U. S. DEPARTMENT OF AGRICULTURE.
BUREAU OF PLANT INDUSTRY—BULLETIN NO. 10.
B. T. GALLOWAY, Chief of Bureau.

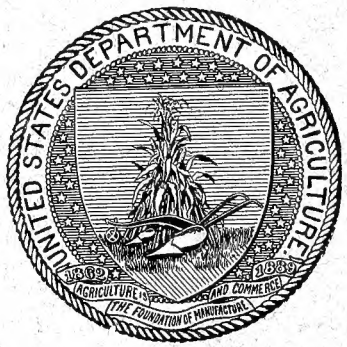
RECORDS OF SEED DISTRIBUTION

AND

COOPERATIVE EXPERIMENTS WITH GRASSES AND FORAGE PLANTS.

BY

F. LAMSON-SCRIBNER, AGROSTOLOGIST,
GRASS AND FORAGE PLANT INVESTIGATIONS.



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LETTER OF TRANSMITTAL.

U. S. Department of Agriculture,
Bureau of Plant Industry,
Office of the Chief,
Washington, D. C., December 26, 1901.

Sir: I have the honor to transmit herewith the manuscript of a paper entitled Records of Seed Distribution and Cooperative Experiments with Grasses and Forage Plants, by F. Lamson-Scribner, Agrostologist, and recommend its publication as Bulletin No. 10 of the Bureau series.

Respectfully,

B. T. Galloway,
Chief of Bureau.

Hon. James Wilson,
Secretary of Agriculture.

PREFACE.

This bulletin relates to the collection and distribution of seeds of grasses and forage plants by the Department of Agriculture through the Office of the Agrostologist, formerly Division of Agrostology, and to cooperative work in grass and forage plant investigations with a number of State experiment stations to whom these seeds were sent. The manner of keeping the records of this seed distribution is explained in detail, and the plan of conducting the cooperative experiments and the line of work or forage problem taken up with each station are fully given. This work was put into operation last year in compliance with an act of Congress, and has proven so satisfactory to all concerned that it has been continued the present year, although there are now no statutory regulations requiring that it should be.

F. LAMSON-SCRIBNER,
Agrostologist.

OFFICE OF THE AGROSTOLOGIST,
Washington, D. C., November 29, 1901.

CONTENTS.

RECORDS OF SEED DISTRIBUTION AND COOPERATIVE EXPERIMENTS WITH GRASSES AND FORAGE PLANTS.

PURCHASE AND COLLECTION OF SEEDS, ROOTS, AND SPECIMENS.

House bill No. 121, Fifty-sixth Congress, first session, making appropriations for the United States Department of Agriculture, contained the following clause:

> *Provided*, That six thousand dollars of the amount hereby appropriated [for grass and forage plant investigations] be used to purchase and collect seeds, roots, and specimens of valuable and economic grasses and forage plants to be distributed to the various experiment stations in the several States and Territories, to be by them used, under the direction of the Secretary of Agriculture, to ascertain their adaptability to the various soils and climates of the United States.

In carrying out the plans necessary to meet this provision in the bill making appropriations for the Agricultural Department, Mr. C. L. Shear, an assistant in the Division of Agrostology, was put in charge of the seed and field work July 1, 1900, when the law making the appropriations went into effect. Mr. Shear was instructed to make collections of seeds of the valuable native grasses and forage plants and was directed to secure in quantity seeds of wild range grasses, also those species of probable value in the South for winter pasturage, those likely to prove good meadow grasses for high altitudes, and of those adapted to binding drifting sands. In carrying out this work it not infrequently happened that long, tedious journeys had to be made to regions inaccessible to stock before grasses in seed could be found and collections made. As a result of this work in the field during the season 4 tons of seed of about 130 varieties of grasses and forage plants were gathered, the quantities varying from 1 pound to 500 pounds. A list of the varieties of seeds gathered, with notes upon some of the more important species, was presented in Circular No. 9, issued from the office of the Secretary in December, 1900. In conducting the cooperative work with the stations, which will be referred to later, it was necessary to supplement this amount of seeds of native varieties by purchasing from dealers seeds of the more important tame grasses and forage plants which the experiments called for.

COOPERATION WITH THE STATIONS AUTHORIZED.

In the House bill referred to above, making appropriations for the Department of Agriculture for 1900–1901, there was this clause:

> And the agricultural experimental stations are hereby authorized and directed to cooperate with the Secretary of Agriculture in establishing and maintaining experimental grass stations for determining the best methods of caring for and improving meadows and grazing lands, the use of different grasses and forage plants, their adaptability to various soils and climates, the best native and foreign species for reclaiming the overstocked ranges and pastures, for renovating worn-out lands, for binding drifting sands and washed lands, for turfing lawns and pleasure grounds, and for solving the various forage problems presented in the several sections of our country.

In order to carry out this feature of the law, the Secretary of Agriculture, through the recommendation of the Agrostologist, directed Mr. Thomas A. Williams, then assistant chief of the Division of Agrostology, to visit the several experiment stations, especially those in the Western States, to study the forage problems of most importance to each, and by consulting with the directors of the stations to arrange plans for carrying on cooperative work with them with the view of solving the problems determined upon.

LINES OF INVESTIGATIONS OF FORAGE PROBLEMS.

Mr. Williams says in his report, published as Circular No. 8 (revised), of the office of the Secretary:

> In brief, this series of visits to the stations demonstrates clearly not only that there are many problems which can be studied much better through station and Departmental cooperation, but that the station authorities themselves appreciate the desirability of such cooperative work and are eager to enter into it. It is recognized that in these general problems, while the stations are able to work out the details of experiments and matters of relatively local bearing, there is a most important phase of the investigations that can be much more satisfactorily handled by the Department, and, in order to secure the best results to the country at large, it is highly desirable that there should be the closest cooperation between stations and Departmental investigations. In addition to the assistance which the Department can render the stations in solving these special problems through the detailing of its experts for field investigations and supplying seed for experiments, this cooperation will have a most important bearing on the work of the stations in encouraging greater concentration on lines of greatest importance to the people and in rendering more readily available to the station workers the experience and training of the Departmental experts.
>
> Consultation with the station authorities has emphasized the desirability of cooperation along a number of lines of investigation, the following being perhaps the most important at the present time and including every section of the country.
>
> (1) The formation, care, and management of pastures, including the selection of the best varieties, methods of preparing the soil and of planting the seed, and after treatment of grass lands, including grazing, rest, fertilizing, and cultivation.
>
> (2) Range improvement, or the best methods of bringing up the natural grass ands of the great range regions of the country and maintaining them in the condition of greatest productivity, including the improvement of the native grass cover by reseeding, alternation of rest and grazing periods, scarifying, etc.

(3) Alkali-resistant crops, particularly those best adapted to furnishing forage that can be used to supplement the native ranges.

(4) Cover crops for soils liable to wash, which will at the same time afford a supply of forage or can be turned under for green manure.

(5) A continuous soiling series for use in sections where the dairying industry is paramount.

(6) Winter pasturage for the South and Southwest.

(7) Sand-binding grasses for the coast regions and along the Great Lakes.

(8) Meadow crops for higher altitudes, particularly in the Rocky Mountain States, where, although pasturage is abundant, crops that will produce profitable amounts of hay are greatly needed.

(9) Supplementary forage crops, particularly those with a short season of growth, that can be grown in rotation with wheat, cotton, and other primary crops, either for forage or for the improvement of the soil fertility.

(10) Drought-resistant crops for arid sections.

(11) The selection and development of improved varieties of grasses and forage crops adapted to special conditions and uses.

As a result of visiting the State stations, and through correspondence, it has been ascertained that cooperative work can be arranged for the investigation of each of these problems with one or more stations most advantageously situated, and there is no question as to urgent need of such investigations.

ARTICLES OF COOPERATION.

A plan was devised to carry on this work under articles of cooperation signed by the station officials and officials of this Department, of which the following are presented as examples:

Articles of cooperation in investigations on improvement of the Northwestern ranges between the ———— Agricultural Experiment Station and the Division of Agrostology, United States Department of Agriculture.

The object of these investigations shall be to find the best and most practical way of improving the forage conditions in the dry sections of the Northwest, and specially of renewing the worn-out ranges and devising methods of managing them whereby the highest degree of productivity may be maintained. The following plan of cooperation is agreed upon:

1. The ———— Experiment Station to procure a suitable tract of range land; to undertake immediate supervision of the work through a member of its official staff; and to furnish all implements, fencing, etc., required by the investigations, the same to be the sole property of the station when this cooperative arrangement is dissolved.

2. The U. S. Department of Agriculture, through the Division of Agrostology, to assist in selecting the land and in planning and conducting these investigations; to furnish seed of native and introduced grasses and forage plants for experiments on said tracts, and pay other expenses connected with the investigations, not to exceed ———— in any one fiscal year, it being understood that under the appropriation act the Department can not assume responsibility for the continuance of its contribution beyond June 30, 1901.

3. The investigations conducted under this cooperative agreement shall be planned conjointly by the representatives of the ———— Experiment Station and the Division of Agrostology, officially charged with the work, subject to the approval of the proper authorities in each case.

4. Both parties to this agreement shall be free at any time to use the results obtained in these investigations in their official correspondence and publications, giving proper credit to the fact that such results have been secured by cooperative work.

_____ _____,
Director _____ *Experiment Station.*
_____ _____,
Chief Division of Agrostology.

Approved:

_____ _____,
Secretary of Agriculture.

Articles of cooperation in grass and forage plant investigations between the _____ *Agricultural Experiment Station and the Divison of Agrostology, United States Department of Agriculture.*

The object of these investigations shall be to find the best crops for supplying forage to supplement the natural ranges and for the improvement of cultivated lands. The following plan of cooperation is agreed npon:

1. The _____ Experiment Station to provide land at the home station, or at outlying representative points in that territory, upon which to make said experiments, and to undertake the immediate care and supervision of the work.

2. The U. S. Department of Agriculture, through the Division of Agrostology, to furnish all seeds necessary in making these experiments, and to otherwise assist in planning and conducting said investigations.

3. The investigations conducted under this cooperative agreement shall be planned conjointly by the representatives of the _____ Experiment Station and the Division of Agrostology officially charged with the work, subject to the approval of the proper authorities in each case.

4. Both parties to this agreement shall be free at any time to use the results obtained in these investigations, giving proper credit to the fact that such results have been secured by cooperative work.

_____ _____,
Director _____ *Experiment Station.*
_____ _____,
Chief Division of Agrostology.

Approved:

_____ _____,
Secretary of Agriculture.

The following is the form in use since the organization of the Bureau of Plant Industry:

Articles of cooperation in grass and forage plant investigations between the Wyoming State Experiment Station and the Bureau of Plant Industry, United States Department of Agriculture.

The subject of these investigations shall be grasses and forage plants for alkali soils and arid lands.

1. The Wyoming Experiment Station to furnish the land necessary for the said experiments, to undertake the immediate supervision and care of the work, and to assist in planning the investigations.

2. The United States Department of Agriculture, through the Bureau of Plant Industry, Office of Grass and Forage Plant Investigations, to assist in planning and conducting the said investigations, and to furnish all seeds necessary for making the experiments.

3. The investigations conducted under this cooperative agreement shall be planned conjointly by the representatives of the Wyoming Experiment Station and the Bureau of Plant Industry, officially charged with the work, subject to the approval of the proper authorities in each case.

4. Both parties to this agreement shall be free, at any time, to use the results obtained in these investigations in their official correspondence and publications, giving proper credit to the fact that such results have been secured by cooperative work.

ELMER E. SMILEY,
Director Wyoming Experiment Station.
B. T. GALLOWAY,
Chief Bureau of Plant Industry, United States Department of Agriculture.

At the present time fifteen of the experiment stations are working in cooperation with the Department on one or more of the lines connected with grass and forage plant investigations.

SEED DISTRIBUTION.

Since the organization of the Division of Agrostology seeds of grasses and forage plants have each year been distributed to the agricultural experiment stations and to many individual experimenters. The following table shows the number of packages of seed so distributed during the fiscal years 1896–1901, inclusive; the total number of packages sent to the experiment stations during this time being 4,166, and to individuals 9,377, or a total of 13,543 packages (see Table I). These for the most part were seeds which were obtained through the direct efforts of the employees of the Division by collections in the field. During the fiscal year 1900–1901 there were distributed to the experiment stations 16,101¼ pounds of seed, embracing 171 varieties, as shown in Tables II and III.

TABLE I.—*Number of packages of seed distributed to the experiment stations and to individuals during the fiscal years 1896 to 1901, inclusive, or for five years, through the Division of Agrostology.*[a]

Distribution.	1896 to 1897.	1897 to 1898.	1898 to 1899.	1899 to 1900.	1900 to 1901.	Total for the five years.
Total number of packages sent to experiment stations	2,281	184	462	292	947	4,166
Total number of packages sent to individuals	632	2,749	1,739	2,709	1,548	9,377
Total number of packages distributed	2,913	2,933	2,201	3,001	2,495	13,543

[a] This does not include the packages distributed to foreign countries.

TABLE II.—*Amount (in pounds) of seeds of grasses and forage plants distributed to the experiment stations and to individuals in the several States and Territories in cooperation with the stations during the fiscal year 1900–1901.*

States and Territories.	Seeds sent to experiment stations.	Seeds sent to individuals in cooperation with the experiment stations.	Total weight seeds distributed to each State.
	Pounds.	*Pounds.*	*Pounds.*
Alabama	.....	30	30
Arizona	710	.....	710
Arkansas	.....	257½	257½
California	.....	46¼	46¼
Colorado	444	242⅛	686⅛
Connecticut	.....	108	108
Delaware	171	.....	171
Florida	.....	51½	51½
Georgia	.....	142	142
Idaho	130	23⅞	153⅞
Illinois	133	283⅛	416⅛
Indiana	.....	20	20
Iowa	.....	6½	6½
Kansas	1,145	456½	1,601½
Kentucky	30	262½	292½
Louisiana	135	14	149
Maine	65	128	193
Maryland	360	518¾	878¾
Massachusetts	.....	214¼	214¼
Michigan	380	53	433
Minnesota	.....	119	119
Mississippi	10	65½	75½
Missouri	691½	244¾	936¼
Montana	193½	227⅞	421¼
Nebraska	249¼	231⅞	481
New Hampshire	3,700	134	3,834
New Jersey	75	238	313
New Mexico	563	76½	639½
New York	81½	137	218½
North Carolina	773	80	853
North Dakota	485	169	654
Nevada	202	41	243
Ohio	100	75½	175½
Oklahoma	30	10⅞	40⅞
Oregon	670½	218½	888⅞
Pennsylvania	.....	214¼	214¼
Rhode Island	50	.....	50
South Carolina	17½	78½	95⅞
South Dakota	307¼	208⅞	516
Tennessee	440⅞	252	692⅞
Texas	752½	117⅞	870½
Utah	35	32¼	67¼
Virginia	107	359½	466½
Washington	1,695	43	1,738
West Virginia	30	3½	33½
Wisconsin	125	64	189
Wyoming	1,014	751	1,765
Total	16,101¼	7,051½	23,152¾

TABLE III.—*Varieties of grasses and forage plants, seeds of which were distributed through the Division of Agrostology in 1900–1901, the amount in pounds of each variety sent out, both to the experiment stations and to individuals in cooperation with the stations, and the total amount distributed.*

Variety.		Sent to stations.	Sent to individuals.	Total distributed.
Latin name.	English name.			
		Pounds.	*Pounds.*	*Pounds.*
Agropyron caninum	Bearded wheat grass	23½	22	45½
Agropyron divergens	Bunch wheat grass	10	12	22
Agropyron occidentale	Western wheat grass	491⅛	86¼	577¾
Agropyron richardsoni	Richardson's wheat grass	1	.....	1
Agropyron riparium	Riparian wheat grass	5	.....	5
Agropyron spicatum	Bunch wheat grass	428	54⅛	482⅛
Agropyron tenerum	Slender wheat grass	428¼	82½	510¾
Agropyron violaceum	.....	1½	.....	1½
Agrostis alba	Red top	274⅛	72⅛	347
Agrostis canina	Rhode Island bent	18	55	73
Agrostis stolonifera	Creeping bent	8	5¼	13¼
Alopecurus occidentale	Mountain foxtail	2	.....	2
Alopecurus pratensis	Meadow foxtail	18	10	28
Aristida humboldtiana	Humboldt's triple-awn	1¼	.....	1¼
Aristida fasciculata	Triple-awn	¼	.....	¼
Ammophila arenaria	Beach grass	167	93⅛	260⅛
Andropogon saccharoides	Feather beard grass	186¼	25	211¼
Anthoxanthum odoratum	Sweet vernal grass	1	.....	1
Arrhenatherum elatius	Tall oat grass	244	28	272
Atriplex canescens	Shad scale	11⅛	5⅛	17
Atriplex confertifolia	Spiny saltbush	2	.....	2
Atriplex eremicola	.....	20¼	3	23¼
Atriplex halimoides	Gray saltbush	49	17¼	66¼
Atriplex holocarpa	Annual saltbush	12½	6½	19
Atriplex nuttallii	Nuttall's saltbush	43	23¼	66¼
Atriplex pabularis	.....	11	.....	11
Atriplex semibaccata	Australian saltbush	108	67¾	175¾
Atriplex truncata	Utah saltbush	12	.....	12
Atriplex volutans	Tumbling saltbush	21½	2½	23¾
Avena sativa	Winter oats	21	14	35
Beckmannia erucæformis	Slough grass	25	.....	25
Bouteloua oligostachya	Blue grama	129¼	18	147¼
Bouteloua bromoides	Brome grama	10	.....	10
Bouteloua curtipendula	Side-oats grama	52¾	6	58¾
Bouteloua eriopoda	Woolly-foot grama	5¼	.....	5¼
Bouteloua hirsuta	Bristly grama	1¼	.....	1¼
Bouteloua humboldtiana	Humboldt's grama	5	.....	5
Bouteloua polystachya	Low grama	72¼	¼	72½
Brassica napus	Rape	13	35¼	48¼
Bromus inermis	Awnless brome grass	459	744⅓	1,203⅓
Bromus marginatus	Short-awned brome grass	154	13	167
Bromus pallidus	.....	9	.....	9
Bromus polyanthus	Many-flowered brome	19	.....	19
Bromus pumpellianus	Mountain brome grass	½	.....	½
Bromus richardsoni	Richardson's brome	9	.....	9
Bromus schraderi	Schrader's brome	1	.....	1
Bromus unioloides	Rescue grass	322½	91½	414
Bulbilis dactyloides	Buffalo grass (roots only)	.....	.....	.....
Calamagrostis canadensis var	Canada blue joint	5	1	6
Calamovilfa longifolia	Sand grass	7	1	8

TABLE III.—*Varieties of grasses and forage plants, etc.*—Continued.

Variety.		Sent to stations.	Sent to individuals.	Total distributed.
Latin name.	English name.			
		Pounds.	*Pounds.*	*Pounds.*
Carex macrocephala	Big head sedge	9	132	141
Chætochloa composita	Arizona millet	5¼	.....	5¼
Chætochloa italica	German millet	20	49⅛	69⅛
Chætochloa italica var	Golden wonder millet	.....	⅛	⅛
Chloris elegans	.....	11¼	.....	11¼
Cicer arietinum	Gram or chick pea	2	4	6
Cynodon dactylon	Bermuda grass	20	50¼	70¼
Cynosurus cristatus	Crested dog's tail	7	29⅛	36⅛
Dactylis glomerata	Orchard grass	424	130	554
Dactyloctenium australiense	Button grass	25	3	28
Deschampsia cæspitosa	Tufted hair grass	2	.....	2
Desmodium tortuosum, var	Beggarweed	2	⅛	2⅛
Desmodium sp	Perennial beggarweed	¾	.....	¾
Eatonia obtusata	.....	1	.....	1
Eleusine coracana	African millet	5	.....	5
Elymus ambiguus	.....	5	2	7
Elymus arenarius	Sea rye grass	6	3	9
Elymus canadensis	Canada rye grass	167½	15	182½
Elymus canadensis var	....do	56¾	6	62¾
Elymus condensatus	Giant rye grass	49⅛	9	58⅛
Elymus glabriflorus	Smooth-flowered rye grass	9¾	.....	9¾
Elymus glaucus	Mountain rye grass	15¼	4	19¼
Elymus macounii	Macoun's rye grass	11	.....	11
Elymus simplex	Alkali rye grass	17	3	20
Elymus virginicus submuticus	Short-awned rye grass	86	1½	87½
Eragrostis neo-mexicana	Mexican love grass	13	.....	13
Eriochloa punctata	Everlasting grass	2½	.....	2½
Eriocoma cuspidata	Indian millet	83	8	91
Erodium cicutarium	Alfilaria	6	5	11
Ervum lens	Lentils	1	.....	1
Euchlæna mexicana	Teosinte	22	54¾	76¾
Eurotia lanata	Winter fat	8¼	¼	8½
Festuca arundinacea	Reed fescue	41	.....	41
Festuca duriuscula	Hard fescue	17	3	20
Festuca elatior	Meadow fescue	405½	257¼	662¾
Festuca heterophylla	Various-leaved fescue	1	15	16
Festuca kingii	King's fescue	7⅝	⅛	8
Festuca ovina	Sheep's fescue	6½	63	69½
Festuca rubra	Red fescue	24	65	89
Festuca thurberi	Thurber's fescue	3	.....	3
Glycine hispida	Soy bean	361½	304	665½
Helianthus sp	Sunflower	.....	.....	.....
Hilaria cenchroides	Curly mesquite	7	.....	7
Hilaria mutica	Black galleta	9¼	.....	9¼
Hordeum vulgare	Barley	12	.....	12
Kœleria cristata	Prairie June grass	2	.....	2
Lathyrus sativus	Bitter flat pea	115	216	331
Leptochloa dubia	.....	13¼	.....	13¼
Lespedeza striata	Japan clover	32	20	52
Lolium italicum	Italian ray grass	117	145½	262½
Lolium perenne	Perennial ray grass	298	35	333
Lycurus phleoides	Texas timothy	16½	.....	16½
Medicago denticulata	Bur clover	154	38	192

TABLE III.—*Varieties of grasses and forage plants, etc.*—Continued.

Variety.		Sent to stations.	Sent to individuals.	Total distributed.
Latin name.	English name.			
		Pounds.	*Pounds.*	*Pounds.*
Medicago maculata		2	5	7
Medicago sativa	Alfalfa	1,371	1,501½	2,872½
Medicago sativa turkestanica	Turkestan alfalfa	6	57	63
Medicago sativa var	Oasis alfalfa	11		11
Melilotus alba	Sweet clover	80½	28	108½
Melinis minutiflora	Molasses grass	28		28
Mucuna utilis	Velvet bean	47	4	51
Muhlenbergia racemosa	Wild timothy			
Muhlenbergia gracilis		¾		¾
Onobrychis sativa	Sainfoin	138½	21	159½
Panicularia americana	American manna grass	3	10	13
Panicum bulbosum	Turnip grass	14		14
Panicum bulbosum var	do	4¾		4¾
Panicum crus-galli	Barnyard grass	715½	368½	1,084
Panicum miliaceum	Broom-corn millet	1,226	230¾	1,456¾
Panicum obtusum		3¼	12	15¼
Panicum texanum	Colorado grass	370	177	547
Pappophorum apertum		½		½
Paspalum compressum	Carpet grass	2	2	4
Paspalum dilatatum	Large water grass	8½	3¼	12
Phalaris arundinacea	Reed canary grass	10	11½	21½
Phaseolus mungo	Green gram	23		23
Phaseolus retusus	Metcalfe bean	7¾	1½	9¼
Phaseolus sp	Vallo bean	2		2
Phleum asperum	Sand timothy	½		½
Phleum pratense	Timothy	618	172½	790½
Pisum arvense	Russian blue field pea	72	91½	163½
Pisum sativum var	Black marrow-fat pea	62	60	122
Poa compressa	Canada blue grass	93½	50½	144
Poa fendleriana	Mutton grass	2		2
Poa glaucifolia	Glaucous blue grass	1		1
Poa laeviculmis	Smooth-stemmed blue grass	4½		4½
Poa laevigata	Smooth blue grass	15		15
Poa lucida	Shining blue grass	46	2	48
Poa macrantha	Sea-side blue grass	177½	156½	334
Poa nevadensis	Nevada blue grass	4		4
Poa pratensis	Kentucky blue grass	366½	77	443½
Poa trivialis	Rough-stalked blue grass	4½	10	14½
Poa wheeleri	Wheeler's blue grass	7½	1	8½
Poterium sanguisorba	Burnet	75½	26	101½
Puccinellia airoides	Alkali spear grass	16		16
Rumex sp	Dock	2		2
Sorghum vulgare var	Kafir corn	12	13½	25½
Sorghum vulgare var	Colman cane	6		6
Sorghum vulgare var	Early amber cane	6	3	9
Sorghum vulgare var	Early orange cane	6		6
Sorghum vulgare var	Folger's cane	6		6
Secale cereale	Winter rye	122		122
Sporobolus airoides	Fine saccaton	29½		29½
Sporobolus cryptandrus	Dropseed	12¼	3	15¼
Sporobolus depauperatus	Steel grass	3		3
Sporobolus wrightii	Wright's saccaton	29¼	3¼	32¾

TABLE III.—*Varieties of grasses and forage plants, etc.*—Continued.

Variety.		Sent to stations.	Sent to individuals.	Total distributed.
Latin name.	English name.			
		Pounds.	*Pounds.*	*Pounds.*
Sporobolus wrightii var		10		10
Stipa viridula		2¼		2¼
Stipa sp		5		5
Triodia mutica		¼		¼
Trifolium alexandrinum	Egyptian clover	10	3	13
Trifolium hybridum	Alsike clover	7¾	100	107¾
Trifolium incarnatum	Crimson clover	2	56¼	58¼
Trifolium medium	Mammoth clover	10	65	75
Trifolium pratense	Red clover	615	42	657
Trifolium repens	White clover	135	11	146
Triticum spelta	Spelt	21	17	38
Vicia maritima	Seaside vetch	18		18
Vicia villosa	Hairy vetch	309	228	537
Vigna catjang	Cowpea	2,180½	150½	2,331
Vigna catjang var	Black cowpea	204		204
Zea mays	Indian corn	22½	6	28½
Zizania aquatica	Wild rice		2	2
Total		16,101¼	7,051½	23,152¾

NOTE.—Total varieties, 171.

SEEDS TO PRIVATE INDIVIDUALS.

Many applications were made to the Secretary of Agriculture by individuals for seeds of grasses adapted to special conditions for purely experimental purposes. In order to meet these requests and to keep all of our work in line of cooperation with the experiment stations, the following letter was addressed to the directors of the several stations under date of January 31, 1901:

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF PLANT INDUSTRY,
OFFICE OF THE AGROSTOLOGIST,
Washington, D. C., January 31, 1901.

SIR: Requests for seeds of grasses and forage-plants for special purposes are received by this Department from many private individuals throughout the country and prior to the current fiscal year the Secretary has, so far as possible, generously responded to these requests. For the most part they have come from intelligent and progressive farmers who had definite objects in view and whose reports relative to the seeds sent them have oftentimes been of great value. A record has been kept of every package of seed thus sent out and we have classed the parties as our "volunteer experimenters" and our cooperation with them, costing only the seed sent, has been mutually advantageous. We would be glad to continue this line of work and hope that you will enable us to do so and respectfully ask your cooperation in the matter. If agreeable to you, we will refer all applications for seeds and grasses and forage plants made by individuals in your State to you by addressing them a letter like the inclosed (marked 1). If they then should write to you and you deem it wise for us to honor their request, the seeds will be forwarded, so far as our supply will permit. We will notify you of the shipment of the seed on a card similar to the inclosed

(marked 2), which is our preliminary step in the record. We could, if you wish, send seed in quantity to you to be redirected to individuals in your State from your station. In such case we would expect you to furnish us the addresses of the parties to whom the seed was sent and the amount in each case. At the close of each season we send blanks (marked 3) to every individual to whom seeds have been sent from this office for the purpose of obtaining a report as to the results of the experiments or progress made. We arrange with every one receiving seeds in the way here described to report results to this office and we will, upon your request, send you duplicate copies of these reports and thus share with you in all the results obtained. I would be pleased to have an expression from you in regard to this plan of cooperation with individuals.

Respectfully,

F. LAMSON-SCRIBNER,
Agrostologist.

AGRICULTURAL EXPERIMENT STATION,
Manhattan, Kans.

The scheme proposed in this communication met with very favorable reception on the part of the experiment stations, as will be seen by the replies here quoted, which are in the main expressions of all those received.

WASHINGTON AGRICULTURAL COLLEGE AND SCHOOL OF SCIENCE,
Pullman, Wash., February 8, 1901.

DEAR SIR: I am in receipt of your favor of January 31, and note carefully the plan outlined therein for the distribution of seeds of grasses and forage plants in the several States. The plan you propose meets with my approval and will have the hearty cooperation of this station.

Yours, very truly,

E. A. BRYAN, *President.*

F. LAMSON-SCRIBNER,
Agrostologist, Department of Agriculture, Washington, D. C.

THE PENNSYLVANIA STATE COLLEGE
AGRICULTURAL EXPERIMENT STATION,
February 19, 1901.

DEAR SIR: Replying to yours of January 31, relative to the matter of distribution of seeds and forage plants, I beg to say that it would give this station pleasure to accept your very courteous and generous proposal in regard to cooperation. If you will refer applicants to us as requested, we will be very glad to advise you as to the matter of honoring their requests and to receive from you the duplicate reports of results.

Very respectfully, yours,

H. P. ARMSBY, *Director.*

Mr. F. LAMSON-SCRIBNER,
United States Department of Agriculture, Washington, D. C.

The total amounts of seeds thus distributed to individuals in each State is shown in Table II, and the total quantity of each variety of seed so distributed is shown in Table III.

SYSTEM OF KEEPING RECORDS.

In order to bring all this work into such shape that the results might be utilized by both the stations and the Department, the following plan of records was adopted. Upon the receipt of an application from a

correspondent in any given State, the following letter was sent to the applicant:

U. S. DEPARTMENT OF AGRICULTURE,
GRASS AND FORAGE PLANT INVESTIGATIONS, DIVISION OF AGROSTOLOGY,
Washington, D. C., ———, *1901.*

DEAR SIR: Your letter of ———, addressed to ——— ———, has been referred to this division. The law (House bill No. 121, Fifty-sixth Congress, first session, making appropriations for the Department of Agriculture) requires that all seeds of grasses and forage plants distributed by this division for experimental use be sent to the experiment stations. We will be pleased to honor, so far as possible, any requests for seeds made through the director of your agricultural experiment station, located at ———. Please state definitely to the director the object of your request.

Respectfully,

F. LAMSON-SCRIBNER,
Agrostologist.

If the request was indorsed by the director of the experiment station a card was then made out in accordance with the following blank, directing the shipping clerk to send the seed, and when the shipment was made this card was returned to the office of the Agrostologist and filed for record.

State: ———. ———, 1901.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF PLANT INDUSTRY,
WASHINGTON, D. C.

COOPERATIVE EXPERIMENTS IN GRASS AND FORAGE PLANT INVESTIGATIONS WITH ——— EXPERIMENT STATION.

Name and address of experimenter: ———.
Variety of seed and amount sent: ———.
Source and age of seed: ———.
Object of experiment: ———.
Date of shipment: ———.

At the same time a card, the form of which is shown below, was sent to the director of the experiment station, advising him of the shipment, and this card was designed for filing at the station :

COOPERATIVE EXPERIMENTS IN GRASS AND FORAGE PLANT INVESTIGATIONS.

U. S. DEPARTMENT OF AGRICULTURE,
WASHINGTON, D. C.

——— ———
EXPERIMENT STATION

Name and address of experimenter : ———.
Variety of seed and amount sent : ———.
Source of seed : ———.
Object of experiment: ———.
Seeds shipped ———, 190—. Report received ———, 190—.

When seeds were sent to any individual under this plan he was advised of the fact by the following letter, in which the nature of final report expected from the correspondent was outlined. We found this to be important, for in many cases when we had called for reports as to results of seeds distributed the party receiving them often said that he wished he had known earlier the nature of the report wanted,

and he would have taken the necessary notes. This letter was designed to cover this ground.

U. S. Department of Agriculture,
Grass and Forage Plant Investigations,
Washington, D. C., ———, 190–.

Dear Sir: In accordance with arrangements made with the director of the agricultural experiment station of your State for conducting cooperative experiments with grasses and forage plants, the following seeds are being sent to you:

In sending you these seeds it is understood that you will try them in an experimental way to test their adaptability to your section or their special value. It is further understood that you will give them all the care necessary to meet the requirements of the experiment and report the result obtained on blanks which will be furnished you at the proper time. These reports will be filed in this office and copies will be sent to the director of your State experiment station. The following are the principal points to be noted:

Conditon and preparation of soil.
Date and method of planting.
Method of cultivation, if any.
Date of full bloom.
Date of ripening.
Date and method of harvesting.
Quality of the product.
Yield per acre of forage or seed, or both.
Stand and amount of growth made.
Value of the plant as food for stock.
Also any other miscellaneous notes of economic interest.

The seed produced by native and introduced plants, not obtainable from seedsmen, should be carefully saved.

Respectfully,

F. Lamson-Scribner,
Agrostologist.

Mr. ———.

At the close of the season blanks for reports of the form here presented will be sent to everyone who received seeds. Copies of these reports will be sent to the directors of the experiment stations in the States where the experimenters are located.

UNITED STATES DEPARTMENT OF AGRICULTURE.

Grass and Forage Plant Investigations.

EXPERIMENTS WITH GRASSES AND FORAGE PLANTS.

Report on varieties cultivated at ———. [*Name town, county, and State.*]

Common name, ———. Latin name, ———.
Kind, condition, and preparation of soil, ———.
Date and method of planting, ———.
Cultivation, if any, ———.
Date and method of harvesting and stage of maturity reached when harvested, ———.
Date of full bloom, ———. Date of ripening, ———.
Yield per acre (if practicable), ———.
Quality of product, ———.
Notes on growth, ———.
Your opinion of the value of the plant as feed for stock, ———.
Name of experimenter, ———. Post-office, ———. County, ———. State, ———.

[On reverse.]

GENERAL REMARKS.

190—.

(State.)

Name of experimenter:

Post-office:

County:

VARIETY.

(Common name.)

(Latin name.)

UNITED STATES DEPARTMENT OF AGRICULTURE,
GRASS AND FORAGE PLANT INVESTIGATIONS.

Report on grass and forage plant investigations.

INSTRUCTIONS.

Kindly fill out this blank, reporting each variety separately, and return in the inclosed franked and addressed envelope. No postage required.

The final record of distribution is kept upon a card, the face and reverse side of which is herewith shown. Only one species is entered on this card, and the cards are filed in alphabetical order. The amount we have on hand is shown at any time, together with the amount distributed, and to whom.

		RECEIVED FROM—	AMT. LBS.
Agropyron tenerum (Slender wheat grass).	12	Griffiths & Lange	31½

Fiscal year 1900–1901.

July.		Aug.		Sept.		Oct.		Nov.		Dec.		Jan.		Feb.		Mar.		Apr.		May.		June.	
D.	B.	D.	B.	D.	B.	D.	B.	D.	B.	D.	B.	D.	B.	D.	B.	D.	B.	D.	B.	D.	B.	D.	B.

[Reverse.]

Date.	Amount.	Name.	Post-office.	State.
Feb. 25	5	Walter J. Hovey	Fort Pierre	S. Dak.
Feb. 27	10	Luther Foster	Laramie	Wyo.
Feb. 28	10	James Withycombe	Corvallis	Oreg.
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....

It may interest some to note the form of our accession cards, which is shown herewith:

DATA.

Seeds of—
Agropyron tenerum.
(Slender wheat grass).

Collector's No. ———.
Distribution No. 21.

From Griffiths & Lange. Locality, Billings, Mont. Date, July 14, 1900. Altitude ———. Amount, pounds, 31½.

Habit of growth, ———.
Character of soil, ———.
Use ———.

By this system of records the Office of the Agrostologist has full data in regard to all seeds received or sent out, and it is possible to show at any time the variety or amount sent to any experiment station or to any individual in cooperation with the station. The totals of these amounts for the fiscal year 1900–1901 are shown in Tables II and III.

Table IV contains a list of those experiment stations with which the Department of Agriculture, through the Office of the Agrostologist, is carrying on cooperative experiments in grass and forage plant investigations. This is a list of the stations with which the Department is working during the current fiscal year, for, although the law cited specifically directing the stations to cooperate with the Secretary of Agriculture along these lines is no longer in force, it having been omitted from the bill making appropriations for the Department during the present year, it has been deemed best to continue the work, apparently so well begun under the bill of last year.

TABLE IV.—*List of experiment stations with which articles of cooperation have been signed.*

State.	Object of investigations.	Department allowance.
Arizona[1]	For improving the forage conditions and renovating the ranges.	Seeds and funds.
California	The planting and testing of sand-binders	Do.
Colorado	Grass and forage plants for alkali and arid soils	Do.
Kansas	The best method of pasture and range improvement	Do.
Maryland	To find the best crops for use in securing a continuous soiling.	Seeds only.
Michigan	To find the best grasses for fixing the drifting sands along the Great Lakes and to determine the possibility of converting these into lands productive of forage and other crops.	Do.
Missouri	To find the best method for the formation and management of meadows and pastures in the Middle Western States.	Do.
Nebraska	Growing and testing of native and cultivated grasses for the Great Plains region.	Do.
New Hampshire	Improvement and renovation of worn-out hay and pasture land.	Seeds and funds.
New Mexico	Forage crops to supplement ranges and the improvement of cultivated lands.	Seeds only.
Oregon	To find the best sand-binding grasses and to determine the possibility of rendering sandy lands productive of both grasses and forage plants.	Seeds and funds.
South Dakota	For testing drought-resisting forage plants with a view to finding varieties suitable for use in the range region.	Do.
Tennessee	Formation and management of pastures and meadows in Middle Southern States.	Seeds only.
Texas	Formation of meadows and pastures in the Middle Southern States.	Seeds and funds.
Washington	For improving forage conditions and renewing worn-out ranges.	Do.
Wyoming	Forage plants for arid and alkali lands	Seeds only.
Delaware	Cover crops for orchards	Do.
Utah	Forage plants for arid and alkali lands	Do.

[1] Not renewed for 1901–2.

Since this work of cooperation was first inaugurated the Bureau of Plant Industry, which includes the Office of the Agrostologist, has been established, and the new articles of cooperation now in force have been slightly modified from those of last year to meet the new terms of expression required by this new organization, and a similar modification has been made in the letter addressed to individual applicants for seeds, as will appear from the copy presented below, which is that of the form now used:

U. S. DEPARTMENT OF AGRICULTURE, BUREAU OF PLANT INDUSTRY,
GRASS AND FORAGE PLANT INVESTIGATIONS, OFFICE OF THE AGROSTOLOGIST,
Washington, D. C.,———, 190–.

DEAR SIR:

Your letter of ———, addressed to ———, requesting seeds, has been referred to this office. The Department of Agriculture is conducting experiments with grasses

and forage plants in your State in cooperation with your agricultural experiment station located at ———. In order to continue the plans already made we would ask you to kindly present your request through the director of your experiment station. We will be glad to honor, so far as possible, all such requests. Please state definitely to the director of the station the object of your request.

Respectfully,

F. LAMSON-SCRIBNER, *Agrostologist.*

CONCLUSION.

Thus far our plan of cooperation with the stations in grass and forage plant investigations and the manner of keeping our records, as above described, have been quite satisfactory, but it is not unlikely that some changes or improvements may be made as the work progresses. Doubtless the work can be rendered more effective and more certain of useful results if an official of the Department can be located at those stations where important cooperative work is being carried on. This officer may be a scientific aid—and we are already employing scientific aids in this way—or he may be someone more experienced. In any case, he should be given immediate charge of the work, to which he should give his whole time while at the station. During some months of the year, especially during the winter season, he could spend his time at the Department in order to familiarize himself with our methods and make up his reports. It is to be regretted that the important work of grass and forage plant investigations has not more funds available for conducting this cooperative work on a larger, more effective, and more striking scale.

I have only to add that I wish to give expression here to our most sincere regrets at the loss of Mr. Thomas A. Williams, in whose charge this cooperative work had been placed and who had so successfully carried out the ideas of the Department while engaged upon it. The present season Prof. A. S. Hitchcock has been placed in charge of this work and has visited many of the stations and made a special study of the conditions existing where cooperative work is being carried on.

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