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The Woodland Workbook

Stand Management

Growing Eucalypts in Western Oregon

Why should eucalyptus trees be planted in Oregon, where we have some of the best timber species in the world? Some 90 nations of the world have asked themselves the same question and found good reasons to introduce trees of this genus. The eucalypts as a group are the most widely planted forest trees and in the greatest numbers of any forest trees in the world (figure 1).

Eucalypts have been grown, and are growing, at several locations in western Oregon. A number of species have been tried, some for up to 10 years. This publication collects this experience together. We cannot yet make firm recommendations, but this publication may help you decide:

1. if eucalypts are trees you want to grow,
2. what you might grow them for, and
3. with our current level of knowledge, what species or group of species best fits your goals and growing conditions.

If your site is in eastern Oregon or in any heavy snow or frost zone, eucalypts are not for you.

Around the world, "eucalypt" is the usual common name for members of the tree genus *Eucalyptus*. In the United States, "eucalyptus" is sometimes used as a common name. In this publication, we have tried to

Figure 1.—In Bridge, Oregon, *E. nitens* at 7 years old.

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stay with the most universal name, eucalypt.

Why eucalypts?

Eucalypts are native only to Australia and a few nearby islands. The approximately 500 known species have native habitats that range from the tropics to the alpine regions of Australia and the island of Tasmania. Unfortunately, those that are cold-resistant are the slower-growing species and have not been used extensively for lumber products. So little is known of their growth habits and potential. Many countries have planted eucalypts because they can provide a crop of fuel wood for energy generation in as few as 6 to 10 years. Most species do not have to be replanted for several crop rotations because they sprout from the stump.

Some 30 other uses of eucalypts have been developed. Some industrialized nations, particularly Spain and France, have converted large areas of native pine forests to *Eucalyptus* species for the production of rayon, pulp, hardboard, and fuel for electrical generation. Such conversions are for economic reasons. Short rotations of 6 to 15 years contrast with 60 or more years for their native pines and other conifers.

Do eucalypts have potential in Oregon? So far, the main interest has been in their use for firewood. A couple of the most frost-hardy species are used as floral decorations. Other potential uses include pulp, hardboards, or wafer board.

Growth rates

Eucalypt species differ widely in growth rate and maximum size. In Oregon, some eucalypts have a maximum height around 30 feet (figures 1 and 2). Some reach 30 feet at 10 years of age, and are still growing rapidly. In their native habitat, some can grow to over 200 feet. Some of the naturally smaller species have grown larger in Oregon, California, and Florida than they do in their Australian homeland.

Figure 2.—5-year-old *E. delegatensis* cut 4½ feet above ground; grown near Reedsport on the Oregon coast.

Table 1 lists some of the eucalypt species that have been planted in western Oregon and describes what has been learned so far. The blank places in the table indicate there are many things we do not yet know.

The growth of trees for up to 10 years gives some idea of their growth potential in Oregon (figure 3). Note that some have slowed in growth relatively early while others have grown rapidly for as long as they have been observed. Native red alder is shown for comparison.

Much less is known about diameter or volume growth of eucalypts here. Some diameter figures are given in table 1.

Cold tolerance

Cold tolerance is a critical criterion in species selection. There are some very frost-tolerant eucalypts. Unfortunately, the more cold-hardy trees have a shorter mature height. Most of the timber-producing species tried so far have had serious freeze damage in some locations in Oregon. A eucalypt grower must always make this tradeoff between size and cold tolerance by examining the local climate, the risk of freezing that is acceptable, and the growth rate of the trees.

Table 1 gives a cold-tolerance rating and a minimum temperature for survival. The cold-tolerance rating is simply a comparison among the species. The minimum temperatures are only those that have been observed so far. Some of these species may have lower minimums.

The low temperature limits are, in fact, quite variable: If a low temperature is approached gradually over a period of many days, the low temperature may do no harm; on the other hand, if the temperature drops abruptly after a period of mild temperatures, damage or death can result. Wind can make the damage worse.

The December 1983 freeze saw temperatures in many areas suddenly drop to 10°F or less, resulting in complete kill of some trees in some locations. Many others of some species received severe damage (top killed back to the ground but resprouted, figure 4), but a few showed no damage at all.

Table 1.—A summary of experience with the most promising *Eucalyptus* species grown in Oregon (*E. grandis,* a common California eucalypt, is included for contrast)

Species	Cold tolerance	Low temperature limit (°F)[a]	Susceptibility to browsing	Basal sprouts[b]	Growth trials in Oregon			
					Location[c]	Age (years)	Height	Stem diameter (inches)
E. archeri	High	2	High	Yes	W.V.	4	23	—
					W.V.	8	34	9.8
E. camphora	High	8	Medium	Yes	—	—	—	—
E. coccifera	Medium	10	—	No	W.V.	4	23	—
E. dalrympleana	Medium	10	Low	Yes	Coast	5	27	5.7
					W.C.	3	18	2.3
					W.V.	3	28	—
E. delegatensis	Medium	10	Low	No	Coast	5	36	6.0
					W.C.	6	34	3.2
					W.V.	4	24	—
E. divericata	High	5	High	Yes	W.C.	3	19	1.8
E. glaucescens	High	2	Low	Yes	W.C.	5	23	2.4
E. grandis	Low	24	—	Yes	—	—	—	—
E. gunnii	High	2	High	Yes	Coast	5	23	2.9
					W.V.	3	20	—
					W.V.	4	26	—
E. irbyi	High	5	—	Yes	W.C.	2	7	0.8
E. niphophila	High	10	—	Yes	W.V.	8	22	12.0
					W.V.	10	18	—
E. nitens	Med-low	16	Low	No	Coast	5	31	5.8
					W.C.	5	16	2.6
					C.C.	4	22	3.0
E. nova-anglica	Med-low	16	—	Yes	W.V.	2	7	—
E. pauciflora	Med-low	16	Medium	Yes	W.V.	4	17	2.3
E. perriniana	Med-low	16	—	Yes	W.V.	7	38	7.0
E. subcrenulata	Med-low	16	Medium	Yes	W.V.	4	25	—
E. urnigera	High	5	Low	Yes	W.V.	4	23	—
					Coast	5	23	2.8
					W.C.	6	34	3.5

[a] An abrupt temperature drop to a temperature higher than that listed can be fatal.

[b] Some species listed as not sprouting may sprout following a harvest. They did not resprout following freezes.

[c] W.V., Willamette Valley; Coast, Reedsport; W.C., Willis Creek, Roseburg area; C.C., central Coast Range, Nashville.

Browsing damage

Incidence of deer browsing varies greatly among species (figure 5). If your planting area is likely to be frequented by deer, choose a less susceptible species. Control of browsing can be accomplished with rigid mesh tubes or by applying a repellant like BGR to the leaves. Because eucalypts grow most of the year, repeated applications are required until the tree is beyond reach of deer.

Nothing is known about the preferences of elk or mountain beaver. Sheep eat most species.

Sprouting

Cut or top-killed trees of most species resprout around the stump or from a lignotuber, a swelling of the stem seen in many species at or below ground level (figure 6a). Resprouting may be immediate or take up to a year—so be patient.

This sprouting habit means that replanting is not necessary after each harvest. Eucalypts are planted once and, after harvest, resprout to grow a new tree. For all but the least cold-tolerant, this helps ensure that a plantation will not be lost during a cold winter. Most freezes kill only the aboveground stem (figure 6b). Frost-killed trees usually can be harvested and the stump left to resprout.

Eucalypt products

In the immediate future, the only foreseeable use for eucalypts in Oregon is firewood. If experience elsewhere in the world is a guide, eucalypts may eventually have a place in Oregon's pulp and paper industry. At least one Oregon company already imports some eucalypt pulp, and pulping tests of Oregon-grown eucalypts show that they do have desirable characteristics.

It may be possible to raise eucalypts for firewood in Oregon. It grows in dense stands, so production rates are high. Most eucalypts sprout, so they need not be replanted. Wood density and heat content are high (about equal to oak for the species tested so far), so the market demand could be high.

The shortcoming, cold tolerance, is less important since rotations can be short. An acceptable size tree can be grown in the period of years between most major freezes. Trees would be harvested in the year they freeze. Eucalypts require thorough seasoning to remove the moisture in the wood.

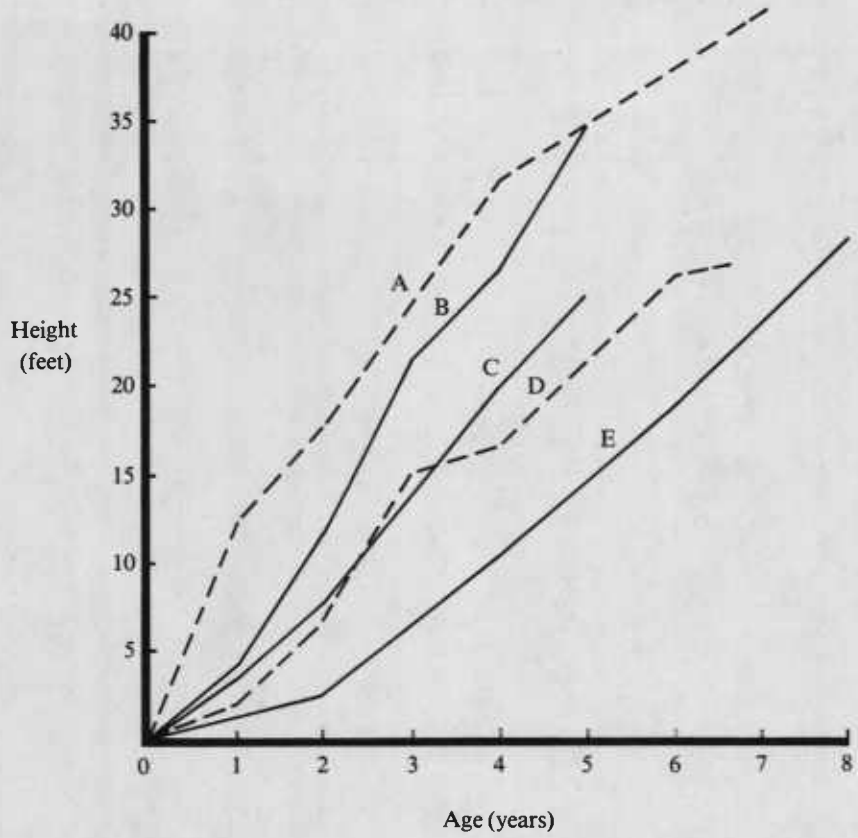

Figure 3.—This graph shows how four eucalypt species have grown in Oregon (red alder is shown for comparison): A, *E. perriniana* (Willamette Valley); B, *E. delegatensis* (coast); C, *E. gunnii* (coast); D, *E. niphophila* (Willamette Valley): E, red alder (coast).

Species recommendations

Four factors are critical to selecting a species:

1. high cold tolerance,
2. ability to sprout,
3. low susceptibility to browsing, and
4. fast growth.

The species that come closest to meeting these criteria in Oregon so far are *E. glaucescens, E. irby,* and *E. urnigera* (figure 7). If browsing can be controlled, *E. archeri, E. divericata,* and *E. gunnii* are also good choices. Beyond these six species, the risks of frost damage or unknowns of growth or browsing damage increase greatly. If you are adventurous and live near the coast, *E. dalrympleana, E. nitens, E. delagatensis,* and other species with a fast growth rate and moderate cold tolerance may be choices.

Eucalyptus seed can come from anywhere within the natural range of each species. Oregon's eucalypt growers do their best to keep records on where the seed comes from. However, uncertainty about source means that, even within species, different seed lots and the seedlings they produce can be very different in growth rate, frost tolerance, etc.

In addition, there appears to be great variability within a seed lot in these same characteristics, much more variability than is usually seen in North American trees. This variability has resulted in situations where entire plantations of eucalypts have been killed by frost, even the root system, except for a very few individuals that appear completely unaffected by the cold. Efforts are underway to root stem cuttings from these special trees. Such variation provides tremendous opportunity for genetic improvement.

Management recommendations

No one has managed eucalypts in Oregon as stands of trees. Many people in the other parts of world have done so, however. Combining their experience with what we know about eucalypts in Oregon does allow us to make some management recommendations.

Because eucalypts are evergreen (keep their leaves all year), containerized seedling care and planting practices have some similarity to those of Oregon conifers. Planting is usually done in late winter and early spring, but containerized stock can be planted any time of year if sufficient moisture is available.

You must take greater care than you would with conifers to prevent overheating or drying out. This care is particularly important because the eucalypts are never really dormant. Twigs are succulent and use lots of water. Bare-root seedlings require even greater care. Keep seedlings moist and humid and plant them the same day they are dug.

The site requirements and site tolerances of eucalypts in Oregon are not known. In addition, there has not been enough experience with the species planted in Oregon to

Figure 4.—5-year-old *E. delegatensis* killed by winter cold. This species is not a good sprouter.

Figure 5.—3-year-old *E. gunnii* after repeated browsing by deer. This species is especially susceptible to browsing.

know if the site tolerances in their native habitats will hold up here. Eucalypts in plantations around the world have shown wide site adaptability. However, moist, fertile, deep, and well-drained soils are always good tree-growing sites. As you move away from this ideal, the chances for problems and/or growth reductions increase.

Good weed control is essential for establishment of eucalypt plantations. The payoff in increased seedling survival and tree growth is great. Since eucalypts are sensitive to most common herbicides, weed control must be accomplished before planting.

Tests of herbicides for weed control in established plantations are continuing in the U.S.—*but no chemical is labeled specifically for eucalypts*. Some herbicides are being used for this purpose in other countries.

Planting density should be 8 × 8 feet to 10 × 10 feet. Species with a small mature size can have a closer spacing, about 6 × 6 feet. The short rotations for eucalypt management, 8 to 15 years, means that thinnings are not practical.

Eucalypts respond well to nitrogen fertilization and, on some soils, to phosphorus. Because growth is rapid and continues throughout the year, two applications over the year are made in some commercial plantations. In New Zealand, the recommended application is 75 pounds per acre of urea at each treatment in bands on either side of the planting row.

Use herbicides safely:

- **Wear protective clothing and safety devices** as recommended on the label. Bathe or shower after each use.
- **Read the herbicide label**—even if you've used the herbicide before. Follow closely the instructions on the label (and any other directions you have).
- **Be cautious** when you apply herbicides—or any other pesticides. **Know** your legal responsibility as a pesticide applicator. You may be liable for injury or damage resulting from pesticide use.

Figure 6a.—Stump sprouts of *E. glaucescens*. Juvenile leaves are silver-dollar-shaped and are used for floral decorations. Mature leaves become elliptic (long and narrow).

Figure 6b.—*E. nitens* top-killed from frost at 5 years of age. Note stem sprouting 1 year later. This tree and the tree of figure 1a are in different locations.

Harvest in most species is followed by dense sprout regrowth. Reducing the number of sprouts from a stump to about three in the second year will increase the diameter growth on the remaining stems. Left alone, sprout clumps thin themselves, but the process takes several years.

A eucalypt stand originating from sprouts is managed just like a seedling stand. We think that three to four rotations are possible before replanting is necessary.

Summary

Experience with *Eucalyptus* species in Oregon is limited. The growth rate and product potential of eucalypts make trials attractive, but large-scale plantings are a risky venture in the current state of knowledge.

Critical factors to consider in selecting species are cold tolerance, sprouting habits, browse susceptibility, and growth rate. No species of *Eucalyptus* meet all of the desirable requirements for western Oregon. Some come closer than others. However, anyone managing eucalypts must be prepared for frost, browsing, or soil-site problems. These uncertainties of survival and growth must be balanced with a flexible management and harvest system. Only then can the advantage of the high growth rate outweigh the disadvantage of these uncertainties.

Additional sources of general information about eucalypts are listed under "For further reading." These sources are all not specific to the United States, let alone Oregon. See the important note about their availability.

If you have additional questions, consult the OSU Extension forestry agent who serves your county.

For further reading

Your public librarian can obtain copies of these titles through the Inter-Library Loan system. Mention to your librarian that *all* of these titles are available at Oregon State University's Kerr Library.

Establishing Eucalypts, What's New in Forest Research No. 107 (Rotorua, New Zealand: Forest Research Institute, 1982).

Eucalypts: Species Choice and Site Requirements, What's New in Forest Research No. 124 (Rotorua, New Zealand: Forest Research Institute, 1984).

Geary, T. F., G. F. Meskimen, and E. C. Franklin, *Growing Eucalypts in Florida for Industrial Wood Production,* U.S. Forest Service General Technical Report SE-23 (Asheville, NC: Southeastern Forest Experiment Station, 1983).

Hillis, W. E., and A. G. Brown, *Eucalypts for Wood Production* (Adelaide, SA, Australia: Commonwealth Scientific and Industrial Research Organization, 1978).

Interplanting, What's New in Forest Research No. 121 (Rotorua, New Zealand: Forest Research Institute, 1983).

Jacobs, M. R., *Eucalypts for Planting,* FAO Forestry and Forest Product Studies No. 11 (Rome, Italy: Food and Agriculture Organization of the United Nations, 1981).

Standiford, R. B., and F. T. Ledig, editors, *Proceedings of a Workshop on "Eucalyptus" in California,* U.S. Forest Service General Technical Report PSW-69 (Berkeley, CA: Pacific Southwest Forest and Range Experiment Station, 1983).

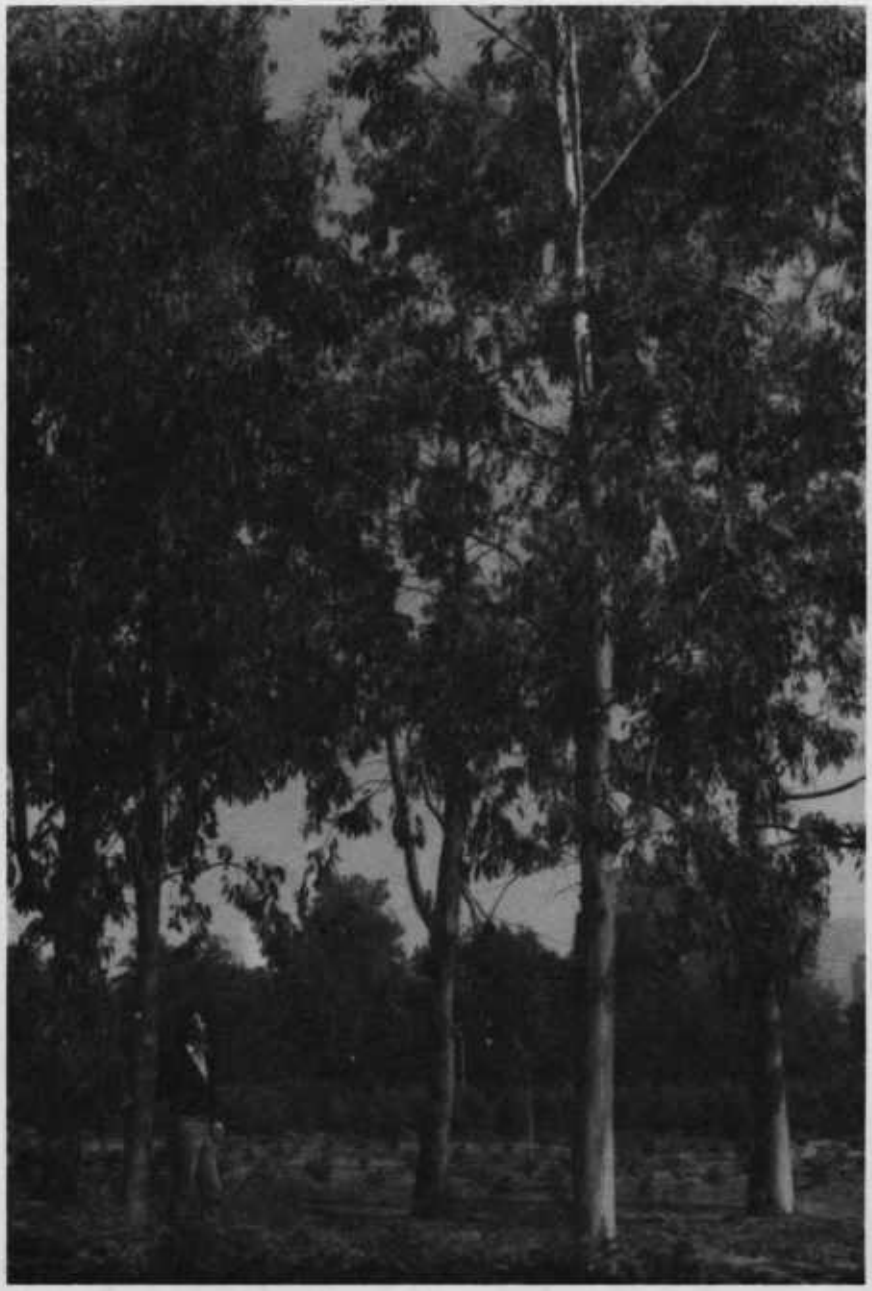

Figure 7.—9-year-old *E. glaucescens.* Trees grow fast on this rich, moist bottom-land site near Roseburg, Oregon.

The Woodland Workbook is a collection of publications prepared by the Oregon State University Extension Service specifically for owners and managers of private, nonindustrial woodlands. They provide useful information of long-range and day-to-day value.

The *Workbook* is available in a 3-ring binder that organizes these publications in 10 sections. For information about how to order, and for a list of titles and prices, write Bulletin Mailing Office, Oregon State University, Corvallis 97331—or inquire at the office of the OSU Extension Service that serves your county.

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