—Available.

Pennfine (Reg. No. 26)

Selected at Pennsylvania Agricultural Experiment Station, University Park—J. M. Duich, A. T. Perkins, and H. Cole.

Source.—Plants collected from recreational areas.

Method of Breeding.—Clonal evaluation and progeny testing. Three superior, turf-type clones selected for synthetic variety.

Description.—Fine-textured, comparatively dense and persistent, with less leaf shredding after mowing than available varieties. At 1-inch mowing height, leaf width about 2.5 mm., in comparison with 2.7 mm. for Manhattan and 3.8 mm. for Linn; vertical seedling growth 50 percent less than Linn. Resistant to *Helminthosporium* spp., *Fusarium roseum*, dollarspot, and leaf rust; and moderate resistance to redthread and snowmold. Adapted for use as component in cool-season turf-grass mixtures and for overseeding damaged turf-grass areas, and shows promise for overseeding berumudagrass putting greens.

Released.—1969, by Pennsylvania Agricultural Experiment Station.

Breeder Seed.—Pennsylvania Agricultural Experiment Station.

Certified Seed.—Available in limited quantities.

Petra

Developed by D. J. van der Have, Netherlands.

Source.—Collections from old pastures in the Netherlands.

Method of Breeding.—Selected plants poly-crossed and progeny tested. High-yielding plants used to produce tetraploids with colchicine. Progeny reselected and again progeny tested as poly-cross material. High-performing plants used to produce a synthetic variety.

Description.—Semiprostate, leafy plants with broad, dark-green leaves; good rust resistance and winter hardiness. Seed size larger than that of diploids. Adapted for use in pastures.

Released.—1963, by D. J. van der Have.

Breeder Seed.—D. J. van der Have.

Certified Seed.—OECD certification. (Distributed by Northrup, King & Co.)

Reville

Developed by D. J. van der Have, Netherlands.

Source.—Collections from old pastures in the Netherlands.

Method of Breeding.—Selected plants poly-crossed and evaluated for forage. Better performing clones treated with colchicine to develop tetraploids. Leafy, vigorous, high-yielding plants combined to produce synthetic variety.

Description.—A vigorous hay-type tetraploid with broad, dark-green leaves; tillers somewhat less than diploid. Flowers a week or more later than Linn perennial ryegrass.

Released.—1963, by D. J. van der Have.

Breeder Seed.—D. J. van der Have.

Certified Seed.—OECD certification. (Distributed by Northrup, King & Co.)

S-23

Selected at Welsh Plant Breeding Station, Aberystwyth, United Kingdom.

Source.—Material obtained from old grazed pastures (Midlands, Kent, Lincolnshire, England; Wales; Holland).

Description.—Spreading growth, late flowering, high tillering, dense, leafy. Very persistent under grazing.

Released.—Welsh Plant Breeding Station. Included in regional testing program.

Certified Seed.—Available from United Kingdom.

S-24

Selected at Welsh Plant Breeding Station, Aberystwyth, United Kingdom.

Source.—Based primarily on two wild plants, but not from old grazed pasture. These plants interbred and further "native" basic plant material added. Also some plants from produce of Hawke's Bay, New Zealand, seed selected and incorporated in strain.

Description.—In United Kingdom more persistent and leafier than most ordinary strains. Capable of producing heavy crops and good aftermath. Starts growth earlier than most ordinary strains.

Released.—Welsh Plant Breeding Station. Included in regional testing program.

Certified Seed.—Available from United Kingdom.

S-101

Selected at Welsh Plant Breeding Station, Aberystwyth, United Kingdom.

Source.—Based entirely on plants derived from very old pastures of Midlands and Kent, England.

Description.—Flowers only slightly earlier than those of S-23; plants less spreading, leaf blades longer and often broader. Leafy, dual-purpose strain approaching hay type.

Released.—Welsh Plant Breeding Station. Included in regional testing program.

Certified Seed.—Available from United Kingdom.

Taptoe

Developed by D. J. van der Have, Netherlands.

Source.—Collections from old pastures in the Netherlands.

Method of Breeding.—Tetraploids produced through the use of colchicine. Selected plants polycrossed and evaluated for forage yield. Superior plants combined in synthetic variety.

Description.—Dark-green, broad-leaved plants, with semiupright growth habit; good rust resistance and cold resistance. Tillering capacity somewhat lower than diploid varieties but seeds larger.

Released.—1963, by D. J. van der Have.

Breeder Seed.—D. J. van der Have.

Certified Seed.—OECD certified. (Distributed by Northrup, King & Co.)

Muhlenbergia wrightii Vasey., spike muhly

Warm-season, tufted native grass that has short rootstalks. Found in southwestern Colorado, Arizona, New Mexico, and Mexico. Common throughout the region but abundant only in local areas. Reasonably productive and palatable. Adapted to widely varying moisture conditions and valued for soil-binding qualities.

P-15618

Increased at Plant Materials Center, SCS, Los Lunas, and New Mexico Agricultural Experiment Station, Las Cruces, cooperating—G. C. Niner and J. E. Anderson.

Source.—Collected in 1958, 10 miles west of

Park View, N. Mex., at elevation of 7,200 feet and 16 inches annual precipitation.

Method of Breeding.—Increase of original collection under isolation, as NM-199.

Description.—Fairly upright as compared with average of other collections tested. Average culm height 23 inches, leaf length 16 inches, basal leaves dense and wider than average tested, plants uniform. Seed production very good. Free of gall (caused by wheat curl mite—*Aceria tulipae*), which has been found in varying degrees on seedheads of all other strains tested. This gall can reduce or eliminate seed production in certain years.

Released.—No. Included in field tests.

Breeder Seed.—Plant Materials Center, Los Lunas.

Oryzopsis hymenoides (Roem. and Schult.) Ricker, Indian ricegrass

Valuable cool-season, native bunchgrass. Widely distributed as mixture with other native grasses over Western United States from North Dakota to Washington and south to California and Texas. Adapted to dry, sandy soils; drought resistant. Nutritious, palatable; good as standing winter feed. High level of seed dormancy restricts use.

P-2575

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

Source.—Native collection made in 1935, 5 miles south of White Bird, Idaho.

Method of Breeding.—Selected from among 152 accessions for its good vegetative characteristics and low hard-seed content. Selection repeated through several generations before initial increase.

Description.—Large, erect plant type. Robust stems; broad, flat, abundant leaves; medium-small, dark, almost naked, elongate seeds. Excellent seedling vigor, averaging less than 50 percent of hard seeds.

Released.—No. Distributed for testing purposes.

Breeder Seed.—Plant Materials Center, SCS, Aberdeen, Idaho.

Oryzopsis miliacea (L.) Benth. and Hook., smilgrass

Cool-season bunchgrass. Used primarily in range seedings in central and southern California.

Increased at California Agricultural Experiment Station, Davis.

Source.—Introduced from Mediterranean region; first tested at California Agricultural Experiment Station in 1879.

Description.—Drought resistant, perennial bunchgrass, with about same climatic adaptation as hardinggrass, but does better on lighter soils. Difficult to obtain stands except in ash of brush burns or on very light soils. Less palatable than veldtgrass or hardinggrass.

Panicum antidotale Retz., blue panicgrass

Warm-season, sod-forming grass native to India and introduced from Australia in 1912. Important in parts of Southwestern United States for dryland and irrigated pastures and erosion control. Not winter hardy. Coarse, vigorous, extensive root system. High forage and seed yields. Grows best on fertile, well-drained soils; responds to nitrogen.

A-130

Increased at SCS Nursery, Tucson, Ariz.

Source.—Australia.

Description.—Original increase of blue panicgrass widely used in Texas and in Southwestern United States.

Released.—1950, cooperatively by Arizona Agricultural Experiment Station and SCS Nursery, Tucson.

Breeder Seed.—Plant Materials Center, SCS, Tucson.

Certified Seed.—Not available. (In commercial production.)

Released.—Certified by California Crop Improvement Association in 1947.

Breeder Seed.—California Agricultural Experiment Station and Plant Materials Center, SCS, Pleasanton, Calif.

Certified Seed.—Not available. (Available commercially.)

T-15327

Selected at SCS Nursery, Woodward, Okla., OK-N-2—J. E. Smith, Jr., and G. L. Powers.

Source.—Bulk common strain of blue panicgrass derived from commercial increase of SCS Nursery, Tucson, Ariz., accession A-130.

Method of Breeding.—One-year-old seedlings that survived -18° F. in dryland field planting increased clonally; extremes in height, plant texture, and dates of flowering discarded; remaining plants bulked.

Description.—Relatively uniform, leafy, medium-fine stems. Heavy seed producer. Considered to be more cold tolerant than common strain available.

Released.—Informally in 1949 by SCS Nurseries, Woodward and Tucson.

Breeder Seed.—Not available.

Certified Seed.—Not available. (In commercial production.)

Panicum coloratum L., kleingrass

Warm-season "species complex" introduced from Africa. Includes bunchgrasses, and spreading types used for hay, pasture, and silage, primarily in southern Texas. Adapted to moist, heavy soils. Withstands considerable drought; not cold tolerant. Seed subject to shattering. Makarikarigrass (*Panicum coloratum* var. *makarikariense* Goossens) more drought resistant than type species.

A-12638

Increased at Plant Materials Center, SCS, Tucson, Ariz.—L. P. Hamilton and T. F. Spaller.

Source.—From Lake Makarikari region, Union of South Africa; introduced as P.I. 142284.

Method of Breeding.—Cold-hardy plants selected from original accession.

Description.—Erect bunchgrass, blue green, leafy. Produces three-fourths forage volume of blue panicgrass. Not woody at maturity.

Released.—No.

Breeder Seed.—Plant Materials Center, SCS Tucson.

Selection 75

Selected at the SCS Nursery, San Antonio, Tex., Texas Agricultural Experiment Station cooperating—J. E. Smith, Jr.

Source.—Introduced from Kimberley, Union of South Africa. Received March 1952 as P.I. 166400, BN-5225.

Method of Breeding.—Selected as best in forage production from large number of similar African accessions. Evaluated in pasture and range plantings for persistence and animal response. Increased for testing as T-20275.

Description.—Plants mostly erect, but variable in form. Dark green to glaucous, leafy. Slender stems to 4 feet at seed maturity. Excellent forage production; dormant winter pasture of good quality in drier regions. Seed shatter from inflorescences as they mature; produces abundant seed.

Good drought tolerance; tolerant of moderate salinity. Plants remain green late in fall and resume active growth very early in spring. Trailing stems in contact with moist soil root at nodes to form loose sod. Adapted in Texas on medium to heavy soils south of 35th parallel, and where rainfall is above 18 to 20 inches.

Released.—Informally by SCS in 1957. Formally in 1969, cooperatively by Texas Agricultural Experiment Station and Plant Sciences Division, SCS.

Breeder Seed.—Plant Materials Center, SCS, Knox City, Tex.

Certified Seed.—Available.

Panicum maximum Jacq., guineagrass

Warm-season, slightly spreading grass from Africa. Used to limited extent for pasture and silage in Florida and parts of southern Texas and California. Tall, rather coarse. Adapted in moist regions, but tolerates some drought; not cold tolerant; grows well on fertile soils. Nutritive value high when leafy and green. Established vegetatively and from seed. Several varieties available in tropical regions. Slender guineagrass (*Panicum maximum* var. *pubiglume* K. Schum), small, slender variety with finer leaves than common, and Purple Top (*P. maximum* var. *coloratum*), low, coarse variety; both grown in Queensland, Australia. Brazilian varieties include ordinary robust type of common and Sempre-Verde (*P. bulbosum* q.v.), fine-leaved, drought-resistant type. Identifiable varieties grown in Puerto Rico, Jamaica, and Hawaii. The leafy Silk Guinea and robust, stemmy, St. Mary's cowgrass are grown in Jamaica, while at least five types are distinguished in Puerto Rico: Local, Gramalote, Borinquen, Broadleaf, and Fine Leaf. A number of leafy types have been identified in Hawaii. Descriptions are included of two experimental varieties from Hawaii.

HA-696

Selected plants increased at Plant Materials Center, SCS, Wailuku, Hawaii—E. A. Lewis.

Source.—P.I. 156074.

Method of Breeding.—Selected plants from early observational planting on Oahu used to vegetatively establish observational planting at Plant Materials Center, Wailuku, in 1957. Seed harvested for further increase.

Description.—Fine-stemmed, fine-leaved type that regenerates in approximately 40 days; produces good yields of forage and seed; stands up well under heavy grazing. In Hawaii is adapted to annual rainfall of 20 to 60 inches from sea level to 3,000-ft. elevation.

Released.—No. Distributed for field-scale plantings throughout Hawaii.

Breeder Seed.—Plant Materials Center, SCS, Wailuku, Hawaii.

HA-716

Selected at Plant Materials Center, SCS, Wailuku, Hawaii—E. A. Lewis.

Source.—Received as P.I. 259549 in 1959. Recorded as accession from Australia via Texas A&M in 1959 (*Panicum maximum* var. *trichoglume* Eyles, or correctly *P. maximum* var. *pubiglume* K. Schum.)

Method of Breeding.—Seed from original observational planting used for increase plantings. Selected as best forage producer of three accessions.

Description.—Leafy, fine-stemmed, erect type with yellowish-green foliage. A good forage and seed producer; strong seedling vigor; stands up well under grazing. In Hawaii is adapted to annual rainfall of 20 to 45 inches from sea level to 2,500-ft. elevation.

Released.—No. Distributed for field-scale plantings throughout Hawaii.

Breeder Seed.—Plant Materials Center, SCS, Wailuku, Hawaii.

Panicum miliaceum L., proso

Warm-season annual introduced from Asia. Grown as grain crop since prehistoric times. Grown in China, U.S.S.R., the Balkans, western Europe, and northern Great Plains in the United States. It is a short-season plant often requiring only 60 to 65 days from seeding to maturity. Hay is coarse and forage yield comparatively low. In the United States used as feed grain, in birdseed mixtures, and as food crop for game birds. Varieties that have been grown widely in the United States in-

clude: Yellow Manitoba, Turghai, and Early Fortune. Certified seed of the following varieties is available: Akron, Leonard, Panhandle, Turghai, and White.

Dove

Increased at the Plant Materials Center, SCS, Americus, Ga.; Georgia Agricultural Experiment Station, Athens, cooperating.

Source.—P.I. 196292 received from India.

Method of Breeding.—Best vigor and grain yield among 35 accessions evaluated at Americus, Ga. Seed multiplied at Plant Materials Center, SCS, Coffeyville, Miss.

Description.—In contrast to most other varieties, it is adapted to southern latitudes. Quick maturing, upright, loose-drooping panicle, and seed of a light straw color. Pale or yellow green, lax leaves and comparatively heavy stems. Useful food plant for upland game birds.

Released.—Informally in Southeastern United States.

Breeder Seed.—Plant Materials Center, SCS, Americus.

Certified Seed.—Not available. (Some commercial supplies.)

Panhandle

Selected at Nebraska Agricultural Experiment Station, Lincoln.

Source.—Common white seed stock included in testing program.

Method of Breeding.—Twelve plants selected, with seed from individual heads planted in single progeny rows. Seed from four most similar rows bulked and rogued for offtype plants for several generations.

Description.—Medium in height, relatively early, only fair straw strength, heads semicompact, and seed shattering average. Seed creamy white with high test weight. In Nebraska, produces higher grain yields than other varieties tested.

Released.—1967, by Nebraska Agricultural Experiment Station.

Breeder Seed.—Nebraska Agricultural Experiment Station.

Certified Seed.—Available.

Panicum obtusum H.B.K., vine mesquite

Warm-season, sod-forming, native grass. Distributed from western Missouri and southern Colorado to Texas, Arizona, and Mexico. Used for grazing and erosion control. Develops long stolons.

Grows well on fine, compact soils. Less drought resistant than many grasses adapted to arid Southwest; not cold tolerant. Feeding value of immature forage fair to good. Varieties not available.

Panicum ramosum L., browntop millet

Warm-season annual from Asia. Used for wild-bird feed and as minor forage plant in Southeastern United States. Not aggressive. Short

season of growth; requires fertile soil and good moisture. No varieties available.

Panicum repens L., torpedograss

Warm-season, sod-forming grass indigenous to tropical and subtropical coasts of both hemispheres. Restricted distribution and use for pasture and erosion control from Florida along gulf coast to Texas. Grows on coarse sands and wet muck

soils. Very aggressive and may become serious weed. Not cold resistant, but tolerant to grazing unless heavily used. Palatable, but less nutritious than pangolagrass. Propagated vegetatively. Varieties not available.

Panicum texanum Buckl., Texas millet

Warm-season annual found in open areas in Southern United States. Well adapted to low land along streams, and appears as weed in cultivated fields.

Artex

Increased at Plant Materials Center, SCS Brooksville, Fla.

Source.—Collected by W. C. Garrett in 1958 in vicinity of Blountstown, Fla.

Method of Breeding.—Increase of original collection. Distributed for testing as F-639 and MS-358.

Description.—Forage production is heavier than browntop millet but less than pearl millet. Seed yields in range from 500 to 1,000 pounds per acre. Adapted to wide variety of soils but makes best growth on deep soils with adequate moisture. An important source of food for game birds, also of value for temporary grazing and hay.

Released.—Informally, through Plant Materials Centers.

Breeder Seed.—Plant Materials Center, SCS, Brooksville.

Certified Seed.—Not available.

Panicum virgatum L., switchgrass

Important warm-season, native, sod-forming grass. Occurs throughout most of United States. Especially valuable for forage, pasture, and erosion control in central and southern parts of Great Plains. Most abundant on relatively moist, fertile areas. Coarse stemmed, vigorous root system; short rhizomes. High yields of seed and forage. Good seedling vigor. Quality acceptable during periods of rapid growth, but low as standing winter feed.

Blackwell

Selected at Plant Materials Center, SCS, Manhattan, Kans.—D. R. Cornelius.

Source.—Seed harvested in 1934 from single plant growing in native prairie near Blackwell, Okla.

Method of Breeding.—Single plant selected in comparison with many other collections at SCS Nursery, Manhattan. Tested as KG-208.

Description.—Upland-type switchgrass of medium height, with rather large stems. Ranked high in leafiness, total forage produced, and resistance to rust and other diseases. Good seedling vigor. Wide adaptation in range seedings, pasture plantings, water ways, and other permanent plantings in Kansas, Oklahoma, southern Nebraska, and northern Texas in areas of 20 inches or more of annual precipitation. Will grow on sandy ranges and favorable lowland sites in area of 15 to 20 inches of annual precipitation.

Released.—1944, cooperatively by Kansas Agricultural Experiment Station and Plant Materials Center, SCS, Manhattan.

Breeder Seed.—Plant Materials Center, SCS, Manhattan.

Certified Seed.—Available.

Caddo (Reg. No. 4)

Selected at Oklahoma Agricultural Experiment Station, Stillwater, ARS cooperating—H. W. Staten, W. C. Elder, R. A. Chessmore, and J. R. Harlan.

Source.—Field collections from southern Great Plains, especially central Oklahoma.

Method of Breeding.—Mass selection in space-planted nurseries, with elimination of undesirable types. Process repeated, using most promising lines; seed from selected plants used to establish rows. Five rows selected for uniformity and superior production; seed bulked to form experimental strain 4200.

Description.—Tall, robust, upland switchgrass generally characteristic of central Oklahoma. Leafy, productive, considerable rust resistance,

rather uniform when seeded in rows for seed production. Gives heavy yield of seed under favorable conditions. Forage yield under irrigation outstanding for native grass; recovers well after mowing. No special features distinguish it positively from other varieties, but tends to be greener and contains less red pigment in stems and heads than many other varieties.

Released.—1955, cooperatively by Oklahoma Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Oklahoma Agricultural Experiment Station.

Certified Seed.—Available.

Carthage

Increased at National Plant Materials Center, SCS, Beltsville, Md.

Source.—Single clone collected vegetatively by K. E. Graetz in 1957 near Carthage, N.C.

Method of Breeding.—Clone multiplied vegetatively in isolation. Open-pollinated seed from this isolation constituted initial material for multiplication. Tested under numbers BN-8624, SC-56-32, and AM-77.

Description.—Leafy, better than average spread, and early spring recovery. Seed production good. Growth about 5 feet tall. Adapted to North Carolina, Tennessee, Arkansas, and northward. Northern limits undetermined. Suggested for use as grazing, hay, wildlife strips, and for planting streambanks, dams, and spoil-disposal areas.

Released.—No. Distributed for testing.

Breeder Seed.—National Plant Materials Center, SCS, Beltsville.

Grenville

Increased at former SCS Nursey, Albuquerque, N. Mex.

Source.—Collection near Grenville, N. Mex., at elevation of 5,900 feet and annual precipitation of 16 inches.

Method of Breeding.—Bulk increase of source material. Selected for increase from among others in comparison rows because of better seedling vigor, growth habit, and seed production at location tested.

Description.—Intermediate type between northern and southern geographic strains. Plants uniform, leafy, fine stemmed, and remain green well into fall. Height at maturity 3 to 4 feet. Medium maturity date. No rust or other diseases observed.

Released.—Informally through SCS in Texas. Recognized for certification by New Mexico Crop Improvement Association.

Breeder Seed.—Plant Materials Center, SCS, Los Lunas, N. Mex.

Certified Seed.—Available.

Kanlow

Developed at Kansas Agricultural Experiment Station, Manhattan, ARS cooperating—F. L. Barnett and K. L. Anderson.

Source.—SCS collection from lowland site near Wetumka, Okla., in 1957.

Method of Breeding.—Collection planted at Manhattan in spring of 1958; 200 plants selected for leafiness, vigor, and retention of green late in season; selections isolated at Ashland Farm near Manhattan.

Description.—Tall, coarse, productive, especially adapted to lowlands where flooding, high water table, or other excess water problems occur, but performs well on upland where soils are not too thin or droughty. Not intended to replace upland varieties, such as Caddo and Blackwell, but to supplement them because of adaptation to wet locations.

Released.—1963, cooperatively by Kansas Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Kansas Agricultural Experiment Station.

Certified Seed.—Available in limited quantity.

Nebraska 28

Developed at Nebraska Agricultural Experiment Station, Lincoln, ARS and SCS cooperating—L. C. Newell.

Source.—Native stand of switchgrass collected in Holt County, Nebr., in 1935.

Method of Breeding.—Spaced plants grown at this experiment station from original collection selected for type and allowed to cross-pollinate in isolation. Resulting seed bulked and increased.

Description.—Relatively early maturing strain of switchgrass, representative of Nebraska sandhill types. Average plants semidecumbent, with fine stems of moderate height, bluish green, and leafy; but considerable variation in plant type exists. Well adapted to diverse soils and used successfully for pasturage and soil-conservation purposes, such as seeded waterways in pure stands or mixtures. Matures seed in mid-August to early September. In areas with longer growing seasons is susceptible to rust, which is likely to be serious factor in production.

Released.—1949, cooperatively by Nebraska Agricultural Experiment Station; Plant Science Research Division, ARS; and Nursery Division, SCS.

Breeder Seed.—Nebraska Agricultural Experiment Station.

Certified Seed.—Available.

Pathfinder (Reg. No. 17)

Selected at Nebraska Agricultural Experiment Station, Lincoln, ARS cooperating—L. C. Newell.

Source.—Domestic collections in 1953 from Nebraska and Kansas.

Method of Breeding.—Clones selected as "Type f" from space-planted nurseries of collections were polycrossed and progeny tested. Twelve superior clones of selected type polycrossed in isolation. Within 12 progenies, 192 plants selected and intercrossed in isolation to produce breeder seed.

Description.—Winter hardy, vigorous, leafy, late maturing, and rust resistant in region of adaptation. Good stand establishment and forage production for late-spring and summer grazing. Used in pure stands or in mixtures with other warm-season prairie grasses. Tests indicate its adaptation in Nebraska and adjacent areas. Most favorable area for seed production is in eastern third of Nebraska south of Platte River.

Released.—1967, cooperatively by Nebraska Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Nebraska Agricultural Experiment Station.

Certified Seed.—Available.

PM-SD-149

Selected at Plant Materials Center, SCS, Bismarck, N. Dak.—John McDermand.

Source.—Collected from native plants near Forestburg, S. Dak.

Method of Breeding.—Composite of open-pollinated seed from four outstanding accessions in initial evaluation nursery.

Description.—Leafy, upland type of medium height. Under irrigation at Bismarck, forage yield is about 5 tons per acre and seed yields have been as high as 450 pounds of pure live seed per acre.

Released.—No. Distributed for field testing, 1966.

Breeder Seed.—Plant Materials Center, SCS, Bismarck.

Summer

Selected at South Dakota Agricultural Experiment Station, Brookings—J. G. Ross.

Source.—Native collection, P.I. 214759, made by W. L. Tolstead and L. C. Newell south of Nebraska City, Nebr., in 1953.

Method of Breeding.—Collection found superior when grown at Brookings. Mass selection for earliness, leafiness, and rust resistance. Selections from replicated nursery of progenies from these plants made and placed in polycross. Since high degree of uniformity of desirable type was present, foundation field was established from seed harvested from this nursery.

Description.—Tall, upright, with abundant, somewhat coarse leaves. Starts growth after June 1 and matures seed in mid-September. Produces high yield of forage and seed.

Released.—1963, by South Dakota Agricultural Experiment Station.

Breeder Seed.—South Dakota Agricultural Experiment Station.

Certified Seed.—Available.

Paspalum dilatatum Poir., dallisgrass

Major warm-season, slightly spreading bunchgrass introduced from Argentina or Uruguay in mid-1800's. Used for pasture throughout much of Cotton Belt wherever annual rainfall is as much as 30 inches. Grows better than bermudagrass on wet soils. Palatable, nutritious. Tolerates moderately close grazing, and should be grazed to prevent accumulation of dead leaves and stalks. Serious weed in lawns.

planted from seed collected in same area. Selection made in 1943 in space-planted nursery at Hamburg, La.

Method of Breeding.—Plant selection for normal forage type that excelled in viable seed produced. Tested in progeny row and extended to new-strain test where both seed and forage production compared.

Description.—No definite distinguishing characteristics for identification. Exceeded average of strains included by 32 percent for pure seed content. Ergot-infected florets amounted to 28 percent less than average.

Released.—1951, cooperatively by Louisiana Agricultural Experiment Station and Louisiana Crop Improvement Association.

Breeder Seed.—Discontinued.

B-230

Selected at Louisiana Agricultural Experiment Station, Baton Rouge—C. R. Owen.

Source.—Lot B of seven lots of seed collected from natural stands in lower Red River bottom. Selection made in 1941.

Method of Breeding.—Plant selection followed by progeny testing for seed-quality and forage-vigor evaluation. Tested in new-strain experiments where seed yields, seed quality, and forage were compared.

Description.—Not distinguishable from common dallisgrass. Produces better quality seed than common dallisgrass by about 30 percent. Remains green later in fall and begins growth earlier in spring.

Released.—1951, cooperatively by Louisiana Agricultural Experiment Station and Louisiana Crop Improvement Association.

Breeder Seed.—Louisiana Agricultural Experiment Station.

Certified Seed.—Not available.

B-430

Selected at Louisiana Agricultural Experiment Station, Baton Rouge—C. R. Owen.

Source.—Nursery from which selection taken

Prostrate

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—G. W. Burton.

Source.—Obtained from B. Smith, North Carolina Agricultural Experiment Station, Raleigh, who received it from Bernardo Rosengurt of Montevideo, Uruguay.

Method of Breeding.—Seeds from several progenies that appeared to be similar in type and 100-percent apomictic were blended and increased to furnish seed released in regional tests.

Description.—More prostrate, more resistant to foliage diseases, more persistent, maintaining good stands much longer than common dallisgrass. Outyielded common dallisgrass in clipping tests at Tifton. Very susceptible to ergot, very irregular in meiosis, poor in seed production.

Released.—No. Included in regional testing program.

Breeder Seed.—Georgia Coastal Plain Experiment Station.

Paspalum nicorae Parodi, brunswickgrass

Warm-season grass, rhizomatous, slender, erect to suberect culms. Produces dense sod. Introduced from Uruguay and southern Brazil.

Source.—P.I. 202044 from Argentina.

Method of Breeding.—Compared with other accessions for rate of spread, height, sod density, seed-producing potential, and overall vigor. Identified for testing as MS-906 and F-1888.

Description.—Typical of species. At maturity, averages about 30 inches tall. Sod has bluish or glaucous cast; seed yield and quality good. Adapted in the southern Coastal Plain, silty up-

Amcorae

Increased at Plant Materials Centers, SCS, Arcadia, Fla., Americus, Ga., and Coffeerville, Miss.

lands of southern Mississippi Valley, and blackland prairie of Alabama and Mississippi. Rated as a preferred grazing plant in South America. Has potential for grazing, hay, cover plant in waterways, and for seeding eroded areas.

Released.—No. Distributed for testing. Tentative name, Amcorae.

Breeder Seed.—Plant Materials Center, SCS, Americus.

SC 20-672

Increased at SCS Nursery, Americus, Ga.—Paul Tabor.

Source.—Springs dug March 1, 1945, at Brunswick, Ga. and included in observational tests.

Description.—Rhizomatous species generally similar to bahiagrass. More than two-seed racemes per stem. Some plants glaucous, others light green. Dense sod produced.

Released.—No.

Breeder Seed.—Plant Materials Center, SCS, Americus.

Paspalum notatum Flüggé, bahiagrass

Major warm-season grass that spreads slowly by short, stout rhizomes. One of the first USDA introductions from Brazil in 1914. Common bahiagrass adapted in Florida and lower Coastal Plain. Rated as more palatable but less winter hardy than Pensacola. Aggressive species that spreads rapidly from seed. Well suited for pasture use on sandy soils of low fertility or where good fertilizer programs are not maintained.

Argentina

Selected at Florida Agricultural Experiment Station, Gainesville, ARS cooperating—George Ritchey.

Source.—P.I. 148996 from Argentina; seed presented by L. R. Parodi.

Method of Breeding.—Selected as one of two distinct types from this introduction in 1945. Plots and pastures planted in 1945-46.

Description.—Leaves wider than those of Pensacola but narrower than those of common. Preferred by cattle. Medium cold resistance, making most growth during midsummer. Very susceptible to ergot. Adapted throughout Florida and coastal areas of other Southern States.

Released.—1949-50, cooperatively by Florida Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Not available.

Certified Seed.—Not available. (Available commercially)

Paraguay

Source.—Origin obscure. Presumably traces to early introductions that became established along Gulf of Mexico.

Description.—Coarse, tough. Leaves shorter and hairier than those of Pensacola. Used to some extent as general-purpose turfgrass.

Released.—No.

Breeder Seed.—Not available.

Certified Seed.—Not available. (Some commercial production in Texas.)

Paraguay 22

Increased at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—J. L. Stephens.

Source.—P.I. 158822 collected by J. L. Stephens in Paraguay in 1947.

Method of Breeding.—Selection of one plant in source nursery. Progeny tests indicated that selection was true breeding and probably 100-percent apomictic.

Released.—No. Included in regional testing program as Tifton bahiagrass.

Breeder Seed.—Georgia Coastal Plain Experiment Station.

Certified Seed.—Not available. (Some commercial production.)

Pensacola

Found by county agent, Ed Finlayson, Pensacola, Fla. Sprigs from vacant lot on Government Street, Pensacola, taken to SCS Nursery, Americus, Ga., in May 1940 by Paul Tabor.

Source.—Plants growing along docks and railroad tracks at Pensacola. Thought to have arrived by fruit boat from Central or South America.

Method of Breeding.—Comparative tests conducted at several experiment stations. Experimental pastures and plots for forage yield and chemical composition planted at Gainesville, Fla., in 1942.

Description.—Similar to common bahiagrass, except more cold hardy, narrower blades, smaller seed, and more responsive to fertilization. Seed germination excellent, with full stands and ground cover in 8 to 12 weeks. Adapted throughout southeastern Coastal Plain area and to all Florida.

Released.—Approved as superior forage by Florida Agricultural Experiment Station, Gainesville, in 1944. Seed distributed by SCS Nursery, in Americus, 1942, with first large-scale distribution in 1944.

Breeder Seed.—Plant Materials Center, SCS, Americus.

Certified Seed.—Available.

Pensacola × Common

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—G. W. Burton.

Source.—F₁ hybrid between selected plants from Pensacola bahiagrass and common broadleaved bahiagrass.

Method of Breeding.—Triploid from cross—Pensacola (diploid) × common (tetraploid). Sterile in isolation, but seeds well when interplanted with pollinator, such as Pensacola bahiagrass. Seeds produced give rise to uniform progeny exactly like female parent, indicating reproduction by apomixis.

Description.—Broader, more tender leaves, more palatable than Pensacola bahiagrass. Outyielded common parent twofold and Pensacola parent by 10 to 15 percent in replicated clipping tests.

Released.—No. Included in regional testing program.

Breeder Seed.—Georgia Coastal Plain Experiment Station.

Tifhi 1 (Reg. No. 1)

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—G. W. Burton.

Source.—Developed from selected clones coming from commercial Pensacola bahiagrass.

Method of Breeding.—Selected clones of Pensacola tested for general combining ability in poly-cross tests. Best of these tested for specific combining ability in single crosses. Two of best that were self-sterile and cross fertile and gave good single cross carry test numbers 14 and 108. Interplanted vegetatively in strips up to 30 feet wide to establish seed-production fields, where hybrid seed may be produced simply by combining all seed produced. Distributed for testing as Pensacola hybrid 14 × 108.

Description.—Slightly leafier than commercial Pensacola. One of parents (selection 108) more shatter resistant, facilitating seed production. Hybrid carries considerable heterosis, yielding up to 25 percent more forage than commercial check. In 4-year grazing test in replicated pastures produced 69 pounds more beef per acre per year than commercial Pensacola—statistically significant difference.

Released.—1957, cooperatively by Georgia

Coastal Plain Experiment Station and Plant Science Research Division, ARS.

Breeder Stock.—Discontinued.

Tifhi 2

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—G. W. Burton.

Source.—Developed from selected clones of commercial Pensacola bahiagrass.

Method of Breeding.—Selected clones of Pensacola tested for general combining ability in poly-cross tests. Best of these tested for specific combining ability in single crosses. Two of best that were self-sterile and cross fertile and gave good single cross carry test numbers 18 and 108. Interplanted vegetatively in strips up to 30 feet wide to establish seed-production fields, where hybrid seed may be produced simply by combining all seed produced. Distributed for testing as Pensacola hybrid 18 × 108.

Description.—Slightly leafier than common Pensacola. Both parents more shatter resistant and much better seeders. Tifhi 2 is more disease resistant than Tifhi 1 or Pensacola. Over 4-year period Tifhi 2 yielded 7 percent more dry forage than Tifhi 1.

Released.—1961, cooperatively by Georgia Coastal Plain Experiment Station and Plant Science Research Division, ARS.

Breeder Stock.—Discontinued.

Wilmington

Increased at SCS Nursery, Rock Hill, S.C.

Source.—Collected in 1940 from naturalized stand near Wilmington, N.C., by Paul Tabor.

Method of Breeding.—Increase of original collection. Tested as SC 20-338, AM-1284, and MS-131.

Description.—Narrow-leaf, cold-hardy bahiagrass; makes dense sod; plants of medium size. Only bahiagrass not injured by cold at Chapel Hill, N.C., between 1941 and 1953. Seed production poorer than Pensacola but adequate for multiplication. Seed about 30 percent larger than Pensacola. Adapted for forage and conservation use in the Southern United States and of greatest value north of area in which Pensacola is adapted.

Released.—Seed distributed from SCS Nursery, Rock Hill, in 1943. Proposed for release in Georgia and Mississippi in 1971.

Breeder Seed.—Plant Materials Center, SCS, Americus, Ga., and Coffeeville, Miss.

Certified Seed.—Available.

Paspalum urvillei Steud., vaseygrass

Warm-season bunchgrass introduced from Argentina prior to 1880. Distributed from North Carolina to Florida and west to Texas, common

along gulf coast. Grows well on wet land; eliminated by close grazing. Seed shatters readily. Varieties not available.

Pennisetum clandestinum Hachst., kikuyugrass

Warm-season, sod-forming grass from Africa. Not recommended in United States. Aggressive pasture species where adapted, but can be serious

weed in lawns and cultivated crops. Not winter hardy; unadapted in Southeastern United States. Propagated vegetatively. Varieties not available.

Pennisetum purpureum Schumach., napiergrass

Warm-season, slightly spreading bunchgrass introduced from Africa in 1913. Limited use for green feed, silage, and rotational grazing in Florida, gulf coast, and parts of Southwest. Coarse; forms large clumps. Must be cultivated to maintain high yield potential. Grows best in moist, fertile soil. Fair drought resistance; moderate frost resistance. Propagated vegetatively. Considerable variation among geographical races. In Hawaii, clonal varieties developed from selected seedlings.

Merkeron

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—G. W. Burton.

Source.—F₁ hybrid between two selections carrying numbers 1 and 208.

Method of Breeding.—From 1936 to 1941 selection within open-pollinated seedling progenies of local types and introductions practiced. In fall of 1941 several of these selections hybridized to combine desirable characteristics, including resist-

ance to *Helminthosporium* eyespot. One of these crosses involving selection 1, vigorous common type, and selection 208, plant with very short internodes and many tillers, gave plants yielding 35 percent more than checks and best common napiergrass hybrids. In 1944 several of best of these hybrids sent to Río Piedras, Puerto Rico, for testing. Best of these—cross between selections 1 and 208—released under name Merkeron in 1955 by Velez Fortuno, head of plant breeding at Experiment Station, Río Piedras.

Description.—Leafy, many-tillered, late-maturing F₁ hybrid resistant to *Helminthosporium* eyespot.

Released.—1955, by Experiment Station, Río Piedras.

Breeder Stock.—Experiment Station, Río Piedras and Coastal Plain Experiment Station, Tifton, Ga.

Certified Stock.—Not available. (Available commercially.)

Pennisetum typhoides (Burm.) Stapf and Hubbard, pearl millet (also *P. glaucum* (L.) R. Br.)

Important warm-season annual from India and Africa, where grown primarily for grain. Used for pasture, soiling, and silage from Maryland to Florida and west to Texas. Well adapted in Coastal Plain. Grows best in moist, warm locations; grows on poor sandy soils; responds well to fertilizer. Highly nutritious and palatable. Good regrowth under proper management.

Gahi 1 (Reg. No. 6)

Selected at Georgia Coastal Plain Equipment Station, Tifton, ARS cooperating—G. W. Burton.

Source.—Commercial F₁ hybrid developed from four inbred lines selected from many lines isolated from common pearl millet, several introductions from Africa and India, and hybrids between them.

Method of Breeding.—Inbred lines isolated, stabilized, and tested for general and specific combining ability. Four of them, carrying numbers 13, 18, 23, and 26, chosen because they give good,

high-yielding single crosses in all combinations; used to produce hybrid seed. F₁ seed produced by harvesting all open-pollinated seed from isolated field planted to mixture of equal numbers of live seeds of inbreds 13, 18, 23, and 26. This seed containing 65–75 percent of hybrids and 25–35 percent of selfs or sibs will perform as well as 100-percent hybrid seed when planted at rate of 10 pounds per acre in 30- to 36-inch rows. Increased for testing as Georgia Hybrid 1.

Description.—Leafier, later maturing, and more productive than common pearl millet. At Tifton yielded 50 percent more forage from May through September and over three times more after August 1 than common check. Recovery after grazing also much faster.

Released.—1958, cooperatively by Georgia Coastal Plain Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Georgia Coastal Plain Experiment Station.

Certified Seed.—Available in quantity.

Georgia Inbred Lines (Reg. Nos. PL 1, PL 2, PL 3, PL 4, PL 5, and PL 6)

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—G. W. Burton.

Tift 23B₁ (Reg. No. PL 1).—Superior inbred line, uniform, many culmed, medium to fine stemmed; leaves and sheaths pubescent and stems, nodes, and sheaths develop purple color on exposure to sun. Resistant to foliage diseases and imparts green ear resistance to most F₁ hybrids. One of four parents of Gahi 1.

Tift 23A₁ (Reg. No. PL 2).—Originated in F₂ of cross between inbred 556 and *Tift 23B₁*, followed by repeated backcrosses to *Tift 23B₁*. Completely male-sterile and similar to *Tift 23B₁* in appearance. In India, used to produce hybrid grain variety HB-1.

Tift 23DB₁ (Reg. No. PL 3) and *Tift 23DA₁* (Reg. No. PL 4).—Developed by introducing a recessive d_2d_2 gene pair for dwarfness through a series of backcrosses into *Tift 23B₁* and *Tift 23A₁*, respectively. Inbreds resemble tall counterparts except for height. The dwarf gene pair, d_2d_2 , reduces plant height about 50 percent, without altering length of head or peduncle.

Tift 239DB₂ (Reg. No. PL 5).—Developed by introducing d_2d_2 dwarf gene pair into *Tift 13* (one of four parents in Gahi 1) by a series of three backcrosses, and selfing selected dwarf plants for 10 generations. Smooth, nonpubescent foliage, grey seeds with light-brown germ ends, fine culms.

Tift 239DA₂ (Reg. No. PL 6).—Developed by crossing tall cytoplasmic male-sterile L103A₂ (selected in India by D. S. Athwal) with *Tift 239DB₂* and backcrossing for eight generations the dwarf male-sterile plants from each cross with *Tift 239DB₂*. Thus, *Tift 239DA₂* looks like *Tift 239DB₂* and should be the same except for cytoplasm.

Released.—1968, cooperatively by Georgia Agricultural Experiment Station and Plant Science Research Division, ARS.

Starr (Reg. No. 1)

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—G. W. Burton.

Source.—Developed as synthetic from material selected from common pearl millet and introductions carrying P.I. numbers 115055 and 115059. These introductions received from U.S.S.R. in

1936. P.I. 115055 originally from Tunisia, northern Africa, and P.I. 115059 from India.

Method of Breeding.—Broadleaved, highly palatable inbred line of common pearl millet crossed with broadleaved, short internode, leafy dwarf line in 1944. Selected F₂ plants carrying desired combination of characters tested and reselected in advanced selfed generations. Finally, best recombined in synthetic bearing name Starr in honor of Silas Starr, first director of Georgia Coastal Plain Experiment Station.

Description.—Broader leaves, shorter internodes and stems, and more leaves per stem than common pearl millet; matures 4-6 weeks later. In clipping tests produced about as much total dry matter as common, but produced much higher yields of leaves. Easier to manage under grazing, lasts longer, and produces more beef and milk under grazing than common type.

Released.—1951, cooperatively by Georgia Coastal Plain Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Georgia Coastal Plain Experiment Station.

Certified Seed.—Available in quantity.

Tiflate

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—G. W. Burton.

Source.—Fifty-four introductions from Nigeria and Upper Volta that bred true for short-day photoperiod sensitivity.

Method of Breeding.—Fifty-four introductions from Nigeria and Upper Volta that bred true for less than 12-hour-day photoperiod sensitivity were allowed to cross-pollinate, isolated in one greenhouse section, in winter of 1963-64. Seed was increased in 2 succeeding years under isolation in winter plantings in Puerto Rico.

Description.—Highly heterozygous, uniform only to extent that all plants remain vegetative until day length is 12 hours or shorter. In latitude of Tifton, Ga., plantings made from April to August, will not flower until late October or early November. When not grazed or cut, April and August plantings may reach respective heights of 15 and 5 feet when mature. Most plants have pubescent leaves; seeds variable in size and considerably larger than those of Gahi 1 and Starr. Photoperiod sensitivity keeps it in a vegetative condition for a longer period in summer, gives better seasonal distribution of forage, more succulent, leafier, and more digestible forage, increases length of growing season, and increases ease of management. Although it produces less dry matter per acre under most cutting regimes, 2 years of grazing data indicate that it will be equal, and perhaps superior, to Gahi 1 under grazing. More

resistant to *Helminthosporium setariae* than a number of other millets, including common, Starr, and Gahi 1. Like other pearl millets, it contains no prussic acid.

Released.—1969, cooperatively by Georgia

Coastal Plain Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Georgia Coastal Plain Experiment Station.

Certified Seed.—Has been approved for certification in Texas.

Phalaris arundinacea L., reed canarygrass

Cool-season, sod-forming grass indigenous to North America, Europe, and Asia. Locally important for hay, pasture, silage, and erosion control, especially in North Central States and on west coast from northern California to Washington, and to limited extent in northeastern, southern, and intermountain regions. Well adapted to poorly drained soils subject to flooding, but can be grown on drier upland soils.

Frontier

Selected at Canada Department of Agriculture Research Station, Ottawa, Ontario, Canada—R. M. MacVicar.

Source.—Native collections.

Method of Breeding.—Three cycles of maternal line selection under controlled pollination. Tested as Ottawa 1133-7.

Description.—Tall, leafy, somewhat later in maturity than common. Considered superior for fodder production because of leafiness and later maturity. Total yield capacity equal or superior to other known strains under Canadian conditions. Especially adapted to high-fertility soils with adequate moisture.

Released.—1959, by Canada Department of Agriculture.

Breeder Seed.—Canada Department of Agriculture Research Station, Ottawa.

Certified Seed.—Available.

Grove

Selected at Canada Department of Agriculture Research Station, Ottawa, Ontario—R. M. MacVicar and D. R. Gibson.

Source.—Native collections.

Method of Breeding.—Large number of selections evaluated in clonal and outcross progeny tests. Four superior clones identified and intercrossed in isolation to provide basic seed.

Description.—Very leafy; some 7 to 10 days later in maturity than Frontier. First growth is not equal to Frontier but good second growth makes it equal in crude-protein production. Main attributes are late maturity and ability to give high yields of very leafy herbage at high levels of soil fertility. May be more suitable than common reed canarygrass for haylage production.

Released.—1970, by Canada Department of Agriculture.

Breeder Seed.—Canada Department of Agriculture Research Station, Ottawa.

Certified Seed.—Not available. (Projected for 1974.)

Ioreed

Selected at Iowa Agricultural Experiment Station, Ames, SCS cooperating—H. D. Hughes and C. P. Wilsie.

Source.—Parental clones selected from German Steenacker 1; German Rodowbrooker 18; Oregon commercial; Minnesota J18, J15C, J15A, J20B; U.S. Department of Agriculture 55009 and 55018; and old Iowa strain 503.

Method of Breeding.—Ten clones from above sources selected on basis of forage, seed-yielding ability, and forage quality; saved and recombined. Iowa clone represented about one-third and other nine sources about 7 percent each of seed recombined to form Ioreed. Synthetic 1 seed first obtained in 1945.

Description.—Hardy, vigorous, moderately productive, with good leaf-disease resistance. Mid-early in maturity, fair in seed production, rather susceptible to seed shattering. Appears similar to commercial types from longtime stands in Iowa and Minnesota.

Released.—1946, cooperatively by Iowa Agricultural Experiment Station and Nursery Division, SCS.

Breeder Seed.—Iowa Agricultural Experiment Station.

Certified Seed.—Available.

Iowa Synthetics

Selected at Iowa Agricultural Experiment Station, Ames—I. T. Carlson.

Source.—Seed collections made in Iowa and southern Minnesota in 1954.

Method of Breeding.—Synthetics RC-1 and RC-2 each developed from six clones selected on basis of individual plant performance, clonal evaluation, and topcross progeny performance. Selection mainly for high seed yield and seed retention; some attention given to other agronomic

traits including forage yield and disease reaction. The two synthetics have three clones in common.

Description.—Superior seed yield and seed retention, good forage yield and winter hardiness. RC-1 is similar to commercial seed lots in maturity and about 2 days earlier than RC-2.

Released.—No. Syn 2 seed distributed for testing in 1968 and subsequent years.

Breeder Seed.—Iowa Agricultural Experiment Station.

Certified Seed.—Not available.

P-2369

Selected at Plant Materials Center, SCS, Pleasanton, Calif.—O. K. Hoglund, C. C. Sorenson, and H. W. Miller.

Source.—Selection from variety originally developed by J. H. Christ at Idaho Branch Station, Sandpoint. In 1934 planted along creek at Plant Materials Center, SCS, Pullman, Wash. Packet of seed, produced at Pullman, received at Pleasanton in 1949.

Method of Breeding.—Mass phenotypic selection for summer and winter active plants.

Description.—Summer and winter active (in Mediterranean climate); very robust. Glaucous culms to 6 feet; leaves abundant, soft, and lax. Poor seedling vigor. Seed production good; seed quality consistently high. Best adapted to wet lands and areas subject to spring and fall flooding.

Released.—No. Included in conservation plantings.

Breeder Seed.—Plant Materials Center, SCS, Pleasanton.

Rise

Selected at Rudy-Patrick Research Center, Ames, Iowa—R. R. Kalton and C. J. Nettles.

Source.—Clones selected from field collections of seed made in north-central region of United States and western Canada.

Method of Breeding.—Selections evaluated in clonal and progeny tests for stand establishment, vegetative vigor, recovery ability, leafiness, shattering resistance, freedom from disease, high germination capacity, and yield. Recombination of 10 elite clones; evaluated for agronomic merit in Iowa, Illinois, Kansas, and Minnesota. Tested as R.P. 200.

Phalaris coerulea Desf., sunolgrass

Increased at Plant Materials Center, SCS, Pleasanton, Calif.—H. W. Miller and O. K. Hoglund.

Source.—Increase of *Phalaris coerulea*, P.I. 111994, introduced from Australia in 1935.

Description.—Vigorous, productive, winter hardy, leafy, and disease and drought resistant. Good recovery. Few days later in maturity. Improved seed yield, seed quality, shattering resistance, and stand establishment in comparison with common seed sources.

Released.—Distributed for testing by Rudy-Patrick Co. in 1962, 1963, and 1964.

Breeder Seed.—Rudy-Patrick Co.

Certified Seed.—Available. (Commercial seed available in limited quantities.)

S-5573

Selected at Canada Department of Agriculture Research Station, Saskatoon, Saskatchewan—R. P. Knowles.

Source.—Single plant showing good seed retention in old stand at Saskatoon.

Method of Breeding.—Three cycles of mass selection from original lines for plants resistant to shattering. Synthetic of 10 plants formed to produce breeder seed.

Description.—Seed retention much superior to Frontier, Ioreed, and commercial. Vigor slightly inferior to above strains. Five percent of seeds yellow.

Released.—No. Included in regional tests.

Breeder Seed.—Canada Department of Agriculture Research Station, Saskatoon.

Superior

Selected at Oregon Agricultural Experiment Station, Corvallis, ARS cooperating—H. A. Schoth.

Source.—Material growing on Oregon Agricultural Experiment Station farm.

Method of Breeding.—Single-plant selection made in 1926.

Description.—Comparatively nonshattering, large seeds; leafy, late maturing. Adapted to highland and fairly wet areas, but not resistant to long periods of inundation.

Released.—Cooperatively by Oregon Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Discontinued.

Certified Seed.—Not available. Looked promising in some tests. Strain used in grazing tests at Alabama Agricultural Experiment Station, Auburn, apparently traces to Superior.

Method of Breeding.—Tested at Pleasanton since 1936 and under range conditions at Sunol, Calif., since 1944.

Description.—Rapid-developing, long-lived bunchgrass, with strong seedling vigor. Closely

resembles hardinggrass in general appearance, but has three or more round, bulblike enlargements at base of stem rather than elongated corm. Poor seed producer; florets drop from rachis as seed heads mature.

Released.—No. Included in regional testing

program. Dropped from testing because of poor seed production, restricted range of adaptation, and susceptibility to killing by overgrazing. Failed to exhibit any superiority over hardinggrass.

Breeder Seed.—Discontinued.

Phalaris tuberosa var. *hirtiglumis* Batt. and Trab., koleagrass

Increased at California Agricultural Experiment Station, Davis—R. M. Love.

Source.—Introduction received from Agricultural Experiment Station, Rabat, Morocco, in 1955. California accession number T.O. 2143.

Description.—Coarse bunchgrass. Resembles hardinggrass in general appearance, but has round, bulblike enlargements at base of culm—somewhat similar to *Phalaris coerulescens*. Some indication it requires higher rainfall than hardinggrass.

Released.—No. Included in regional testing program.

Breeder Seed.—California Agricultural Experiment Station.

Perla

Selected at Plant Materials Center, SCS, Pleasanton, Calif.—H. W. Miller and O. K. Hoglund.

Source.—Introduced from Morocco. Received as *Phalaris tuberosa* var. *stenoptera* (P.I. 202480) and assigned accession number P-14529. Later reidentified as *P. tuberosa* var. *hirtiglumis*.

Method of Breeding.—Increased under isolation with minor phenotypic selection to eliminate off-types.

Description.—Tall, robust, rapid-developing bunchgrass, with short rhizomes. Resembles hardinggrass in general appearance, but has much stronger seedling vigor and hairy glumes. Easy to establish, grows well during cold winter months, and produces good seed crops. Stands frequently improve through natural reseeding, which differs from hardinggrass. Range livestock graze it readily; reaches range readiness about 3 weeks before hardinggrass. In dry years produces more forage because of early growth. Adapted to soils with restricting layer in Mediterranean climatic zone wherever average annual rainfall is 16 inches or more.

Released.—1970, cooperatively by California Agricultural Experiment Station and Plant Materials Center, SCS, Pleasanton.

Breeder Seed.—Plant Materials Center, SCS, Pleasanton.

Certified Seed.—Available fall 1971.

Phalaris tuberosa var. *stenoptera* (Hack.) Hitchc., hardinggrass

Cool-season, slightly-spreading grass from Union of South Africa; indigenous to northern Africa. Used for pasture and erosion control in California and sparingly in other parts of Southwest. Adapted to subtropical winter rainfall climate; best suited to heavy soils; drought resistant; palatable; withstands heavy grazing.

Increased at California Agricultural Experiment Station, Davis.

Source.—Introduced from Toowoomba Botanical Gardens, Australia, in 1914 by P. B. Kennedy, California Agricultural Experiment Station. Seed collected from old hardinggrass field at Hopland, Lake County, Calif., in 1940 by D. J. Vanderwal. This seed lot given accession number P-11740 and increased at Plant Materials Center, SCS, Pleasanton, Calif.

Description.—Long-lived, persistent, dryland, perennial bunchgrass, with intermediate winter growth. Short, stout rhizomes originating from base of low-lying crown; semibroad, blue-green leaves. High forage yields. Most widely adapted

range grass used in California. Survives on rather infertile, stony soils, but yields best on heavy soils. Adapted to zones of less than 15 inches of rainfall if clay layer in soil profile.

Released.—Certified by California Crop Improvement Association in 1946.

Breeder Seed.—Foundation seed available from California Crop Improvement Association.

Certified Seed.—Available in quantity.

P-14893

Selected at Plant Materials Center, SCS, Pleasanton, Calif.—O.K. Hoglund and C. C. Sorenson.

Source.—Introduced from Italy as P.I. 217441.

Method of Breeding.—Some phenotypic selection to eliminate offtypes.

Description.—Rapid-developing bunchgrass, with short, stout rhizomes. Stronger seedling vigor, finer stems and leaves, and more compact in growth than standard hardinggrass; may have higher quality forage. Appears to have same site

and rainfall requirements as hardinggrass. Shorter stature makes seed harvesting easier.

Released.—No. Included in field-evaluation program.

Breeder Seed.—Plant Materials Center, SCS, Pleasanton.

Wintergreen

Selected at the Texas A&M University Agricultural Research Center, McGregor—M. J. Norris.

Source.—Surviving plants from two plant introductions (PI 193056 and PI 196338) originally planted in 1952. Surviving plants noted following severe drought in late 1954.

Method of Breeding.—Increase of three plants that survived extended drought in 1954, and tested under similar conditions in 1963, 1966, and 1967.

Descriptions.—Cool-season, perennial bunchgrass somewhat more erect than commercial hardinggrass; distinguishable mainly by summer survival in area with extended dry periods and high temperatures.

Released.—1969, by Texas Agricultural Experiment Station.

Breeder Seed.—Texas A&M University, Agricultural Research Center, McGregor.

Certified Seed.—Available.

Phleum nodosum L., diploid timothy

Leafy, persistent, low-growing species. Some forms are almost prostrate and spread by creeping stolons.

Evergreen

Developed at Plant Breeding Institute, Weibullsholm, Landskrona, Sweden.

Source.—Domestic collections.

Description.—Low-growing diploid with fine stems and leaves. Dark green; good tiller production and spreading characteristics. Adapted for use in pastures and as low-maintenance, general-purpose turfgrass.

Released.—W. Weibull AB, Landskrona.

Breeder Seed.—W. Weibull AB, Landskrona.

Certified Seed.—Available.

Phleum pratense L., timothy

Major cool-season bunchgrass from Europe. Used for hay, pasture, and silage throughout humid sections of Northern United States. Long lived in cool, humid regions; winter hardy, but not resistant to close, continuous grazing. Palatable and nutritious; valuable hay grass. Poor recovery with limited moisture; does not tolerate drought or high temperatures.

Astra

Developed by Plant Breeding Institute, Weibullsholm, Landskrona, Sweden.

Source.—Indigenous plants.

Method of Breeding.—Mass selection. Large number of plants started under isolation. Undesirable plants rogued prior to anthesis. Seed harvested from remaining plants and bulked to form breeder seed.

Description.—Growth pattern similar to that of Climax; both varieties mature at same time. In Ontario average yield slightly below that of Climax under hay plus aftermath pasture management, but yield difference not statistically significant. Not so prominent flag leaf as Climax, which helps to distinguish variety in field. Good resistance to disease and winterkilling.

Released.—Plant Breeding Institute, Weibull-

sholm. Distributed in Canada by Ontario Seed Cleaners and Dealers, Ltd., Brampton, Ontario.

Breeder Seed.—Plant Breeding Institute, Weibullsholm.

Certified Seed.—Available.

Bariton

Developed by Barenbrug Holland N.V., Arnhem, Holland.

Source.—Collections from lawns, pastures, and other uncultivated areas.

Method of Breeding.—Selection and evaluation of individual plants, clones, and families.

Description.—Late heading, dark green, good tillering, persistent and winter hardy, good yield of palatable forage. Suitable for meadows of medium to long duration and for athletic fields where it shows fair density under mowing.

Released.—1964. Agency for U.S. and Canada—Steven J. R. Frohlich & Co., Princeton, N.J.

Breeder Seed.—Barenbrug Holland N.V.

Certified Seed.—Available.

Barmoti

Developed by Barenbrug Holland N.V., Arnhem, Holland.

Source.—Commercial seed lot.

Method of Breeding.—Selection and evaluation of individual plants, clones, and families.

Description.—Early hay-type, with early, prostrate-erect spring growth; very leafy stems; high hay yield; good aftermath. Good persistence and moderate resistance to *Heterosporium phlei*.

Released.—1951. Agency for U.S. and Canada—Steven J. R. Frohlich & Co., Princeton, N.J.

Breeder Seed.—Barenbrug Holland N.V.

Certified Seed.—Available.

Bounty

Selected at Canada Department of Agriculture Research Station, Ottawa, Ontario—W. R. Childers.

Source.—Original clones selected from material supplied by Morgan Evans, Wooster, Ohio, and from variety Otofte.

Method of Breeding.—Superior late-maturing clones selected and included in open-pollinated progeny test. Five highest yielding progenies noted, and their maternal clones established vegetatively in isolated increase block.

Description.—Tall, with leaves held high on the stem; maturity 7 to 10 days later than Climax. Stems larger and leaves broader than Climax. Under higher summer temperatures the lateness differential becomes shorter.

Released.—1966, Canada Department of Agriculture.

Breeder Seed.—Canada Department of Agriculture Research Station, Ottawa.

Certified Seed.—Available.

Champ

Selected at Canada Department of Agriculture Research Station, Ottawa, Ontario—W. R. Childers and L. P. Folkins.

Source.—Fifty-six plants selected from a local farmer's field that had been closely grazed for 15 years.

Method of Breeding.—Clones increased and tested in greenhouse for dry-matter production and rapidity of new-culm formation. Top 10 clones selected for field testing. Replicated polycross progeny tests and yield trials established throughout Canada. Top four clones selected for synthetic.

Description.—Excellent seedling vigor; seedlings stool rapidly to produce thick stand; stems finer than most varieties. Matures 5 to 7 days earlier than Climax; flowering heads shorter, more dense than most varieties. Most important characteristic is quick recovery and good aftermath production. Seed yields have been 15 to 20 percent less than Climax.

Released.—1967, Canada Department of Agriculture.

Breeder Seed.—Canada Department of Agriculture Research Station, Ottawa.

Certified Seed.—Available in quantity.

Clair (Reg. No. 3)

Increased at Kentucky Agricultural Experiment Station, Lexington—R. C. Buckner.

Source.—Naturalized strain growing on farm of Clair Andrew, Vevay, Ind.

Method of Breeding.—Comparative tests. Strain designated as "Vevay" in regional testing program.

Description.—Very early maturing strain, relatively coarse, vigorous, with good aftermath production. Good persistence in region of adaptation.

Released.—1958, Kentucky Agricultural Experiment Station.

Breeder Seed.—Kentucky Agricultural Experiment Station.

Certified Seed.—Available in quantity.

Climax

Selected at Canada Department of Agriculture Research Station, Ottawa, Ontario—R. M. MacVicar.

Source.—Wide collection of seed lots.

Method of Breeding.—Synthetic variety developed by combining several progeny-tested clones.

Description.—Tall, fine stemmed. Characterized by marked leafiness; leaves carried high on stems. Under conditions of good fertility, aftermath growth excellent. Highly resistant to rust. Seven to ten days later in maturity than common.

Released.—1947, Canada Department of Agriculture.

Breeder Seed.—1947, Canada Department of Agriculture Research Station, Ottawa.

Certified Seed.—Available. (Seed produced in Canada and United States.)

Drummond

Selected at Macdonald College, Quebec, Canada—J. N. Bird.

Source.—Strain from northern Europe, S-48 and S-51 from Wales, and F.C. 15150 from ARS and Ohio Agricultural Experiment Station, Wooster, all introduced during 1930-33.

Method of Breeding.—Maternal line selection, with space-planted progeny tests.

Description.—Reaches flowering and seed stage about 10 to 14 days later than common timothy at Macdonald College. Winter hardy, with appreciable amount of rust resistance. Slightly inferior to Climax in midsummer aftermath yield.

Released.—Macdonald College, Quebec.

Breeder Seed.—Department of Agronomy, Macdonald College. Hogg and Lytle, Ltd., Oakwood, Ontario, have exclusive rights to breeder seed.

Certified Seed.—Available.

Dural

Selected at University of Manitoba, Winnipeg, Canada.

Source.—Parent material obtained from New York Agricultural Experiment Station, Ithaca, and from Ontario College of Agriculture, Guelph, Ontario, Canada.

Description.—Selected for yield, leafiness, and resistance to rust. Winter hardy; well adapted to more humid areas of Manitoba. Medium in maturity.

Released.—University of Manitoba.

Breeder Seed.—Discontinued.

Engmo

Selected at the Agricultural Experiment Station, Tromsø, Norway—Karl Flovik.

Source.—Collections from old mountain meadow in Troms county.

Method of Breeding.—Selected for winter hardiness, early vigor, and leafy growth.

Description.—Very winter-hardy variety, superior to others tested in Alaska. In Alaska, characterized by early spring growth, high first-cut yield, high proportion of leaves to stems, and high-quality forage.

Released.—In Norway. Made available in Alaska in 1953 by Alaska Agricultural Experiment Station and ARS cooperating.

Breeder Seed.—Alaska Agricultural Experiment Station, Palmer. (Not inconceivable that Alaskan source may differ somewhat from original after several generations of seed increase in Matanuska Valley.)

Certified Seed.—Available in limited quantity.

Essex (Reg. No. 2)

Selected at New York Agricultural Experiment Station, Ithaca—R. P. Murphy and S. S. Atwood.

Source.—Wide collection of seed lots from plant breeders in United States. Parental clones: N.Y. 48-30, N.Y. 48-140, N.Y. 48-154, and N.Y. 48-215.

Method of Breeding.—Synthetic variety developed from four selected clones. Breeder seed produced in isolated plot from randomly planted vegetative pieces of four clones in 100 or more replications. Equal amounts of seed from each parental clone mixed together for breeder seed. Certified seed first advanced generation from foundation seed; not eligible for use as planting stock for production of any class of certified seed.

Description.—Very late maturing, leafy. Yielded 97 percent as much as common and Climax when planted alone, 94 percent when planted with alfalfa, and 93 percent when planted with Empire birdsfoot trefoil. Approximately 2 weeks later in maturity than common and 10 days later than Climax. Forage at first harvest nearly always leafier and freer of foliar diseases than common, Climax, and other earlier maturing types. In limited tests for seed production similar to common and lower than Climax in yield.

Released.—1955, by New York Agricultural Experiment Station.

Breeder Seed.—New York Agricultural Experiment Station.

Certified Seed.—Available in quantity.

Heidemij

Developed by D. J. van der Have, The Netherlands.

Source.—Plants collected from old pastures.

Method of Breeding.—Plants evaluated for pasture-forage qualities. Superior plants intercrossed and progenies included in forage test for 5 years. Four clones selected for inclusion in synthetic.

Description.—Leafy, prostrate, pasture-type, medium-green leaves. Late flowering; prefers cool climates; can be used for both pasture and turf.

Released.—1935, D. J. van der Have.

Breeder Seed.—D. J. van der Have.

Certified Seed.—OECD certified.

Hopkins

Selected at Ohio Agricultural Experiment Station, Wooster, ARS cooperating—M. W. Evans.

Source.—Collections from old meadows and roadsides.

Method of Breeding.—(See Marietta.) Composed of selections F.C. 28119 and F.C. 28152.

Description.—In northern Ohio approximately 14 to 15 days later than common timothy.

Released.—1946, cooperatively by Ohio Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Discontinued.

Certified Seed.—Available in limited quantities.

Huron

Selected at North Ridgeville, Ohio, and Ohio Agricultural Experiment Station, Wooster, ARS cooperating—M. W. Evans.

Source.—Plant selected along roadside about 4½ miles west of Wakeman, Huron County, Ohio, in 1911.

Method of Breeding.—(See Marietta.) Evaluated as F.C. 3937.

Description.—Late variety; about 6 days later

blooming and maturing seed than common timothy.

Released.—Cooperatively by Ohio Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Discontinued.

Itasca (Reg. No. 1)

Selected at Minnesota Agricultural Experiment Station, St. Paul.

Source.—See Method of Breeding.

Method of Breeding.—Composed of seven inbred lines from following sources: One from Minnesota commercial seed, one from T7, two from Cornell 1620, and three from Cornell 1777. Synthetic tested as Minnesota 1630.

Description.—Rank growing; well adapted to conditions in Minnesota. Similar to commercial timothy in maturity, but superior in growth character and habit.

Released.—Minnesota Agricultural Experiment Station.

Breeder Seed.—Not available.

Certified Seed.—Available.

King

Developed by D. J. van der Have, The Netherlands.

Source.—Plants collected from old pastures in The Nether'ands.

Method of Breeding.—Plants evaluated in space-planted nursery. The best plants were intercrossed for progeny forage testing. Four superior clones included in synthetic.

Description.—Prostrate spring growth habit. Leafy, semidecumbent, fairly wide leaves, dark green, late maturity. Useful for pasture or turf.

Released.—1961, D. J. van der Have.

Breeder Seed.—D. J. van der Have.

Certified Seed.—OECD certified.

Lorain

Selected at Ohio Agricultural Experiment Station, Wooster, ARS cooperating—M. W. Evans.

Source.—Collections from old meadows and roadsides.

Method of Breeding.—(See Marietta.) Composed of selections. F.C. 15167 and F.C. 28147.

Description.—In northern Ohio approximately 10 to 12 days later than common timothy. Leaves remain green for about 8 to 10 days longer than those of common. Adapted for hay production in northern Ohio.

Released.—1939, cooperatively by Ohio Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Discontinued.

Certified Seed.—Available.

Marietta

Selected at Ohio Agricultural Experiment Station, Wooster, ARS cooperating—M. W. Evans.

Source.—Collections from meadows and roadsides.

Method of Breeding.—Selection practiced in space-planted nurseries. Plots arranged in blocks of selections having same time of heading, blooming, and maturity. Progeny tested in space-planted row plots in successive generations. Composed of selections F.C. 11901, 12468, and 15220. In 1946 selections changed to F.C. 11901, F.C. 28096, and F.C. 28185. Leaves of last two selections remain green longer than those of F.C. 12468 and F.C. 15220.

Description.—Blooms and matures in northern Ohio approximately 5 days earlier than common timothy. Leaves tend to remain green nearly as late as those of common timothy. Well adapted to southern Ohio.

Released.—1937, cooperatively by Ohio Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Discontinued.

Certified Seed.—Not available.

Medon

Selected at Ontario College of Agriculture, Guelph, Ontario, Canada—O.M. McConkey.

Source.—Local collections and introductions from Scandinavia, U.S.S.R., central Europe, Great Britain, and United States.

Description.—Leafy, winter hardy, well adapted in Ontario.

Released.—Ontario College of Agriculture.

Breeder Seed.—Ontario College of Agriculture.

Certified Seed.—Not available.

Milton

Selected at Macdonald College, Quebec, Canada—J. N. Bird.

Source.—Strains obtained from New York Agricultural Experiment Station, Ithaca, Minnesota Agricultural Experiment Station, St. Paul, and Svalof Experiment Station, Sweden; commercial seed from Dickinson Seed Co., Chicago, Ill., in 1911.

Method of Breeding.—Fairly rust resistant in comparisons made with inoculated plats at Macdonald College, whereas ordinary commercial strains susceptible to timothy rust. Winter hardy, early maturing, vigorous.

Released.—Macdonald College, Quebec.

Breeder Seed.—Macdonald College, Quebec.

Certified Seed.—Hogg and Lytle, Ltd., Oakwood, Ontario, have exclusive rights to breeder seed.

N7-126

Developed by Northrup, King & Co., Minneapolis, Minn.

Source.—Itasca, Drummond, Lorain, Climax, and common.

Method of Breeding.—Individual plants selected for leaf-disease resistance, leafiness, and aftermath recovery. Seventeen clones combined in synthetic.

Description.—Leafy hay type with leaves well up the culms; resistant to stem rust and good tolerance to leaf diseases. Maturity similar to Climax.

Released.—No. Under consideration for release.

Breeder Seed.—Northrup, King & Co.

S-50

Selected at Welsh Plant Breeding Station, Aberystwyth, Wales, United Kingdom.

Source.—Collections from old pastures in the Midlands and Kent.

Method of Breeding.—Mass selection for dense low-growing pasture type.

Description.—Short leaved; forms dense stems and heads short; diploid; poor seed producer. Palatable to livestock, but forage yields low in comparison with other varieties.

Released.—Welsh Plant Breeding Station.

Breeder Seed.—Welsh Plant Breeding Station.

Certified Seed.—Not available.

Swallow

Selected at University of Alberta, Edmonton, Canada.

Source.—Late Swedish stock Svalof 523 introduced into Alberta in 1918.

Description.—Hay type. Similar to common

timothy in appearance, but with good stem rust resistance (Edmonton) and winter hardiness.

Released.—University of Alberta.

Breeder Seed.—University of Alberta.

Certified Seed.—Available in limited quantity.

Timfor

Developed by Northrup, King & Co., Minneapolis, Minn.

Source.—Itasca, Lorain, and commercial sources.

Method of Breeding.—Individual plants selected for leafiness, aftermath recovery, resistance to stem rust, and freedom from leaf spot diseases. Maturity similar to common. Fifteen clones combined in synthetic. Tested as N7-128.

Description.—Medium early, very leafy, hay type, relatively free of leaf diseases.

Released.—Expected release in 1971.

Breeder Seed.—Northrup, King & Co.

Verdant (Reg. No. 4)

Selected at Wisconsin Agricultural Experiment Station, Madison, ARS cooperating—E. L. Nielsen and P. N. Drolsom.

Source.—Collection of named varieties and introduced seed lots.

Method of Breeding.—Open pollination of 81 selected clones from diverse sources. Field selections made in spaced progenies. Artificially screened for stem rust. Synthetic based upon 28 clones selected for stem rust and leaf streak tolerance, late maturity, leafiness, vigor, seed production, and stiff straw. Distributed for testing as Wisconsin T-1.

Description.—Late-maturing hay type. Moderately coarse, good tolerance to stem rust and leaf streak, vigorous, stiff strawed.

Released.—1968, cooperatively by Wisconsin Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Wisconsin Agricultural Experiment Station.

Certified Seed.—Available.

Poa ampla Merr., big bluegrass

Cool-season, native bunchgrass. Valuable in Pacific Northwest and throughout northern part of intermountain region. Very early, relatively coarse, palatable. Damaged by overgrazing; drought resistant.

Sherman

Selected at Plant Materials Center, SCS, Pullman, Wash.—V. B. Hawk, J. L. Schwendiman, and A. L. Hafenrichter.

Source.—Collected from native vegetation near Moro, Sherman County, Oreg., by D. E. Stephens, superintendent of Sherman Branch Experiment Station, Moro, in 1932. Re-collected by SCS in 1935.

Method of Breeding.—Comparisons among 178 accessions. Selected accession subjected to mass selection. Tested as P-2716.

Description.—Starts growth very early in spring. Productive, early maturing, 35 to 38 inches tall, erect growing, fine stemmed. Long-lived

perennial bunchgrass; high in seed, forage, and root production. Distinct blue, moderately abundant leaves; large, compact seedhead. Plants apomictic. ($2n=63$.) Adapted to conservation seedings alone or with alfalfa in dryland areas in wheat-fallow farmland on light-textured soils. Successfully used for reseeding burned-over forest lands in pine zones of Western States.

Released.—1945, cooperatively by Washington Idaho, and Oregon Agricultural Experiment Stations at Pullman, Moscow, and Corvallis, respectively, and Plant Materials Center, SCS, Pullman. Distributed for field tests in 1938.

Breeder Seed.—Plant Materials Center, SCS, Pullman.

Certified Seed.—Available in quantity.

***Poa annua* L., annual bluegrass**

Cool-season, annual bunchgrass from Europe. Serious weed in lawns and golf courses; tolerates close mowing and produces seed under regular mowing at height of one-fourth inch. Under cool

conditions volunteer stands may provide good- to fair-quality turf. Not recommended, but may be encouraged to provide fall and spring cover on bermudagrass fairways. Varieties not available.

***Poa bulbosa* L., bulbous bluegrass**

Cool-season bunchgrass from Europe. Used for pasture and erosion control in parts of Western United States, including southwestern Idaho, Oregon, and northern California. Increased from bulblets that form in panicle.

Tested against commercial and other naturalized strains.

Description.—Vigorous, robust, leafy, tall, productive, late maturing. Heavy forage and seed producer. Short-lived perennial. Reseeds readily; seed high in germination. Adapted for use as understory grass in range seedings of crested wheatgrass or other dryland grasses at elevations of less than 4,000 feet, where it provides good ground cover.

Released.—1956, cooperatively by Idaho Agricultural Experiment Station, Moscow, and Plant Materials Center, SCS, Pullman.

Breeder Seed.—Plant Materials Center, SCS, Pullman.

Certified Seed.—Not available.

P-4874

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

Source.—Pullman, east on Highway 3 near Idaho State line. Collected in 1937 by J. L. Schwendiman from naturalized stand.

Method of Breeding.—Bulk selections from open-pollinated planting of original collection.

***Poa canbyi* (Scribn.) Piper, canby bluegrass**

P-851

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

Source.—Collection from Blue Mountains, Wash.

Method of Breeding.—Selected as most vigorous accession from large group of collections of this polymorphous bluegrass species. Bulk increase of open-pollinated plants after removal of aberrants.

Description.—Vigorous, robust, leafy; characterized by excellent early spring growth, abundant basal leaves, numerous stems 16 to 18 inches in height, and abundant seedheads. Seed matures in mid-June, when plants become dormant until onset of fall rains.

Released.—No. Increased for testing in field plantings as an understory grass in range seedings.

Breeder Seed.—Plant Materials Center, SCS, Pullman.

***Poa compressa* L., Canada bluegrass**

Canon

Cool-season, sod-forming grass from Europe. Used for pasture and erosion control in humid parts of Northern United States. Adapted to open, rather poor, dry soils, but does not withstand heavy grazing. Less desirable than Kentucky bluegrass for turf.

Selected at Ontario Agricultural College, University of Guelph, Guelph, Ontario, Canada.

Source.—Collections from United States and Canada.

Method of Breeding.—Mass selection for leafiness, disease resistance, and type.

Description.—Hardier and earlier in spring growth, flowering, and maturity than normal for species. Improved in leafiness, disease resistance,

longevity, and yield. Comparatively pure as to type.

Released.—1944, by Ontario Agricultural College.

Breeder Seed.—Ontario Agricultural College.

Certified Seed.—Available in limited quantities.

Poa fendleriana Nannf., mutton bluegrass

Cool-season, native bunchgrass. Widely distributed in intermountain region, extending south to high-elevation rangelands of Arizona and New

Mexico. Palatable and nutritious; provides early grazing. Adapted to wide range of soil types; drought resistant. Varieties not available.

Poa glauantha Gaudin, upland bluegrass

Cool-season bunchgrass. Found from eastern Canada to Pacific Northwest and in Europe. Shows some promise for erosion control and general-purpose turf in Pacific Northwest.

Description.—Numerous compressed, fine, wiry culms; decumbent at base. Many flat, short, dark-green, well-distributed leaves. Seedhead numerous, lax, becoming brownish, compact, and nodding at maturity. Seeds small; lemmas lightly pubescent and sparsely webbed at base. Plants resemble Canada bluegrass, but become sodbound less readily, lodge less, and produce more seed. Adapted to low-fertility soils for ground cover.

Draylar (Reg. No. 3)

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

Source.—Introduced as *Poa* spp., P.I. 109350, in 1935 by Westover-Enlow expedition from Chorsum, Turkey. Tested and propagated as P-410.

Method of Breeding.—Aberrant plants removed from original introduction and remaining apomictic ($2n=50$) plants increased.

Released.—1951, cooperatively by Washington Agricultural Experiment Station and Plant Materials Center, SCS, Pullman. Named "Draylar" in 1963.

Breeder Seed.—Plant Materials Center, SCS, Pullman.

Certified Seed.—Not available.

Poa pratensis L., Kentucky bluegrass

Major cool-season, sod-forming grass from Europe. Extensively used for pasture, recreational turf, and erosion control in Northeastern and North Central States and southward in Appalachians to northern Georgia. Important lawn grass in Pacific Northwest and throughout much of northern and central Great Plains and intermountain region. Best adapted to well-drained, productive soils of limestone origin.

humidity. Level of apomixis is 50 percent, and hence only reproduced vegetatively ($2n=48$).

Released.—1964, by Warren's Turf Nursery. (Clone protected by Patent No. 2615.)

Breeder Stock.—Warren's Turf Nursery.

Certified Stock.—Not available. (Sod commercially available.)

A-10

Selected at Warren's Turf Nursery, Palos Park, Ill.—B. O. Warren.

Source.—Collections of plants from old turf areas, including golf fairways and cemeteries.

Method of Breeding.—Spaced-plant testing and sod-plot evaluation.

Description.—Narrow leaved, dark green, and medium density. Fair resistance to leaf spot and powdery mildew, good resistance to stem rust and stripe smut, and superior resistance to those pathogens active in conditions of high temperature and

Selected at Warren's Turf Nursery, Palos Park, Ill.—B. O. Warren.

Source.—Collections of plants from old turf areas, including golf fairways and cemeteries.

Method of Breeding.—Space-plant testing and sod-plot evaluation.

Description.—Leaf medium in width and stiffer than most bluegrasses; color darker than Merion in spring and fall, somewhat lighter in summer. Growth more dense than most bluegrasses; tolerates 1/2-inch mowing height. Superior resistance to leaf spot, stripe smut, and powdery mildew, average resistance to stem rust, and good resistance

A-20

to *Fusarium roseum*. Level of apomixis about 80 percent, and hence only reproduced vegetatively ($2n=38$).

Released.—1968, by Warren's Turf Nursery.

Breeder Stock.—Warren's Turf Nursery.

Certified Stock.—Not available. (Sod commercially available.)

A-34

Selected at Warren's Turf Nursery, Palos Park, Ill.—B. O. Warren.

Source.—Collection of plants from old turf areas, including golf fairways and cemeteries.

Method of Breeding.—Spaced-plant testing and sod-plot evaluation under artificial shade (65 percent).

Description.—Leaf medium in width and color; weaker than most bluegrasses; density above average. Superior shade tolerance in comparison with other Kentucky bluegrasses, fine fescues, and rough bluegrass. Resistance to leaf spot is medium; good resistance to stem rust, stripe smut, and powdery mildew. Above average vigor, and in open sunlight will tolerate ½-inch mowing. In shade, mowing at 1½ to 2 inches is necessary. Level of apomixis above 90 percent.

Released.—1964, by Warren's Turf Nursery.

Breeder Seed.—Warren's Turf Nursery.

Certified Seed.—Not available. (Limited commercial production.)

Arboretum

Selected at Missouri Botanical Garden, St. Louis—W. L. Brown.

Source.—Collections of plants from old pastures and lawns in Missouri and neighboring States.

Released.—Informally. Included in several turf tests; not outstanding in most tests.

Certified seed.—Not available. (Limited commercial increase in Pacific Northwest.)

Bargenta

Developed by Barenbrug Holland N.V., Arnhem, Holland.

Source.—Collections from lawns, pastures, and other uncultivated areas.

Method of Breeding.—Selection and evaluation of one plant.

Description.—Vigorous type adapted for pasture use.

Released.—1965. Agency for U.S. and Canada—Steven J. R. Frohlich & Co., Princeton, N.J.

Breeder Seed.—Barenbrug Holland N.V.

Certified Seed.—Available.

Baron

Developed by Barenbrug Holland N.V., Arnhem, Holland.

Source.—Collections from lawns, pastures, and other uncultivated areas.

Method of Breeding.—Selection and evaluation of one plant.

Description.—Rather broad, dark-green leaves; very persistent; and with good resistance to *Helminthosporium* leaf spot. Suitable for lawns, athletic fields, and roadsides. Drought resistant, winter hardy, makes dense turf, needs little mowing. Quick establishment; greens up earlier in spring than other varieties.

Released.—1969. Agency for U.S. and Canada—Steven J. R. Frohlich & Co., Princeton, N.J.

Breeder Seed.—Barenbrug Holland N.V.

Certified Seed.—No.

Beltsville 117-27(6)

Selected at Plant Industry Station, Beltsville, Md.—A. A. Hanson and F. V. Juska.

Source.—Irradiated Merion Kentucky bluegrass.

Method of Breeding.—Single aberrant plant selected in M_3 generation from M_2 mutant.

Description.—Prostrate growth habit, dark green. Fair to good seed yield at Beltsville. Susceptible to stripe smut. Good tolerance to leaf spot and rust.

Released.—No. Distributed for testing in 1964.

Breeder Seed.—Plant Industry Station.

Belturf

Selected at Plant Industry Station, Beltsville, Md.—A. A. Hanson and F. V. Juska.

Source.—Field collections in Maryland and Alabama. Traces to vegetative collection from old management experiment at Plant Industry Station.

Method of Breeding.—Vegetative collections separated into six individual tillers and space planted for seed production and for elimination of contaminants. Seed harvested and used to establish unreplicated solid-seeded plots and space-planted progeny test. Promising selections included in replicated plot test for evaluation under two levels of nitrogen. Selected and evaluated as S-5.

Description.—Vigorous, semiprostrate type; excellent rhizome development and spread. Fair seed yield at Beltsville; highly apomictic. High tolerance to leaf spot and rust. Distinguished from Merion by medium-green color and narrower leaves.

Released.—No. Distributed for testing in 1964.
Breeder Seed.—Plant Industry Station.

C-1 or Newport C-1

Synonymous for Newport.
Certified Seed.—Available.

Campus

Developed by Gebr. van Engelen, Netherlands.
Source.—Old turf areas.

Description.—Dark green; fair to good turf-forming characteristics. Moderately susceptible to leaf spot and rust; not rated as tolerant to extreme temperatures.

Released.—Gebr. van Engelen.

Breeder Seed.—Gebr. van Engelen.

Certified Seed.—Not available. (Available commercially.)

Cougar

Selected at Plant Materials Center, SCS, Pullman, Wash.; Washington Agricultural Experiment Station, cooperating—J. L. Schwendiman and A. G. Law.

Source.—From Professor Frandsen, Denmark, as F.C. 22190 in 1934.

Method of Breeding.—Propagated through four generations to eliminate aberrant plants. Space planted in 1952; 14 single-plant selections made in 1953. Seed from four outstanding plant selections space planted. Aberrant plants removed; bulked seed of each selection used for further testing in turf tests of Agronomy Department of Washington Agricultural Experiment Station, Pullman. Identified as P4358. Breeder seed is mechanical mixture of equal seed weight from clones PNW-204, PNW-402, and PNW-602.

Description.—Dwarf, low growing; short, dark-green leaves. Similar to Merion, but 10 to 14 days later in seed maturity. Produces very few aberrant plants. Resistant to powdery mildew.

Released.—1965, cooperatively by Washington Agricultural Experiment Station and Plant Materials Center, SCS, Pullman.

Breeder Seed.—Plant Materials Center, SCS, Pullman, and Washington Agricultural Experiment Station.

Certified Seed.—Available in quantity.

Delta

Selected at Canada Department of Agriculture Research Station, Ottawa, Ontario, Canada—R. M. MacVicar.

Source.—Native stands.

Method of Breeding.—Single-plant selection.

Description.—Vigorous, erect, fine stemmed, relatively early, apomictic. Adapted to cooler sections of Kentucky bluegrass region, where leaf spot infestations, to which it is susceptible, are less frequent. Marked resistance to mildew. Used for pasture and turf.

Released.—1938, by Canada Department of Agriculture.

Breeder Seed.—Canada Department of Agriculture Research Station, Ottawa.

Certified Seed.—Available. (Some production in Pacific Northwest.)

FFR 9.031

Selected at Farmers Forage Research Cooperative, Lafayette, Ind.—R. J. Buker.

Source.—Plants obtained from C. R. Funk, Rutgers, N.J., who had screened population for *Helminthosporium* leaf spot and stripe smut.

Method of Breeding.—Superior clone selected on basis of turf trials at Lafayette, Ind., and seed-production tests at Spokane, Wash.

Description.—Dwarf to semidwarf, resistant to leaf spot and stripe smut, produces good seed yield. Highly apomictic.

Released.—No. Seed under increase.

Breeder Seed.—Farmers Forage Research Cooperative.

Fylking

Developed at Swedish Seed Association, Svalof, Sweden.

Source.—Single-plant collections in southern Sweden.

Method of Breeding.—Selection in spaced-plant nurseries and plot evaluation.

Description.—Low - growing, semiprostrate, dense turf; short, medium-wide blades; good root system. Moderate to good resistance to leaf spot, rust, *Fusarium roseum*, and strip smut. Rate of growth during establishment not so rapid as Merion. Tolerates close mowing.

Released.—Swedish Seed Assoc. (Clone patented in U.S. Protection does not apply to seed.)

Breeder Seed.—Plant Breeding Institute of Swedish Seed Assoc.

Certified Seed.—Not available. (Distributed in U.S. by Jacklin Seed Co., Inc., Dishman, Wash.)

Kenblue

Increased at Kentucky Agricultural Experiment Station, Lexington.—R. C. Buckner.

Source.—Blend of seed from farms located in

major seed-producing counties in central Kentucky.

Description.—Consistently superior in performance to all named varieties and to seed lots of foreign origin, in tests at Kentucky Agricultural Experiment Station, Lexington. Superiority attributed to resistance to diseases and tolerance to sod webworm.

Released.—1967, by Kentucky Agricultural Experiment Station.

Breeder Seed.—Kentucky Agricultural Experiment Station.

Certified Seed.—Available.

Kenon

Selected at Ontario Agricultural College, University of Guelph, Guelph, Ontario, Canada.

Source.—Collection of domestic and foreign sources.

Method of Breeding.—Mass selection for hay and pasture type.

Description.—Selected for leafiness, better distribution of growth, and hardiness. Resistant to rust; somewhat better hay yield than common sources.

Released.—1944, by Ontario Agricultural College.

Breeder Seed.—Ontario Agricultural College.

Certified Seed.—Not available.

Merion (Reg. No. 1)

Selected at Plant Industry Station, Beltsville, Md., by U.S. Golf Association Green Section, ARS cooperating—F. V. Grau.

Source.—Single-plant selection made by Joseph Valentine of Merion Golf Club, Ardmore, Pa., in 1936 and increased by John Monteith, Jr., former director, U.S. Golf Association Green Section.

Method of Breeding.—Plant selection and apomictic seed progenies obtained through succeeding generations tested in cooperative turf research program of Plant Science Research Division, ARS, and U.S. Golf Association Green Section. Tested as B-27.

Description.—Low growing, short leaves, good color. High degree of resistance to *Helminthosporium* leaf spot. More tolerant to close mowing than common Kentucky bluegrass. Susceptible to rust and stripe smut.

Released.—1947, cooperatively by Plant Science Research Division, ARS, and U.S. Golf Association Green Section.

Breeder Seed.—Pennsylvania Agricultural Experiment Station, University Park.

Certified Seed.—Available in quantity.

Newport (Reg. No. 2)

Selected at Plant Materials Center, SCS, Pullman, Wash.—Jens Clausen, Carnegie Institution of Washington, Stanford University, Stanford, Calif., and Plant Materials Center staff.

Source.—Maritime race collected from coastal bluffs at Newport, Lincoln County, Oreg., by W. E. Lawrence. Propagated under Carnegie Institution of Washington, accession CIW 4466-1 and P-13821.

Method of Breeding.—Seed of original collection used to establish spaced planting in 1949. Strain found apomictic ($2n=81$); bulked seed used for increase in 1953. This strain used in Carnegie Institution of Washington hybrid bluegrass studies.

Description.—Vigorous, highly productive, coastal race of broad climatic tolerance. Wide, dark-green leaves, low growing, fair to good in seed production, medium late in seed maturity, rapid sod forming. Appears to be fairly resistant to rust and *Helminthosporium* leaf spot.

Released.—1958, cooperatively by Washington and Oregon Agricultural Experiment Stations at Pullman and Corvallis, respectively, and Plant Materials Center, SCS, Pullman.

Breeder Seed.—Plant Materials Center, SCS, Pullman, and Washington Agricultural Experiment Station.

Certified Seed.—Available in quantity.

Nu Dwarf

Selected by R. H. Rasmussen, Hooper, Nebr.

Source.—Field collection.

Method of Breeding.—Increase of original collection.

Description.—Selected for dwarf character and aggressive growth in area of adaptation. Not typical dwarf type. Performs well in area of adaptation, but disease susceptible in Eastern United States.

Released.—By R. H. Rasmussen. (Clone patented, but protection does not apply to seed.)

Breeder Seed.—R. H. Rasmussen.

Certified Seed.—Not available. (Some commercial supplies.)

Nugget

Selected at the Alaska Agricultural Experiment Station, ARS cooperating—H. J. Hodgson, R. L. Taylor, L. J. Klebesadel, and A. C. Wilton.

Source.—Single plant collection made in 1957 at Hope, Cook Inlet, southcentral Alaska.

Method of Breeding.—Spaced-plant evaluation of bluegrasses collected in Alaska. named varieties and commercial sources. Evaluation of promising selections under turf conditions.

Description.—Outstanding winter survival. Very dense, dark green, tolerant to powdery mildew and *Helminthosporium* spp., good seed yields. Comparatively narrow leaves, erect seedheads, good rhizome development, rapid germination and growth. Snow mold reaction comparable with other varieties. Highly apomictic.

Released.—1966, cooperatively by Alaska Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Alaska Agricultural Experiment Station.

Certified Seed.—Available.

P-29

Selected at New Jersey Agricultural Experiment Station, New Brunswick, and developed jointly with Jacklin Seed Co., Inc., Dishman, Wash.—C. R. Funk, D. W. Jacklin, and W. T. Boyd.

Source.—Single plant found in lawn at Albany, N.Y.

Method of Breeding.—Six-thousand plants collected from old turf areas screened in either spaced-plant nurseries or in clonal plots receiving turf maintenance. Promising selections subsequently evaluated in solid-seeded turf plots, spaced-plant progeny tests, and seed-production trials.

Description.—Attractive, leafy, moderately fine textured, dark green, turf type. Excellent resistance to stripe smut and leaf rust, good resistance to powdery mildew, and moderately good resistance to leaf spot. Produces dense aggressive turf. Good record of persistence, spread, and overall turf performance.

Released.—No. Distributed for testing.

Breeder Seed.—Jacklin Seed Co., Inc.

P-57

Selected at New Jersey Agricultural Experiment Station, New Brunswick, and developed jointly with Turf-Seed Inc., Hubbard, Oreg.—K. J. McVeigh, S. J. Han, B. L. Rose, and C. R. Funk.

Source.—Single plant found on campus of College of Agriculture and Environmental Science, Rutgers University, New Brunswick, N.J.

Method of Breeding.—Six thousand plants collected from old turf areas were screened in either spaced-plant nurseries or in clonal plots receiving turf maintenance. Promising selections subsequently evaluated in solid-seeded turf plots, spaced-plant progeny tests and seed production trials.

Description.—Very attractive, leafy, moderately low growing turf type, with a fresh, bright, moderately light green color. Produces aggressive,

dense, upright turf, with soft, velvety texture. Excellent resistance to stripe smut, and moderately good resistance to leaf spot.

Released.—No. Seed distributed for testing.

Breeder Seed.—New Jersey Agricultural Experiment Station.

P-69

Selected at New Jersey Agricultural Experiment Station, New Brunswick, and developed in cooperation with J. L. Adikes, Inc., Jamaica, N.Y.—G. W. Pepin, R. A. Russell, and C. R. Funk.

Source.—Apomictic F₁ hybrid from Bellevue × Belturf cross.

Method of Breeding.—Single hybrid plant selected from progeny rows planted with seed from Bellevue × Belturf cross.

Description.—Moderately low growing, good vigor, medium leaf texture, producing dense turf with a rich, dark-green color. Maintains good color throughout growing season; good resistance to leaf spot, moderate resistance to stripe smut and leaf rust.

Released.—No. Distributed for testing.

Breeder Seed.—New Jersey Agricultural Experiment Station.

P-84

Selected by New Jersey Agricultural Experiment Station, New Brunswick, and developed in cooperation with E. F. Burlingham and Sons, Forest Grove, Oreg.—G. W. Pepin, C. R. Funk, and R. J. Peterson.

Source.—Apomictic F₁ hybrid from Bellevue × Belturf cross.

Method of Breeding.—Hybridization yielded “triploid” hybrid with approximately 82 chromosomes (unreduced Bellevue with reduced gamete from Belturf).

Description.—Moderately low growing, good density and vigor, medium texture, and very attractive rich, dark-green color maintained throughout growing season. Good resistance to leaf spot and moderate resistance to leaf rust and stripe smut. Leafy turf type with rather prostrate leaves and a moderately slow rate of vertical growth.

Released.—No. Distributed for testing.

Breeder Seed.—New Jersey Agricultural Experiment Station.

P-106

Selected by New Jersey Agricultural Experiment Station, New Brunswick, and developed in cooperation with E. F. Burlingham and Sons, Forest Grove, Oreg.—G. W. Pepin, C. R. Funk, and R. J. Peterson.

Source.—Apomictic F₁ hybrid from Bellevue × Pennstar cross.

Method of Breeding.—Hybridization resulted in triploid hybrid possessing approximately 94 chromosomes (unreduced Bellevue with reduced gamete from Pennstar).

Description.—Moderately low growing, leafy, turf type, good density and vigor, medium texture, and an attractive, moderately dark green color maintained very well into late fall and early spring. Good resistance to leaf spot and stripe smut, and moderate resistance to leaf rust.

Released.—No. Distributed for testing.

Breeder Seed.—New Jersey Agricultural Experiment Station.

Park (Reg. No. 4)

Selected at Minnesota Agricultural Experiment Station, St. Paul—H. L. Thomas, Herman Shultz, A. R. Schmid, and H. K. Hayes.

Source.—Vegetative material collected from 60 old pastures and waste places throughout Minnesota in 1937.

Method of Breeding.—Collections separated into 281 vigorous individual plants; carried through extensive selection and testing program until 1947. Eighteen clones selected for further testing; in 1953 mixture of 15 best apomictic clones increased for testing as Minnesota 95.

Description.—In Minnesota described as being superior to Merion in seedling and plant vigor, resistance to rust, and sod formation.

Released.—1957, by Minnesota Agricultural Experiment Station.

Breeder Seed.—Minnesota Agricultural Experiment Station.

Certified Seed.—Available in quantity.

Pennstar

Selected at Pennsylvania Agricultural Experiment Station, University Park—J. M. Duich and H. B. Musser.

Source.—Field collections and accessions received from other experiment stations.

Method of Breeding.—Space-planted progeny tests and evaluation in sod plots. Offtype plant, selected in 1947, from progeny that traced to selection made in 1930. Selection designated as K5 (47) proved to be highly apomictic. Distributed for testing as K5 (47).

Description.—Dark green; similar to Merion in general appearance. High resistance to leaf spot, rust, and stripe smut. In extensive tests has exhibited wide area of adaptation, tolerance to close mowing, and less thatch than most aggressive types. Not high seed producer.

Released.—Pennsylvania Agricultural Experiment Station.

Breeder Seed.—Pennsylvania Agricultural Experiment Station.

Certified Seed.—Available.

Prato

Developed by D. J. van der Have, Kapelle-Biezeling, Netherlands—D. J. Glas.

Source.—Collection of plants from eastern Holland.

Method of Breeding.—Plants selected for strong rhizome growth and other characteristics over 3-year period. Seed from superior plants used to establish turf tests. Under short mowing, three plants proved to be superior in turf density, texture, and tolerance to *Helminthosporium vagans* and dry soil conditions.

Description.—Produces dense turf because of prolific tillering and above-average number of leaves per tiller. Under turf conditions, leaves medium narrow, with lower leaves tending to be prostrate. Slightly lighter green than common. Individual plants very leafy, with medium-wide, rather short leaves. Moderately resistant to *Helminthosporium* spp. and some tolerance to rust. Maturity slightly later than common.

Released.—Holland, 1959, by D. J. van der Have; United States, 1964, by Northrup, King & Co.

Breeder Seed.—D. J. van der Have.

Certified Seed.—Available under OECD scheme.

Primo

Developed at Plant Breeding Institute, Weibullsholm, Landskrona, Sweden.

Source.—Domestic collections.

Description.—Fairly low growing, broad leaves; shorter flowering stems than Merion. Fall dormancy more pronounced and spring growth earlier than Merion. Anthocyanin pigment in flowers less intense than Merion. Indications of susceptibility to *Helminthosporium* leaf spot.

Released.—Plant Breeding Institute, Weibullsholm.

Breeder Seed.—Plant Breeding Institute, Weibullsholm.

Certified Seed.—Available in Canada from Ontario Seed Cleaners and Dealers, Ltd., Brampton, Ontario.

Sodco

Selected at Indiana Agricultural Experiment Station, Lafayette—W. H. Daniel.

Method of Breeding.—Composite of four selected clones.

Description.—Dark green, slow germinating, slow-growing turf type. Leaves medium to wide,

height medium, thatch buildup slow. Resistant to powdery mildew and stripe smut. Tolerates medium shade and close mowing, requires ample nutrition and good care.

Released.—1967, by Indiana Agricultural Experiment Station through Ag Alumni Seed Improvement Association (Patent applications filed for four parental clones).

Breeder Seed.—Indiana Agricultural Experiment Station.

Certified Seed.—Available.

South Dakota 4305

Developed by the Seed Certification Service, Agricultural Experiment Station, Brookings, S. Dak.—J. D. Colburn.

Source.—Selected foundation fields eligible for certification must have shown a high degree of uniformity, be located in South Dakota and have been in native Kentucky bluegrass for minimum of 10 years. Seed from each of these fields was planted in a comparative trial to determine trueness to type before being admitted to certification.

Description.—Uniform-color and even-growing turf. Resists injury under extremes of temperature and other environmental conditions. Produces plump seed of uniformly high test weight. Good seedling vigor.

Released.—Certified program was started in 1967 in response to demand for certified seed in the eastern area of the United States.

Breeder Seed.—None.

Certified Seed.—Available in quantity.

Troy

Selected at Montana Agricultural Experiment Station, Bozeman, ARS cooperating—R. E. Stitt.

Source.—Increase of P.I. 119684. Introduced from Turkey by Westover-Wellman expedition in 1936.

Description.—Vigorous pasture strain. Released for use in irrigated pastures in Montana. Tall, erect-growth habit, good recovery, open sod. Not outstanding with respect to disease resistance. Adapted to cooler parts of Kentucky bluegrass region. Early maturing; ready to graze at Bozeman 10–14 days before other strains.

Released.—1955, cooperatively by Montana Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Montana Agricultural Experiment Station.

Certified Seed.—Available in limited quantity.

Windsor

Selected at Research Division, O. M. Scott & Sons Co., Marysville, Union County, Ohio—V. A. Renner.

Source.—Collected in 1949 from grazed pasture area near Marysville by V. A. Renner.

Method of Breeding.—Single-plant selection made from original collection; progeny tested through successive generations. Selection found to be facultative apomict, with $2n=86$. Tested under code number S-2 at Salem, Oreg., Hayward and Pasadena, Calif., Long Island, N.Y., and Marysville, Ohio.

Description.—Produces very dense turf cover when maintained under mowing height from three-fourths to over 2 inches. Leaf texture slightly finer than Merion. Clipping measurements over 2-year period show Windsor produces less vertical growth than common, Delta, and Park. Moderate to high resistance to *Helminthosporium* leaf spot and rust. Performs well under high summer temperatures and low soil-moisture levels.

Released.—1962, as component in O. M. Scott & Sons Co., proprietary bluegrass lawn-seed mixtures. Original Windsor clone patented in 1963; patent protection does not apply to seed.

Breeder Seed.—Controlled by O. M. Scott & Sons Co.

Certified Seed.—Not available. (Commercial production under contract between selected growers and O. M. Scott & Sons Co.)

Windsor II

Selected at Research Division, O. M. Scott & Sons Co., Marysville, Ohio—T. Fuchigami and E. Mayer.

Source.—Collection of plants made in 1962 from lawns in San Fernando area, Calif.

Method of Breeding.—Single-plant selection made from original collection; progeny tested to assess apomictic stability. Seed from clonally propagated plants used for turf testing at Long Beach, Calif.; Marysville, Ohio; Accokeek, Md.; and St. Louis, Mo. Tested as Ba 62-54.

Description.—Low-growing variety. Moderate to high level of resistance to *Helminthosporium vagans*, *H. sativum*, *Puccinia* spp., *Sclerotinia homoeocarpa*, *Ustilago striiformis*, and *Fusarium roseum*. Blue-green leaf color. Seed ca. 900,000/lb.

Released.—Distributed for testing in 1969. (Patent pending on clone.)

Breeder Seed.—O. M. Scott & Sons Co.

Certified Seed.—Not available.

Poa secunda Presl, Sandberg bluegrass

Cool-season, native bunchgrass distributed throughout intermountain region. Valuable for early-spring grazing; foliage cured on stem,

fairly palatable. Grows on wide range of soil types; deep rooted, drought resistant, and persistent. Varieties not available.

Poa trivialis L., rough bluegrass

Cool-season, sod-forming grass from Europe. Distributed in Northern United States. Limited use in lawn mixtures for shady areas. Does best in cool, moist environment; dormant during mid-summer, not adapted on dry sites.

Polis

Developed by J. Joordens' Zaadhandel N.V., Venlo-Blerick, Holland.

Source.—Plants collected from very dry pasture in France.

Method of Breeding.—Selection for dwarf types.

Description.—Dwarf type with somewhat darker color than common. Forms dense turf, more persistent than common, suitable for lawn mixtures.

Released.—J. Joordens' Zaadhandel N.V.

Breeder Seed.—J. Joordens' Zaadhandel N.V.

Certified Seed.—Not available. (Distributed by The Landis Co. Inc., Waupaca, Wis.).

Setaria italica (L.) Beauv., foxtail millet

Warm-season annual from Asia. Used for late sown hay in Great Plains and to limited extent for birdseed and pasture. Grows best under warm conditions; not drought resistant. Largely replaced by sudangrass and early-maturing sorghums for temporary pasture and emergency forage. Many varieties developed when crop was popular, including common, German, Golden Wonder, Goldmine, Hungarian, Siberian, Kursk, and Turkestan.

to considerable extent on environmental conditions. In Canada outyielded most, if not all, commercial millets in same maturity group.

Released.—1937, Canada Department of Agriculture.

Breeder Seed.—Canada Department of Agriculture Research Station, Ottawa.

Certified Seed.—Not available. (Some commercial production in Ontario.)

P-15656

Selected at Plant Materials Center, SCS, Pullman, Wash.

Source.—P.I. 178991 collected in Turkey by J. R. Harlan, 1948.

Method of Breeding.—Open-pollinated seed collected from best accession under evaluation.

Description.—Vigorous, stiff strawed, early maturing. Excellent seed production; moderate resistance to lodging and seed shattering. Shows promise for use in wildlife food plantings.

Released.—No. Increased for testing.

Breeder Seed.—Plant Materials Center, SCS, Pullman.

Empire

Selected at Canada Department of Agriculture Research Station, Ottawa, Ontario, Canada—R. M. MacVicar.

Source.—Manchurian material.

Method of Breeding.—Synthetic variety developed by combining selected lines of similar type.

Description.—Tall, leafy, high yielding, late maturity. Seeds golden, tending toward roundness. May be identified readily by high percentage of bifurcate inflorescences; this bifurcate character dominant, but degree of expression depends

Sorghastrum nutans (L.) Nash, indiagrass

Warm-season, native bunchgrass. Distributed throughout Eastern United States and west to North Dakota, Colorado, and Arizona. Valuable range grass in central and southern Great Plains. Does best on fertile bottom lands, but also grows on sandy soils. Palatable early in season, but only fair for winter use; damaged by overgrazing.

Cheyenne

Selected at SCS Nursery, Woodward, Okla.—J. E. Smith, Jr., and G. L. Powers.

Source.—Native rangeland near Supply, Okla., 1942.

Method of Breeding.—Increase of bulk collec-

tion at Cheyenne, Okla., until 1951, then at Texline, Tex. Only one seed crop grown by SCS at this location.

Description.—Heterogeneous plant makeup. Good forage type, good seed producer. Adapted for range and pasture in western Oklahoma and in Texas.

Released.—Informally by SCS in 1945, but field established by Max Bower in 1954 at Morton, Tex., believed to be first planting made for commercial seed production.

Breeder Seed.—Not available.

Certified Seed.—Not available. (In commercial production.)

Holt (Reg. No. 16)

Developed at Nebraska Agricultural Experiment Station, Lincoln, ARS cooperating—E. C. Conard and L. C. Newell.

Source.—Collections in Elkhorn Valley of Holt County in northeastern Nebraska.

Method of Breeding.—Mass selection for type. Grown at Lincoln since 1942.

Description.—Moderately early maturing; superior in leafiness and yield to early-maturing strains from northern and western sandhill region of Nebraska. Relatively finer leaves and stems than later maturing varieties from more southerly sources, which may produce more total forage. Well suited for revegetation either in pure stands or in mixture with other relatively early maturing, tall, warm-season grasses, such as Nebraska 28 switchgrass and sandhill bluestems. May also be grown in diverse mixtures containing such midtall grasses as Butte sideoats grama and Nebraska 27 sand lovegrass. Should be grown in irrigated rows for seed production and will mature seed crops in such relatively short seasons as those of western or northern Nebraska.

Released.—1960, cooperatively by Nebraska Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Nebraska Agricultural Experiment Station.

Certified Seed.—Available.

Llano

Selected at Plant Materials Center, SCS, Los Lunas, N. Mex., and New Mexico Agricultural Experiment Station, University Park, cooperating—J. A. Downs, G. C. Niner, and J. E. Anderson.

Source.—Collected in 1956 and 1957 from sandy plains sites in eastern New Mexico—one near Hudson and other near Portales—at elevation of 4,000 to 4,100 feet and average annual precipitation of 16 to 17 inches.

Method of Breeding.—Increased separately, but

combined in equal parts to produce heterogeneous second generation. In comparison-row planting and in initial increase, growth, flowering, and seedling characteristics of two collections were similar. Increased and tested as PM-NM-275.

Description.—Fairly uniform, with good leaf production extending well up culms. Under irrigation and fertilization, plants mature at 5 to 6 feet, yielding high-quality seed in excess of 400 pounds per acre. Adapted to range and pasture seeding on sandy sites in southwestern Great Plains, where rainfall is erratic and relatively low. Performed well in eastern New Mexico and east-central and southeastern Colorado, but needs adequate testing farther north and east.

Released.—1963, by New Mexico Agricultural Experiment Station and Plant Materials Center, SCS, Los Lunas.

Breeder Seed. Plant Materials Center, SCS, Los Lunas.

Certified Seed.—Available.

Nebraska 54

Increased by private seed producer, Harold Hummel, Fairbury, Nebr.

Source.—Seed collected in 1954 by H. Hummel from selected native plants growing along railroad right-of-way and in native ranges in southern part of Jefferson County, Nebr.

Method of Breeding.—Placed directly in seed production.

Description.—Tall, leafy, moderately late maturing indiagrass. Can produce high seed yields. Good seedling vigor. Adapted in southern and eastern Nebraska and in northern Kansas.

Released.—1957; certified as to origin by Nebraska Crop Improvement Association.

Breeder Seed.—Not available.

Certified Seed.—Available.

Osage

Selected at Kansas Agricultural Experiment Station, SCS and ARS cooperating—F. L. Barnett.

Source.—Seed collected from eastern and central Kansas and Oklahoma in 1953.

Method of Breeding.—Recurrent selection for leafiness, vigor, freedom from rust, and, since species tends to mature late, for earliness of maturity. Eight clones selected for inclusion in synthetic. Distributed for testing as Kansas Experimental Strain 3.

Description.—Tall, vigorous, leafy, late maturing, and rust resistant. Good seed yields. Adapted in eastern Kansas, western Missouri, and north-eastern Oklahoma. Best seed yields south of Kaw and Smoky Hill rivers.

Released.—1966, cooperatively by Kansas Agri-

cultural Experiment Station, Plant Sciences Division, SCS, and Plant Science Research Division, ARS.

Breeder Seed.—Kansas Agricultural Experiment Station.

Certified Seed.—Available.

Oto

Developed at Nebraska Agricultural Experiment Station, Lincoln, ARS cooperating—L. C. Newell.

Source.—Collections from natural grasslands of Nebraska and Kansas in 1953–54.

Method of Breeding.—Fifteen accessions exhibited bright-green leaves, brown panicles, and late maturity. One group of 100 clones were isolated and progeny bred true for brown-glumed seed. Nebraska tests showed marked superiority in establishment and yield where soil moisture and fertility not limiting.

Description.—Long-season variety; plants robust and erect, attaining spread of 2 feet and height of 6 feet; leaves long and bright green; panicles broad in anthesis, contracting into golden to dark brown, compact heads. Matures late in the season, with seed harvests at early frost dates in southern Nebraska. Recommended primarily in mixed stands of warm-season prairie grasses in which it improves late summer grazing. Area of recommended use centers in eastern and southern Nebraska extending into adjacent areas.

Released.—1970, cooperatively by the Nebraska Agricultural Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Nebraska Agricultural Experiment Station.

Certified Seed.—Available in 1972.

PM-ND-444

Selected at Plant Materials Center, SCS, Bismarck, N. Dak.—John McDermand.

Source.—Collection from native plants in the vicinity of Ludden, N. Dak (PM-ND-343) and

Britton and Hecla, S. Dak. (PM-SD-56 and PM-SD-44).

Method of Breeding.—Composite of open-pollinated seed from three accessions selected on the basis of performance in single-row evaluation test.

Description.—Good, leafy type, representative of collection area. Ranked high in forage and seed production in comparison with other field collections and named varieties in initial tests. Apparently free of disease.

Released.—No. Distributed for field testing.

Breeder Seed.—Plant Materials Center, Bismarck, N. Dak.

Tejas

Selected at Texas Research Foundation, Renner—E. O. Gangstad.

Source.—Collections from Texas, Oklahoma, and New Mexico in 1954.

Method of Breeding.—Selected for leafiness, forage yield, and seed yield in polycross nurseries planted in 1955, 1957, and 1959. In 1962, 10 highest yielding clones bulk planted and increased as experimental synthetic variety Tejas.

Description.—Relatively uniform plant size; robust, vigorous, dark blue-green plant. Lemon-yellow seedhead, with dark awned seeds. Flowers in mid-October at Renner.

Released.—No.

Breeder Seed.—Texas Research Foundation.

Western

Selected at U.S. Southern Great Plains Field Station, Woodward, Okla.

Source.—Number of field collections, primarily from south of Woodward.

Method of Breeding.—Series of best-plant recurrent-selection cycles.

Description.—Selected for high production of low-dormancy seed. Good forage type.

Released.—No. Included in field testing program.

Breeder Seed.—Oklahoma Agricultural Experiment Station, Stillwater.

Sorghum bicolor (L.) Moench.

(*Sorghum bicolor* × *S. sudanese*), sorghum × sudangrass hybrids

Important warm-season annuals developed by crossing cytoplasmic male-sterile sorghum lines with improved varieties of sudangrass. Used for silage, soiling, and pasture in Great Plains and Southern United States. Commercial varieties available. High forage yields; varieties vary in

recovery under rotational grazing or frequent mowing, in quality, and in prussic acid potential. Seed of proprietary hybrids available in quantity. Many varieties may eventually be replaced by hybrids produced on male-sterile sudangrass lines.

NB-280S

Developed at Nebraska Agricultural Experiment Station, ARS cooperating—O. J. Webster and L. V. Peters.

Source.—Male-sterile Martin (*Sorghum bicolor*) and N-7035 (*S. sudanense*).

Method of Breeding.—F₁ hybrid produced by controlled pollination of male-sterile Martin and N-7035 sudangrass.

Description.—Good seedling vigor and rapid regrowth recovery. Stem size and leaf width larger than true sudangrass but less than some sorghum × sudangrass hybrids. Low HCN at pasture stage. Yields equal to or better than standard sudangrass varieties. Lodging may be a problem if crop grown for silage.

Released.—1963, by Nebraska Agricultural Experiment Station.

Breeder Seed.—Nebraska Agricultural Experiment Station.

Certified Seed.—Available.

Suhi 1 (Reg. No. 110)

Developed at Georgia Agricultural Experiment Station, Experiment—J. P. Craigmiles.

Source.—Male-sterile Rhodesian grass (*Sorghum arundinaceum* (Wild.) Stapf) developed from P.I. 156549 and Tift sudangrass.

Method of Breeding.—Seed produced by controlled pollination between male-sterile Rhodesian grass and Tift pollinator. Good pollination obtained with three rows of male-sterile alternated with each row of pollinator. Seed yield somewhat erratic.

Description.—Wide leaves, rather dry stems, and good level of disease resistance. At maturity dark seeds have reddish-brown to black glumes. Good seedling vigor, rapid regrowth, and extreme height (8 to 12 feet) when allowed to mature. Adapted in most areas where sudangrass is grown. High prussic acid potential; should be grazed with caution.

Released.—1961, by Georgia Agricultural Experiment Station.

Breeder Seed.—Discontinued.

Certified Seed.—Not available.

***Sorghum halepense* (L.) Pers., johnsongrass**

Important warm-season, sod-forming grass introduced from Turkey in about 1830. Serious weed throughout much of Southern United States and as far north as southern Illinois and Indiana. Palatable and nutritious for hay and pasture on fertile soils from Alabama to Texas; damaged by heavy grazing or frequent cutting; root binding corrected by renovation and adequate fertilizer.

Mississippi Fine Stem

Selected at Mississippi Agricultural Experiment Station, State College, ARS cooperating—H. W. Bennett.

Source.—Large number of field collections.

Method of Breeding.—Selection made on number of culms produced from seed first season (above 60); further selection made on degree of clipping and palatability.

Description.—Produces 130 to 180 culms per plant, 2 to 4 feet tall, 1/32 to 1/8 inch in diameter; largest culm never gets as large as minimum allowed in grade 1 hay. Very leafy. Relatively low seed production. Has been used as source material in breeding program.

Released.—No. Included in regional testing program.

Breeder Seed.—Mississippi Agricultural Experiment Station.

Mississippi Persistent

Selected at Mississippi Agricultural Experiment Station, State College, ARS cooperating—H. W. Bennett.

Source.—Large number of field collections.

Method of Breeding.—Selection made on number of culms produced from seed first season (above 60); further selection made on degree of clipping and palatability.

Description.—Produces 80 to 120 culms per plant, up to 5 feet tall, 1/8 to 1/4 inch in diameter. Rather compact base with very slowly spreading rhizomes. Persistent under mowing; withstood six clippings for 2 years. Only self-fertile plant in large number handled.

Released.—No. Included in regional testing program.

Breeder Seed.—Mississippi Agricultural Experiment Station.

Sorghum halepense × *S. bicolor* (including *S. halepense* × *S. sudanense* and *S. alnum* Parodi), sorgrass

De Soto

Selected at Texas Research Foundation, Renner—E. O. Gangstad.

Source.—Introductions.

Method of Breeding.—Seed progeny of 4n grass sorghum, including *Sorghum alnum*, *S. sudanense* and *S. arundinaceum* planted in polycross nurseries in 1958, 1959, and 1960 and selected for persistence, high seed and forage yields, palatability, and low prussic acid potential. Most satisfactory strain increased in 1961, 1962, and 1963.

Description.—Vigorous growing, intermediate-sized plants. Broad, flat leaves; large, open panicle; and short terminal rhizomes. Plant somewhat larger than johnsongrass, but slightly smaller than most selections of *S. alnum*.

Released.—Texas Research Foundation.

Breeder Seed.—Texas Research Foundation.

Certified Seed.—Not available.

Mississippi ISJ

Selected at Mississippi Agricultural Experiment Station, State College, ARS cooperating—H. W. Bennett.

Source.—Collections of Hodo sorgo and johnsongrass.

Method of Breeding.—Cross made by pollinating hot-water emasculated (42° C. for 10 minutes) Hodo sorgo florets with red-stigma johnsongrass. Selfing started in F₁ and has been continued. Spaced F₂ plants left where set for growth-habit studies. Perennial (75 percent) plants grazed by cattle. Cattle consistently grazed types containing juice regardless of stem size. Five percent of selectively grazed population selfed; progeny selected for juiciness by hand twisting and for nonspreading rhizomes.

Description.—Selection from F₆ made on basis of plant size intermediate between sorgo and johnsongrass. Produces 20 to 40 culms per plant, 9 to 12 feet tall, 1/3 to 1/2 inch in diameter. Very slowly spreading rhizomes. Produces two cuttings per year. Total carbohydrate content of 10 to 14 percent. Seed set approximately 50 percent. Produces extremely well under irrigation and fertilization.

Released.—No. Included in regional testing program.

Breeder Seed.—Mississippi Agricultural Experiment Station.

Mississippi SJ-2

Selected at Mississippi Agricultural Experiment Station, State College, ARS cooperating—H. W. Bennett.

Source.—Collection of Hodo sorgo and johnsongrass.

Method of Breeding.—Similar to Mississippi ISJ.

Description.—Selection from F₆ made on basis of grass-type habit and carbohydrate content. Very leafy; 14-percent total carbohydrate content in 50-percent dry-matter plant. Produces 40 to 90 culms per plant, 3 to 5 feet tall, 1/16 to 5/16 inch in diameter. Self-fertile and good seed producer. May be cut at least twice per season.

Released.—No. Included in regional testing program.

Breeder Seed.—Mississippi Agricultural Experiment Station.

Perennial Sweet

Selected at Substation 8, Lubbock, Tex.—R. E. Karper.

Source.—In 1941 L. F. Randolph, New York Agricultural Experiment Station, Ithaca, doubled chromosome number of common sudangrass with colchicine and crossed this tetraploid with johnsongrass. Seed of this hybrid sent to Substation 8, Lubbock, for further study.

Method of Breeding.—Progeny selections grown for several years, but appeared too early and unproductive. Few selections retained their seed well; these persistent types grown in 1945 surrounded by Sweet sudangrass. Three natural outcrosses with Sweet sudangrass recovered in 1946. Selection continued for sweet juicy stalks, good fertility, seed yield, and perennial rooting habit intermediate between johnsongrass and sudangrass.

Description.—Synthetic tetraploid (4n) that would be expected to cross freely with johnsongrass, but not likely to cross with other sorghums. Rootstalks short and thick, more weakly perennial, not so difficult to eradicate as johnsongrass. More likely to be profitable when handled as annual. As palatable as Sweet sudangrass. Seed similar to that of Sweet sudangrass; glumes predominantly chocolate or mahogany in color; seeds persistent. Plant mostly tan.

Released.—1957, by Substation 8, Lubbock.

Breeder Seed.—Substation 8, Lubbock.

Certified Seed.—Not available.

Sorghum Alnum

Introduced into United States from Argentina, Union of South Africa, Australia, and New Zealand. Grown at Substations 8 and 12 at Lubbock and Chillicothe, Tex., respectively, since mid-40's, and collection from Argentina received by Georgia

Agricultural Experiment Station, Athens, in 1949. Major source of seed in United States traces to seed lots obtained from Australia and New Zealand in 1952. Commonly referred to as columbusgrass in Union of South Africa.

Source.—First described by Lorenzo R. Parodi in 1943. He received seed in 1936 from A. Ragonese, agronomist, Province of Santa Fe, Argentina. Parodi concluded grass must have originated under cultivation as hybrid between johnsongrass and some other introduced sorghum (*Sorghum vulgare*). Records indicate material grown in Union of South Africa, Australia, and United States traces to seed lots that had origin in Argentina. ($2n=40$.)

Description.—Tall, robust, rather closely resem-

bling johnsongrass in many ways. Coarser, larger stems, often wider leaves, and generally taller than johnsongrass. Heads longer, lax, more spreading, with more branches at whorl. Rhizomes stout, short, and turn up close to crown. No difficulty experienced in killing it out by plowing. Seed shatters very readily. Although seed somewhat larger than that of johnsongrass, difficult to identify it in intermediate range. Some crossing could be expected to occur with johnsongrass. Sorghum *Alum* accessions exhibit wide range in plant type; some lots more uniform than others. Prussic acid potential equivalent, for most part, to that of johnsongrass.

Certified Seed.—Not available. (Available commercially.)

***Sorghum sudanense* (Piper) Stapf, sudangrass**

Major warm-season annual introduced from Africa in 1909. Used for pasture, silage, soiling, and hay throughout much of United States, but not well adapted to sandy Coastal Plain in South or to regions where summers are relatively cool. Palatable and nutritious; some varieties high in prussic acid. Grows best on fertile soils; drought resistant. Sudangrass is widely grown, but much of former acreage replaced by sorghum × sudangrass hybrids.

California 23

Selected at Imperial Valley Field Station, El Centro, Calif.—L. G. Goar.

Source.—Common sudangrass.

Method of Breeding.—Selected from common sudangrass in early 1930's; reselected at Davis, Calif., to eliminate black seed and other offtypes.

Description.—Little later in heading and more uniform than common sudangrass; somewhat taller and more vigorous growth. Yielded 10 to 20 percent more than common or Sweet sudangrass at California Agricultural Experiment Station, Davis. Susceptible to leaf diseases when grown under humid conditions.

Released.—1938, by California Agricultural Experiment Station.

Breeder Seed.—California Agricultural Experiment Station.

Certified Seed.—Not available.

Common (Garawi)

Introduced into United States in 1909.

Source.—Probably native of upper Egypt; cultivated near Khartoum under name "garawi," but it may have originated farther south in Africa.

Description.—Several strains of sudangrass de-

veloped from early introductions; similar in type, being extremely early and susceptible to disease.

Released.—Informally by USDA and State agricultural experiment stations in early 1900's.

Certified Seed.—Some local strains certified. (Ample commercial supplies.)

Cumberland (Reg. No. 13)

Selected at Tennessee Agricultural Experiment Station, Knoxville—J. K. Underwood.

Source.—Selected from California 23 sudangrass with degree of disease resistance, Leoti sweet sorghum, and Piper sudangrass.

Method of Breeding.—Selections SG 1-16, 2-7, and 3-7 from cross (California 23-17 × Leoti sweet sorghum) × (California 23-17 × Piper sudangrass) combined to make Synthetic 1. Synthetic 1 in its sixth generation (1957-63). Distributed for testing as Tennessee Synthetic 1.

Description.—Vigorous. High forage yields, maintaining resistance to leaf spot; good leafy quality; prussic acid content low. Seed color variable (brown, reddish purple, or black); caryopsis brownish.

Released.—No. Distributed for regional testing.

Breeder Seed.—Tennessee Agricultural Experiment Station.

Georgia 337 (Reg. No. 111)

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—G. W. Burton.

Source.—Developed from intercrossing and selection of material tracing its parentage to Tift sudangrass, McLean sorghum, and lines low in prussic acid from Wisconsin Agricultural Experiment Station, Madison.

Method of Breeding.—Disease resistance of Tift and low prussic acid content of Wisconsin material combined by hybridization and screening F_2 populations. This material crossed with McLean sorghum for broad leaves, disease resistance, juiciness, and sweet stalk. Selected F_2 's recombined several times to bring together desired characteristics. Usually 1,000 or more F_2 's tested in F_3 generation in single-row plots between rows of common and Tift. Finally, F_2 plant breeding true for desired traits in F_3 increased in isolation.

Description.—Excellent disease resistance, sweet juicy stalks, wide leaves, low prussic acid content. Uniform straw-colored seedcoat. Late maturing. Often outyields other varieties during long growing seasons; shown great yield potential under irrigation. Its disease resistance gives it dependability and quality lacking in some varieties during heavy disease epidemics.

Released.—1964, cooperatively by Georgia Coastal Plain Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Georgia Coastal Plain Experiment Station.

Greenleaf (Reg. No. 105)

Selected at Kansas Agricultural Experiment Station, Manhattan—R. C. Pickett.

Source.—Advance generation backcross of common sudangrass \times Leoti Red sorghum received in 1940 from Substation 12, Chillicothe, Tex. After several generations of selection, composite group of selected lines bulked for increase in 1951.

Method of Breeding.—Selection for several generations in cross of sudangrass \times sweet sorghum.

Description.—Juicy stalk; tall, fairly coarse, vigorous, leafy, freely tillering, late maturing; tan glume (from Leoti parent). High degree of resistance to leaf diseases. High forage yields.

Released.—1953, by Kansas Agricultural Experiment Station.

Breeder Seed.—Kansas Agricultural Experiment Station.

Certified Seed.—Available in quantity.

Lahoma (Reg. No. 108)

Selected at Oklahoma Agricultural Experiment Station, Stillwater—W. C. Elder.

Source.—Breeding materials received from Substation 12, Chillicothe, Tex., in 1948.

Method of Breeding.—Selected from progeny row that remained in vigorous growing condition after other entries had succumbed to drought and severe chinch bug infestation. Distributed for testing as Oklahoma 130.

Description.—Wide leaved, late maturing drought enduring. Very uniform in growth habit, tillers well. Distinctive yellow-green leaf. Good

seed producer; seed ranges in color from apricot to sienna. Leaf diseases may be troublesome when moisture excessive. No more prussic acid than other sweet types.

Released.—1954, by Oklahoma Agricultural Experiment Station.

Breeder Seed.—Oklahoma Agricultural Experiment Station.

Certified Seed.—Available in limited quantity.

N-7035

Selected at Nebraska Agricultural Experiment Station, ARS cooperating—O. J. Webster and L. V. Peters.

Source.—Developed from hybridization of Sweet 372 and Wisconsin 106 sudangrasses.

Method of Breeding.—Pure-line selection from advanced segregating generation. Screened for low HCN and good agronomic characters. Final evaluation made as line, and in sorghum \times sudangrass combinations.

Description.—Fine stemmed, juicy stalked, fine leaved, low HCN.

Released.—1963, by Nebraska Agricultural Experiment Station as hybrid NB-280S.

Breeder Seed.—Nebraska Agricultural Experiment Station.

Certified Seed.—Not available.

Piper

Selected at Wisconsin Agricultural Experiment Station, Madison—D. C. Smith.

Source.—Tift and lines obtained from Substation 12, Chillicothe, Tex., and Kansas Agricultural Experiment Station, Manhattan.

Method of Breeding.—Resulted from series of crosses among lines low in prussic acid, Tift, and Texas selection, followed by repeated testing and selection. Last cross made in 1942.

Description.—Low in prussic acid potential, vigorous, resistant to leaf blight and anthracnose at northern locations. Both light- and dark-colored seeds. Early variety. Most stalks dry.

Released.—1960, by Wisconsin Agricultural Experiment Station.

Breeder Seed.—Wisconsin Agricultural Experiment Station.

Certified Seed.—Available in quantity.

Sweet 372 (Reg. No. 92)

Selected at Substation 12, Chillicothe, Tex., ARS cooperating—J. R. Quinby, R. E. Karper, and J. C. Stephens.

Method of Breeding.—Mixture of strains selected from intercrosses between strains selected from cross between sudangrass and Leoti sorghum. Selected strains all unusually palatable to cattle.

Description.—Similar to common sudangrass, except stems juicy and sweet and glumes sienna in color. Plants grow 3 to 8 feet tall and tiller freely. Stems less than one-half inch in diameter; leaves long and narrow. Forage yield slightly above that of common sudangrass, but increase in weight due to higher seed production.

Released.—1943, cooperatively by Substation 12, Chillicothe, and Plant Science Research Division, ARS.

Breeder Seed.—Substation 12, Chillicothe.

Certified Seed.—Available in quantity.

Sweet 372(S1)

Selected by J. R. McNeill Seed Co., Spur, Tex.—J. R. McNeill.

Source.—Single-plant selection from field of registered Sweet 372 sudangrass.

Method of Breeding.—Seed of this and other selections planted in isolated blocks on dryland having good underground moisture. Only two of these seemed superior; only that designated S1 (selection 1) increased.

Description.—Single-strained selection from Sweet 372; synthetic composed of multiple strains. Plants fine stemmed, free tillering, with peduncles that recurve under weight of heads. Seed covered by dense sienna glumes; glabrous and glossy. Seedling vigor good. Maturity 3 to 5 days earlier than average of Sweet 372 sudangrass in High Plains area of Texas.

Released.—Distributed by J. R. McNeill Seed Co.

Breeder Seed.—Discontinued.

Certified Seed.—Not available.

Tift (Reg. No. 95)

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—G. W. Burton.

Source.—Developed from hybridization program involving common sudangrass and Leoti sorghum.

Method of Breeding.—Disease-resistant plants in some 35,000 F₂'s of cross between common sudangrass and Leoti sorghum backcrossed to sudangrass. Thirty thousand F₂'s from these backcrosses gave superior individual that bred true

for disease resistance and uniform enough in other characteristics to permit its increase in isolation and its release.

Description.—Mixture of chocolate- and tan-colored seeds; basic tan plant color; fine stemmed and leafy. Resistant to *Colletotrichum graminicolum*, *Helminthosporium turcicum*, bacterial stripe, and bacterial streak. Somewhat later maturing than other sudangrass varieties. During heavy disease epidemics produces more forage of higher quality for longer period of time than disease-susceptible varieties.

Released.—1943, cooperatively by Georgia Coastal Plain Experiment Station and Plant Science Research Division, ARS.

Breeder Seed.—Georgia Coastal Plain Experiment Station.

Certified Seed.—Not available.

Wheeler

Selected by Carl Wheeler, Bridgeport, Kans.

Source.—Seed received from USDA in about 1911.

Description.—Early strain of common sudangrass. In general, taller and higher yielding than most common strains. Not very leafy. Susceptible to disease. Prussic acid potential comparable to that of common types.

Released.—1915, by Carl Wheeler.

Breeder Seed.—Not available.

Certified Seed.—Available in quantity.

Wild Sudan

Source.—Seed collected by Paul Tabor in 1945 from naturalized stand at Clewiston, Fla. Tested as SC 20-833. *Sorghum* sp.

Description.—Annual; similar to sudangrass in appearance. Seed shatters soon after maturity, remains sound for some time, volunteers freely. Extensively naturalized in Everglades area just south of Lake Okechobee in Florida. Susceptible to leaf and stem diseases; resistant to drought.

Released.—Distributed by SCS Nursery, Thorsby, Ala., in 1950.

Breeder Seed.—Plant Materials Center, SCS, Americus, Ga.

Certified Seed.—Not available.

Sorghum vulgare var. *drummondii* (Nees) Hack. ex Chiov., chicken corn

Source.—Seed collected near Epes, Ala., by W. C. Young in August 1939 from naturalized stand. This species introduced apparently by accident in Black Belt of Alabama about 1860; became widespread few years later. Practically disappeared as naturalized plant. Tested as SC 26-104.

Description.—Wild sweet sorghum of medium size. Bears seed that shatters soon after maturity, remains sound over winter, germinates following spring and summer. Used in wildlife plantings.

Released.—Distributed by SCS Nursery, Thorsby, Ala., in 1950.

Breeder Seed.—Plant Materials Center, SCS, Americus, Ga.

Certified Seed.—Not available. (Limited commercial supplies.)

***Sporobolus airoides* (Torr.) Torr., alkali sacaton**

Native bunchgrass found from Washington and South Dakota south into Mexico. Abundant in parts of Southwest on lower alkaline flats; also grows on rocky soils and open plains; tillers extensively on moist sites. Grazes well during growing season; unpalatable when mature and not good as winter forage.

P-15617

Selected at Plant Materials Center, SCS, Los Lunas, and New Mexico Agricultural Experiment Station, University Park, cooperating—G. C. Niner and J. E. Anderson.

Source.—Collected from shallow upland range site in 1958, 12 miles south of Claunch, N. Mex., at elevation of 5,800 feet and precipitation about 13 inches annually.

Method of Breeding.—Increase of original collection as NM-184.

Description.—Similar in growth form to bottomland types. Seedling vigor and herbage pro-

duction good, seed production average. Needs further testing on upland sites.

Released.—No.

Breeder Seed.—Plant Materials Center, SCS, Los Lunas.

PM-ND-264

Increased at Plant Materials Center, SCS, Bismarck, N. Dak.—John McDermid.

Source.—Clones collected in 1958 and 1959 from a saline bottomland site west of Bowman, N. Dak.

Method of Breeding.—Direct increase of original collections.

Description.—Selected for use in establishing permanent vegetation on alkaline or saline sites in North Dakota and South Dakota. Seed yield at Bismarck, with supplemental irrigation, averages about 165 pounds of clean seed per acre.

Released.—No. Distributed for field testing.

Breeder Seed.—Plant Materials Center, SCS, Bismarck.

***Sporobolus cryptandrus* (Torr.) A. Gray, sand dropseed**

Native bunchgrass widely distributed in United States; common in western ranges and important in Southwest and parts of Oregon and Idaho. Adapted to sandy soils. Low palatability; fair

winter herbage. Prolific seeder that increases on depleted range under proper grazing or protection. Varieties not available.

***Sporobolus wrightii* Munro ex Scribn., sacaton**

Native bunchgrass occurring from Arizona to western Texas and south into Mexico. Useful for grazing when young, furnishes hay and good winter grazing, especially on alluvial flats and bottom

lands. Robust; larger than alkali sacaton and more exacting in its water requirement. Varieties not available.

***Stenotaphrum secundatum* (Walt.) Kuntze, St. Augustinegrass**

Warm-season, sod-forming grass indigenous in West Indies and common in tropical Africa, Mexico, and Australia. Used as lawn grass from Florida to eastern Texas and for pasture on muck soils in southern Florida. Subject to winterkilling north of Augusta, Ga., and Birmingham, Ala. Grows best on relatively fertile, well-drained soils; tolerates shade. Subject to chinch bug damage. Propagated vegetatively. "Texas Common" is used extensively on lawns in eastern half of Texas. Subject to severe damage by chinch bugs and brownpatch. A virus known as St. Augustinegrass

decline is a major problem in lower Gulf Coast area.

Bitter Blue

Selected originally from Florida lower east coast.

Source.—Originally selected by tradesman. Stories conflicting as to just who selected variety and as to original source. Variety known and widely used in commerce in Florida for over 25 years. Brisk demands for St. Augustinegrass sod

brought about widespread misuse of name and misidentity of improved variety with common and pasture-type St. Augustinegrass. Selections from several sources under test at Florida Agricultural Experiment Station, Gainesville.

Method of Breeding.—Not known, but surmised to be natural selection.

Description.—Improved variety with closer internodes, shorter, more narrow leaves, greater leaf density, and closer growing habit than common type. Attractive blue green, good shade tolerance, frost resistance. Does not tolerate continuous wear; hence, best adapted for ornamental turf.

Released.—Never officially.

Breeder Stock.—Not available.

Certified Stock.—Not available. (Available commercially.)

Ea 611081

Selected at Research Division, O. M. Scott & Sons Co., Marysville, Ohio—J. A. Long.

Source.—Material introduced from Africa.

Method of Breeding.—Open-pollinated seed collected from one clone. From progeny nursery established from this seed, one clone selected and increased vegetatively.

Description.—Vigorous, dense growing, leaf texture slightly finer than present varieties. Shows higher tolerance level to chinch bug than presently available varieties. Exhibits less cold tolerance than Texas Common. Moderate to high resistance to gray leaf spot. Chromosome number $2n=18$, purple stigma.

Released.—1970, by O. M. Scott & Sons Co. Clone patented in 1969.

Breeder Stock.—O. M. Scott & Sons Co., Marysville.

Certified Stock.—Not available. (Commercial sod production under contract with growers and O. M. Scott & Sons Co.)

Floratine

Selected at Florida Agricultural Experiment Station, Gainesville—G. C. Nutter and R. J. Allen, Jr.

Source.—Selected originally in 1948 and maintained at Belle Glade, Fla.; vegetative material

moved to Gainesville in 1953 for evaluation as turfgrass.

Method of Breeding.—Natural selection (probably a seedling from Bitter Blue).

Description.—Low growing, fine textured, and attractive blue green. Stolons branch prolifically, producing dense turf of short (1½ inches) and narrow (10/32 inch) leaves; average internode length 1.8 inches as compared with 2.0 inches for Bitter Blue and 3.0 inches for common. Average maximum unmowed height in test plots 4.3 inches compared with 5.0 inches for Bitter Blue; tolerates close mowing and has survived at one-half inch. Rate of coverage and other characteristics similar to those of Bitter Blue.

Released.—1959, by Florida Agricultural Experiment Station.

Breeder Stock.—Florida Agricultural Experiment Station.

Certified Stock.—Available.

Roselawn

Selected at the Everglades Experiment Station, Belle Glade, Fla.—A. Daane, R. W. Kidder, and R. A. Bair.

Source.—First observed in 1931 at Roselawn Farms of the White Belt Dairy in Hialeah, Fla.; vegetative material moved to Belle Glade in 1937.

Method of Breeding.—Natural selection. Thought to be seedling that was selected because of vigor and resistance to gray leaf spot.

Description.—Superior pasture variety with longer internodes, larger leaves, more vigorous vegetative growth, and fewer seedheads than common types. Used on approximately 80 percent of organic soil pastures in southern Florida, and has averaged over 1,000 pounds gain per acre on yearling steers in grazing trials at the Everglades Experiment Station. Not good turf type because of open growth habit, tall growth, and lighter color.

Released.—1944, informally by Everglades Experiment Station.

Breeder Stock.—Not available. (Several selections of Roselawn maintained at Florida Agricultural Experiment Station, Gainesville.)

Certified Stock.—No. (Planting material available commercially.)

Stipa comata Trin. and Rupr., needle-and-thread

Cool-season, native bunch grass. Widely distributed over most of Western United States; common on dry, sandy, or gravelly sites. Relatively coarse; leaves toughen rather early, but forage

value fair to good early in season and after seeds drop. Sharply pointed seeds with long, barbed awns may cause physical injury, especially to sheep. Varieties not available.

Stipa pulchra Hitchc., California needlegrass (purple needlegrass)

Cool-season, native bunchgrass found primarily in California. Used for grazing in spring and summer; cures well on stem; rated high in forage

value, but awns may be troublesome to sheep. Varieties not available.

Stipa viridula Trin., green needlegrass

Cool-season, native bunchgrass found from Wisconsin to Montana and south to New Mexico. Valuable in northern Great Plains, Wyoming, and Colorado. Palatable and nutritious. Starts growth relatively early and remains green until late in season.

Description.—Superior to Green Stipagrass in level of dormancy exhibited by newly harvested seed and comparable in forage and seed yields. Morphologically indistinguishable from Green Stipagrass.

Released.—1969, cooperatively by Montana, North Dakota, and South Dakota Agricultural Experiment Stations and Plant Science Research Division, ARS.

Breeder Seed.—U.S. Northern Great Plains Research Center.

Certified Seed.—Available in quantity.

Green Stipagrass (Reg. No. 2)

Selected at U.S. Northern Great Plains Research Center, ARS, Mandan, N. Dak.—G. A. Rogler.

Source.—Collected near Mandan in 1935.

Method of Breeding.—Single-plant selection from above source; progeny tested, increased, and distributed as Mandan 397.

Description.—Superior to common green needlegrass in forage and seed yields and in seedling and regrowth characteristics.

Released.—1946, cooperatively by North Dakota Agricultural Experiment Station, Fargo, and Plant Science Research Division, ARS.

Breeder Seed.—U.S. Northern Great Plains Research Center.

Certified Seed.—Not available.

P-15638

Selected at Plant Materials Center, SCS, Bridger, Mont.—J. R. Stroh.

Source.—Single plant in plot of western wheatgrass at Plant Materials Center, Bismarck, N. Dak. Collected by J. L. McWilliams in 1959. Original seed collected near Hettinger, N. Dak.

Method of Breeding.—Direct increase from single plant. Selected from among 44 accessions for superior seed and forage production and low seed dormancy.

Description.—Superior to Green Stipagrass in seed and forage production and exhibits less seed dormancy; resistant to leaf and stem rust. Seed production and regrowth characteristics good. Seed dormancy has not been compared with Lodorm.

Released.—No. Distributed for limited field testing.

Breeder Seed.—Plant Materials Center, SCS, Bridger.

Lodorm (Reg. No. 19)

Selected at U.S. Northern Great Plains Research Center, ARS, Mandan, N. Dak.—H. M. Schaaf and G. A. Rogler.

Source.—Bulk collection made in native stand north of Bismarck, N. Dak., in 1935.

Method of Breeding.—Recurrent selection for low seed dormancy for three generations within spaced-plant progenies of promising lines. Tested as Mandan 2611.

Stipa viridula × *Oryzopsis hymenoides* (× *Stiporyzopsis caduca*)

Mandan Ricegrass

Selected at U.S. Northern Great Plains Research Center, ARS, Mandan, N. Dak.—G. A. Rogler.

Source.—Amphidiploid of natural cross of *Stipa viridula* and *Oryzopsis hymenoides*. F₁ hybrid occurred in nursery at Mandan in 1941; fertile F₂ plant found in 1945.

Method of Breeding.—Natural intergeneric hybridization followed by spontaneous chromosome doubling.

Description.—Morphologically intermediate between two parent species, with growth habit more closely approaching that of *O. hymenoides*.

Released.—No. Distributed for testing.

Breeder Seed.—U.S. Northern Great Plains Research Center.

***Trichachne californica* (Benth.) Chase, Arizona cottontop**

Warm-season, native bunchgrass. Distributed from west Texas to Colorado, Arizona, and South America; found in abundance during years having good spring rains when it attains height of about 3 feet. Light, fluffy seed produced throughout growing season when moisture favorable. Seed difficult to harvest and process. Palatable to livestock.

PMT-389

Increased at Plant Materials Centers, SCS, at Spur, Tex., and Knox City, Tex.

Source.—Collections from Van Horn, Tex., area in 1958.

Method of Breeding.—Increase of original collection at Spur, Tex., in 1960, and at Knox City, Tex., in 1965-68. Equal in seed production and

considerably better in forage production than other collections tested at Knox City.

Description.—Typical of species in general appearance. Adapted to medium- to fine-textured soils of western Edwards Plateau, Rio Grande Plain, and Trans Pecos area of west Texas. Seed offered as blend of about 80 percent sideoats grama and 20 percent Arizona cottontop. Seed units will adhere to sideoats grama seed and feed readily through seeding equipment.

Released.—Informally by SCS in early 1960's and again in 1968.

Breeder Seed.—James E. "Bud" Smith Plant Materials Center, SCS, Knox City, Tex.

Certified Seed.—Not available. (Uncertified seed offered as blend with sideoats grama in limited quantities.)

***Tripsacum dactyloides* (L.) L., eastern gamagrass**

Warm-season, native sod-forming grass with thick, scaly rhizomes. Found in natural grassland prairies of Central and Eastern United States along streambanks and other lowland sites. Grows in large clumps; must be properly managed for hay or pasture.

PM-K-24

Increased at Plant Materials Center, SCS, Manhattan, Kans.—R. D. Lippert.

Source.—Collections in 1958 from Kansas and Oklahoma.

Method of Breeding.—Seed from 70 collections bulked and used to establish seed-increase field in 1960. Seed from this field advanced two generations by harvesting and replanting. Natural selection under combine harvesting for more uniform maturity.

Description.—Well-adapted, leafy ecotype; typical in general appearance to species.

Released.—No. Distributed for testing.

Breeder Seed.—Plant Materials Center, SCS Manhattan, Kansas.

***Zoysia japonica* Steud., Japanese lawngrass**

Warm-season, sod-forming grass from Asia. Used for general-purpose turf and erosion control in Southeastern United States. Relatively winter hardy, but does not thrive or compete well where summers are short or cool. Grows best on heavy soils; not drought resistant. Relatively coarse and tough. Produces seed, but generally planted vegetatively.

Meyer (Reg. No. 12)

Selected at Arlington Farms, Va., and Plant Industry Station, Beltsville, Md., in cooperation with U.S. Golf Association Green Section—Ian Forbes, M. H. Ferguson, and F. V. Grau.

Source.—Japanese lawngrass (*Zoysia japonica* Steud.) seed introduced in 1930 from northern Korea. *Z. japonica* known to have been in United States in 1895.

Method of Breeding.—Promising individual plant selected at Arlington Farms in 1940. Vegetative material moved to Beltsville in 1941; increased for testing in 1947-48 as Z-52.

Description.—Develops tough, wear-resistant turf. Leaf width intermediate between that of *Z. matrella* (L.) Merr. and common *Z. japonica*. Drought resistant, but will turn brown during long, dry periods. Grows and persists on relatively poor soils. Rate of spread and color improved by applications of fertilizer and irrigation. Competes very satisfactorily with weeds and other grasses in areas where adapted. Competition from other species increases time required to attain complete coverage. Winter hardy, but in general only recommended in areas with long, warm growing season. Warm-season grass; becomes dormant and brown with first frost.

Released.—1951, cooperatively by Plant Science

Research Division, ARS, and U.S. Golf Association Green Section. Name "Meyer" honors memory of Frank N. Meyer, USDA plant explorer.

Breeder Stock.—Plant Industry Station, Beltsville.

Certified Stock.—Available. (Ample commercial stock.)

Midwest

Selected at Indiana Agricultural Experiment Station, Lafayette—W. H. Daniel and W. C. LeCroy.

Source.—Open-pollinated seedling nursery representing 40 sources.

Method of Breeding.—Selected as preferred individual plant from over 3,000 seedlings in 6-year testing program.

Description.—Medium green, vigorous; faster spreading and with wider leaves than Meyer. Turf open, not excessively fluffy and easy to walk on. It retains color 2 to 3 weeks longer in fall and starts regrowth 1 to 2 weeks earlier in spring than Meyer.

Released.—1963, by Indiana Agricultural Experiment Station.

Breeder Stock.—Indiana Agricultural Experiment Station.

Certified Stock.—Available.

Z-73

Selected at Plant Industry Station, Beltsville, Md., in cooperation with U.S. Golf Association Green Section—F. V. Grau.

Source.—Meyer zoysia.

Method of Breeding.—Single-plant selection from plants grown from seed produced on Meyer zoysia.

Description.—Vigorous, relatively fast spreading. Leaf width intermediate between that of Meyer and common *Zoysia japonica*. Winter hardy. Produces good seed yields; seedheads golden tan. Appears to be less competitive to Kentucky bluegrass than Meyer. Suggested for use in erosion control and on large lawns and highways. Proposed name, "Sunburst."

Released.—No. (Seed from Z-73 distributed in 1952.)

Breeder Stock.—National Plant Materials Center, SCS, Beltsville.

Zoysia japonica × *Z. tenuifolia* Willd. ex Trin.

Emerald (Reg. No. 7)

Selected at Plant Industry Station, Beltsville, Md.—Ian Forbes.

Source.—Selected from several F₁ hybrids between *Zoysia matrella* varieties *japonica* and *tenuifolia*. *Z. japonica* parent introduced from Korea and *Z. tenuifolia* parent from Agricultural Experiment Station at Guam.

Method of Breeding.—Hybrids made in all possible combinations between varieties *japonica*, *matrella*, and *tenuifolia*. Selection in F₁ based on turf quality (leaf width, density, color, growth habit) and winter hardiness. Tested as experimental 34-35.

Description.—Vegetatively propagated F₁ hybrid (*Z. matrella* var. *japonica* × *Z. matrella* var. *tenuifolia*). In comparison with varieties *japonica*,

matrella, *tenuifolia*, and Meyer zoysia at Beltsville and at Tifton, Ga., Emerald had best total turf-quality score at both locations for 3 years. Combined to varying degrees greater winter hardiness, nonfluffy growth habit, and faster rate of spread of its *japonica* parent with finer leaves, denser turf, and dark-green color of its *tenuifolia* parent. Exhibited hybrid vigor in rate of spread, browning, and density ratings. Considerably more shade and frost tolerant than bermudagrass.

Released.—1955, cooperatively by Georgia Agricultural Experiment Station, Tifton; Plant Science Research Division, ARS; and U.S. Golf Association Green Section.

Breeder Stock.—Georgia Coastal Plain Experiment Station.

Certified Stock.—Available in quantity.

Zoysia matrella (L.) Merr., manilagrass

Warm-season, sod-forming grass introduced from Asia. Used as lawngrass in Southeastern United States. Finer, denser sod but less winter hardy than *Zoysia japonica*.

F. C. 13521

Increased at Alabama Agricultural Experiment Station, Auburn.

Source.—Received from H. N. Vinall in 1927. F.C. 13521 obtained originally from J. B. Norton, Hartsville, S.C.; probably selection from S.P.I. 48574.

Description.—Fine, dark green. Leaf blades usually 3 to 5 inches long when not mowed. Grows very dense. Produces creeping stolons that root profusely; ends of stolons cling to ground and thus grow under competing plants. Stands con-

siderable shade. Produces seedheads and some seed in spring. Rather free from diseases and insects. Susceptible to drought, but recovers rapidly when moisture becomes available.

Released.—Alabama Agricultural Experiment Station.

Breeder Stock.—Alabama Agricultural Experiment Station

Certified Stock.—Available. (Shown in some lists of certified stock as 15321.)

Obsolete grass varieties (largely experimental)

Name or No.	Handbook Agriculture edition	Name or No.	Handbook Agriculture edition
A-1770 (fairway wheatgrass)-----	1959	New York Synthetic L (smooth brome)-----	1959, 1965
A-2514 (Russian wildrye)-----	1959	New Zealand (tall fescue)-----	1959
A-10675 (Siberian wheatgrass)-----	1965	Norbeck (creeping bentgrass)-----	1959, 1965
A-11527 (sand lovegrass)-----	1959, 1965	Oklahoma 1 (smooth brome)-----	1959, 1965
A-12445 (<i>Bromus coloratus</i>)-----	1959	Oklahoma 8 (sudangrass)-----	1959, 1965
A-12752 (Boer lovegrass)-----	1959, 1965	Oklahoma 4880 (Boer lovegrass)-----	1959
A-14156 (kleingrass)-----	1959	Oklahoma (Chapel Hill) (smooth brome)-----	1959, 1965
Algerian (blue panicgrass)-----	1959	P-1822 (thickspike wheatgrass)-----	1959, 1965
Alta 4-36 (tall fescue)-----	1959, 1965	P-2447 (bunchgrass)-----	1965
Alta 144 (tall fescue)-----	1959	P-14943 (thickspike wheatgrass)-----	1965
B. in. 12 (smooth brome)-----	1959, 1965	Pasture Laboratory Synthetics 1 through 7 (orchardgrass)-----	1959, 1965
Beltsville selections (Japanese lawngrass)---	1965	Pennsylvania synthetics (orchardgrass)-----	1959
Beltsville Synthetic 4 (sudangrass)-----	1959, 1965	PM-C-14 (alkali sacaton)-----	1965
Cold Hardy (Lehmann lovegrass)-----	1959, 1965	PM-C-29 (bluebunch wheatgrass)-----	1965
Cornell 1777 (timothy)-----	1959	PM-C-30 (western wheatgrass)-----	1965
Cornell 4059 (timothy)-----	1959	PM-M-161 (bluebunch wheatgrass)-----	1965
Dahlgren (creeping bentgrass)-----	1959, 1965	Reno (plains bluegrass)-----	1959, 1965
Flagstaff (black grama)-----	1959, 1965	Rescue 440 (rescuegrass)-----	1959, 1965
Formosa (yellow bluestem)-----	1959, 1965	Rhode Island 6 (red fescue)-----	1965
German 8 (foxtail millet)-----	1959	Ryegrass 12 (Italian ryegrass)-----	1959, 1965
German 8A (foxtail millet)-----	1959	Sand strain (western wheatgrass)-----	1959
German R (foxtail millet)-----	1959	Selection 7 (pearl millet)-----	1959, 1965
H-1 (Italian ryegrass)-----	1959, 1965	Shelby (timothy)-----	1959, 1965
Hardy (Lehmann lovegrass)-----	1959	South Dakota 15 (crested wheatgrass)-----	1959, 1965
Hybrid SJ (pearl millet)-----	1959, 1965	South Dakota 20 (intermediate wheatgrass)---	1959
Idaho 3 (intermediate wheatgrass)-----	1959, 1965	<i>Stipa hyalina</i> -----	1965
Idaho 4 (intermediate wheatgrass)-----	1959, 1965	Stoneville rust-resistant strains (Italian rye- grass)-----	1959, 1965
Iowa M2-10820 (intermediate wheatgrass)---	1959, 1965	Stoneville Selection (sudangrass)-----	1959, 1965
Iowa synthetics (orchardgrass)-----	1959	Stoneville Synthetic 1 (sudangrass)-----	1959, 1965
Jeanerette (smooth brome)-----	1959, 1965	Stoneville Synthetic 2 (sudangrass)-----	1965
Kalahari (Lehmann lovegrass)-----	1959, 1965	Synthetic 1 (kleingrass)-----	1959
Kansas Experimental (indiangrass)-----	1965	T-20258 (<i>Stipa hyalina</i>)-----	1959, 1965
KB-143(233) (Kentucky bluegrass)-----	1959	Tennessee strains (tall fescue)-----	1959, 1965
KB-176(22) (Kentucky bluegrass)-----	1959	Texas Synthetic 63-1 (kleingrass)-----	1965
Kentucky 45-50 (tall fescue)-----	1965	Texas Synthetic 63-4 (blue panicgrass)-----	1965
Kentucky Select (orchardgrass)-----	1965	Trogdon (orchardgrass)-----	1959, 1965
Kuhl (smooth brome)-----	1965	Turkish (fairway wheatgrass)-----	1959, 1965
Lomas (blue wildrye)-----	1959, 1965	Utah 42-1 (crested wheatgrass)-----	1959, 1965
M2-10302 (indiangrass)-----	1959, 1965	Utah 109 (pubescent wheatgrass)-----	1959
M2-10820 (intermediate wheatgrass)-----	1965	Utah Synthetic (orchardgrass)-----	1959, 1965
M2-11108 (Canada wildrye)-----	1959, 1965	Washington 88 (orchardgrass)-----	1959, 1965
M2-11142 (orchardgrass)-----	1959, 1965	Washington H-2 (orchardgrass)-----	1959, 1965
Mandan 315 (reed canarygrass)-----	1959, 1965	Wisconsin 52 (orchardgrass)-----	1959
Mandan 2194B (crested wheatgrass)-----	1959, 1965	Wisconsin B-55 (smooth brome)-----	1959, 1965
Mandan 2359 (crested wheatgrass)-----	1959, 1965	Wisconsin B-63 (smooth brome)-----	1959, 1965
Michigan B-2 (smooth brome)-----	1959	Wisconsin F-52A (orchardgrass)-----	1965
Mississippi SJ-1 (sorghum)-----	1959, 1965	Woodward Strain W-4 (sideoats grama)-----	1959, 1965
NCS-511 (tall fescue)-----	1959	Woodward Strains W1, W2 (switchgrass)-----	1959
Nebraska 10 (crested wheatgrass)-----	1959, 1965	Woodward Strains W1, W2, W3, W4, W5 (sand lovegrass)-----	1959, 1965
New York Synthetic B (timothy)-----	1959, 1965		
New York Synthetic D (orchardgrass)-----	1959		
New York Synthetic E (Aurora) (orchard- grass)-----	1959, 1965		

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