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# the wild huckleberries of oregon and washington—A DWINDLING RESOURCE

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## ABSTRACT


An estimated 160,000 acres support huckleberries in Oregon and Washington, but this area is dwindling as trees and shrubs invade the berry fields. Effective vegetation-control methods and huckleberry management techniques have not been developed. However, such techniques are available for the closely related eastern blueberries, and it may be possible to modify these methods for northwestern conditions. Descriptions and an identification key of the 12 northwestern *Vaccinium* species are given, as well as a literature review.



Keywords: Huckleberries, *Vaccinium* sp., bilberry, blueberry, whortleberry, forest management, forest burning, soils, herbicides, pruning.


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## IMPORTANCE

Wild huckleberry fields occupy an estimated 160,000 acres in Oregon and Washington.[1] One of these fields (the 2,500-acre Twin Buttes field near Trout Lake, Washington) produced an estimated berry harvest of 280,000 gallons in 1969--112 gallons per acre. With these berries valued at $3 per gallon, the economic yield was over $300 per acre for that single year. In addition, recreational benefits also were enjoyed by the berrypickers, who spent 163,000 visitor days on the Twin Buttes huckleberry field during the 1969 season (see footnote 1).

The Twin Buttes huckleberry field probably is more productive than most of the 160,000 acres of wild huckleberry land in Oregon and Washington, and the 1969 season was unusually favorable, with excellent berrypicking and camping weather throughout August and September. Many other areas are not picked as heavily. However, several hundred tons of wild huckleberries are picked every year in the Puget Sound area, and an estimated $1 million worth of evergreen huckleberry brush is harvested annually in western Washington (Breakey 1960). Northwestern huckleberries are an extremely valuable resource.

Even half of the 1969 huckleberry yield at Twin Buttes would equal or exceed the value of timber produced annually on most high-site forest land, and the Twin Buttes huckleberries grow on a poor site. In fact, most huckleberry fields occupy sites that are only marginal for timber production. The most productive fields seem to occupy the poorest timber-growing lands.[2]

[1] Gerhart H. Nelson. Huckleberry management. 4 p. May 14, 1970. (Unpublished, on file at USDA Forest Service, Region 6, Portland, Oreg.)

[2] George A. Bright. Huckleberry release from reproduction. 3 p. September 24, 1937. (Unpublished, on file at Mount Adams Ranger District, Trout Lake, Wash.)

This publication is the first step in a research program aimed at developing management techniques that can be used to conserve and develop the huckleberry resource. It summarizes available information on native northwestern *Vaccinium* species and their management. Management techniques for eastern *Vaccinium* species also are summarized.

## NATIVE SPECIES

Northwestern huckleberries would be called "blueberries" in eastern North America, where the term "huckleberry" refers to plants in the genus *Gaylussacia*. Kelsey and Dayton (1942) list "blueberry," "bilberry," and "whortleberry" as common names for the northwestern *Vaccinium* species. Whatever one chooses to call them, 12 blueberrylike *Vaccinium* species grow in Oregon and Washington. Three of these (*V. occidentale*, *V. uliginosum*, and *V. Ovatum*) produce berries in clusters, like the eastern blueberries. The clustered-berry habit is significant, for cluster-fruited species can produce 10 to 20 times more than single-fruited species of similar size and vigor (Darrow 1960).

Unfortunately, *V. occidentale* (western huckleberry) and *V. uliginosum* (bog blueberry) are low shrubs that bear small clusters of two to three berries of poor quality. Western huckleberry (fig. 1) occurs in mountain swamps, mostly on the eastern slopes of the Cascade Mountains (Abrams 1951). Bog blueberry (fig. 2) also grows in swamps, but along the coast (Hitchcock et al. 1959). Neither are important berry producers.

*V. ovatum* (evergreen huckleberry, fig. 3) is a tall shrub with glossy evergreen leaves. It grows along the coast from British Columbia to California, producing large clusters of rather strong-flavored berries that are less desirable


Figure 1.--Western huckleberry *(Vaccinium occidentale).*


Figure 2.--Bog blueberry *(Vaccinium uliginosum).*

than other huckleberries for fresh use. The leafy branches are used by florists as fillers and background foliage.

Most northwestern huckleberries produce berries singly rather than in clusters. In three of the nine single-fruited species (*V. parvifolium*, *V. scoparium*, and *V. myrtillus*), these berries are red. *V. parvifolium* (red huckleberry, fig. 4) is common where moist shady habitats occur in lowlands and mountain valleys from central California to Alaska. Always found west of the Cascade Mountains in Oregon and Washington, it becomes a large erect shrub after spending 4 to 5 years as a trailing, vinelike juvenile plant (Camp 1942). The red berries are palatable, but rather sour and not commercially important.

*V. scoparium* (grouseberry, fig. 5) bears red berries that are sweeter than those of the red huckleberry. Birds and animals harvest most of the berry crop, however, for *V. scoparium* is a low-matted species that grows at high altitudes in the Cascade, Olympic, Siskiyou, Blue, and Wallowa Mountains. *V. myrtillus* (dwarf bilberry, fig. 6) resembles the grouseberry but is slightly larger (Camp 1942). It grows on the eastern slopes of the Cascade Mountains and bears a dark red to blue berry (Hitchcock et al. 1959).

The six remaining northwestern huckleberry species all bear blue or black berries singly, in the axils of the leaves. *V. deliciosum* (Rainier bilberry, fig. 7) is common at elevations above 4,500 feet in the alpine meadows of the Olympic and Cascade Mountains. It is a small plant with deep blue, sweet berries that have a glaucous bloom. Less common than the Rainier bilberry in Oregon and Washington, but similar in appearance, *V. caespitosum* (dwarf huckleberry, fig. 8) grows in wet meadows and on moist

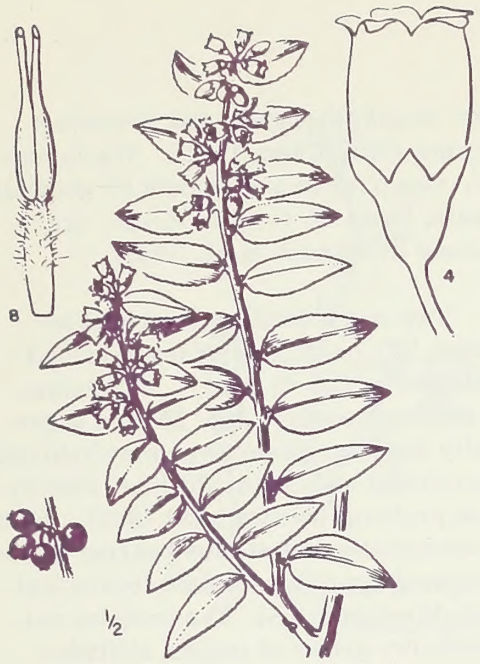


Figure 3.--Evergreen huckleberry
*(Vaccinium ovatum).*


Figure 4.--Red huckleberry
*(Vaccinium parvifolium).*

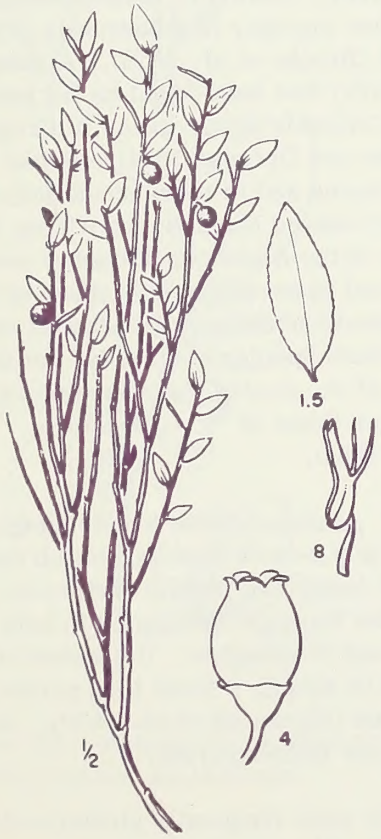


Figure 5.--Grouseberry
*(Vaccinium scoparium).*


Figure 6.--Dwarf bilberry
*(Vaccinium myrtillus).*


Figure 7.--Rainier bilberry
*(Vaccinium deliciosum).*


Figure 8.--Dwarf huckleberry
*(Vaccinium caespitosum).*

rocky ridges throughout the Northwest (Abrams 1951, Camp 1942). The leaves of *V. caespitosum* are smooth or glandular beneath; those of *V. deliciosum* are glaucous (Hitchcock et al. 1959).

Two more dark-berried huckleberries, *V. ovalifolium* (oval-leaved huckleberry, fig. 9) and *V. alaskaense* (Alaska huckleberry, fig. 10) are superficially similar. They even may hybridize, complicating an already difficult identification problem (Szczawinski 1962). Both are moderately tall shrubs bearing entire or inconspicuously serrulate leaves and bluish-black berries. The oval-leaved huckleberry grows at middle altitudes throughout the Northwest (Abrams 1951), while Alaska huckleberry usually grows in somewhat moist habitats (Camp 1942) along the coast and in the Cascades from northwestern Oregon to Alaska (Hitchcock et al. 1959). However, these species often grow together in moderately dry habitats (Brooke et al. 1970). Alaska huckleberry has been found as far south as the McKenzie River valley in Oregon (Franklin and Dyrness 1971). It has larger leaves and is more shade tolerant than oval-leaved huckleberry (Camp 1942). Berries of the Alaska huckleberry are juicier and more acidic than those of the oval-leaved huckleberry (Hitchcock et al. 1959). Both species are seedy, but the berries of *V. ovalifolium* have more seeds than those of *V. alaskaense* (Palser 1961).

*V. globulare* (blue huckleberry, fig. 11) is a 2- to 4-foot-tall shrub that grows at lower and middle elevations east of the Cascade Mountains in both Oregon and Washington. Its leaves are globular in shape, without long points at the apexes (Hitchcock et al. 1959). Its berries are bluish-purple.

The most frequently picked northwestern huckleberry, *V. membranaceum*


Figure 9.--Oval-leaved huckleberry
*(Vaccinium ovalifolium).*

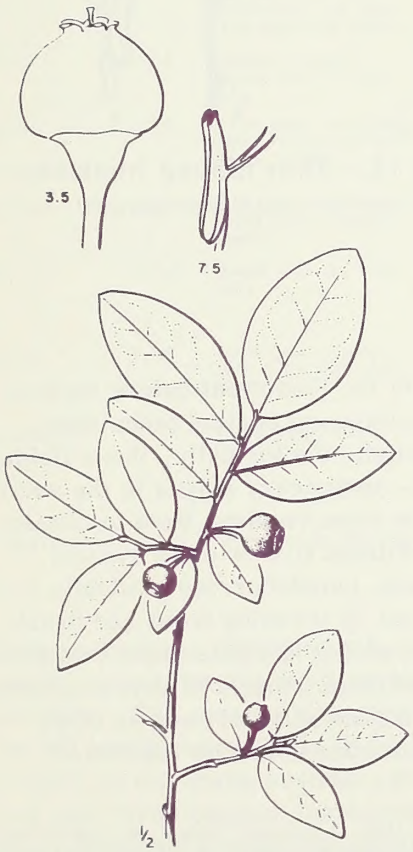


Figure 10.--Alaska huckleberry
*(Vaccinium alaskaense).*


Figure 11.--Blue huckleberry
*(Vaccinium globulare).*

(thin-leaved huckleberry, fig. 12), resembles blue huckleberry but is a coarser shrub with larger leaves that have long-pointed apexes (Camp 1942, Hitchcock et al. 1959). Thin-leaved huckleberry grows at moderate to high elevations on both eastern and western slopes of the Olympic and Cascade Mountains. It is also found in the Wallowa and Blue Mountains of eastern Oregon and eastern Washington (Hayes and Garrison 1960). Its purplish-black fruits are subacid, aromatic, and deliciously flavored (Abrams 1951). They are borne singly and are larger than most other wild huckleberries in the area (Darrow et al. 1944).

The habitat requirements of thin-leaved huckleberry are less critical than those of many other western huckleberries (Camp 1942). It grows as an understory shrub under unbroken forest canopies but is more abundant and vigorous under partial canopies and in the open (Neiland 1958). *V. membranaceum* grows well in dry areas (Darrow 1960). It is abundant in burned-over areas and produces large fruit crops which are harvested extensively. Thin-leaved huckleberry also is utilized as forage (Darrow et al. 1944). The carotene and energy contents of its leaves are higher than those of many browse plants (Hamilton and Gilbert 1966), but their browse quality is rated fair to poor for sheep and goats, poor for cattle, and useless for horses (Sampson and Jespersen 1963).

Characteristics of the 12 native northwestern *Vaccinium* species are summarized in table 1. A field key (Appendix) should facilitate species identification.

## MANAGEMENT PROBLEMS

Most huckleberry fields originated from the uncontrolled wildfires that were common in the Northwest before modern fire protection and control techniques were applied. Ecologically, these fields are seral--temporary stages in the natural succession from treeless burn to climax forest. Without fire or other radical disturbance, huckleberries gradually are crowded out by invading trees and brush. A few years after establishment they produce a maximum amount of berries; then production gradually declines as other shrubs and trees dominate the site.[3/]


Figure 12.--Thin-leaved huckleberry *(Vaccinium membranaceum).*

[3] F. C. Hall. Literature review of huckleberry *(Vaccinium membranaceum)* in the Cascade Range of Oregon. 5 p. 1964. (Unpublished, on file at USDA Forest Service, Region 6, Portland, Oreg.)

Table 1.--Characteristics of the native northwestern *Vaccinium* species [1/]

| Species | Height | Twig description | Leaf length | Leaf description | Flower description | Berry description |
|---|---|---|---|---|---|---|
| | ---*Feet*--- | | ---*Inches*--- | | | |
| *V. membranaceum* | 2-6 | Yellow-green; slightly angled; smooth | 1-2.5 | Egg-shaped with tapering or long-pointed tip; very small teeth along the margins | Longer than broad; pale yellowish-pink; single | Purplish-black; without bloom; spherical |
| *V. globulare* | 1.5-4 | Greenish-yellow; slightly angled; smooth | .75-1.75 | Oval or egg-shaped, with rounded or abruptly pointed tip; very small teeth along the margins | As broad as long; rounded at the sides and more or less flattened from above; pale pinkish-yellow; single | Dark purple; without bloom; spherical |
| *V. ovalifolium* | 3-10 | Yellow-green; conspicuously angled; smooth | .75-2 | Oval or oblong; smooth or very slightly toothed margins; waxy bloom on lower surface; veins prominent | Somewhat longer than broad; broadest just below mid-length; style same length or shorter than petal tube; pink; single | Bluish-black; with bloom; spherical; borne on a curved stem that is not enlarged below the berry |
| *V. alaskaense* | 1.5-4 | Yellow-green; somewhat angled; smooth or with very short hairs | 1-2.5 | Egg-shaped to elliptical; smooth or very slightly toothed margins; waxy bloom on lower surface; sparse, gland-tipped hairs on midnerve | As broad or broader than long; broadest just above base; style slightly longer than petal tube; bronzy-pink; single | Bluish-black with bloom or purplish-black without bloom; spherical to pear-shaped; borne on a straight stem that is somewhat enlarged just below the berry |
| *V. deliciosum* | .3-1.5 | Greenish-brown; inconspicuously angled; smooth; dense | .5-2 | Longer than broad; wider near the tip than at the base; small teeth along the upper margins; waxy bloom on lower surface | Nearly spherical; pink; single | Blue-black; with bloom; spherical |
| *V. caespitosum* | .5-1 | Yellow-green to red; somewhat angled; usually hoary with tiny white curved hairs, but sometimes smooth and shiny | .4-1.25 | Longer than broad; wider near the tip than at the base; small teeth along the upper margins; each tooth tipped with a bristlelike hair | Twice as long as broad; white to pink; single | Light blue to blue-black; with bloom; spherical |
| *V. myrtillus* | .5-1 | Greenish; strongly angled; with very short hairs | .4-1.25 | Egg-shaped or oval; sharply-toothed margins; strongly veiny on the lower surface | Length and breadth approximately equal; pink; single | Dark red to blue-black: without bloom; spherical |
| *V. scoparium* | .3-1.3 | Bright green or yellow-green; strongly angled; smooth; broomy | .25-.5 | Narrowly oval or lance-shaped; small teeth along the margins; strongly veiny on the lower surface | Length and breadth approximately equal; pink; single | Bright red; spherical |
| *V. parvifolium* | 3-12 | Green; very prominently angled (almost square); smooth | .25-1.25 | Oval to elliptical; smooth margins; thin | As broad or broader than long; waxy; yellowish-pink; single | Bright red; spherical |
| *V. ovatum* | 1.5-10 | Covered with very short hairs | .75-2 | Very numerous and leathery; narrowly egg-shaped, with pointed tips; sharply-toothed margins; shiny above | Longer than broad; pink; borne in clusters of 3-10 | Shiny black; usually without bloom; spherical |
| *V. [illegible]* | .7-1.8 | Yellow-green; round; covered with very short hairs | .6-1.25 | Wider near the rounded tip than at the base; smooth margins; thick; lower surface veiny | Longer than broad; pink; single or in clusters of 2-4 | Blue to black; with bloom; spherical |
| *V. [illegible]* | .7-2 | Yellow-green; round; smooth; rigid | .4-1 | Longer than broad; wider near the tip than at the base; smooth margins; waxy bloom often present on lower surface | Longer than broad; pink or white; single or in clusters of 2-4 | Blue to black; with bloom; spherical |

[1/] Compiled from the descriptions of Abrams 1951, Hayes and Garrison 1960, Hitchcock et al. 1959, Peck 1961, and Szczawinski 1962.

Lodgepole pine, mountain ash, and beargrass seem to be the most serious competitors. The acreage occupied by thin-leaved huckleberry fields is declining rapidly as old burns become reforested and new burns become increasingly rare. Many formerly productive huckleberry areas now produce no berries at all.

Others are shrinking as trees and brush invade along their edges. The heavily used Twin Buttes field is an example. This field once encompassed over 8,000 acres of old burn.[4/] Before the days of

[4] Roger S. Stamy. Action plan for controlling public use in the Sawtooth huckleberry fields. 7 p. March 10, 1970. (Unpublished, on file at Mount Adams Ranger District, Trout Lake, Wash.)

fire protection, it was perpetuated by periodic fires set by the Indians.[5] However, fires have been kept out of the area for over 40 years, and the original area has dwindled to 2,500 acres as huckleberries have been replaced by brush and trees. Local foresters estimate that the Twin Buttes field is disappearing at the rate of 100 acres per year. In 25 years it could be gone. Huckleberry fields throughout the Northwest are similarly deteriorating. Some will disappear in less than 25 years if competing vegetation is not controlled.

New, transitory huckleberry fields sometimes develop where clearcutting produces favorable habitats, but berry occurrence and production are erratic. Some clearcuts produce good huckleberry crops, others do not. Moisture conditions in the cutover area and species composition of the *Vaccinium* stand may be partially responsible, but the factors influencing huckleberry occurrence and productivity on recent clearcuts are largely unknown.

Huckleberries frequently grow in the partial shade of moderately open forest stands. These bushes often are large and vigorous, but they seldom produce many berries. However, seasons occasionally occur in which shaded bushes produce a good crop. The conditions causing repeated failures and those responsible for occasional successes have not been measured or compared.

As our population increases, more people pick huckleberries every year. As the berry fields deteriorate, there are fewer berries to pick. In the most popular fields, fragile soils erode as vehicles are driven off the roads, sanitation facilities become inadequate, and littering becomes a major problem. Some pickers become lost looking for more productive areas. Searching for these lost pickers cost $3,500 on one Ranger District during a recent 3-year period.[6] Simply providing information to the thousands of huckleberry pickers that descend upon National Forest, State, and private forestry offices is a major task.

Access roads can be constructed and vehicle use regulated. Sanitation facilities can be provided, trails built, and the public educated. However, these activities will soon become futile if the huckleberry resource itself is not preserved. Natural succession should be stopped or reversed where huckleberry production is the most important land use. Where increasing numbers of berry pickers exert more and more pressure on heavily used fields, it may be desirable to increase berry production through cultural practices (fertilization, pruning, or mulching, for example).

## MANAGEMENT TECHNIQUES

Access roads, sanitary facilities, campsites, and information have been provided at several heavily used huckleberry fields. Assistance given to the huckleberry pickers is often well organized, efficient, and beneficial. However, the huckleberry fields themselves have not received equivalent attention in Oregon and Washington. Little has been done since the Indians stopped burning the fields many years ago. Lack of knowledge and limited financing are chiefly responsible. No one really knows how to manage northwestern wild huckleberries.

[5] Donald E. Wermlinger. Twin Buttes huckleberry management plan. 25 p. January 5, 1968. (Unpublished, on file at Mount Adams Ranger District, Trout Lake, Wash.)

[6] Wright T. Mallory. Huckleberry management. 1 p. March 11, 1970. (Unpublished, on file at USDA Forest Service, Region 6, Portland, Oreg.)

Although management techniques are not yet available for northwestern huckleberries, the wild blueberries of eastern North America have been managed for decades. *Vaccinium* species and climatic conditions are quite different in the east, but some of the techniques developed there may be applicable in Oregon and Washington.

## Eastern Lowbush Blueberries

*V. Angustifolium*, the native lowbush blueberry of northeastern America, produces most of the commercial crop in eastern Canada (Barker et al. 1963). It is a rhizomatous plant with a subterranean horizontal stem that forms a dense network in the soil (Hildreth 1929). The berries are harvested from native fields, where cultural practices are usually limited to periodic burning and weed control (Barker et al. 1964).

Lowbush blueberry fields are burned every 2 or 3 years--usually by spreading straw or hay (1 ton per acre) in the fall, then burning it in early spring. If blower-type oil burners or liquid propane gas burners are used, spreading straw is unnecessary and burning can be done in the fall (Barker et al. 1964). Regardless of the technique used, old stems are destroyed by burning. The new growth comes from buds on the underground rhizomes.

Burning is the best method of pruning. Chandler and Mason (1943) recommended burning every third year; in a 2-year cycle, yields decreased and costs increased. Black (1963) found that total berry production was greater when burning was done every second year. However, repetitive burning could be detrimental to long-term production, for each burn destroys some of the upper soil. This destruction of upper soil horizons is particularly serious where flamethrower burning is practiced (Smith and Hilton 1971).

Periodic burning kills the old lowbush blueberry stems and stimulates sprouting (Belzile 1943). Disking also stimulates sprouting, but it is too destructive to be practical. Cutting the rhizomes with a turf hoe produces the same effect without destroying the living plants. The cut rhizomes produce new stem growth on one side of the cut, new root growth on the other side (Hitz 1949). Cutting the bushes off close to the ground instead of burning removes the old stems, but new growth then comes from buds on the part of the plant above ground (Chandler and Mason 1939).

Although periodic burning increases production in established lowbush blueberry fields, it may not be beneficial in creating new fields. When a New Brunswick woodlot bordering on an established blueberry field was cleared of trees and burned annually, the burned area was occupied by ferns, rushes, and other competing vegetation--but not by blueberries (Hall 1955). This increase in competing vegetation may have resulted from alterations in soil nutrient and pH relationships. Burning usually reduces total nitrogen in the soil, but it raises the pH and increases the supply of available nutrients near the surface (Austin and Baisinger 1955, Debell and Ralston 1970, Isaac and Hopkins 1937).

Burning also affects the microbiological populations of forest soils (Wright and Tarrant 1957). This may affect plant growth indirectly; soil fungi stimulate root formation and enhance the growth of *Vaccinium* seedlings (Nieuwdorp 1969). These fungi may always be associated with *Vaccinium* plants (Rayner 1929), but they do not seem to be species-specific (Freisleben 1934).

Burning in established blueberry fields sometimes reduces vegetative competition; this is true for several eastern

*Vaccinium* species which are more tolerant of fire than their natural associates (Reiners 1965, Brayton and Woodwell 1966). Little is known about the fire tolerance of northwestern *Vaccinium* species, but *V. deliciosum* seems to be more tolerant than alpine fir, mountain hemlock, heath, and cassiope (Douglas and Ballard 1971). If this holds for other northwestern *Vaccinium* species, controlled burning may be very useful in eliminating the brush and trees encroaching upon huckleberry fields in Oregon and Washington. Otherwise, mechanical or chemical weeding may be necessary.

When chemical weed controls were tested in native eastern blueberry fields, dilute solutions of the ammonium salt of 2,4-D killed some of the competing vegetation without injuring blueberry plants. More concentrated 2,4-D solutions killed the blueberries, as did ammonium sulfamate. Borax, applied at the rate of 1 or 2 pounds per hundred square feet, killed or injured several weedy species without injuring the berry bushes (Smith et al. 1947).

Climate and soils strongly influence productivity in the blueberry fields of northeastern America. Low temperatures throughout the growing season severely limit blueberry production in some areas (Hall, Aalders, and Barker 1964). Soil acidity is important throughout the region, with eastern blueberries growing best in the pH range of 4 to 5 (Hall, Aalders, and Townsend 1964). Growth is also correlated with the amounts of extractable iron, magnesium, and aluminum in the soil; acetate-extracted iron is an excellent indicator for potential blueberry soils (Bradley and Smittle 1965).

Where native eastern blueberry fields occur on poor soils, fertilizers are sometimes applied. The blueberries respond to these fertilizers, but competing weeds often respond with even greater vigor (Barker et al. 1964). Nitrogen usually is the most critical nutrient element in podzol soils (Trevett 1962). It should be applied in the ammonium form (Townsend 1966). Additions of ammonium nitrate can increase yields by 50 percent. Phosphorus and potassium, used together in the absence of nitrogen, also increase yields. However, complete nitrogen-phosphorus-potassium fertilizers seem to stimulate weed growth without affecting berry production (Rayment 1965). Optimum levels have been established for nitrogen, phosphorus, potassium, calcium, and magnesium in lowbush blueberry leaves (Townsend and Hall 1970). These optimum levels may be useful in estimating fertility levels and in prescribing fertilizer treatments.

Where lowbush blueberry fields are intensively managed, a surface mulch of peat or sawdust may be used to conserve soil moisture and promote rhizome growth (Kender and Eggert 1966). However, most of the mulching is done in cultivated fields, where highbush blueberry (*V. corymbosum*) and its horticultural varieties are usually grown. Highbush varieties are better suited to commercial production than the lowbush blueberry, which has rather small, soft berries and is inconveniently close to the ground (Johnston 1951).

## Eastern Highbush Blueberries

Mulching cultivated fields of highbush blueberries is almost always beneficial, but effects vary with soil type and mulch material. Mulching increased blueberry growth on clay loam soils but decreased growth on sandy soils in Maine (Chandler and Mason 1942). Sawdust seems to be a better mulch than peat moss, hay, or straw (Griggs and Rollins 1947,

Shutak et al. 1949). Sawdust mulch also is better than frequent cultivation or a soil-covering crop (Shutak and Christopher 1951). It does not significantly affect moisture content or acidity of the berries (Griggs and Rollins 1948).

Soil acidity seems to be more important than soil texture for cultivating blueberries (Johnston 1942a). Soil nutrients also are important, but the cultivated highbush blueberry requires less phosphorus, potassium, calcium, and magnesium than other fruits (Bailey et al. 1949). Nitrogen is the limiting nutrient in the growth of most cultivated blueberry plants (Kramer and Schrader 1942). When nitrogen in the form of ammonium sulfate was applied to cultivated highbush blueberries in the mid-Willamette Valley, yields of up to 10 tons per acre were achieved (Martin and Garren 1970).

Fertilizers are best applied in the spring, when the plants are blooming (Doehlert 1941). Season of application is less important for herbicide application. Both spring and autumn applications of chemical weed controls have been successful. Diuron and Simazine,[7] sprayed between the rows in cultivated fields, controlled weeds without affecting berry production or quality (Welder and Brogdon 1968).

Unlike the lowbush blueberry fields, cultivated highbush blueberry fields are not burned over. Instead, old dead wood is removed by light pruning. Pruned bushes produce fewer and larger berries (Brightwell and Johnston 1944), although removal of more than a quarter of the bush is too severe (Bailey et al. 1939). No pruning data are available for the northwestern huckleberries, but excessive pruning may do more harm than good. Severe clipping suppresses the flowering of antelope bitterbrush, snowbrush ceanothus, and creambush rockspiraea (Garrison 1953b); huckleberry flowering also may be suppressed.

When side shoots are removed from highbush blueberries and rooted in a mixture of sand and peat, many new bushes can be obtained from a single parent (Johnston 1935). When these side shoots are of current-year origin, they are sometimes referred to as "softwood cuttings" (Doran and Bailey 1943). However, most highbush blueberry propagation involves the rooting of older "hardwood cuttings." Four-inch cuttings are taken from 1-year-old shoots, with the cuts made just above and just below buds. Cuttings from the basal ends of shoots that bear only vegetative buds survive and grow better than more distal cuttings or those from flowering shoots (O'Rourke 1942, 1944). Treating the cut ends with indolebutyric acid in talc greatly increases rooting success (O'Rourke 1943), and adding ammonium phosphate to the peat-sand rooting medium benefits subsequent shoot growth (Schwartze and Myhre 1948, 1949).

The productivity and yield of highbush blueberries seem to follow fairly closely the amount of growth and size of the plants (Merrill 1944). Nevertheless, accurate estimation and measurement of berry yields and quality are difficult--for both lowbush and highbush blueberries and for both eastern and northwestern species. It is possible that quality is closely related to berry size. The largest berries usually are sweeter and seedier than smaller ones in the Jersey

[7] This publication does not contain recommendations for use of these pesticides nor does it imply that the uses discussed here have been registered. All uses of pesticides must be registered by appropriate State and/or Federal agencies before they can be recommended.

variety of highbush blueberry; berries picked late in the season tend to be sweeter than those picked earlier (Uhe 1957). Diameter-volume relationships have been calculated, and average numbers of berries per cup can be estimated at harvest time by measuring only the largest berries (Chandler 1941).

Berry size is inherited in highbush blueberries, with smallness a dominant genetic character (Draper and Scott 1969). Sweetness, firmness, and ripening speed are also genetically determined in cultivated highbush blueberries (Johnston 1942b). Fifty years of careful breeding have produced several superior horticultural varieties. Horticultural development of native northwestern huckleberries is unlikely, but the identification and propagation of superior wild clones may be profitable in managed fields.

## Western Huckleberries

Managed fields of wild huckleberries do not yet exist in Oregon and Washington, and management knowledge is limited. However, the importance of competing vegetation has been recognized for at least 35 years. Several control techniques have been tested. All trees were cut on 5 acres of the Twin Buttes huckleberry field in 1937 (see footnote 2). Ten years later, a ranger on the Mount Hood National Forest purposely thinned some of the trees invading the Larch Mountain huckleberry field (Parke 1968). In 1963 trees were felled on 72 acres of the Twin Buttes field. Slash was piled and burned on part of this area, but no broadcast burning was attempted. Six acres of this treated area were scarified in 1964 with a range-land disk behind a crawler tractor. Trees were felled on another 120 acres of the Twin Buttes field in 1965 and 1966 (see footnote 5). None of these operations successfully eliminated vegetative competition or halted ecological succession.

An animal exclosure was constructed in the Twin Buttes huckleberry field in 1934, and vegetation within the exclosure and on an adjacent unfenced plot was observed yearly until 1942. Sheep grazing apparently benefited the huckleberries. The sheep reduced vegetative competition and lightly browsed the huckleberry bushes on the unfenced plot. This produced thriftier, more vigorous huckleberry growth.[8/] Competing vegetation inside the exclosure soon began to crowd out the huckleberries. A severe late frost in the spring of 1940 killed huckleberry leaves, new shoots, and flowers on both plots; however, bushes protected by groves of alpine trees suffered little damage. Shade from the trees delayed snowmelt, and the snow retarded early-season growth until after the killing frost. Apparently, huckleberry crops are greatly influenced by snowpack duration. Shade may therefore benefit berry production--in some seasons. Seasonal fluctuations in the growth of *Vaccinium membranaceum* are extreme (Garrison 1953a).

Future huckleberry management in the Northwest would benefit from a complete inventory of the huckleberry resource. Procedures for such an inventory were devised by Frederick C. Hall in 1967 and tested on the Mount Adams District of the Gifford Pinchot National Forest in 1968. An excellent inventory, map, and management plan for the Twin Buttes huckleberry field resulted (see footnote 5).

The inventory can be extended to other huckleberry fields in the Northwest. Appropriate modifications of the management techniques used in eastern North America can be tested in the West and necessary new techniques devised. When

[8/] K. C. Langfield. Effect of grazing on huckleberry production. 2 p. December 9, 1942. (Unpublished, on file at Mount Adams Ranger District, Trout Lake, Wash.)

efficient techniques become available, the existing huckleberry fields can be preserved and new ones established. Finally, productivity can be increased in heavily used fields to satisfy increasing numbers of berrypickers. All this will require considerable amounts of time and money. We should begin at once. Our wild huckleberry fields are dwindling in size and productivity with every passing year.

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# APPENDIX

## FIELD KEY TO NATIVE NORTHWESTERN *VACCINIUM* SPECIES

1. Leaves widest above midlength . . . . . 2
1. Leaves widest at midlength or below . . . . . 5

2. Leaf margins toothless; flowers and berries sometimes clustered . . . . . 3
2. Small teeth along upper-leaf margins; flowers and berries always single. . . . 4

3. Twigs have very short hairs; leaves conspicuously veiny below . . *V. uliginosum*
3. Twigs hairless; leaves not conspicuously veiny below . . . . . *V. occidentale*

4. Lower leaf surfaces have waxy bloom; marginal teeth not bristle-tipped; flowers nearly spherical . . . . . *V. deliciosum*
4. Lower leaf surfaces without waxy bloom; marginal teeth tipped with bristlelike hairs; flowers twice as long as broad. . . . . *V. caespitosum*

5. Leaf margins toothed both above and below middle of leaf . . . . . 6
5. Leaf margins toothed only above middle of leaf, only below middle, or not at all . . . . . 10

6. Shrubs less than 18 inches tall . . . . . 7
6. Shrubs more than 18 inches tall . . . . . 8

7. Broomy; twigs hairless; berry bright red . . . . . *V. scoparium*
7. Not broomy; twigs have very short hairs; berry dark red to blue-black . . . . . *V. myrtillus*

8. Leaves leathery, dark green, and lustrous above; twigs covered with very short hairs; flowers and berries borne in clusters of 3-10 . . . . . *V. ovatum*
8. Leaves not leathery or lustrous; twigs hairless; flowers and berries single . . . . . 9

9. Leaf tips tapering and long-pointed; flower longer than broad. . . . . *V. membranaceum*
9. Leaf tips rounded or abruptly pointed; flower as broad as long . . . . . *V. globulare*

10. Twigs bright green, very prominently angled and nearly square; berries bright red . . . . . *V. parvifolium*
10. Twigs yellow-green, somewhat angled but not square; berries bluish-black. . . . . 11

11. Leaf veins prominent; lower midrib without gland-tipped hairs; style same length as or shorter than petal tube; berry stem curved, not enlarged just below berry . . . . . *V. ovalifolium*
11. Leaf veins not prominent; lower midrib with sparse gland-tipped hairs; style slightly longer than petal tube; berry stem straight, enlarged just below berry . . . . . *V. alaskaense*

Minore, Don

1972. The wild huckleberries of Oregon and Washington--a dwindling resource. USDA Forest Serv. Res. Pap. PNW-143, 20 p., illus. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

The 12 northwestern *Vaccinium* species are described. Management problems are outlined, and pertinent literature is reviewed. Efficient management techniques are unknown, but some of the methods used in managing eastern blueberries may be applicable.

*Keywords:* Huckleberries, *Vaccinium* sp., bilberry, blueberry, whortleberry, forest management, forest burning, soils, herbicides, pruning.

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