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Floral Greenery

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Prepared by Bernard S. Douglass, U.S. Forest Service, Division of State and Private Forestry, Portland, Oregon

Consultation and review by the following cooperators is gratefully acknowledged by the author:

Charles A. King, Production Manager, Kirk Company, Puyallup, Washington

Joseph Buhaly, Extension Forestry Specialist, Washington State University, Cooperative Extension Service, Puyallup, Washington

John Callison, Callisons, Incorporated, Seattle, Washington

Al Ericksen, Manager, Sherwood Forest Farms, Incorporated, Chehalis, Washington

Morris L. Kirk, Vice President, Kirk Company, Puyallup, Washington

Cecil Paul, Forest Manager and Greenery Picker, Lake Bay, Washington

Terry O'Toole, President, West Coast Evergreen Company, Seattle, Washington

Edwin Voss, Forest Manager, Greenery Picker, and Processing Plant Manager, Lake Bay, Washington

Darrell Turner, Extension Soil Scientist, Washington State University, Cooperative Extension Service, Puyallup, Washington

Ralph Voris, Outdoor Education Specialist, Oregon State Forestry Department, Salem, Oregon

Cover photos—Floral designer makes effective use of salal in this flower arrangement (left). Picking salal along the northern Oregon Coast (right).

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INTRODUCTION

Mild, moist climatic conditions in the western portions of northern California, Oregon, Washington, and British Columbia provide ideal growing conditions for extensive forests with a lush understory of smaller plants. Certain native species of coniferous trees, evergreen shrubs, and ferns produce foliage that is both attractive and durable. Sprays of greenery harvested from these plants are prized by the floral trade throughout the Nation.

Luxuriant forest growth along the Northwest Coast of North America is the product of the temperate marine climate of this region. Only a few other places on our planet—portions of Western Europe, southwestern South America, and New Zealand—enjoy a similar climate. It is caused by prevailing ocean winds and storms that carry cool, moisture-laden air landward where abundant condensation occurs as fog, rain, and snow.

The buying, processing, selling, and shipping of native floral greenery is big business for several companies in the Pacific Northwest. Gathering boughs or sprays of floral greenery to sell to these companies provides full-time work and is the principal income for many

rural families. Thousands of others, such as loggers, fishermen, farmers, housewives, and people from many other walks of life, pick floral greenery as a part-time occupation.

Some greenery pickers harvest entirely from their own land, but most of them lease picking rights from other landowners. From the forest landowner's standpoint, leasing picking rights for greenery is good business. The extra income that he derives from this source need not harm the forest, and it may help defray the costs of developing his timber trees to maturity. Responsible pickers practice sound conservation techniques that may actually build up the yield of greenery over the period of their contracts. They may also provide such incidental benefits to the landowner as controlling unauthorized trespass, suppressing or reporting fires, and keeping roads and trails open.

One purpose of this bulletin is to describe the various types of floral greenery and how they are harvested and sold to a processor. An equally important purpose is to describe cultural practices and conservative harvesting techniques that will increase growth, yield, and quality of commercial floral greenery products.

SUPPLY AND DEMAND TRENDS

Forest plant species suitable for floral greenery and, at the same time, available in commercial quantities are quite limited in number. Relatively few species combine the beauty and durability demanded by floral designers. It does not appear likely that some heretofore undiscovered native species will make a sudden and spectacular impact on the floral greenery market.

The supply base for gathering most Pacific Northwest species of floral greenery products is gradually diminishing. Many forest lands that formerly produced commercial floral greenery have been temporarily removed from production by timber harvesting. Soaring taxes and demand for suburban subdivisions has accelerated converting forest lands to other uses.

A significant influence on demand is competition from greenery species grown in other parts of the United States, as well as in Canada, Mexico, and Central and South America. This will be discussed later in greater detail under headings of individual species. Competition from artificial greenery produced in Asia from plastics is another growing concern. Some of these artificial products are very sophisticated and realistic in appearance. They have some obvious advantages from the standpoints of durability and reuse.

On the one hand, air transportation and refrigerated trucks have helped rapid distribution and contributed to fresh condition of Northwest greenery upon delivery to its destination, but these modes of improved transportation have also increased the supply base of competing types of greenery produced in other regions.

John Callison, Callisons, Inc., made the following observations: "Floral designers are artistic, imaginative people who are constantly looking for new ideas. History has proven that while one species of greenery may dominate the market for several years (as huckleberry did until recent years and sword fern before huckleberry), it will ultimately decline as designers feel the need for a change.

Thus, a long-range demand cycle is evident. Today's most popular foliage, salal, will probably in time be replaced as the favorite by another species presently in less demand. Since there are relatively few foliage species in the world adaptable to all types of floral designing, it is logical to assume that a foliage species such as huckleberry, which once dominated the market, will again have its day."

A current trend in floral designing is toward shorter bouquets requiring shorter background material. This trend is creating increased demand for short bunches of salal and huckleberry, sometimes called "Little Johns." With proper promotion, Oregon grape, a short-stemmed type of foliage with little present commercial demand, could benefit from this trend.

An estimated 80 percent of coniferous boughs are used during the Christmas holiday season. Christmas uses for boughs include outdoor commercial displays, street decorations, wreaths, door swags, mantel decorations, and other Christmas display items. The remaining 20 percent are used year-long by florists and decorators for such items as sprays, floral arrangements, and banquet and convention decorations.

Processors have a special storage problem during a 6-to-8-week period beginning about May when the new growth is in the succulent stage and unsuitable for picking. Processors find it necessary to build up sufficient inventory of greenery in cold storage to carry them through this unproductive period. The stock may have to be held as long as 3 months until utilized in proper rotation. The problem is to keep stock in fresh condition for this period. Huckleberry sometimes sheds its leaves and fern sometimes spots out. Florists pay the highest prices for greenery during this storage period. At the same time, the chance of getting durable foliage is minimal.

The "big three" floral greenery species of the Pacific Northwest, other than coniferous boughs, are salal, evergreen huckleberry, and sword fern. Value of harvested salal and huckleberry products in 1972 was about equal.

Sword fern was about one-third the value of salal or huckleberry. Funeral sprays and floral arrangements utilize large amounts of floral greenery. An estimated 75 percent of sword fern production and 50 percent of salal and evergreen huckleberry production is used for this purpose. The remaining uses include a large variety of vase arrangements. The supply and demand outlook for the individual species will be described in greater detail under separate headings.

1. Coniferous Boughs

The custom of using decorative coniferous boughs has been associated with the Christmas holiday season and the display of Christmas trees for centuries. The use of decorative boughs probably dates back to 15th century Germany where the Christmas tree custom is believed to have originated. The custom gradually spread to other areas of Europe, and eventually to the New World in the late 1700's via Hessian soldiers and Pennsylvania settlers from Germany.¹ By 1850 the Christmas tree tradition had become firmly entrenched in the United States, and the simultaneous use of decorative Christmas boughs was a natural outgrowth.

Cutting of commercial Christmas tree boughs in the Pacific Northwest began around the turn of the century. Popularity of wreaths, door swags, and street decorations have gradually increased each year to the present time. The future outlook for boughs appears favorable. Along with the growing demand is a gradually improving supply situation. High elevation stands of young noble fir, for example, were relatively scarce and inaccessible until recent years. With the advent of road building and logging in mountainous areas during the past 20 years, old-growth stands of high elevation true firs have been converted to vigorous young stands with high bough-productivity potential. Vigorous young stands, rather than older trees, furnish the highest quality and most easily gathered boughs.

Suitable trimmings from Christmas tree plantations offer an additional potential supply

¹ Arthur M. Sowder, USDA, Extension Service and Forest Service, Agriculture Information Bulletin No. 94, "Christmas Trees, the Tradition and the Trade," Rev. July 1967.

of the shorter, lower quality boughs known as wreath materials. The number of acres planted to Christmas trees in the Pacific Northwest is increasing each year.

Western boughs are in strong competition with boughs from other areas. Western true fir boughs, for example, compete directly with balsam fir and Fraser fir boughs from the eastern United States. Also, cedar boughs from northeastern Canada and eastern United States compete with western cedars. Eastern boughs, besides being attractive, permit freight savings to eastern buyers.

2. Evergreen Huckleberry

Evergreen huckleberry was first cut and sold commercially for greenery in the early 1920's. Its small, attractive leaves and graceful, flattened sprays lend themselves well to many types of floral designs. Demand increased steadily until about 1960. Since that date, demand by floral designers has leveled off, and even declined somewhat in recent years. Cedar boughs from eastern Canada have replaced huckleberry to some extent, particularly in lower price floral sale areas. A constant trend toward higher production costs has raised the price of huckleberry to the point where cheaper competitive foliage have moved into the market.

3. Salal

Salal was introduced to the floral greenery trade in the mid-1940's. Its large leaves were in sharp contrast with the small leaves of evergreen huckleberry, and floral designers discovered that it filled a real need for a different type of component for their arrangements. Demand for salal has gradually increased, and the outlook for future demand looks favorable. Most of the increased production in recent years has originated in western British Columbia. This trend is favored by a large volume of salal plants, relatively plentiful labor supply, and decreased incidence of the brownspot disease in that region. An estimated one-third of the total harvest of salal was from British Columbia in 1972.

4. Sword Fern

Commercial gathering of sword fern fronds for floral greenery dates back to the turn of the century when the Sam Roake Company of

Castle Rock, Washington, shipped the first samples to a wholesaler in the East. Sword fern is relatively durable, as compared with the native eastern ferns, and lend themselves well to handling and shipment. Funeral sprays and other massive-type displays are particularly suited to the characteristics of this plant.

The peak production year for sword fern was 1947. Since that date production has gradually declined, and in 1972 amounted to less than one-third the 1947 volume. The principal reason for this decline is production of two other competing plants grown outside the Pacific Northwest. One of these competitors is leatherleaf fern, which produces very durable attractive (though smaller) fronds. This fern is grown as an agricultural row crop in Florida.

The other competing product is Comador Palm fronds from Mexico and Guatemala which somewhat resemble fern fronds.

The outlook for sword fern production appears to be a continued gradual decline. However, a demand for sword fern is expected to continue because of its adaptability to large arrangements and its unique form and beauty.

5. Other Species

Other principal Northwest floral greenery species in approximate order of importance are Scotch broom, Port-Orford-cedar, and Coast redwood. Combined production of these species was less than one percent of combined production of salal, evergreen huckleberry, and sword fern in 1972.

PREREQUISITES FOR HARVESTING

1. Check First With a Buyer

Demand and price fluctuate from area to area, from season to season, and from year to year. Pickers should maintain close contact with managers of local processing plants to determine the current demand and price situation for various species and types of floral greenery.

Processing plants for the "big three" — huckleberry, salal, and sword fern — are usually permanently and centrally located within principal picking areas. Experienced pickers need only check the plant to obtain latest demand and price information. From past contacts, experienced pickers know what the buyer requires in the way of quality, bundling, and freshness. Likewise, the buyer can rest assured that these requirements will be met by most experienced pickers.

The real problem occurs with inexperienced pickers. They are sometimes motivated to pick floral greenery by reading sensationally optimistic, but unrealistic articles about making easy money from the woods. What these articles frequently fail to mention is that harvesting forest products requires the landowner's permission, and the work is difficult,

tedious, and demands much know-how. Sufficient judgment to determine which sprays are harvestable and sufficient physical dexterity to pick them quickly come only with experience. Inexperienced pickers are dismayed to find that their daily harvest is quite low. Even then, buyers may find it necessary to cull out large amounts of poor quality foliage. One of the greatest problems from the buyer's standpoint is that inexperienced pickers consume a great deal of time and attention during their breaking-in period. Perhaps the best time for new pickers to approach the processor is in early fall when greenery is most plentiful.

Finding a buyer for Christmas boughs may pose a more difficult problem than for other types of floral greenery. The seasonal nature in the demand for this type of product is the reason. Pickers frequently find it necessary to make their contacts at the buyer's place of business, rather than at a local processing plant. Bough buyers are very particular about quality and length of bough. A field examination of prospective bough cutting areas by the cutter and buyer or his representative is recommended. A mutually satisfactory understanding regarding price, quality, and delivery arrangements can then be consummated.

2. Locate the Product

Whether to locate the buyer first or the picking area first is somewhat like answering the proverbial chicken or the egg question. Obviously, one cannot exist without the other! Merely finding a plentiful supply of plant materials of a desirable species is not enough. These questions need to be answered:

- a. Is the greenery of salable quality; as affected by color, branch arrangement, branch length, and insect or disease damage?
- b. Is salable quality foliage sufficiently concentrated to make picking worthwhile?
- c. Is the picking area within about $\frac{1}{2}$ mile of a driveable road?
- d. Is the greenery product in current market demand?
- e. Is the landowner willing to lease out picking rights or sell "stumpage" by the bunch or pound at a fair price?

If the answers to these questions are affirmative, the picker is ready to complete a harvesting agreement with the landowner and make delivery arrangements with a local processor.

3. Tenure of Management and Trespass Control

Cultural practices increase volume and quality of any type of decorative foliage product, but the effort is not justified unless the picker can have reasonable assurance of making a profit on his investment. This requires that he obtain exclusive harvesting rights on the area for a several-year period. It also requires adequate trespass control on the picking area. Posting of suitable trespass or no-picking signs is always advised. Obtaining cooperation of law enforcement officers, other pickers, and neighbors is also good business. The more valuable the product, the more tempting it becomes to illegal picking.

4. Enter Into a Harvesting Contract with Landowner

Many picking contracts are merely a verbal agreement between the landowner and the picker; however, making the agreement in writing is strongly recommended. As a

minimum, the contract should include the following information:

- a. Dated signature of both parties.
- b. Legal description of the picking area.
- c. Period of the contract.
- d. Granting of exclusive picking right to the contractor.
- e. Amount, time, and basis of payments to the landowner.
- f. Fire protection requirements.
- g. Cultural practice requirements.
- h. Waiver of liability provisions to absolve landowner from legal claims incurred by picker.

The period of contract should be sufficiently long to permit the picker to reap the benefit of his fertilizing, pruning, or other cultural practices. Five-year periods are commonly used. Renewal of the contract is commonly done when results have been satisfactory to both parties.

Payments may be based on land area, volume of harvest, value of harvest, or some combination of these methods; for example, some contracts require annual payments to the landowner and permit harvesting an unspecified amount of greenery. These payments might average about 50 cents per acre per year plus an additional 2 cents per bunch harvested. The advantage of the latter method of payment schedule, from the landowner's standpoint, would be guaranteed annual payments, even though the lease holder might opt to defer harvesting for a year or two.

5. Obtain a Harvesting Permit

a. Private Lands in Oregon — Oregon State permits are not required except under the following circumstances:

- (1) When using chain saws or other power equipment, obtain a "Permit to Operate Power Driven Machinery" from a local office of the Oregon State Forestry Department.
- (2) When harvesting on classified reforestation lands, obtain a "Permit to Harvest Forest Crops on Classified Reforestation Lands" from the

Department of Revenue in Salem, Oregon.

b. Private Lands in Washington — “Specialized Forest Products Harvesting Permits” are always required from area offices of the Department of Natural Resources or from County Sheriff’s offices. Additional permits are required under the following circumstance:

When using chain saws or other power equipment, obtain an “Operating Permit” from an area office of the Department of Natural Resources.

c. State Lands — A sale contract from the State Forestry Department is required before harvesting floral greenery on Oregon State lands. A sale contract from the Department of Natural Resources is required to harvest floral greenery on Washington State - managed lands.

d. Federal Lands — Harvesting on National Forest lands requires a sale contract from a U.S. Forest Service District Ranger. Bureau of Land Management harvesting requires a sale contract from a BLM district office.

6. Transportation, Equipment, Tools, and Clothing

Unimproved harvest roads are the general rule. Brushing out and limbing may be required every year or two as brush and trees expand into the roadways. Spot graveling or culverts may be required on problem sections of roads used during the rainy season, especially where 4-wheel-drive vehicles are not available. High centers, overhanging branches, and rough spots cause heavy depreciation on newer vehicles. Therefore, older pick-ups, panel delivery trucks, or large sedans are usually preferred for harvesting and hauling operations involving bunched floral greenery. Larger volume floral greenery operations, such as bough harvesting, may require a truck with high side and end racks. One advantage of brush picking is low investment requirements for tools and equipment. The principal harvesting tool is actually a pair of strong, agile hands for breaking off sprays of huckleberry or salal sprays or

cutting fern fronds. A system of harvesting trails may be gradually developed through a harvesting area by pruning lower limbs and stubs from overhead trees, trimming back hardwood brush, and removing heavy debris from the foot path. A small chain saw, belt machete or hatchet is a handy tool for maintaining or locating harvest trails. Different types of foliage requires somewhat different harvesting tools and equipment.

- a. Evergreen Huckleberry and Salal
 - (1) Brush sticks (see illustration), or
 - (2) Baling twine for tying into bundles.
 - (3) Twine knife.
 - (4) Small chain saw, belt axe, or machete.
- b. Sword Fern
 - (1) Tying twine (precut to about 18-inch lengths).
 - (2) Ring knife for cutting fronds.
 - (3) Split burlap sacks for carrying bundles.
 - (4) Nail or wire fasteners to secure burlap rolls.
 - (5) Small chain saw, belt hatchet, or machete.
- c. Christmas Boughs
 - (1) Hand pruners (for cedar and smaller fir boughs).
 - (2) Brush loppers (for cutting heavy, low boughs from the ground).
 - (3) Pole pruners, 24-foot telescoping aluminum handle (for cutting higher boughs from the ground).
 - (4) Baling twine for tying bundles.
 - (5) Small chain saw.

Harvesting floral greenery involves travel over rough terrain in all kinds of weather. Good protective footwear during wet periods are rubber shoe-packs or loggers’ boots worn with heavy wool socks. Rain gear should be sufficiently tough to resist tearing while being worn in brushy country. Lighter summer wear should include long-sleeved work shirt to protect the arms from scratches and insect bites while picking brush or walking. Legs can be protected from yellow jacket and hornet stings by wearing high-top shoes and tying the pant legs. Work gloves are needed the year around.

CULTURE AND HARVEST OF CONIFEROUS BOUGHS

1. Principal Bough Species

Coniferous boughs are used mainly during the Christmas holiday season. Some species, such as Port-Orford-cedar, are also used yearlong for floral arrangements. Commercially suitable bough species must combine beauty, durability, and needle retention. Principal species will be described individually.

a. High Elevation True Fir Boughs — The most popular species for bough materials are known collectively as “high elevation true firs.” They account for about as many pounds of commercial bough cut as all other species combined.

The principal true fir bough species in this group is noble fir [*Abies procera*]. It is unexcelled for needle retention, color, symmetrical branchlet arrangement, and heavy upturned (curled) needles. It comprises about 75 percent of the total true fir bough harvest.

Most noble fir boughs are harvested from thrifty young natural trees growing in high elevation timber stands in the Cascades and portions of the Coast Ranges from Stevens Pass in northern Washington to the Willamette-Umpqua Divide in southern Oregon. Lower quality noble fir boughs are also increasingly being harvested as a by-product from noble fir timber thinnings and Christmas tree plantations. Identifying characteristics are dark-green, pointed, stiff, up-turned needles. The boughs are heavy, stiff, symmetrical, pointed, and flattened.

Silver fir (*Abies amabilis*) is second in importance to noble fir among the true fir bough species. It produces about 25 percent as much commercial bough material as noble fir. Silver fir foliage is symmetrical and attractive, but it does not hold up after cutting as well as noble fir. The natural range of silver fir extends further north than noble fir — through northern Washington and western British Columbia. It also extends south to central Oregon. Like noble fir, it grows naturally at higher elevations. Identifying characteristics



Noble fir boughs are unexcelled for beauty and durability. Stiff, curled, dark-green needles about 1¼ inches long are densely arranged on rigid, symmetrical branchlets.

are a rather flat arrangement of the lateral needles and a ridge of shorter, forward-pointing needles along the top of the twigs. Unlike the sharp pointed needles of noble fir, the tips of silver fir needles are blunt or slightly notched. White stomata lines on the undersides of the needles impart a silvery appearance, hence the name “silver fir.”

The other true firs, alpine (*Abies lasiocarpa*) and Shasta red (*Abies magnifica*, var. *shastensis*) are relatively unimportant for bough materials and together probably contribute less than 5 percent of total true fir bough production. Alpine fir somewhat resembles a short-needled noble fir, but its pungent odor is unattractive to some people. Shasta red fir is a close relative and southern neighbor of noble



Silver fir boughs do not bring as high price as noble fir, but are used for the same general purposes. White stomata lines on the undersurface of the needles impart a silvery appearance. The needles are about 7/8-inch long and their tips are slightly notched. An identifying characteristic is a ridge of shorter, forward-pointing needles on the top of the twig.

fir. However, it lacks the high degree of symmetry, dark green color, and needle density that is characteristic of noble fir. It also produces softer needles which are easily crushed in packing.

b. Cedar Boughs. — The second most important types of bough materials are the cedars. They have flattened, pendulous branches and tiny scale-like foliage. The cedar species in greatest demand for boughs is western redcedar (*Thuja plicata*). This is an important timber tree of the Pacific Northwest. It is used extensively for lumber, shingles, and split products. Its natural range extends along the Pacific Coast from southern Alaska to northern California. It also grows inland in northern Idaho, northwestern Montana, and along the west slopes of the southern Canadian Rockies. The principal use of western redcedar boughs is for “roping” or

“garlands.” This product is formed by tying continuous strands of boughs onto a wire backing. Cedar is also used for wreath components and other Christmas decorations. The foliage imparts a pleasant odor that many people associate with the Christmas holiday season.



Western redcedar produces long, flat, drooping sprays. They are of coarser texture than Port-Orford-cedar. The small, scale-like needles form a distinctive diamond pattern where they overlap.

Many people consider Port-Orford-cedar (*Chamaecyparis lawsoniana*) to be the most beautiful of all cedar bough materials. Its natural range is confined to a coastal strip 130 miles long from Coos Bay, Oregon, to Eureka, California. The graceful, flat, bead-like foliage is used yearlong to some extent by florists, but the greatest demand is for Christmas boughs. Unfortunately, an uncontrolled root fungus disease (*Phytophthora lateralis*) is slowly but steadily taking a heavy toll of Port-Orford-cedar trees. It does not attack the other cedar species. Spores of this fatal disease are usually introduced into an area by infected soil clinging onto tractors and other logging equip-

ment, then spread locally in water courses and by foot and vehicle traffic through infected areas.¹ The future for Port-Orford-cedar boughs looks doubtful because the disease is firmly entrenched and still spreading.



Port-Orford-cedar sprays are flat, drooping, and fern-like. The scale-like needles are very fine, soft-textured, and blue-green in color.

A third cedar used for bough materials is incense-cedar (*Libocedrus decurrens*). Its natural range generally follows the Cascade, Sierra Nevada, and Coast mountain ranges from northern Oregon to northern Lower California. Incense-cedar boughs, like those of western redcedar, are used for Christmas specialties. An attractive feature of some boughs are striking, bright yellow pollen buds that form on the tips of some branchlets. The boughs containing pollen buds are highly desirable as a component of Christmas wreaths.

c. Junipers — The principal juniper species

¹ Roth, L. E. and Nelson, E. E., U.S. Forest Service, Pest Leaflet 131, "Phytophthora Root Rot of Port-Orford-Cedar," August 1972.



Incense-cedar sprays are generally flat, but tend to be somewhat stiff and bunched. The scale-like needles are more elongated than the other cedars and dark yellow-green in color.

used for bough material is western juniper (*Juniperus occidentalis*). This is the gnarly, heavy-limbed species commonly associated with the drylands of eastern Oregon. It occurs to a lesser extent in eastern Washington and along the east slopes of the Sierra Nevadas in California. The shaggy branches bear rather dense, scale-like foliage and bluish-green berries. The boughs are used as a component of wreaths and other Christmas specialties. Juniper boughs sprayed with gold paint have a striking, gold bead appearance.

A second juniper species, Rocky Mountain juniper (*Juniperus scopulorum*) is similar to western juniper, and its boughs are used for the same general purpose. It grows principally in the Rocky Mountains of the United States and Canada, but also extends into some portions of eastern Washington and northeastern Oregon.

d. Pines — Several species of pine are cut for Christmas boughs, but to a more limited

extent than true firs and cedars. The long needles are attractive and have good retention. However, they are in strong competition with boughs cut from natural pine stands and abandoned pine Christmas tree plantations in many other parts of the country.

A favorite pine Christmas bough is from western white pine (*Pinus monticola*). Its soft blue-green needles occur in clusters of five. Its natural range extends along the West Coast mountain ranges from southern British Columbia to central California. It also appears inland in northern Idaho, northwest Montana, northeast Washington, and in the Canadian Rockies.



White pine needles are slender, flexible, soft textured, and blue-green in color. They grow in clusters of five.

Another pine suitable for Christmas boughs is Scotch pine (*Pinus sylvestris*). The French and Spanish strains of this species are particularly attractive, with their short, stiff, blue-green needles in clusters of two. These natives of southern Europe are widely planted for Christmas trees. Unmanaged Christmas tree

plantations or cull trees within managed Christmas tree plantations that show good color, branch form, and vigor are the main source of Scotch pine boughs.

The other pine commonly used for Christmas boughs is ponderosa pine (*Pinus ponderosa*) with long needles in clusters of three. Ponderosa pine is the principal timber species of eastern Washington and eastern Oregon. Scattered stands also occur in some of the drier portions of Willamette, Umpqua, and Rogue River drainages in western Oregon.

e. Douglas-fir — Douglas-fir (*Pseudotsuga menziesii*) is the principal timber tree in Oregon and Washington. The boughs are attractive and fragrant, but due to poor needle retention, they must be cut late in the Christmas season. Bough demand, therefore, is quite restricted and largely limited to local markets.

f. Coast Redwood — Coast redwood (*Sequoia sempervirens*) is the world's tallest tree. It grows along a narrow coastal strip,



Coast redwood sprays are flattened and yew-like in appearance. The lance-shaped needles are dark-green on top and lighter green on the undersides.

extending from the southwest corner of Oregon to central California. The branches form flat, fan-like sprays. The short, flatly arranged needles are dark green on top and whitish on the undersides. The foliage, at first glance, strongly resembles that of western yew. It is used to a limited extent in floral arrangements and for Christmas boughs.

2. Principal Production Areas

Bough production is largely tied to the natural

ranges of those coniferous species that produce commercial boughs. Some bough species, such as redcedar grow over a wide range in the Northwest. Others, such as Port-Orford-cedar, have a very restricted natural range. Some species, such as noble fir, have a wide natural range, but grow naturally only at higher elevations. The following table shows bough production in the principal bough harvesting areas in 1969.

TABLE I
Christmas Tree Boughs
by Species and Production Areas in 1969

Bough Production in Pounds					
Area	High Elevation True Firs	Douglas-fir	Cedars	Junipers	Pines
Puget Sound Basin	329,000	61,000	357,000		33,000
Washington Coast	83,000		30,000		4,000
Interior Valleys in Western Washington	332,000		98,000		1,000
Eastern Washington	4,000			7,000	
Total Washington	748,000	61,000	485,000	7,000	38,000
Oregon Coast	152,000		430,000		11,000
Interior Valleys Western Oregon	332,000	29,000			2,000
Eastern Oregon	4,000	9,000	3,000		6,000
Total Oregon	488,000	38,000	433,000		19,000

3. Selecting a Suitable Stand

Within the natural range of each bough species, production is also tied to the occurrence and availability of suitable stands of bough producing trees. Some forest ownerships are closed to bough cutting, others are inaccessible by roads. Permission of the owner, whether public or private, is required. Some stands are too young for harvesting boughs, others are so old that the lower branches have shed or have become sup-

pressed. Some stands occur on sites that are so poor that color, needle texture, and branch vigor cause the boughs to be of unmerchantable quality. Others occur on high sites and produce excellent boughs, but the desired species of trees are so scattered that economic harvesting of boughs is impossible. For these reasons, stands of trees suitable for bough cutting are actually quite limited. A stand that produces excellent boughs today may completely outgrow its capacity to produce merchantable boughs within 5 or 10 years.

Meanwhile, a younger stand in some other area may have just reached the proper age for bough production.

Ideal bough production conditions are open-grown stands about 20 to 40 years old growing on productive timber sites. These conditions are most often found in burns and clearcuts that are lightly stocked with timber, especially where individual trees of a desired bough species have attained a head start over the other trees in the stand. Foresters call these heavy-limbed, dominant individuals "wolf trees" because of their aggressive growing habits and their tendency to suppress their smaller neighbors. Other good bough types are trees that border roadways, clearcuts, fields, or natural openings in the forest where their branches receive open sunlight on one or more faces of the crown.

Even normally stocked, even-aged stands produce suitable bough materials in the upper portions of their crowns where the branches are exposed to sunlight. However, the harvesting opportunities on such trees is limited because fully stocked trees shed their lower branches, and the tops are difficult to reach. Moreover, removal of live branches from small tree crowns frequently over shocks the tree. The best opportunity to harvest boughs in fully stocked young stands is during precommercial thinning operations, which will be described in the next section.

4. Compatibility With Timber Management

Both bough and timber production can be compatible on the same area if proper bough cutting practices are used. In fact, bough sales may provide supplementary income to the owner of an immature forest without diminishing future productivity of the stand for timber. In the case of complete removal of lower limbs by basal pruning, it may actually improve the timber value of a tree by increasing the production of clear wood on the pruned portion of the bole.

Thinning is the forestry practice of periodically cutting a portion of the trees in overstocked young stands to widen the spacing between the retained timber crop trees. From the forestry standpoint, thinning improves the growth rate of the crop trees by reducing

competition for sunlight and moisture. It also improves the general quality of the stand by removing lower quality trees such as those that are deformed, diseased, excessively limby, or suppressed by competition. Timing the thinning operation to coincide with the bough cutting season provides an excellent opportunity to harvest boughs from the upper branches of the felled thinnings. Revenue from the boughs may help defray thinning costs. It may even provide a financial incentive to perform a needed thinning operation.

5. Fertilization

Fertilizers are becoming more and more important for improving growth rates of timber trees and improving quality of Christmas trees. The same nitrogen response that improves coniferous timber tree growth or Christmas tree quality also improves bough quality. Almost all coniferous tree applications utilize a nitrogen fertilizer. A common rate of aerial application to improve timber growth is 200 to 300 pounds of nitrogen per acre, usually in the form of urea pellets. Most effective season of application is between the middle of March and the end of April before the buds have opened.¹

Branches of fertilized trees increase in internodal growth, stem diameter, needle length, needle thickness, and numbers of internodal buds. They also become visibly darker green in color. Where a timber stand has not been previously fertilized, bough quality and production can be increased by scattering fertilizer under the driplines of individual trees that show high potential for bough production. Recommended application rate per tree of nitrogen will vary with site quality as well as tree diameter. However, it can be roughly calculated on a basis of dividing 250 pounds per acre by the number of dominant trees per acre. Commonly used nitrogen applications per tree for various diameters breast height (DBH) follow:

¹ Darrell O. Turner, Extension Specialist in Outlying Testing and Joseph Buhaly, Extension Forestry Specialist, Washington State University, Cooperative Extension Service, Ext. Bul. 585, October 1968.

Tree DBH (Inches)	Recommended Dose of Nitrogen Per Tree (Pounds)	Approximate Equivalent Fertilizer Weight Per Tree (Pounds)		
		Urea	Ammonium Nitrate	Ammonium Sulfate
8	1	2	3	4
12	1 ½	3	4 ½	6
16	2 ½	5	7 ½	10
20	3 ½	7	10 ½	14
24	4 ½	9	13 ½	18

6. Types of Boughs

The highest value boughs, called “backs,” are heavy, flat, symmetrical branch tips of true fir species. Backs are harvested from higher quality main branch tips of vigorous, open grown trees — particularly noble fir. They are normally cut 24 inches to 32 inches long for door swags and other Christmas specialties. Smaller or lower quality true fir boughs 8 to 32 inches in length, called wreath materials, are priced a few cents less per pound than backs. Large quantities are used for wreaths and other Christmas specialties. Requirements for



Noble fir “backs” being crated at a stockpiling area in the Coast Range of northwestern Oregon.

wreath materials are less exacting than for backs in respect to color, curl, needle density, and symmetry. Both backs and wreath materials are frequently harvested from the same tree.

The greatest demand for redcedar boughs is for “roping.” These are continuous strands made up of 18-to-24-inch boughs tied onto a wire for support. Considerable quantities of all cedar species are also used for wreaths and other Christmas specialties. Port-Orford-cedar, although cut principally for Christmas boughs, is in yearlong demand by florists for floral arrangement components. These are purchased by processing plants, made into 2-pound bunches, crated, and shipped to florists and decorators in the same manner as salal and evergreen huckleberry. Pine and juniper boughs are used for wreaths, mantel pieces, and other Christmas specialties.

7. Bough Cutting Techniques

The usual method of bough cutting removes only the usable tips of the branches. A sturdy hand pruner is the most popular tool for cutting from the ground. Where the branches are too large for easy cutting with a hand pruner, a light-weight, long-handled lopping shears is a more powerful cutting tool. The highest quality boughs are usually found above arm’s reach from the ground where they are exposed to more sunlight. Most bough cutters harvest the tips of the higher boughs with a long-handled tree trimmer with a rope-operated blade. The length of handle on a trimmer can be adjusted from about 5 to 25 feet by adding sections or by using an aluminum telescoping pole. Some bough cutters climb the tree, pull the branch tips upward against the trunk with a wire hook, and cut them to desired lengths with a hand pruner. However, this method requires considerable agility, and use of a safety rope. Also, it is limited to trees with low branches for easy climbing and flexible branches for easy bending against the trunk.

Where to make the cut on a branch is important from the standpoint of assuring future bough production on the same branch. Best results are obtained by cutting just above a



Cutting high quality Port-Orford-cedar boughs with a hand pruner in southwestern Oregon.

large, vigorous branch fork about 3 or 4 feet from the tip of the branch. Within 4 or 5 years, both forks will normally develop secondary tips of salable quality for a second harvest. This system is successful only under open-grown conditions where expanding growth from adjoining trees will not over-top and suppress the branch before it can produce a second crop of boughs.

Some bough cutting contracts may require complete removal of limbs from the lower portion of the bole of timber trees. This forestry practice will improve future log grades. In this case, the cuts should be made flush with the bark to avoid leaving a stub. This will permit the wound to heal quickly and produce knot-free wood over the scar. An efficient tool for completely removing lower branches is a light-weight chain saw or single-blade "boy's axe." A long-handled pruning saw is required for completely removing the higher branches. Although complete branch removal improves future log grade, it has some disadvantages from the bough cutter's standpoint. It increases harvesting costs by requiring a second trimming operation to remove the salable tips. It also eliminates branches that might otherwise produce a second crop of bough tips.

A good rule of thumb for protecting a tree from overshock during bough cutting is not to

remove more than 25 percent of the live crown of a tree during any 5-year period. Growth studies by the U.S. Forest Service have shown that removing more than this amount is likely to shock the tree and slow its growth rate to the detriment of future timber production.¹

Another source of boughs from natural stands are trees that are felled during precommercial thinning operations. In this case, it is essential to defer the thinning until the bough-cutting season, which extends from about October 15 to December 1. Most branch tips over 8 inches long from the open-grown top portion of the crown will produce wreath materials. An exception is the leader spike which does not make a salable bough.

Although most boughs are harvested from wild trees, an increasing potential for wreath materials, especially noble fir, are trimmings from Christmas tree plantations. Part of this production is branch tips cut from unmerchantable grade Christmas trees of good color, needle quality, and branch form. Noble fir growers should consider retaining cull trees until near the end of their rotation to develop the maximum amount of salable foliage. Another source of supply is trimmings from basal pruning. This is the commonly used cultural practice of removing the bottom branches of developing Christmas trees to form a handle. Basal-pruned branches must be free of dust, mud, splatters, and off-color or suppressed needles in order to qualify as salable wreath material. Christmas tree growers can enhance bough quality by controlling grass and weeds, fertilizing, and delaying basal pruning as long as possible to improve size and quality of the bottom branches. Noble fir Christmas tree growers should defer their basal pruning operations until October 15 if they wish to take advantage of a bough market. They should also call a bough buyer in advance of cutting to determine if their boughs are of a salable quality and species. The buyer can also explain his grade and length requirements at this time and arrive at an agreement with the bough cutter on price.

¹ Leo A. Isaac, Pacific Northwest Forest and Range Experiment Station, Forest Research Note #33, "Results of Pruning to Different Heights in Young Douglas-fir," January 24, 1945.

8. Storage and Delivery

Bough buyers will specify how they want their cutters to bundle and package boughs for delivery. Many buyers prefer to purchase woods-run boughs and do their own segregating into backs and wreath material.

One good method for carrying boughs out of the woods is to make them into 30- to 40-pound bundles. Each bundle is tied in the middle by two wraps of plastic baling twine and tightened with a slip knot. Each bundle should be built up with the shorter branches in the middle, tips pointing out from both sides of the bundle, and alternating layers of boughs face up and face down.

Inexperienced bough cutters may be asked by the buyer to bring in only a small sample load



Hauling boughs from the woods to a roadside landing on a horse-drawn travois.

of boughs in his first delivery. This enables the grower to check for quality and make suggestions to improve quality of subsequent deliveries.

Boughs should be stored in shallow, loose piles. Shady, damp, cool, wind-sheltered areas should be selected to minimize drying and heating. They should not be stored in closed buildings. A good storage area is under a densely stocked second-growth timber stand.

An additional asset for a storage area would be a handy water supply for sprinkling during a period of low humidity, high temperatures, or drying east winds. Boughs in storage should be kept damp, but not soaked or lying in water. Excess moisture may cause mold and needle shedding. A simple test for overheating is to place the hand inside the bundles. If heat is detected, bundles should be opened, sprinkled, rebundled, and placed in looser, shallower layers.

The bough cutting season is a short period from about mid-October to December 1. Cutters should work closely with the buyer regarding the buyer's cut-off date for purchasing boughs. Unlike Christmas trees, which are usually sold just as they are cut, Christmas boughs require additional time for fabricating into wreaths, door swags, and other specialty items.

Bough delivery should be made to the buyer as soon as possible after harvesting. The Christmas tree bough season is short and hectic, and the buyer must work on a tight schedule to complete delivery to wreath makers and other customers. Unsold boughs become a liability to the buyer, for it requires time and money to dispose of them.

CULTURE AND HARVEST OF EVERGREEN HUCKLEBERRY

1. Plant Description

Evergreen huckleberry (*Vaccinium ovatum*) is an erect evergreen shrub 4 to 8 feet in height. Its evergreen leaves are thick, glossy, egg-shaped, finely toothed and about $\frac{3}{4}$ to $1\frac{1}{2}$ inches in length. Besides floral greenery, this

shrub produces clusters of small, edible black huckleberries for home and commercial use. Evergreen huckleberry will tolerate a moderate amount of shade, and frequently occurs as a understory shrub in coniferous forests. Dark green, fan-shaped sprays, which are in

greatest demand for floral greenery, are produced only under partial shade. Plants growing in open sunlight produce erect spike-like branches. These, too, are picked for floral greenery during late winter when their color changes seasonally to reddish-green, but to a much lesser extent than the green sprays. The natural range of evergreen huckleberry is a narrow coastal strip from southern British Columbia to central California.



Evergreen huckleberry produces dark green, flattened sprays when grown in partial shade.

2. Principal Production Areas

The Puget Sound Basin leads all other evergreen huckleberry floral greenery areas with approximately 70 percent of total 1969 huckleberry production. The most productive areas are on islands, peninsulas, and along the western shoreline of Puget Sound.

The second most important huckleberry production areas are along the Pacific Coast of Oregon and Washington and northern California. Huckleberry from these areas is seldom picked very far inland from the ocean beaches.

The inland valleys of Oregon and Washington are not important huckleberry producing areas. Combined 1969 production for these areas accounted for less than 3 percent of the total evergreen huckleberry harvest. Pro-

duction from British Columbia, too, is relatively minor. Most of the British Columbia harvest is from Texado Island, which lies between Vancouver Island and the mainland.

3. Preferred Growing Sites

Typical huckleberry brush picking areas in the Puget Sound Basin are under fairly open-grown, second-growth stands on infertile glacial till soils. The best producing areas are usually within about 5 miles of salt water. Huckleberry does not compete successfully with more aggressive shrubs or trees, such as tall bracken fern, salmonberry, and red alder. These species are commonly associated with more productive timber sites.

Typical picking areas along the Pacific Coast are under stands of spruce and hemlock that are sufficiently open-grown to permit partial sunlight. Huckleberry usually does not grow very far inland from the ocean beaches and coastal plains. Bushes growing in open, windswept fields or plains near the beaches or sand dunes generally lack good form and color. In general, Pacific Coast huckleberry foliage is rated somewhat lower for color and keeping qualities than the Puget Sound sources.

Ninety-eight percent of floral greenery huckleberry demand is for dark green, flattened sprays associated with partial shade. The remaining 2 percent of production, called "red huckleberry," is harvested in December through March from the same species of plants growing in open sunlight. These open-grown plants often turn seasonally red during this period. The name "red huckleberry" is, therefore, derived from the color of the leaves; not the berries. (A red huckleberry plant exists but has deciduous leaves and is not used for greenery production.)

Upright terminal spikes, from which the leaves project in all directions, rather than flat sprays, are the desired shape for red huckleberry.

Huckleberry always requires a particular degree of shade to develop a combination of vigorous growth, dark green color, and desirable flat sprays. Too much shade causes stunted plants with weak branches and suppressed foliage. Too much sunlight causes

TABLE 2
EVERGREEN HUCKLEBERRY FOLIAGE PRODUCTION BY AREAS
AND COUNTIES (1969* VS 1972)**

Areas and Counties	Number of Bunches		Areas and Counties	Number of Bunches	
	1969	1972		1969	1972
WASHINGTON			OREGON		
PUGET SOUND			OREGON COAST		
Kitsap	784,100		Coos	225,800	
Mason	581,100		Curry	108,500	
Jefferson	256,900		Tillamook	15,500	
Pierce	222,600		Clatsop	10,000	
Island	60,800		Lincoln	5,600	
Clallam	11,600				
Thurston	7,500		Area total	365,400	350,000
Area total	1,924,600	1,700,000			
WASHINGTON COAST			INTERIOR VALLEYS		
Grays Harbor	200,000		Lane	49,800	
Pacific	56,000		Benton	200	
Area total	256,000	300,000	Area total	50,000	--
INTERIOR VALLEYS			OREGON TOTAL		
Lewis	36,000		PERCENT	15	14
Area total	36,000	--			
WASHINGTON TOTAL			CALIFORNIA		
PERCENT	79	83	NORTHERN PACIFIC		
			COAST		
				50,000	50,000
			Area total	50,000	50,000
BRITISH COLUMBIA			CALIFORNIA TOTAL		
PACIFIC COAST			PERCENT		
	100,000	25,000		50,000	50,000
Area total	100,000	25,000		2	2
BRITISH COLUMBIA TOTAL			GRAND TOTAL FOR		
PERCENT	4	1	ALL AREAS		
				2,781,100	2,375,000
			PERCENT TOTAL	100	100

*Bernard S. Douglass, U.S. Forest Service, "Special Forest Products 1969 Harvesting Report, Oregon and Washington," 1970.

**Rounded estimates by Charles A. King, Kirk Company, Puyallup, Washington, July 1973.



This evergreen huckleberry spray is typical salable quality from bushes grown in partial shade.



This tall, narrow shoot called red huckleberry is produced by the same species growing in open sunlight.

an upright growth pattern, rather than flat sprays, and an off-green color. Many pickers believe that an ideal degree of shade is about 50 percent crown cover formed by the overhead tree canopy. Putting it another way, one would see about 50 percent open sky when looking up through the tree tops. Actually, a shade variation of one-third to two-thirds crown cover seems to produce satisfactory huckleberry growth. Formal studies are needed to determine the exact degree of partial shade needed to obtain optimum quantity and quality of merchantable sprays.

Best huckleberry greenery is from understory plants grown in second-growth coniferous stands such as Douglas-fir, redcedar, hemlock, and Sitka spruce. Some commercial grade huckleberry is also picked under alder, maple, willow and other deciduous trees. These should be harvested in the early portion of the picking season from about July to September. After fall rains begin, a sooty mold frequently forms on the leaves. This is caused by honey dew secretions from aphids feeding on overhead deciduous leaves. Also, when deciduous leaves are shed in the fall, they tend to pile up on the bushes and smother the huckleberry foliage.

5. Compatibility With Timber Management

Unthinned second-growth stands often tend to form dense thickets that exclude sunlight from the forest floor. This shades out huckleberry plants or stunts their growth. Crowding also slows the growth rate of timber. A good combination forestry practice and huckleberry management practice is to thin out the suppressed, defective, and crowded trees, and to retain only the best timber crop trees at proper space intervals. Proper spacing is such that the crowns do not quite touch. One rule of thumb is to maintain an average spacing between trees equal in feet to the average DBH of dominant trees in inches plus the numerical value of the site. If, for example, one were growing timber with an average breast high diameter of 8 inches on Site III land (which represents about average growth rate conditions for westside Douglas-fir), he should maintain an average spacing between trees of about $8 + 3 = 11$ feet.¹

The same thinning that benefits timber growth by reducing competition will also benefit huckleberry growth by letting partial

¹ Wendell Harmon, U.S. Forest Service, Portland, Oregon, "Timber Stand Improvement Guidelines for Douglas-fir," July 1965.

sunlight in to the ground. Harvest roads, firebreaks, and trails constructed through timber stands also increase huckleberry production by increasing the amount of light on the ground. Thus, huckleberry greenery and timber production both benefit from good forestry thinning practices.

Large openings in the forest permit too much sunlight for high quality huckleberry foliage production. These openings should be planted with trees to create partial shade. Again, this is a good practice for timber production as well as for huckleberry foliage production.

6. Pruning Techniques

Old huckleberry bushes tend to become tall, woody, and slow growing. Under these conditions they put on scanty annual growth. The quantity and quality of their sprays is also inferior to that produced on thrifty younger branches.

Old plants may be rejuvenated by pruning them back near ground level to short stubs. Good tools for this job are circular brush saws, light chain saws, brush hooks or machetes. Pruning stimulates many new sprouts which will produce harvestable sprays in 3 or 4 years. Another pruning technique is breaking



Pruning back old huckleberry wood with a power brush cutter stimulates heavy sprouting. The new growth will produce an abundance of high-quality sprays.

down the old bushes by turning a crawler-type tractor directly over the top of each bush clump. Care must be taken not to uproot the entire bush during this operation. Quality and yield of pruned huckleberry plants may be further increased by fertilizing as described in the next section.

7. Fertilization

Darrell Turner, Soil Scientist with the Washington State University Western Washington Research and Extension Center, made a huckleberry fertilization study on the Kitsap Peninsula, southern Puget Sound area, in 1958-1960.¹ Various trial weights of urea, a high nitrogen fertilizer, were broadcast around individual huckleberry bushes during March. After two growing seasons, the weights of marketable huckleberry sprays were compared for unfertilized bushes and those fertilized at the rates of $\frac{1}{4}$, $\frac{1}{2}$, and 1 pound of urea per bush. Turner found that bushes fertilized at the $\frac{1}{2}$ -pound rate produced about twice as many pounds of sprays as the unfertilized bushes. Increasing the fertilizer rate to 1 pound per bush further increased the yield of sprays to nearly triple that of the unfertilized bushes. Besides increasing the yield, fertilizing also improved the color and density of the foliage.

The effect of fertilizing largely wears off in two years, and should, therefore, be reapplied every third year.

Cost of $\frac{1}{2}$ pound of urea, together with the labor of applying it, is approximately 5c per huckleberry bush. Based on an expected gain of $\frac{1}{2}$ a bunch of sprays per bush two years after fertilizing, and a price to the picker of 32c per bunch, we could assume that the 5c fertilizing investment would result in a 16c per bush gain in value of harvested greenery.

Several limitations and precautions in using nitrogen fertilizer were noted by Cecil Paul, pioneer forest greenery manager in the southern Puget Sound area. He found that nitrogen applications alone do not necessarily insure increased production of salable foliage. The bushes must also be exposed to a proper

¹ Darrell O. Turner, Washington Agricultural Experiment Station, Stat. Cir. 383, "Fertilizing of Evergreen Huckleberry," February 1961.

degree of shade, old wood must be pruned back, and heavy hardwood competition held in check. Therefore, fertilizing must be considered a useful supplement to other good cultural practices rather than an end in itself. Paul also noticed that branch tips become more palatable to rabbits and more susceptible to frost dieback in the fall after bushes are fertilized. However, in spite of these limitations, fertilizing is one of the most effective and profitable culture practices to increase production and improve the quality of huckleberry greenery.

8. Harvesting Techniques

The principal tool for picking evergreen huckleberry is a strong, agile pair of hands. The stems are quite brittle and can be snapped off by hand to proper length. Experienced pickers look for flattened, dark green sprays 12 to 30 inches in length. Processors like to have at least one-third of the sprays in each bundle broken to maximum length, with gradually declining lengths for the balance of the bundle. If a spray is somewhat on the small side, it may pay to let it grow another year. The main source of shorter sprays is trimmings to improve the appearance of larger sprays or to improve the future growth characteristics of the bush. Experienced pickers remove superfluous tips from otherwise good sprays by breaking downward to prevent visible scars or skinned spots. Considerable picking experience is required to harvest the greatest amount of salable foliage from a bush without impairing its productivity.

The branching habit of huckleberry is somewhat erratic. It tends to produce numerous upright shoots or spikes. After several years growth, the spike will droop to a more horizontal position and develop into a fan-shaped spray. Understanding how a huckleberry spray develops will help pickers learn techniques that will keep a bush productive. The first year's growth of a future spray is an unbranched spike about 12 to 24 inches in length. It may arise out of a portion of the stem, and seldom conforms to the pattern of a harvestable spray. The second year's growth is only about half as long as last year's spike,

and the flattened characteristics of a spray may first become visible. The third year's growth is even less—only about 4 to 8 inches—and many sprays may now be ready to pick.

The object of a good picker is to make the break just above a junction point where an erratic spike or immature spray departs from the flattened, pickable portion of the spray. This technique improves quality of the present harvest, and at the same time, leaves the bush in good condition for future production.



Pointed out is a huckleberry branch fork where an experienced picker would break off the flat spray (left), retaining the upright shoot (right) for future production.

9. Insect, Disease, and Weather Damage

Insects and disease cause an estimated 25 percent loss of evergreen huckleberry foliage production. Damage is cyclic by years. "Salt spray" or "white spot" is the most damaging fungus disease of huckleberry. It is especially prevalent near the Pacific Coast. Infected leaves appear to be sprinkled with talcum powder.

The most damaging insect is the blackheaded fireworm (*Rhopobota naevana*). This moth larva feeds on the tips of the new growth causing a blunt, ragged appearance when the new growth hardens off. This insect is also a problem in commercial cranberry bogs. Further branch elongation is often curtailed for

the current growing season. Insecticide trials to control fireworm on huckleberry were made on the Kitsap Peninsula in the southern Puget Sound area.¹ Effective control was attained by spraying with one of the chlorinated hydrocarbon chemicals shortly after bud burst when the larvae first appeared. However, these chemicals have since been banned for general usage. Present recommendation is to spray with 1.3 pounds of 50 percent diazinon wettable powder per 100 gallons of water.

Several insects besides fireworm damage huckleberry sprays. Some species eat small round holes in the leaves during the succulent stage, causing "shot huckleberry." Leaf miners are another nuisance. They eat chlorophyll out of the interior of the leaf, leaving only a thin, white membrane on the top leaf surface.

Weather damage is also a potential hazard to huckleberry foliage production. Silver leaf is a condition caused by prolonged freezing weather. The top surface of the leaf dies and turns a silvery gray color. Early fall freezing sometimes kills back tips before they harden off, causing the tender new leaves to die back and turn black.

Pickers use different methods of handling and carrying brush out of the woods. One method utilizes a "brush stick." This is a broom handle size pole 4 or 5 feet in length. It contains a row of holes drilled through the pole at 4 or 5 inch intervals. The pole is held vertically on the ground for loading with the small end down for easy sliding. A long nail is inserted in the bottom hole to secure the bottom of the load. Then, handfuls of brush are pressed from the top to the bottom of the pole. When the pole is loaded its full length, the compressed layers of brush are secured firmly in place by inserting a long nail through a slightly larger diameter hole just above the top layer. When the pole is completely filled, it resembles a brushy cylinder. The picker's shoulder is well padded by brush while carrying the loaded poles out of the woods.

Another system is tying 16 to 20 handfuls of brush into a single 35- to 45-pound bundle with

¹ Joe Buhaly, Extension Forestry Specialist, Washington State University, Cooperative Extension Service, "Tip Moth Control Demonstration Plots on Evergreen Huckleberry Brush, 1959."



Carrying sprays of huckleberry out of the woods on a brush stick. This stick works equally well for salal and other short-stemmed greenery.

a loop of strong twine. The twine is cinched around the stems, which are alternately crossed in the middle of the bundle so that the spray tips point outward in opposite directions. These bundles, called "double-end bales," make well balanced loads for carrying out of the woods.



Huckleberry is tied into standard sized bunches at the packing shed then placed under a shower to maintain freshness.

The bundled brush is delivered to the packing shed for showering, sorting, trimming, and tying into standard 1-5/8 pounds dry-weight bunches, which are equivalent to 1-7/8 pounds wet weight bunches. Pickers are paid according to the number of bunches that the processor can produce from his pickings. The finished bunches are crated at the processing plant and shipped to markets in many parts of the United States in refrigerated trucks and airplanes.



A hydraulic press at the processing plant compresses bunches of evergreen huckleberry in a crate for shipment.

The picking period for evergreen huckleberry is year around except for a brief period beginning about May 15 when succulent new growth starts to develop. By mid-July the new growth is usually sufficiently hardened off to start the main harvesting season. Summer-picked brush requires especially high-quality

standards because it is in strong competition with floral greenery produced in the eastern United States. Brush commands the highest prices in March, April, and May when the demand is greatest and the supply limited.

Pickers should deliver their greenery to the processor as soon as possible after picking to avoid "shattering" (shedding of leaves) and heating in the bundles. All floral greens are most vulnerable to spoilage between the time that they are picked and the time that they are placed in a shower room or in cold storage. Durability of foliage in the floral arrangement is strongly affected by its care after picking. Spoilage problems are especially critical during hot summer days before the new growth has completely hardened off. Some pickers sprinkle their sprays with water from a hose nozzle or sprinkling can to help maintain coolness and freshness in the bundles before delivery. All growers should store brush in a cool, shady spot during the summer months to avoid heating and shattering. Freezing normally will not damage huckleberry foliage unless it is picked or handled while in a frozen condition. Frozen leaves will turn black at the point of contact.¹ For this reason, pickers stay out of the woods during period of prolonged hard freezing.

Since the market for red-leaved huckleberry is very limited, as compared with that for the green-leaved type, advance arrangements should be made with the processor to fill specific orders. However, florists are showing increased interest in spiky-type floral designs, and red huckleberry may increase in demand to fill this need.

¹C. Ralph Voris, Asst. Publ. Relations Director, Oregon State Forestry Department, "The Forest and the Florist," October 1961.

CULTURE AND HARVEST OF SALAL

1. Plant Description

Salal (*Gaultheria shallon*) is a low, semierect evergreen shrub with thick, leathery, glossy, finely toothed, lemon-shaped leaves about 2 to 4 inches in length. The greenish-red twigs form a conspicuous zigzag pattern between each leaf node. The plant produces loose

clusters of bluish-black, grape-shaped berries about three-eighths of an inch in diameter. Although the berries are sweet and small-seeded, most people consider them too bland and tasteless for good eating. The plant is capable of spreading rather rapidly by means of shallow underground shoots just under the

organic surface layer of soil, known as "duff." Like evergreen huckleberry, salal will thrive in either open sunlight or partial shade, but produces the best quality floral sprays under the partial shade of lightly stocked coniferous forest trees. It frequently forms the principal ground cover on west side forest lands.

Salal produces commercial floral greenery in the Puget Sound Basin and along the Pacific Coast in the same general areas where evergreen huckleberry is found. In fact, the two species are frequently intermixed and both are sometimes harvested from the same picking area. Salal also grows in the Coast Ranges, Willamette Valley, and west slopes of the Cascades from British Columbia to California. A limiting influence on commercial grade salal is brownspot fungus (*Phyllosticta gaultheriae*) which causes small, circular dead spots on the leaf surface. This disease is particularly prevalent in areas of heavy rainfall.

2. Principal Production Areas

Salal production, like that of evergreen huckleberry, is concentrated in the Puget Sound Basin. Approximately 60 percent of the total 1969 salal production was from this area. Other important salal-producing areas are



This salal grows in a rain forest near the Pacific Coast. The bushes are taller than a man. By contrast, the height of salal bushes growing in the Puget Sound area seldom exceed 3 feet.

southeastern Vancouver Island and along the Pacific Coast in Oregon and Washington.

Many sites that produce commercial salal also produce huckleberry. However, western British Columbia is an exception to this general rule. It places second to the Puget Sound area in salal production; yet produces very little huckleberry. Most of the increased salal production since about 1965 has originated in British Columbia where picking labor is relatively plentiful and brownspot disease relatively scarce.

Oregon produces less salal than either Washington or British Columbia. Only about 10 percent of total salal production was produced in Oregon in 1969.

3. Preferred Growing Sites

Salal, like evergreen huckleberry, reaches its best development in glaciated soils near salt water. Salal is one of the site indicator plants for identifying Site III and Site IV forest lands, although it commonly occurs also on Site V lands. Its natural range is greater than that of huckleberry, extending to the west slope of the Cascade Mountains and well into British Columbia on both sides of the Inland Passage which separates Vancouver Island from the Mainland.

Typical picking areas are under somewhat open-type timber stands that provide partial shade. Many pickers have found that an ideal degree of partial shade to produce the desirable dark green, fan-shaped foliage is a 50 percent overhead crown canopy formed by second-growth coniferous trees. The requirements of salal are about the same as those of evergreen huckleberry in this respect.

The leaves of salal are large and showy. Therefore, defects on the surface areas show more readily than on evergreen huckleberry. Salal in many areas is unmarketable because of damage from brownspot fungus or leaf-eating insects.

4. Compatibility With Timber Management

The same comments made for evergreen huckleberry in respect to compatibility of timber management and floral greenery management also apply to salal. Thinning a

TABLE 3
EVERGREEN SALAL FOLIAGE PRODUCTION BY AREAS
AND COUNTIES (1969* VS 1972)**

Areas and Counties	Number of Bunches	
	1969	1972
WASHINGTON		
PUGET SOUND		
Mason	391,800	
Kitsap	349,200	
Jefferson	204,500	
Pierce	127,700	
Thurston	55,500	
Island	52,500	
Calallam	41,400	
Area total	1,222,600	1,300,000
WASHINGTON COAST		
Grays Harbor	192,000	
Pacific	80,000	
Area total	272,000	300,000
INTERIOR VALLEYS		
Lewis	99,400	100,000
Area total	99,400	100,000
WASHINGTON TOTAL	1,594,000	1,700,000
PERCENT	68	62

Areas and Counties	Number of Bunches	
	1969	1972
OREGON		
OREGON COAST		
Coos	80,200	
Lane	45,000	
Lincoln	25,300	
Clatsop	20,000	
Curry	8,500	
Area total	179,000	200,000
INTERIOR VALLEYS		
Lane	30,000	
Linn	30,000	
Columbia	300	
Area total	60,300	75,000
OREGON TOTAL	239,300	275,000
PERCENT	10	10
BRITISH COLUMBIA		
VANCOUVER ISLAND		
WEST COAST	500,000	1,100,000
Area total	500,000	1,100,000
BRITISH COLUMBIA TOTAL	500,000	1,100,000
PERCENT	22	40
GRAND TOTAL	2,333,300	2,725,000
PERCENT TOTAL	100	100

*Bernard S. Douglass, U.S. Forest Service, "Special Forest Products 1969 Harvesting Report, Oregon and Washington," 1970.

**Rounded estimates by Charles A. King, Kirk Company, Puyallup, Washington, July 1973.

forest and creating openings such as roads and trails increases the amount of sunlight reaching the ground. The thinned tree crowns provide sufficient filtered sunlight to produce vigorous growth and, at the same time, sufficient partial shade to produce a desirable dark green color and flattened growth habit of the sprays.

6. Pruning Techniques

Salal normally produces many-branched bushes 1 to 3 feet tall. These short bushes do not require pruning back to stimulate growth and yield. Plants may grow up to 10 feet tall on exceptionally productive sites such as those found a few miles inland from the Pacific Ocean beaches. Production of new growth with a high yield of salable sprays can be stimulated by severely cutting back the tall bushes with a machete, brush hook, power brush saw, or light chain saw. Another effective pruning method is to ride over tall bushes with a crawler-type tractor. Production of salal growing under proper light conditions can be further stimulated by applying a nitrogen fertilizer.

7. Fertilization

Fertilizing salal with nitrogen produces improvements in leaf color and yield, the same as for evergreen huckleberry. Darrell Turner found little response from using phosphorus or potassium fertilizers, but a very significant improvement from using nitrogen-type fertilizers.¹ By fertilizing at the rate of 100 pounds of nitrogen per acre, for example, he tripled the rate of growth and more than tripled the number of healthy leaves. Moreover, nitrogen caused the leaves to turn a darker green color and lessened the degree of infection by the brownspot disease (*Phyllosticta gaultheriae*) Turner attributes the reduced brownspot disease damage on fertilized plants to stimulation of earlier bud-burst and leaf development. He believes that early bud breaking reduces exposure of succulent growth during the peak spore infection period beginning about May 15.

¹ Darrell O. Turner, Washington Agricultural Experiment Station, Bull. 751, "Growth and Disease of Salal as Affected by Fertilizer Treatment," March 1972.

Turner also ran trials on the effect of nitrogen on longevity of huckleberry under storage. He found that nitrogen-treated sprays kept their freshness significantly longer than unfertilized sprays.

Recommended time to apply fertilizer is early spring before the new buds burst. The table on Page 14 will help determine the weights of various types of nitrogen fertilizers that are required to obtain a desired weight of actual nitrogen.

Increased returns from fertilizing salal will depend on a number of variables. These include cost of fertilizer, cost of application, degree of stocking of salal bushes, price per bunch to the picker, and quality and yield as affected by insects, disease, degree of shade, and site. Therefore, the following assumptions should be considered hypothetical and a means of arriving at increased returns; rather than typical for any particular production area or any given year;

Value per bunch.....	\$ 0.34
Yield per acre per year (unfertilized)	50 bunches
Yield per acre per year (fertilized).....	150 bunches
Value of picked salal (unfertilized)	\$17.00
Value of picked salal (fertilized)	\$51.00
Cost per acre of fertilizer and application	\$ 8.00

An investment of \$8 per acre for fertilizing would increase the value of picked bunches by \$34 under the stated conditions. Fertilizing will normally improve color and vigorous appearance of salal, as well as increase its yield per acre.

Salal is like evergreen huckleberry in respect to needing proper growing conditions as a prerequisite for good nitrogen response. Fertilizing will not produce desired results, for example, with too little or too much overhead shade.

8. Harvesting Techniques

Many of the harvesting guidelines previously stated for evergreen huckleberry apply also to salal. In fact, both types of greenery are some-

times harvested simultaneously from the same picking areas in the southern Puget Sound Basin and along some portions of the Pacific Coast. For the sake of avoiding repetition, only those aspects of harvesting that are different from huckleberry will be discussed.

Salal plants usually form dense, semierect, weak-stemmed, low-growing thickets; rather than upright, individual shrubs as in the case of evergreen huckleberry. Root rhizomes just under the surface duff layer provide a means of spreading the plant across the forest floor. Pickers look for bright green, flattened sprays that are free of brownspot, insect, browsing, and other visible defects. The large, showy leaves cause defects to show to a greater degree than on small-leaved huckleberry foliage.

The picking season for salal extends from about mid-July to the first part of June. This is from the time the new growth hardens off to when vigorous new growth sprouts become elongated. These new sprouts must be ripped off each spray that is picked during the early succulent growth period in May and June. Sprouts of new growth will quickly wilt and spoil the appearance of the spray.

Sprays are bunched in two different sizes. Regular salal bunches are the most common size. They contain sprays 12 to 30 inches in



Regular salal bunches weigh 1-5/8 pounds and contain sprays 12 to 30 inches in length.



Standard-size bunches of salal (left) and evergreen huckleberry (right) are compared.

length in 1-5/8 pound bunches (dry weight), the same as for evergreen huckleberry. The other size, called "short bunches" or "Little Johns" contain sprays 15 to 20 inches in length, and have a dry weight of only one pound.

9. Insect, Disease, and Animal Damage

Only well-formed sprays free of defects from



Short bunches of salal, or "Little Johns," weigh 1 pound and contain sprays from 15 to 20 inches in length.

fungus disease, insect feeding, and animal browsing are marketable quality. Brownspot fungus (*Phyllosticta gaultheriae*) is a damaging fungus disease throughout the natural range of salal, especially near the Pacific Coast and in other areas of heavy rainfall. This disease is identified during the dormant season by small, circular, brown spots on the leaf surface. However, it is difficult to detect for several months following infection by a tiny wind-carried spore during the succulent growth period in May and June. By late summer, the infections may be barely visible as somewhat off-colored green spots on last year's leaf surfaces. Pickers may not realize that summer-picked salal contains brownspot infections. However, the infected spots will show up with disastrous results after several

days in damp cold storage. Several other fungi also cause damage on salal leaves at times, but none of these are nearly as damaging as *Phyllosticta* brown-spot.

Several insects feed on salal leaves. One is a small larvae that feeds on the green tissues under the leaf surface; leaving a layer of thin, semitransparent, parchment-like dead tissue over the meandering feeding galleries. Other insects eat holes through the leaves during the succulent growth stage. Deer, elk, cattle, and sheep sometimes feed on salal leaves, especially during winter months when more palatable browse is scarce. It can be assumed from this that despite the widespread occurrence of salal plants, finding top quality foliage can be a major problem on many areas.

CULTURE AND HARVEST OF SWORD FERNS

1. Plant Description

Sword Fern [*Polystichum munitum*] is a large evergreen fern 2 to 4 feet in height. Pointed, narrow, tapered, slightly curved fronds rise from a central stool on the ground in large, compact, circular clusters. The narrow, sharp-pointed, serrated leaflets are shaped somewhat like the frond itself. They are closely,



A pickable sword fern patch under a stand of hemlock trees near the Washington Coast.

and slightly alternately, arranged along a single upright stem.

Sword fern is a common forest plant in moist forest from British Columbia to California. It reaches its best development in old-growth timber stands along the Pacific Coast of Oregon and Washington.

2. Principal Production Areas

Sword fern production is only slightly higher in Washington than in Oregon. About 60 percent of Washington production and 75 percent of Oregon production originates in the rain forests that lie between the Pacific Ocean and the Olympic and Coast Range summits. The balance is harvested on more productive timber sites in the Puget Sound Basin and west side inland valleys of both States.

3. Preferred Growing Sites

Sword fern, unlike huckleberry and salal, reaches its best development on highly productive timber sites. In fact, sword fern is one of the site indicator plants used by foresters to identify the highly productive Site I and Site II timber lands. Conditions that contribute to good sword fern are heavy rainfall and deep, fertile soils. Therefore, it is not surprising that fern production is

TABLE 4
SWORD FERN FOLIAGE PRODUCTION BY AREAS
AND COUNTIES (1969* VS 1972)**

Areas and Counties	Number of Bunches		Areas and Counties	Number of Bunches	
	1969	1972		1969	1972
WASHINGTON			OREGON		
PUGET SOUND			OREGON COAST		
Pierce	35,000		Coos	411,000	
Mason	32,000		Lane	157,500	
Skagit	18,000		Lincoln	116,900	
Whatcom	5,000		Tillamook	80,000	
Thurston	3,400		Curry	70,700	
Island	600		Clatsop	58,600	
Snohomish	500				
Area total	94,800	50,000	Area total	894,700	550,000
WASHINGTON COAST			INTERIOR VALLEYS		
Pacific	380,000		Benton	301,400	
Grays Harbor	365,000		Columbia	2,000	
Clallam	114,200		Linn	500	
Jefferson	92,800		Multnomah	500	
Area total	952,000	600,000	Area total	304,400	150,000
INTERNAL VALLEYS			OREGON TOTAL		
Lewis	358,100			1,199,100	700,000
Cowlitz	125,300		PERCENT	44	44
Wahkiakum	10,000				
Area total	493,400	250,000			
WASHINGTON TOTAL			PERCENT		
	1,540,200	900,000			
PERCENT	56	56			
GRAND TOTAL			2,739,300 1,600,000		
PERCENT TOTAL			100 100		

* Bernard S. Douglass, U.S. Forest Service, "Special Forest Products 1969 Harvesting Report, Oregon and Washington," 1970.

** Rounded estimates by Charles A. King, Kirk Company, Puyallup, Washington, July 1973.

concentrated on the west slopes of the Olympic and Coast Range where these conditions commonly prevail. Sword fern is also picked commercially in lower slopes and valleys between the Coast Range and Cascade Mountains where heavy rainfall occurs with deep fertile forest soils. In drier areas, it is confined largely to moister sites such as wooded ravines and north and east slopes.

Sword fern attains its best development under old-growth stands of hemlock, cedar, Sitka spruce, and Douglas-fir. Small openings, created where a tree has windthrown or died, are especially productive. However, light requirements are less for ferns than for huckleberry or salal. Sword fern also occurs under stands of alder and maple, but early season harvesting is required to avoid sooty mold discolorations on the fronds. These occur where sugary secretions drip onto the fern leaves from aphids feeding on overhead hardwood leaves.

5. Compatibility With Timber Management

Forest thinning enhances sword fern production by permitting partial sunlight to the ground and reducing competition for soil moisture. However, complete removal of the overstory timber produces a stiff, rough-textured, V-shaped frond with an off-green color. Ferns are relatively scarce under young, fully stocked stands with dense, unbroken crown canopies. Too little sunlight reaches the ground under these circumstances. Also, ferns have had too little time to become well established under younger stands. In general, the older the stand, the better the fern production.

6. Sustained Yield Management

Leo A. Isaac, Forest Geneticist with the U.S. Forest Service, made a 6-year study to determine the proper degree of picking on a sword fern plant to maintain its vigor and productivity.¹ Results of this study are summarized in the following table:

Table 5
Sword Fern Yield Over a 6-Year Period
(Average of Picking Dates Throughout the Year)

Percent of Fronds Picked	Percent Increase or Decrease	
	Number of Fronds	Length of Fronds
Nonpicked		
Control	+24	-17
25	+ 2	-18
50	-18	-22
75	-41	-38
100	-71	-70

Isaac concluded from his study that a 25 to 33 percent pick was about right to maintain the fern plant in a continuously productive condition. He further concluded that picking in late winter or spring had less shock effect on a fern plant than the same degree of picking during the fall or early winter. Besides causing a substantial reduction in number of fronds per plant, shock from overpicking also stunts future growth. Fronds under 25 inches in length have no commercial value.

7. Harvesting Techniques

Fern fronds are too tough and stringy to break off easily by hand. Most professional pickers use a special small, curved knife that is attached to a ring that fits over the finger. Fifty-two near-perfect fronds 25 to 28 inches in length form the "regular bunches," which are the size in greatest demand. A lesser demand exists for "long bunches" containing 22 fronds 31 to 33 inches in length.

The picking season for ferns begins in about mid-June when the new fronds harden off sufficiently to resist wilting. The picking season ends about the latter part of May when the old fronds deteriorate in quality and new fronds begin to develop. The highest price and strongest demand occurs in April and May in preparation for the big Memorial Day market. This is also the time when merchantable fronds are scarce due to winter damage and depletion of supply by previous picking.

Most pickers feel that it does not pay to pick a fern patch unless 25 percent or more of the fronds are pickable quality. Pickable quality

1. Leo A. Isaac, Pacific Northwest Forest & Range Experiment Station, U.S. Forest Service, Forest Research Note 33, "Sustained Yield of Sword Fern," January 24, 1945.

means flat appearance, soft texture, intact leaflets, symmetric shape, sufficient hardening off, bright green color, lack of blemishes, and pollen clusters either lacking or confined to the top 6 inches of the frond. Most fern plants retain 3 years growth of live fronds. The current crop of fronds originate from near the center of the crown, and are most nearly erect. The older fronds originate from near the outer edges of the crown and tend to droop over the ground. Almost all picking occurs on the current crop of fronds.

When to first start picking the new crop of fern fronds is a judgment factor that requires considerable experience. Fronds that are sufficiently hardened off to pick develop a glossy appearance. This stage usually occurs 3 or 4 weeks after the fronds have completed their elongation. Thereafter, picking can continue until the following spring.

Pickers strip the leaves from the lower 3 inches of each frond to form handles for tying. They pick with one hand and stack cut fronds in the other hand until the count reaches 52 fronds. The bunches are then bound at the base by inserting one end of a 18-inch precut

twine between the stems, then making several tight wraps, and pulling the other end of the twine between the stems again. The tips of the tied bunches tend to assume a fan shape, which needs correcting before bundling by shuffling the tips to make a pointed bunch with each frond tip lying directly on top of another. Each bunch weighs about a pound. Rolls are made up from 20 to 25 bunches each. The bunches are placed on a split burlap sack with tops all facing the same way, then rolled up into a cylinder like a sleeping bag. Nail or wire fasteners are used to bind the roll.

The rolls should be delivered to the processor as soon as possible, or arrangements made to have them picked up every day or two during the summer months. Ferns picked on hot, dry summer days are best kept fresh by placing their 3-inch handles in water. For this reason, it is best to pick ferns in the proximity of water courses during hot weather periods. Where streams for water storage are unavailable, the ferns should be stored in a damp, cool location in the woods prior to delivery to a processor. Bunches should also be drained of excess water during rainy periods to avoid spoilage from waterlogging.



Bunches of fern are rolled in burlap and secured with a wire fastener for carrying out of the woods.



Packing sword fern for shipment at the processing plant.

HARVEST OF OTHER FLORAL GREENERY SPECIES

TABLE 6
1. Production of Other Species by States and Areas, 1972

State and Area	Number of Bunches			
	Scotch Broom	Redwood	False Boxwood	Port-Orford-cedar
OREGON Coast	21,000			250,000
CALIFORNIA				
Northern Coast		25,000		
WASHINGTON				
Puget Sound Area	49,000			
Interior Valleys	2,000			
BRITISH COLUMBIA			40,000	
	72,000	25,000	40,000	250,000

The following species are relatively unimportant. Their combined greenery production is only about one percent of that of the "big three" -- evergreen huckleberry, salal, and sword fern combined.

2. Scotch Broom

Scotch broom (*Cytisus scoparius*) is a medium-sized shrub of European origin that has escaped from cultivation. It has become a major brush invader in many open fields and recently clearcut forest land west of the Cascades. It develops slender, erect, ribbed, green-stemmed spikes with tiny trifoliate leaves. The bright yellow, pea-like flowers add a brilliant splash of color to the landscape



The fine-textured upright spikes of Scotch broom lend themselves well to tall floral arrangements.

during early summer. The increase in commercial demand is small but steady. Total production has doubled in the past 5 years due to a current trend toward "spiky-type" foliages which are placed within the bouquet, rather than behind it for background effect.

Scotch broom foliage is picked 30 to 40 inches long. These are made into 2-pound bunches by the processor for shipment. Production is concentrated near the Coast in southwestern Oregon and southern Puget Sound regions. It is also harvested commercially along the East Coast, but the picking season is shorter and the quality is lower than on the West Coast. Scotch broom prefers open sunlight and spreads aggressively in open fields, cutover areas, and open coastal beaches. It thrives on dry, sandy or gravelly sites where other shrubs or trees do not easily become established. Supply far outstrips demand. In fact, eradication of Scotch broom in fields and woodlands is a major problem to many landowners.

3. Coast Redwood

Coast redwood (*Sequoia sempervirens*) grows along the coastal fog belt in northern California and extends a short distance into the extreme southwestern corner of Oregon. The natural preservative qualities and attractive reddish color of the wood make it an important timber tree. Groves of huge trees have been preserved for posterity. They provide world-renowned tourist attractions along the northern California coast.

Redwood boughs are gathered from October to December. Like Port-Orford-cedar, they

are made into 2-pound bunches for shipment. The flattened sprays contain light-green, pointed, yew-like needles. Their principal demand is for Christmas specialties, but they are also in demand for floral arrangement components.

4. False Boxwood

False boxwood (*Pachistima myrsinites*) is a small-leaved evergreen shrub that grows in the mountains of Oregon, Washington, and British Columbia. It somewhat resembles evergreen huckleberry. However, commercial production is limited to British Columbia, where about 40,000 bunches are harvested annually for local consumption.

5. Species in Intermittent Demand

Several other floral greenery species have been marketed commercially at various times in the past. Due to the cyclic nature of demand for various greenery species, it is quite possible that they may again come into commercial demand.

a. Dwarf Oregon Grape (*Mahonia nervosa*) is a short forest shrub with prickly, glossy, holly-like leaves oppositely arranged on the stem. Single stems, 15 to 20 inches in length, are made into bunches of 25 stems each. Principal production areas were near the coast in Washington and northern Willamette Valley in Oregon.

b. Wax Myrtle (*Myrica californica*) is a



Oregon grape is harvested as single stems containing a number of oppositely arranged leaflets. Present demand is quite limited. However, a potential exists for increased usage.

small evergreen tree growing near the Pacific Ocean beaches from Washington to southern California. It produces slender, willow-like, dark green leaves 2 to 4 inches long. Early settlers rendered candle wax from its clusters of whitish to purplish berries. Boughs are cut 20 to 28 inches in length and made into 2-pound bunches for shipment to florists. The principal production areas are Coos and Curry Counties in southwestern Oregon.

GENETIC IMPROVEMENT

Any discussion of genetic improvement of floral greenery species must primarily involve a look into the future rather than an analysis of any substantial progress made to date. The history of man's improvement of any agricultural product began with harvesting wild plants in the forest or field. This statement holds just as true for floral greenery plants as it does for strawberries or carrots. The difference is that high quality strains of strawberries and carrots have evolved from unproductive wild plants over a period of many centuries by means of natural selecting and cross breeding. Today, we are still in the

Middle Ages insofar as genetic improvements of floral greenery species are concerned. A few inquisitive and alert pickers have observed exceptional plants in the wild that combine high productivity with high quality foliage. Fewer still have tried to preserve these unusual plants by transplanting, rooting cuttings, or grafting. Only a small beginning has been made in this direction. Hopefully, reading this paragraph might stimulate more people to seek out and preserve elite plants. This could contribute toward a clone bank in which the numbers of elite plants could be increased by vegetative

reproduction. Eventually, even greater genetic improvements could be realized through selective breeding of these elite plants.

Christmas tree growers have already made a beginning in genetic improvement, and this work may provide incidental benefits to the bough industry. Both products are enhanced by attractive branch conformation, attractive needles, lush growth, dark green color, and natural insect and disease resistance. Several noble fir Christmas tree growers, for example, have reported or preserved in clone banks a number of these "1-in-10,000-type" of trees that combine several desirable traits to an unusually high degree. Many such trees could produce unusually high quality boughs, as well as Christmas trees.

Cedar bough cutters, too, have discovered individual genetically superior trees that produce unusually large yields of high quality boughs. The possibilities for creating well-spaced orchards of elite bough-producing trees by means of cuttings or grafts are indeed intriguing. After all, trees could be sold for timber when they outgrow their capacity to produce boughs in paying quantities.

Evergreen huckleberry is another floral greenery plant with considerable potential for genetic improvement. Several brush pickers in the Puget Sound area have discovered and reported unusually attractive and productive bushes to the writer. They have made the interesting observation that elite bushes

frequently occur in groups of several plants each with identical types of foliage and berries. This suggests the possibility that all these plants started from a single seed — perhaps many hundreds of years ago — and gradually spread out by means of natural layering. Layering is formation of a new plant when drooping branches touch the ground and produce their own root system.

Fortunately, evergreen huckleberry is quite easy to propagate by means of cuttings. Let us suppose that rooted cuttings of elite huckleberry plants were systematically planted under an ideal degree of partial shade provided by a thinned timber stand. We could further assume that all native ground cover would be eradicated to reduce competition to the planted huckleberry. Plants under this type of management could very well produce high yields of superior quality greenery on only a fraction of the area presently required. Carrying this hypothesis one step farther, what might the results be of using a lath house instead of a timber stand to provide the shade? This would eliminate root competition from the trees and further refine the manager's ability to control the amount of shade received by each plant.

These same genetic suggestions could also be applied, of course, to salal or any other greenery species. The only limit is mans' imagination and motivation to collect and experiment with superior plant materials.

**TABLE 7
FLORAL GREENERY SPECIFICATIONS AND PRICES**

Product	Unit	Dry Weight (Pounds)	Length of Pieces (inches)	No. Pieces	Average Price per Bunch 1972*
Huckleberry - regular	Bunch	1-5/8	12-28		35c
Huckleberry - short	Bunch	1	12-20		25c
Huckleberry - red leaved	Bunch	2	15-36		35c
Salal - regular	Bunch	1-5/8	12-28		39c
Salal - short	Bunch	1	15-20		25c
Sword fern - regular	Bunch		25-28	52	24c
Sword fern - long	Bunch		31-33	22	15c
Scotch broom	Bunch	2	30-40		28c
Port-Orford-cedar	Bunch	2	24-28		24c

*Prices shown are approximately average for calendar year 1972. Prices vary a great deal seasonally, depending on a number of supply and demand factors. They also vary from year to year, depending on weather conditions, insect and disease damage, competition with other areas and substitute products, long term demand trends, and the general state of the economy. Therefore, average prices per bunch, as shown, may bear little relationship to current prices being offered at any given time, or in any given marketing area.

CONCLUSION

Picking floral greenery provides about \$2½ million a year to pickers in the Pacific Northwest. Financial and employment benefits are multiplied when the greenery passes through the hands of processors, shippers, wholesale florists and, eventually, retail outlets.

People from many walks of life pick floral greenery on a part-time basis to supplement their regular incomes. Others pick floral greenery as a full time occupation. The work is physically arduous, requires considerable know-how, and exposes the picker to all types of weather. Still most people in this type of work enjoy the independence of working on their own in an attractive forest setting. Satisfying, too, is the knowledge that the products harvested are items of forest beauty that will bring pleasure and satisfaction to all who work with it or savor its final beauty in bouquet arrangements.

We have emphasized the compatibility of managing forests for floral greenery at the same time that they are managed for timber

production. It can be truthfully said that good timber management will create a forest environment that will enhance the production of floral greenery. This is a striking example of multiple use forest management, and the same principles of compatibility apply, whether the forest is a large corporate tree farm or a small woodlot owned by a farmer or an absentee city dweller.

Species preferences by floral designers gradually change over the years like women's dresses or men's neckwear. A certain species may reach a peak of popularity, then cycle out of favor only to reappear strongly on the market some years later during a revival trend. But floral greenery, per se, is unlikely to go out of style. A wedding bouquet that brightens the eyes of a newlywed couple today will serve the same heartwarming purpose 50 years from now during their golden wedding anniversary. Floral arrangements always have been and likely always will be, an integral part of our heritage.

DISCLAIMER STATEMENT

The use of trade, firm, or corporation names in this publication is for the information and convenience of the reader. Such use does not constitute an official endorsement or approval by the U.S. Department of Agriculture of any product or service to the exclusion of others which may be suitable.

PESTICIDE PRECAUTIONARY STATEMENT

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key — out of the reach of children and animals — and away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of draft, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first-aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you use for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary land-fill dump, or crush and bury them in a level, isolated place.

NOTE: Some States have restrictions on the use of certain pesticides. Check your State and local regulations. Also, because registrations of pesticides are under constant review by the Federal Environmental Protection Agency, consult your county agricultural agent or State extension specialist to be sure the intended use is still registered.

