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# farm forestry

## 4-H farm forestry project
## Divisions III and IV

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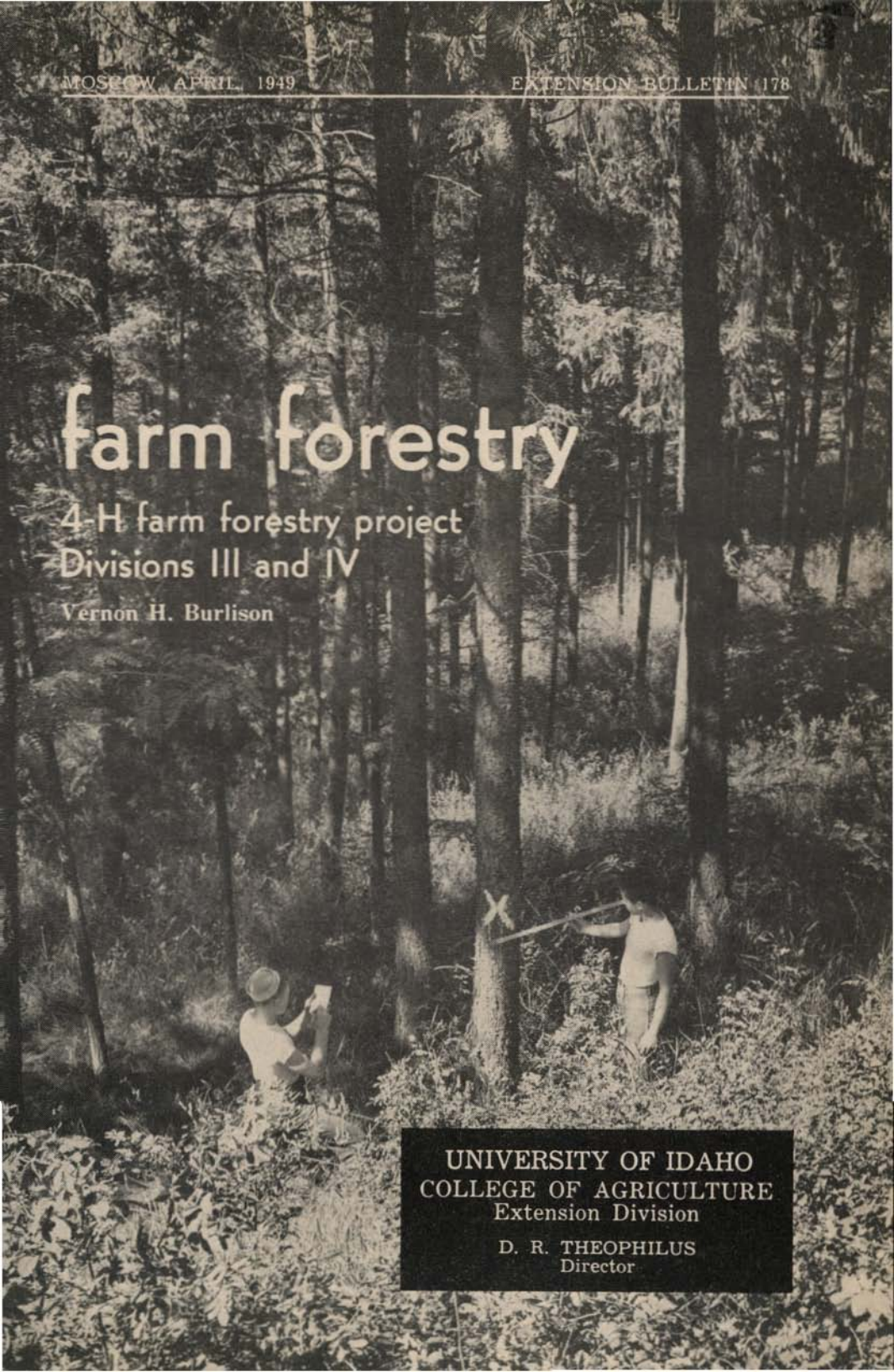

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COLLEGE OF AGRICULTURE
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# Introduction

This handbook presents the project requirements for Divisions III and IV of 4-H Forestry Club work and instructions for any of you who may want work beyond the Fourth Division. Before you start your project, study these instructions carefully with your leader. This will make the work easier and more enjoyable. See the list of helpful publications on page 27.

**Division III—Range and Recreation Appreciation**

In Idaho are vast tracts of publicly owned land used as national and state forests, state parks, federal and state grazing lands, wildlife refuges, and game preserves. Our welfare depends in part upon wise use of these lands.

We manage these public lands so that the greatest number of people can benefit from their continuous or sustained yield of wildland products. The uses and products which woodlands give us must be in balance with their sustained productive capacity. Sustained-yield management does not always produce the greatest immediate return from forests or other wildlands but results in the greatest long-time return. Only by such management can we continue our forest industries into the years ahead.

Our wildlands furnish lumber and other wood materials, livestock and wildlife forage, and water storage. They also provide us with some of our finest recreation.

Grazing is one of the chief values of the wildlands of southern Idaho and, to some extent, in northern sections. We will devote most of our time in Division III to a study of range management and recreational developments on public lands.

# Division III Requirements

1. Learn the accepted common names of 15 range plants and be able to identify them.
2. Collect and mount specimens of 10 range plants. Indicate their relative palatability and other values in range management.
3. Collect 2 pounds of tree seed. Plan a farm tree planting and prepare a planting site.
   Alternative: Make and use a cruiser's stick.
4. Write at least 300 words concerning the values of wildlife.
5. Complete at least three problems listed under "optionals."
6. Prepare and exhibit a window display that is concerned with some phase of range, game or recreation management.
   Alternative: Organize a demonstration on some phase of range, game, or forest recreation management. Enter the demonstration contest at your county fair.
7. Display your work at a club fair or community exhibit.
8. Keep your record book complete.

**REQUIREMENT NO. 1:** Learn the accepted common names of 15 range plants and be able to identify them.

**Overgrazing reduces forage production. Range inside the fence is in fine condition after 4 years' protection. Properly grazed it will support livestock for many years.**

**INSTRUCTIONS:** Learn the names of at least 15 range plants in your locality. Find out which plants make good livestock feed and which are poor forage plants. Study the plants so you can identify them.

To avoid confusion which often results from the use of common names, scientists have devised a scientific system of naming plants. Learn the scientific names as well as the common ones. In an attempt to standardize the common names, scientists have assigned a common name to each plant. The name should apply to it only. In spite of this effort, some plants have more than one common name. In other instances, the same common name may apply to several plants.

The first step toward good range management is acquaintance with range plants. We use this knowledge as a basis for special grazing practices and to tell whether the range is improving or deteriorating. We use it to recommend how many and what kind of animals should graze an area. By it we know what season of the year is best for grazing a range.

**REQUIREMENT NO. 2:** Collect and mount specimens of 10 native range plants. Indicate their relative palatability or other value in range management. These should not be duplicates of specimens that may have been collected under Optionals 13 and 14 in Divisions I and II.

**INSTRUCTIONS:** Follow a procedure similar to that for collecting and mounting tree specimens. For each specimen at the time of collection, record the name, date, place and a short description of where you found the plant growing. Transfer this to your mount cards later.

The size of many range plants will permit collection of the entire plant. If they are too tall, bend the stems into a V, N, or M shape to make them fit on the card. Arrange the specimen so that characters useful in identification will show. It is best to shape the plant in your press as you desire it to appear on the mount card. Avoid bending at nodes or joints as this often results in breaking the stem.

Tubers, bulbs, or thick stems press better if they are split in half. This also exposes inner structures that are often useful in identification. Handle poisonous plants such as water hemlock (*Cicuta* species) with care. Even after drying, the poisonous parts of such plants will often remain dangerous for years. Remember to watch succulent plants closely while they are in the press. Change the papers often enough to prevent molding.

**REQUIREMENT NO. 3:** Collect 2 pounds of tree seed, plan a farm tree planting and prepare the planting site.

Alternate: Make and use a cruiser's stick.

**INSTRUCTIONS: A. Tree Seed Collection**

The University of Idaho School of Forestry will trade you trees for seed. Because 4-H seed collection must be coordinated with the seed requirements of the University nursery, write to the extension forester about your tree seed assignment before you begin collecting. If you have preferences as to the species in Table 1, Operating A Farm Tree Nursery, call them to his attention. He will then assign one or more species that are locally available for your collection work. In the list below, opposite the species most commonly available, are the amounts of pods, cones or other fruits for which the School of Forestry will exchange 100 seedling trees:

| | |
|---|---|
| Black locust | 15 lb. of pods |
| Green ash | 5 lb. samaras |
| Siberian elm | 2 lb. samaras |
| Russian olive | 5 lb. fruits |
| Rocky Mountain and common juniper | 3 lb. berries |
| Ponderosa, western, white and lodgepole pine | 1 bu. cones |
| Blue and Norway spruce | 1 bu. cones |

Make collecting easier by planning beforehand and attacking it with the right method and equipment. A garden rake is a good tool for collecting cones, nuts, pods or other large seed-bearing fruits. Two persons pressing two rakes together in a combing operation can collect black locust and green ash seeds easily. Any scheme to get the seed without the collector's climbing the tree is safer and usually much faster.

Collect seed only from healthy, well-formed trees of medium age. Be sure the seed is fully mature. You can determine maturity by size, color, and natural falling of the fruit. You can also determine it by cutting open some seeds to see whether the inner seed material is plump and well developed. Collect cones before they open; otherwise you will lose much seed from shattering.

The care that seeds receive after collection definitely affects their ability to sprout or germinate. Different species require different care for best germination. A cool, dry place is suitable for storage of most seeds. Refer to Operating A Farm Tree Nursery for more information. Give the seeds the best possible care while you have them.

When you have collected your forest seeds, make entries requested in your record book. Send the seeds at once to the exten-

sion forester. Enclose a tree seed certificate for each species. Write the forester a letter listing the species you want for your tree planting. He will enter your order for trees with the Forestry Department.

**B. Planning a Farm Tree Planting and Preparing the Planting Site.** Decide first upon the purpose of your planting and the space you will need. You can plant in a square block or make it conform to the irregular borders of an uneven-shaped plot. Design every windbreak to give shelter from wind to the area needing protection.

The recommended spacing for woodlot trees on irrigated land is 6 by 6, 9 by 9 feet on dry land. Plant your trees with regular spacing so you can cultivate them in two directions. You will need 1,210 trees for one acre if you space them 6 by 6 feet. With 9 by 9 spacing, it takes 540 trees for an acre. For information on planning a windbreak, see *Tree Planting Stock,* University of Idaho School of Forestry Nursery Catalogue, or *Windbreaks for Idaho Farms* by Gilbert B. Doll.

Give the ground on which you intend to plant your windbreak or woodlot the same thorough soil preparation as for corn, potatoes, or any row crop. We believe fall plowing is best. On dry land sites, especially in southern Idaho, summer fallow the ground the year before planting.

**C. How to Make and Use a Cruiser's Stick.** Make the stick from straight grained, well seasoned wood. Hardwood will last longer. Make it according to the dimensions given in Figure 1. Sandpaper the surfaces smooth and use a pencil to mark the scales. Apply one or more coats of clear varnish or shellac to protect the scales against dirt and scratches.

The graduations on the B scale are 1 inch apart. Table 1 below gives log volumes in board feet for diameters up to 37 inches. Drop the final cipher in each number when putting the values on your stick.

**Table 1.—Volumes for 16-foot logs of different diameters. Scribners Decimal C Log Rule**

| Diameter (inches) | Volume (bd. ft.) | Diameter (inches) | Volume (bd. ft.) | Diameter (inches) | Volume (bd. ft.) |
|---|---|---|---|---|---|
| 6 | 20 | 17 | 180 | 28 | 580 |
| 7 | 30 | 18 | 210 | 29 | 610 |
| 8 | 30 | 19 | 240 | 30 | 660 |
| 9 | 40 | 20 | 280 | 31 | 710 |
| 10 | 60 | 21 | 300 | 32 | 740 |
| 11 | 70 | 22 | 330 | 33 | 780 |
| 12 | 80 | 23 | 380 | 34 | 800 |
| 13 | 100 | 24 | 400 | 35 | 880 |
| 14 | 110 | 25 | 460 | 36 | 920 |
| 15 | 140 | 26 | 500 | 37 | 1030 |
| 16 | 160 | 27 | 550 | | |

Graduate the D scale by using Table 2. For the diameters listed, measure off the corresponding distances from the zero end of the

stick. The other scales are explained in Figure 1. Place all scale markings as accurately as you can. The reliability of the stick will depend upon careful work.

**Table 2—Graduating distances for laying off a scale on a Biltmore stick up to 60-inch diameter.**

| Diameter, inches | Graduating distance, inches | Diameter inches | Graduating distance, inches | Diameter inches | Graduating distance, inches |
|---|---|---|---|---|---|
| 4 | 3.70 | 20 | 14.91 | 42 | 25.66 |
| 5 | 4.56 | 22 | 16.05 | 44 | 26.49 |
| 6 | 5.39 | 24 | 17.14 | 46 | 27.30 |
| 7 | 6.19 | 26 | 18.20 | 48 | 28.09 |
| 8 | 6.96 | 28 | 19.23 | 50 | 28.87 |
| 9 | 7.72 | 30 | 20.23 | 52 | 29.63 |
| 10 | 8.45 | 32 | 21.19 | 54 | 30.37 |
| 12 | 9.86 | 34 | 22.13 | 56 | 31.11 |
| 14 | 11.21 | 36 | 23.05 | 58 | 31.83 |
| 16 | 12.49 | 38 | 23.94 | 60 | 32.54 |
| 18 | 13.72 | 40 | 24.81 | | |

The cruiser's stick is not designed for exact measurements. But you can use it to make reliable estimates of standing timber. Follow the instructions in the use of your stick to make your results more accurate.

You will find many uses for the inch scale. Opposite this scale is the one for board-foot volumes of 16-foot logs. To scale a log, place the stick across the small end of the log as if to measure its diameter inside the bark. Read on the scale the figure which falls on the inside bark line. If the line of inside bark falls halfway between two numbers, average them for a more accurate volume estimate. When a log is not round in cross section, take an average

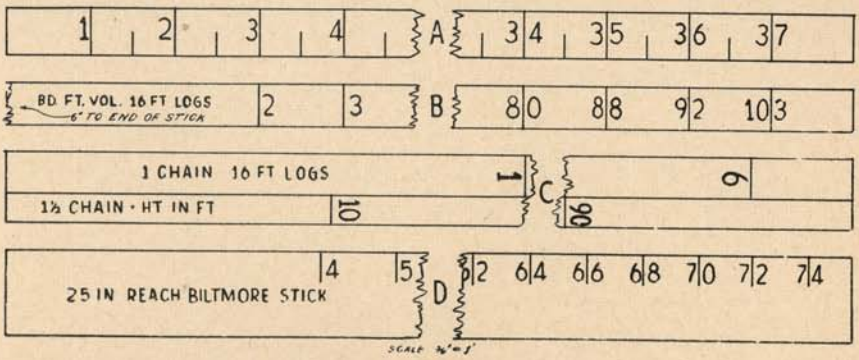



**Figure 1.—Dimensions and scales of a cruiser's stick.**

**A. Bevelled face. Inch scale.**

**B. Scale for board foot volumes of 16-foot logs. Divisions at 1-inch intervals, starting at 6 inches. Scribner Decimal C Log rule. See Table 1.**

**C. Merritt Hypsometer scales. Top or left-hand scale divisions at 6.06-inch intervals. Lower scale divisions at 2.53-inch intervals.**

**D. Scale for estimating diameters of standing trees. See Table 2 for division spacings.**

of the long and the short diameters. Remember this scale is only for 16-foot logs. The volumes given on it are according to the Scribner Decimal C Log Rule which is the official rule for Idaho.

Unless otherwise specified, tree diameters are taken at 4½ feet. This is known as diameter-breast-high or its abbreviation, "d. b. h." To estimate the d. b. h. of a tree, use the Biltmore scale. Hold the stick in horizontal position against the bark 4½ feet above the ground and 25 inches from your eye. Sight evenly across the zero end to the outer bark on one side of the tree. Then sight to the other side and read the number where your line of sight crosses the scale.[1]

The hypsometer scales are for estimating total tree height, or the merchantable height in number of logs. To use either scale, hold the stick in a vertical position 25 inches from the eye. This distance is important. If you are estimating the number of 16-foot logs in a tree, then stand 66 feet (1 chain) from its base. Hold the stick so its bottom is flush with your line of sight to stump height or about 18 inches up on the tree. Then sight along the left edge of the stick to the point on the tree where you believe the top of the last log will come. Read the figure that falls directly on, or just below, the line of sight. To use the right-hand scale, follow the same method described above, but stand 1½ chains (99 feet) from the tree. For total height direct your line of sight to the base of the tree, then to the topmost point. Save yourself time by measuring off distances of one chain and 1½ chains and practice pacing them until you know how many paces to take for each.

Use the cruiser's stick to estimate the d. b. h., total heights and number of 16-foot logs for 10 trees.

**REQUIREMENT NO. 4:** Write a discussion of at least 300 words concerning the values of wildlife.

**INSTRUCTIONS:** Rather than making your paper too inclusive, let it be concerned with one or only a few of the specific values of wildlife. You may confine your discussion to wildlife of Idaho. Write in ink on standard size (8½ inch by 11 inch) theme paper or use a typewriter. Keep the finished paper with your record book. Below are a few suggested topics. These are examples only. You may select one of them or a similar topic of your own.

The value of upland game birds in insect control.
Recreational value of big game animals.
How we benefit from song birds.
Wild animals for food.
Furs and skins from wild animals.

**REQUIREMENT NO. 5:** Complete at least three problems listed under optionals.

**REQUIREMENT NO. 6:** Prepare and exhibit a window display that is concerned with some phase of range, game or forest recre-

1 Mattoon and Barrows, MEASURING AND MARKETING FARM TIMBER, p. 22. U. S. Dept. Agr. Farmers' Bull. 1210. 1940.

**Forests and other wild lands furnish food and cover for many kinds of wildlife.**

ation management. Be prepared to answer questions concerning your exhibit.

Alternative: Organize a demonstration on some phase of range, game, or forest recreation management. Enter the demonstration contest at your county fair.

**INSTRUCTIONS: A. Exhibit.** The exhibit is a desirable method for presenting an idea in a clear and interesting form. Choose your idea. then plan and construct your exhibit to present the idea clearly and forcefully. Here are some suggested topics for exhibits.

Plants used for reseeding range lands in Idaho.
The effects of overgrazing on range plants.
Desirable food and cover plants for pheasants.
Big game animals of Idaho and their distribution.
Winter recreation in the forests of Idaho.

Display your exhibit in a show window of some business establishment during a community exhibit or club fair. These displays will be judged in competition with one another. Contestants must accompany the judge on a tour of the displays and answer questions concerning their respective exhibits. Judging is on the basis of your exhibit's neatness, how well your exhibit presents the theme you selected and your ability to answer question concerning it.

**B. Demonstration.** You may wish to organize a demonstration rather than prepare an exhibit. If so, then select some topic which you believe could be made the theme of an effective demonstration. Your theme must be related to range, game, or recreation management. Here are a few suggestions.

How to construct a salting station for cattle.
How to construct a storage dam for livestock water.
How to make a winter feeding station for birds.
Proper clothes for a summer outing on forest land.
Proper care of a campground.

After you have chosen a topic, get the materials you will need. Work out a detailed plan for your presentation and enter the demonstration contest at your county fair. Your demonstration will be judged in competition with others from the various 4-H Clubs in the county.

Sometimes two 4-H foresters working together can present a demonstration more effectively than one working alone. If you prefer to work with another club member as a demonstration team, both of you can receive credit for this requirement.

**REQUIREMENT NO. 7:** Display your work at a club fair or community exhibit.

**REQUIREMENT NO. 8:** Keep your Record Book complete.

# Division IV — Farm Forestry

During recent years farm forestry has become popular. It includes tree planting for windbreaks, woodlots, erosion control, and wildlife conservation. Management of farm woodland areas, as well as the closely related fields of marketing, wood preservation, tree seed collecting, and woodland protection come under the meaning of farm forestry. Briefly, it refers to all forestry principles practiced on farms. In addition, there is another tie-up between farming and forestry. Nearly all irrigated lands of Idaho are dependent upon forested watersheds for a steady supply of water. Unless we practice good management on these watershed areas, the fertile, irrigated farms can easily become desert again.

Division IV is designed to acquaint you with tree planting. It will help you recognize some harmful forest insects and diseases and to understand better the principles of tree growth. It will give you a deeper appreciation of how valuable watersheds are to irrigated regions. Upon proper completion of this division, you will be well enough acquainted with many forestry practices to put them to use on your farm. You will appreciate the advantages of trees on the farm, as well as all the privileges offered you on national, state, and other forest lands. Make forestry useful to you on the farm, in the mountains, or on the range. Ask for help whenever you need it. Your local forest ranger, county extension agent, or the extension forester will be glad to help you.

## Requirements Division IV – Farm Forestry

1. Plant and care for at least 100 trees.
   Alternative: Cruise at least one-quarter acre of timber.
2. Manage a portion of a farm woodland, windbreak or woodlot.
   Alternative: Collect, identify, and mount six examples of harmful forest insects, fungi, or mistletoes and/or examples of the damage they do. Write a brief statement on the damage each of these pests does.
3. Write an essay on the influence forest and range management has upon supply of irrigation water and water for other uses.
4. Complete at least three optional requirements.
5. Prepare and exhibit a window display on farm forestry.
   Alternative: Organize a demonstration on some phase of farm forestry and enter in the demonstration contest at your county fair.
6. Exhibit your work at a club fair or community exhibit.
7. Keep your record book complete.

**REQUIREMENT NO. 1:** Plant and care for 100 trees.
Alternative: Cruise at least one-quarter acre of timber.

**INSTRUCTIONS: A. Tree Planting.**

**Site Preparation.** If you plowed your ground in the fall, it is not necessary to plow again in the spring. Plow it in the spring well

in advance of planting time if you did not plow in the fall. After plowing, work the ground down to make a firm seed bed. To break up crust or clods and free the area of weeds, cultivate the ground lightly just before planting. Find out from your club leader when you can expect your seedlings and try to have your ground ready when they arrive.

**Heeling In.** If it is bad weather or your planting site is not ready when your seedlings arrive, heel them in until you are ready to plant. In a shaded spot where you can keep the soil moist, dig a short trench as deep as the roots are long. Place the trees in the trench (Figure 2) and cover the roots immediately with moist soil. If the soil is at all dry, pour water in the trench and moisten the soil that you place around the roots. The trees will show better response if you move them to their permanent locations before the buds open and they begin growth.

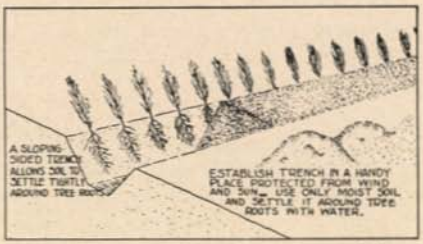



**Figure 2.—Heeling in tree seedlings.**

**Planting.** Make the rows straight by using a long rope or string. Careful pacing is satisfactory for spacing the trees within the row.

Begin the actual planting by removing the trees from the bundle or the heel-in trench. Place them in a pail of muddy water deep enough to cover the roots. A grubbing hoe, shovel, or planting bar makes a good planting tool.[1] With the planting tool, make a hole or slit with ample depth and width to allow the entire root system to be covered without being crowded.[2] Be sure that you insert the roots next to moist soil. Pack the soil firmly around the roots, then firm the soil about the base of the tree by tramping. Loosen the top inch of soil so it will not dry rapidly or crack and expose the roots. It is best if two persons work together on planting. One carries the pail of trees and places them in the openings. The other uses the planting tool to make the openings and to firm the soil about the roots.

**Care After Planting.** In dry-farm areas, care for the tree planting is similar to that for summer fallow land. Keep the area completely free of weeds for 3 or 4 years following planting. On irrigated land, cultivate often enough to keep the planting free of weeds. Use a section of harrow or other suitable weeding equipment. Look ahead at planting time and space your trees to accommodate the cultivating and weeding equipment you will be using later.

The best way to water irrigated plantings is to run a corrugation on either side of each row for the first 2 years. After that, one

1 Forest Service, Soil Conservation Service, and Extension Service. MANAGING THE SMALL FOREST, p. 18. U. S. Dept. Agr. Farmers' Bul. 1989. May, 1947.

2 Doll, Gilbert B. WINDBREAKS FOR IDAHO FARMS, p. 11, Idaho Agr. Ext. Div. Bul. 140. 1942.

furrow in the middle between each two rows is enough. To encourage deep rooting, irrigate to a deep soil level. Allow the soil to dry early enough in the fall to insure ripening of the new growth before frost. Watch black locust closely in this respect. By limiting the supply of moisture in the fall, new growth will ripen and be able to withstand early frosts. On the other hand, trees must go into the winter with enough moisture to prevent excessive drying before spring. A light watering can be made after the leaves have fallen.

**B. Timber Cruising.** Cruising a stand of timber is comparable to taking inventory of the stock of goods in a store or counting the number of sheep in a band. All are means of finding out how much material is on hand. The objective of a timber cruise is to get a reliable estimate of how much of one or more forest products there is in a given tract of timber.

**Types of Cruises.** There are two types of timber cruises—total, and partial or sample. In a total cruise every merchantable tree on the tract is estimated. It is used on smaller areas or for a single valuable species on large areas. In a partial cruise a sample comprising a fraction of the total area is cruised.[1] The total estimate for the area is then computed from the sample. The sample must be spread evenly over the entire area. The plots or strips which are cruised usually total one-tenth of the tract. The fraction to be cruised and the distance between plots or width between strips are decided upon before the cruise is begun.

**Tools Necessary.** For a very simple cruise, all one has to have is a tally sheet and cruiser's stick. Distances are estimated by eye or by pacing and diameters by use of the Biltmore scale. Use of a diameter tape or tree caliper for measuring diameters and a chain or tape for distances would improve the accuracy of the cruise. On large tracts, the cruiser needs a compass and a map of the area he is cruising.

**Procedure in Cruising.** The procedure in cruising is essentially the same, no matter whether your answer is to be in thousands of board feet of lumber, in cords of pulp or fuel wood, in numbers of posts, poles, or Christmas trees. If you are cruising for posts, poles or Christmas trees, you merely record the numbers of these products by species as you come to them. Obtain the final result by summing up the tallies. When cruising for an estimated yield in board feet or cords, tally the trees by species, d. b. h., and number of 16-foot logs per tree. Tree volumes in board feet are then found by referring to a volume table,[2] or by using the average log diameter formula. To find the average log diameter, substitute the d. b. h. value and corresponding factor from Table 3 in the formula given below. Refer to the log scale on your cruiser stick for the board foot volume corresponding to the diameter. Multiply the average

1 Forest Service, Soil Conservation Service, and Extension Service. MANAGING THE SMALL FOREST. U. S. Dept. Agr. Farmers' Bul. 1989. pp. 39-40.
2 For. Ser., S. C. S., Ext. Ser. MANAGEMENT OF SMALL FOREST. U. S. Dept. Agr. Farmers' Bul. 1989. pp. 41.

log volume by the number of logs in the tree. This will give the board foot volume of the tree. If you have several trees of the same size, multiply the tree volume by the number of trees of that size. The totals for the different sizes are added for the final result. To convert your estimate to cords, divide the number of board feet by 500.

**Table 3—Factors to be used in determining diameter of average 16-foot logs in a tree.***

| Species and d. b. h. | Factor | Species | Factor |
|---|---|---|---|
| Western White Pine | | Western Hemlock (2) | 8 |
| less than 20 inches | 4 | Lodgepole Pine | 6 |
| 20 inches | 6 | White Fir | 8 |
| 30 inches | 8 | Western Red Cedar | |
| 40 inches | 9 | well formed tree stands | 4 |
| 20-30 inches | 6 | rapid taper tree stands | 0 |
| Douglas-fir (1) | | Engelmann spruce | |
| 32 or more | 4 | all diameters | 4 |
| Ponderosa Pine | | | |
| 20 | 7 | | |
| 30 | 10 | | |
| 40 | 14 | | |
| 50 | 16 | | |

(1) Cruise to minimum top diameter of 11 to 12 inches for trees less than 30 inches in d. b. h., 12 to 15 inches for 30-inch trees, and 14 to 17 inches for larger trees.

(2) Minimum top diameter, 12 to 16 inches.

**Formula for Determining Average Log Diameter.** The average diameter of each 16-foot log in a tree can readily be computed by use of the correct factor given in Table 3 above, the d. b. h., and the formula:

$$\frac{\text{d. b. h.} + \text{Factor}}{2} = \text{average diameter for all 16-foot logs}$$

Example: A Western white pine measures 24 inches d. b. h. and is estimated to contain 5 logs. Its volume is determined as follows: The factor 6 taken from Table 3 corresponds to the diameter. Substituting in the formula we have

$$\frac{24 + 6}{2} = 15 \text{ inches, the average diameter of all the logs in the tree.}$$

By referring to the log scale on the cruiser's stick, we find a 15-inch log contains 140 board feet. Since there are 5 logs, $5 \times 140$ gives 700 board feet for the volume of our tree. If the answer is needed in cords, we divide by 500 to find that the tree contains about 1.4 cords.

Reduce proportionally the factor listed in the table when the cruise is for shorter logs. If the log is 8 feet long, then reduce the factor one-half.

If you wish to cruise coniferous trees under 20 inches in diameter for cordwood or pulpwood, the values in Table 4 will be helpful.

*Girard, J W. and Gevorkiantz, S. R. TIMBER CRUISING FOREST SURVEY CONTRIBUTIONS. U. S. Dept. Agr. Forest Service. 1939.

**Table 4—Number of trees of different sizes required to yield one cord.**[1]

| d. b. h. (inches) | No. trees to yield one cord |
|---|---|
| 8 | 13.0 |
| 10 | 8.0 |
| 12 | 6.0 |
| 14 | 3.7 |
| 16 | 2.5 |
| 18 | 1.9 |
| 20 | 1.5 |
| 22 | 1.2 |
| 24 | 1.0 |

Two men may work as a crew on cruising. The tally man records all merchantable trees by species and size as the cruiser calls them out. Since cruising is often considered a two-man job, two 4-H foresters may work together in completing this requirement. Select your area and cruise it for an estimate of the amount of board feet of lumber or other forest products it contains. Show results of your cruise in your record book.

**REQUIREMENT NO. 2:** Manage a portion of a farm woodland, woodlot, or windbreak.

Alternative: Collect and mount 6 kinds of harmful forest insects, fungi, or mistletoes and/or examples of the damage they do. Prepare a brief statement on the damage done by each of these pests.

**Instructions: A. Farm Woodland Management.**

Select an area of at least 1/16 acre (2,700 sq ft.), preferably on your own farm. Establish definite boundaries by using stakes. Scout the area to learn what species you have, the number of trees, their average size and distribution. Decide what forest product is to be your harvest crop. Then apply any of the management practices explained below which will help you obtain your goal.

Through management we can increase the value of our Idaho farm woodland resources. There are well over a million acres of woodlands on Idaho farms, about 85 percent of them in the 10 northern counties. Unmanaged coniferous woodlands of northern Idaho are averaging ½ cord of wood per acre year. The annual growth is not this high for conifers in southern Idaho, but native cottonwood stands and irrigated black locust plantings on good sites produce three or more cords per acre year. Good management can greatly increase yields and returns from native woodlands. It is safe to assume that we can raise the average annual return from farm woodlands in Idaho to well over a million dollars for stumpage alone. Farmers who harvest and market their own timber crops will profit from their labor and the use of their equipment.

The aim in woodland management is to produce more high quality products in less time than is done under natural conditions. We

1 Mattoon, W. R. and Barrows, W. B. MEASURING AND MARKETING FARM TIMBER. U. S. Dept. Agr. Farmers' Bul. No. 1210, 1940.

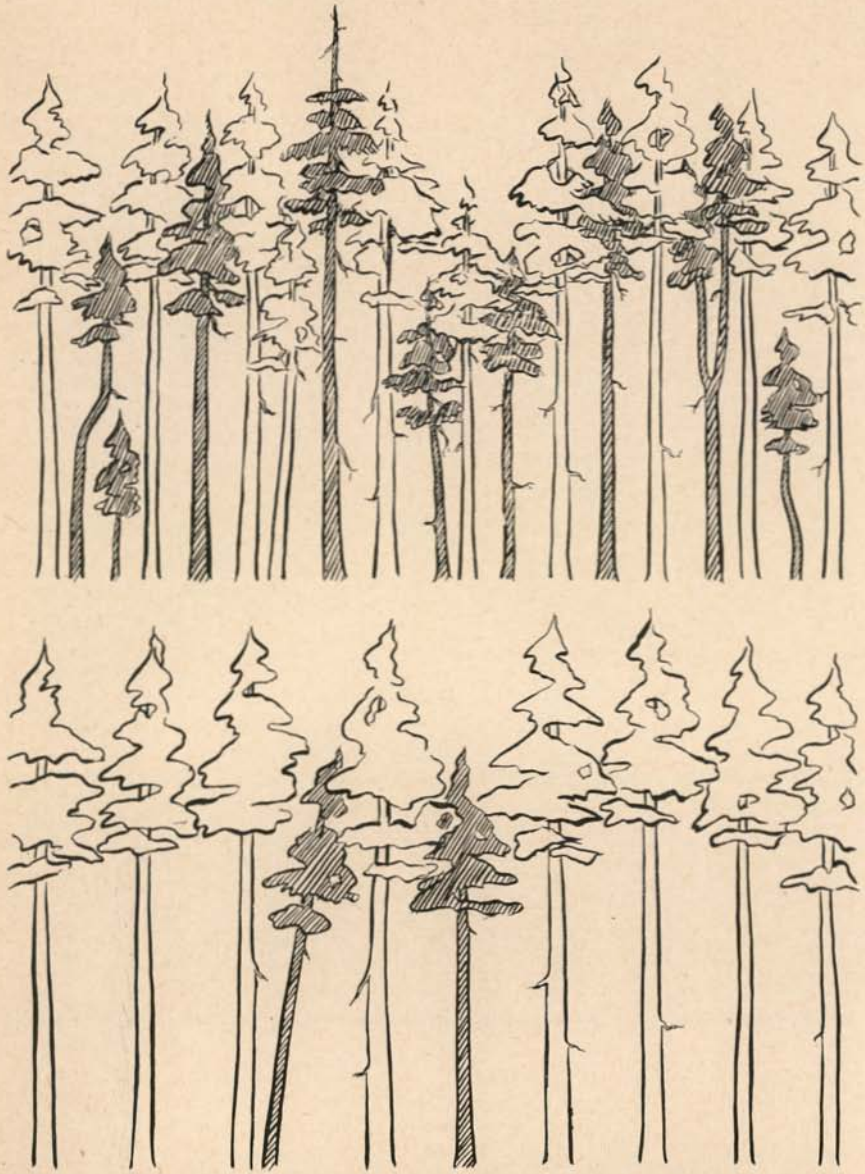


**Figure 3.—Principles of improvement and thinning illustrated. Shaded trees are to be removed in improvement or thinning operations. First view shows stand before improvement. Second illustrates same stand five to seven years later when other trees have become crowded or suppressed and need to be thinned.**

can accomplish this aim through practices which speed up the growth and raise the quality of timber stands. *Thinning* gives trees more growing space and speeds up their growth. Follow these general spacings in thinning native woodlands:

| If d. b. h. of most of the trees in the stand is: | the average spacng between trees should be: |
|---|---|
| 5 inches or less | at least 7 feet |
| 5 to 10 inches | 12 feet |
| 10 to 15 inches | 18 feet |
| 15 inches and over | 25 feet |

*Pruning* upgrades wood products. Prune only the best trees in the stand. *Cutting* is done to harvest trees ready for market and to improve the woodland. Different cutting methods are used. See Figure 3 for types of trees to be removed in improvement cutting and thinning. *Protection* from fire and from overgrazing is important. Full discussion of management practices is given in several publications. Write the extension forester for the latest ones.

**B. Insect and Fungi Collection.** Since you are to collect only six specimens, try to get insects or fungi or other organisms that are of major importance. A piece of wood or bark, or some leaves mounted to show the type of damage done is fine when you are unable to find the insect or organism doing the damage.

Insects and disease together account for a greater annual forest loss than fire. The U. S. Forest Service estimates the annual loss from insects and disease to be about 2 billion board feet of sawtimber and well above 3 million cords of pole timber. The fire toll is somewhat less than 1 billion board feet and 4 million cords.[1] The total loss in round numbers is 3.5 billion board feet. The following publications will assist you in the collection and identification of forest insects. Your leader probably has copies.

Mansuy, Margaret C. *Collection and Preservation of Insects for Use in the Study of Agriculture.* U. S. D. A. Farmers' Bul. No. 1601. 1929.

Keen, E. P. *Insect Enemies of Western Forests.* U. S. D. A. Misc. Pub. 273. 1938.

Shull, W. E. *Idaho Recommendations for Insect Control.* U. of I. Agr. Exp. Sta. Bul. 252. 1944.

Table 5 gives a brief description of some common forest tree diseases in Idaho. We have arranged it to help you identify a disease by knowing the tree species on which it is found.

1 Report of the Forest Resource Appraisal. John B. Woods, Director. The American Forestry Association, 191 17th Street, N. W., Wash., D. C.

**Table 5.—Common forest tree diseases in Idaho.**

| Tree | No. | Disease or Decay and Type | Notes and Description |
|---|---|---|---|
| Conifers: | | | |
| Alpine fir | 1. | Brown felt blight. Fungus disease. | Dense, felty, dark mat covering needles and whole branches. Develops under snow in late spring. Remains through summer on dead branches. |
| | 2. | Yellow witch's broom. Rust fungus disease. | Dense, broom-like growth of twigs on branches. Needles light yellowish green and bear bright orange blisters in late July and August. |
| Douglas-fir | 3. | **Red ring rot.**[1] Fungus decay. | Brown to black hoof-shaped conks with golden-brown under surface. |
| | 4. | **Red-brown butt rot.** Fungus decay. | Brown, coarsely-velvety conks grown together on ground close to trees affected. Under surface olive green when fresh. |
| | 5. | Douglas-fir needle blight. Fungus disease. | Current season's needles with slightly raised brown spots on lower surface. One or more season's needles often shed. |
| | 6. | Douglas-fir dwarf mistletoe. Parasitic plant. | Tiny, dark green leafless shoots among needles on branches, which become long and very slender. Forms dense, conspicuous witch's broom. |
| Grand fir | 7. | **Brown stringy rot.** Fungus decay. | Black or gray-black hoof-shaped conk; large, light-colored spines on under surface; bright brick red interior. Often called Indian paint fungus because Indians made war paint from it. |
| Hemlock | 8. | **Brown stringy rot.** | See No. 7. |
| Junipers | 9. | Juniper apple rust. Rust fungus disease. | Brown, felty galls on twigs and branches, which swell and become jelly-like during wet weather. Alternate stage in bright orange spots on leaves of several members of the apple family. |
| Larch | 10. | **Brown trunk rot.** Fungus decay. | Conks large, more or less cylindrical, chalky white. Intensely bitter flavor has caused it to be called quinine fungus. |
| | 11. | Larch dwarf mistletoe. Parasitic plant. | Short, brownish-green leafless shoots in clusters on slightly swollen branches. Forms dense, conspicuous brooms. |
| | 12. | Larch needle-cast. Fungus disease. | Dead clusters of needles remain attached to branches. Tiny black specks are found on dead needles. |

1. The most important diseases are in bold print.

| Tree | No. | Disease or Decay and Type | Notes and Description |
|---|---|---|---|
| Lodgepole pine | 13. | **Lodgepole pine dwarf mistletoe.** Parasitic plant. | Pale green, leafless shoots. Otherwise, see No. 11. |
| | 14. | Western gall rust. Rust fungus disease. | Globe-shaped gall on branches covered with orange powdery masses in spring. |
| | 15. | Lodgepole pine blister rust. Fungus disease. | Spindle-shaped cankers on branches or stems, bearing orange blisters during spring months. |
| Ponderosa pine | 16. | **Red ray rot.** Fungus decay. | Conks small, white, flat; on underside of down logs; rarely on living trees. Rot radiates like spokes of wheel on ends of logs. |
| | 17. | **Western dwarf mistletoe.** Parasitic plant. | Does not often form brooms. Otherwise see No. 11. |
| | 18. | Western gall rust. | See No. 14. |
| Spruces | 19. | **Red ring rot.** | See No. 3. |
| | 20. | Yellow witches' broom. | See No. 2. |
| Western redcedar | 21. | **Yellow ring rot.** Fungus decay. | Flat, coffee-colored conks on underside of down logs and in root crotches of standing trees. |
| | 22. | Cedar leaf blight. Fungus disease. | Foliage on lower branches appear fire-scorched. Leaves show blackened pits. |
| Western white pine | 23. | **White pine blister rust.** | See No. 15. The most important. |
| | 24. | **Red ring rot.** | See. No. 3. |
| | 25. | **Red-brown butt rot.** | See No. 4. |
| | 26. | **Brown stringy rot.** | See No. 7. |
| Hardwoods: | | | |
| Aspen | 27. | **White trunk rot.** Fungus decay. | Conk black-topped, hoof-shaped, rich brown underneath, limy interior. |

1. The most important diseases are in bold print.

| Tree | No. | Disease or Decay and Type | Notes and Description |
|---|---|---|---|
| Birches | 28. | **White mottled rot.** Fungus decay. | Conks hoof-shaped, gray to brown, often with zones of different shades; undersurface gray-brown to brown. |
| | 29. | **White trunk rot.** | See No. 27. |
| Cottonwoods | 30. | Cytospora canker. Fungus disease. | Pebbled canker where bark is smooth on large and small stems. Tiny reddish-orange horns protrude from bumps in pebbled area during moist weather. |

1. The most important diseases are in bold print.

If you care to read more fully concerning forest diseases, you will find good information in these references:

Baxter, Dow Vawter. *Pathology In Forest Practice.* John Wiley & Sons, New York. 1943.

Boyce, John Shaw. *Forest Pathology.* McGraw-Hll Book Co., New York. 1938. (Second edition of this reference will be published in the winter of 1947-48.)

Rankin, W. Howard. *Manual of Tree Diseases.* Macmillan, New York. 1918.

*U. S. Dept. Agr. Bulletin* 1366, *Check List of Diseases of Economic Plants.* U. S. Govt. Prnting Office, 1926.

Wakeland, Claude, and Hungerford, C. W. *Idaho Recommendations for Insect and Plant Disease Control.* Univ. of Idaho Agr. Exp. Sta. Bul. 159. p. 84, 1934.

**REQUIREMENT NO. 3:** Write a 3-page essay on the influence of forest and range management upon our water supply for irrigation and other water uses.

**INSTRUCTIONS:** In a paper of about 500 words discuss the values of watersheds and how proper management of our forests and range lands is instrumental in preserving these values. You will find helpful material in publications listed under Watershed and Miscellaneous in the back of this handbook. You may also get assistance from Forest Service and Soil Conservation Service personnel, your county extension agent, or the extension forester.

**REQUIREMENT NO. 4:** Complete three problems listed under "optionals." Do not repeat any optional you have done before.

**REQUIREMENT NO. 5:** Prepare and exhibit a window display on farm forestry.

Alternative: Organize a demonstration on some phase of farm forestry and enter in the demonstration contest at your county fair.

**INSTRUCTIONS: A. Exhibit.** Be sure you have time, information, and equipment before you attempt an exhibit that is too inclusive. It is better to confine yourself to some single branch of farm forestry. For instance, the exhibit could be on the theme of windbreaks for your county. How to plant and care for a black locust woodlot would make a good exhibit. Management of native farm woodlands in your area is another suggestion. Decide upon your theme, then plan the exhibit. The next step is to find the materials you need and mold them into a display that fits your plan. See Requirement 6, Division III, for instructions on displaying your exhibit.

**B. Demonstration.** Select any farm forestry idea which you can demonstrate effectively. Here are some suggestions, but you may have many others.

How to locate windbreaks for best protection.

How to treat fence posts with an effective wood preservative.

How to plant a tree.

How to prune a tree.

How trees control erosion.

How to thin an overcrowded woodland.

After you have selected the topic you wish to demonstrate, collect the materials you will need and work out the details of your presentation. Enter your demonstration in the contest at your county fair. It will be judged in competition with demonstrations from other 4-H Clubs in the county. Where two can more effectively present a demonstration by working together, each can receive credit for this requirement.

**REQUIREMENT NO. 6:** Exhibit your work at a club fair or community exhibit.

**REQUIREMENT NO. 7:** Keep your record book complete.

## Fifth Year of 4-H Forestry

There is no definite project outline for work beyond Division IV. If you are interested in a fifth-year project, write to the extension forester.

## Optional Requirements – Range Appreciation

**OPTIONAL REQUIREMENT NO. 1:** Collect and mount 10 poisonous or undesirable range plants.

**INSTRUCTIONS:** Collect and mount specimens of 10 poisonous or otherwise undesirable range plants. As you make the collection, get as many of the poisonous plants of your locality as possible. Learn as much as you can about their poisonous properties. Find out all you can about any poor forage species you collect. Serious death losses in livestock sometimes come from poisonous plants. The presence of large numbers of undesirable plants crowd out good plants. For better range management you need to recognize the poisonous and undesirable plants on your range. Helpful references are listed under Range Appreciation, Plant Identification, in the back of this handbook. Refer to Requirement No. 2 of Division III in this handbook for instructions on how to press and mount plant specimens. If you completed Optional Requirement No. 13 under Divisions I and II, do not repeat those specimens in this collection.

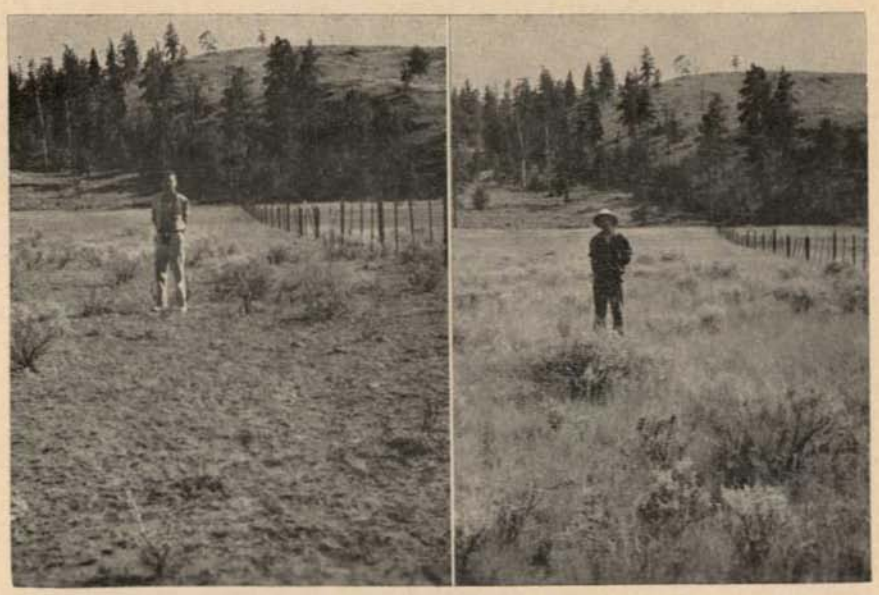
**OPTIONAL REQUIREMENT NO. 2:** Reseed one-half acre of range land or abandoned farm land.

**INSTRUCTIONS:** Select an area of at least ½ acre that is in need of reseeding and seed it with one or more grass species recommended for your locality. It is better if the area can be on your own farm. Be sure that you will be able to protect it from grazing. If it is not protected, your project will probably be a failure.

When rangeland or pasture is in very poor condition, artificial reseeding is usually practiced to avoid long delay in improvement. You may have an area on your farm or ranch upon which the good forage plants have been grazed out. It can be of much more value if you can make it produce more forage of better species through reseeding and proper care.

We will not go into recommended methods of artificial reseeding here. Bulletins on the subject are listed under Range Appreciation, Reseeding, at the back of this handbook. See your county extension agent or write the extension forester if you need further help. Personnel of the Forest Service and Soil Conservation Service can help you on reseeding problems.

**OPTIONAL REQUIREMENT NO. 3:** Write an essay on range appreciation.



**Depleted range before and after reseeding with crested wheatgrass. Second view is the fourth season after reseeding.**

**INSTRUCTIONS:** Select any subject you like that has to do with range management. Write an essay of 300 to 500 words on the topic and keep it with your record book. You may be able to include pictures that will add to your paper. Below is a list of suggested topics.

Grazing on National Forest lands.
Poisonous plants of my locality.
The use of salt in range management.
Stock water developments on the range.
The place of reseeding in range management.

## Recreation and Wildlife Appreciation

**OPTIONAL REQUIREMENT NO. 4:** Make a range fire protection sign, visit a fire lookout station, or write an essay of at least 300 words on range fire prevention and control.

**INSTRUCTIONS:** Fire is a menace to range lands as well as forests. The knowledge and practice of effective methods of fire prevention and control are very important in range management. Refer to Optional Requirements No. 3, 9 and 11 under Divisions I and II. Make your work pertain only to range fire protection. Complete any one of them to fill this requirement.

**OPTIONAL REQUIREMENT NO. 5:** Write a story telling about a trip you have made to a national park or monument, a fish hatchery or game preserve, or about a camping trip on a national forest.

**INSTRUCTIONS:** In your narrative include what you have learned about our country's efforts to make vacation trips to national parks, forests, or monuments more enjoyable. If your story is about a trip to a game preserve or fish hatchery, tell what you learned of the aims or objectives of the preserve or hatchery visited. What methods do its managers use to accomplish the objectives?

**OPTIONAL REQUIREMENT NO. 6:** List 10 predators of game animals, birds or fish. Give the species commonly hunted by each. Make a complete study of the life habits of one species.

**INSTRUCTIONS:** List 10 animals, birds or fish that consistently prey upon other species of wildlife. Find out what each of these predators prefers for food. Select one from your list and learn all you can about its ways of living. If possible, select one that you might be able to observe personally. Here are some of the questions you will want to answer about your selection:

Does it live in forests, deserts, swamps, rocks or some similar place?

What is its size and how long does it usually live?

What kind of home does it have?

What are its hunting habits? Is it bold or shy?

How many young does it raise? Does it have any value?

Write a brief report of your study. In your report you may use pictures of the predator, of where it lives, or of the animals it hunts. Keep the report with your record book.

**OPTIONAL REQUIREMENT NO. 7:** Make a complete study of the life habits of one game species—animal, bird, or fish.

**INSTRUCTIONS:** Select a game animal, bird, or fish in which you have particular interest. For making the study, follow instructions under Optional Requirement No. 5.

## Farm Forestry

**OPTIONAL REQUIREMENTS NOS. 8 AND 9:** Develop and operate a farm tree nursery to produce planting stock for your own use or for sale.

**INSTRUCTIONS:** Write the extension forester for a copy of Operating a Farm Tree Nursery. Instructions are included with the booklet.

**OPTIONAL REQUIREMENT NO. 10:** Keep a complete record of all wood used on your farm during a 6-month period.

**INSTRUCTIONS:** Keep an accurate account of all posts, fuel wood, poles, lumber or any other types of wood used on your farm during 6 consecutive months. Enter totals in your record book.

**OPTIONAL REQUIREMENT NO. 11:** Make and use a cruiser's stick.

**INSTRUCTIONS:** If you did not make and use a cruiser's stick to fill Requirement No. 3 Alternative in Division III, you may do so for optional credit.

**OPTIONAL REQUIREMENT NO. 12:** Cruise at least ¼ acre of timber.

**INSTRUCTIONS:** If you did not choose to complete Requirement No. 1 Alternative, Division IV, for required work, you may do it for optional credit.

**OPTIONAL REQUIREMENT NO. 13:** Collect and mount examples of 6 harmful forest insects, fungi, or mistletoe organisms and/or examples of the damage they do. Prepare a brief statement on the damage done by each of these pests.

**INSTRUCTIONS:** You may do Requirement No. 2 Alternative, Division IV, for optional credit if you did not choose to do it as required work.

**OPTIONAL REQUIREMENT NO. 14:** Make a growth study of 20 trees.

**INSTRUCTIONS:** Select 20 young trees that are easily available. If possible, take 10 trees each of two species. In early spring before growth begins, measure heights and diameters of the trees you selected. Then in late fall, measure them again and determine the average height and diameter growth made by each species during the season. Use a diameter tape or tree caliper for diameter measurements. Use a hypsometer for heights. Record the information in your record book. (Note: Take all diameter measurements at the same height. If you use a height other than 4½ feet above ground, make note of it in your record book.)

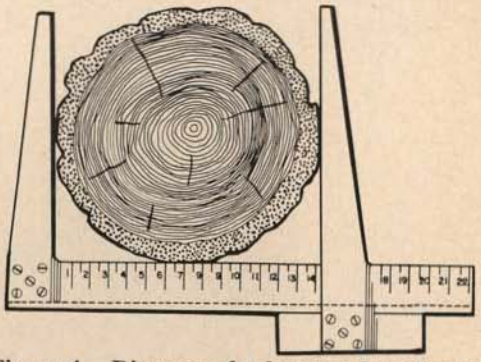


**Figure 4.—Diagram of a homemade caliper.**[1]

1. Mattoon, W. R. and Barrows, W. B. MEASURING AND MARKETING FARM TIMBER. U. S. Dept. Agr. Farmers' Bul. No. 1210. 1940.

Since trees increase in diameter and height as they grow, measurement of height and diameter increases provides a means of studying their growth. Growth records have several values. We use them in computing the total annual growth in stands of timber and in comparing species growth rate. They indicate growing conditions.

## Making Use of Wood

**OPTIONAL REQUIREMENT NO. 15:** Make any farm or home implement from wood.

**INSTRUCTIONS:** Make a singletree, handle for any tool, a picture frame, magazine rack or any other useful implement from wood. Get suggestions from your club leader or county extension agent. Plan your work before you begin.

**OPTIONAL REQUIREMENT NO. 16:** Prepare and treat at least 25 posts with an effective wood preservative and place these posts in use.

**INSTRUCTIONS:** See your county extension agent or write the extension forester for recommendations on procedure in treating fence posts. Either can supply you with the School of Forestry bulletin, "Cold-Soak Wood Preservation," on wood treatment with pentachlorophenol. Since species, seasoning, preservative used, and other factors will affect your treating schedule, specific recommendations must be followed.

**OPTIONAL REQUIREMENT NO. 17:** Make a study of one major forest industry.

**INSTRUCTIONS:** Select any important industry which depends upon forests for raw materials. Refer to your local library or write the extension forester for information. Write a report on the industry selected. Show how it depends on forests. Keep the report with your record book.

## Name Your Own

**OPTIONAL REQUIREMENT NO. 18:** If you have any special interest that is not covered in requirements or optionals, prepare your own standards for a project and complete it for optional credit. In a paragraph, state the standards and objectives you set up for yourself, and tell why you believe it merits optional credit. This work will be judged on soundness of your idea, the standards you set up for the project and the quality of the completed work.

**OPTIONAL REQUIREMENT NO. 19:** Your club may complete a group optional. A suitable project will enable all your club to have a hand in planning. Try to make it require at least 3 or 4 hours of work for each member to complete the project. Your group optional does not have to be finished in 1 year's time. It can be planned to carry on for 2 years or longer. In order for club members to receive optional credit, the current year's work must be completed. A few suggestions for group optionals are:

Establish or improve a club or community picnic area.

Help plan and plant a farm windbreak, woodlot, or a planting for erosion control or game food and cover.

Write and produce a skit on forest and range fire protection. Make the skit at least 8 minutes long and give it before a school assembly or community gathering.

You can use any other idea related to range, wildlife, recreation, or forestry so long as it appears worthwhile. Have your club leader write the extension forester before initiating a group optional if you are in doubt about the idea to be used.

If your club completes a group optional, report your work under "Name Your Own" on page 14 in your record book. Attach additional paper if necessary.

# List of References

## RANGE APPRECIATION

### Management

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1940. *Stock Water Developments: Wells, Springs and Ponds.* U. S. Dept. Agr. Farmers' Bul. No. 1859.

Jardine, J. T. and Anderson, Mark.

1919. *Range Management On the National Forests.* U. S. Dept. Agr. Bul. No. 790. Supt. of Public Documents. Price, 35 cents.

Soil Conservation Service.

*Range Condition.* A classification of range types in different areas. Contact the nearest Soil Conservation office.

### Plant Identification

Forest Service.

1937. *Range Plant Handbook.* Supt. of Public Documents, Washington, D. C. Price, $3.00.

Marsh, D. C.

1929. *Stock Poisoning Plants of the Range.* U. S. Dept. Agr., Dept. Bul. No. 1245. Supt. of Public Documents, Washington, D. C. Price, 35 cents.

Murphy, Edith V. A.

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1934. *Reseeding Burned-Over Lands in North Idaho.* U. of I. Exp. Sta. Bul. No. 201.

Hull, A. C., Jr.

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1942. *Wildlife of Idaho.* Fish and Game Commission, Boise, Idaho.

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1940. *Measuring and Marketing Farm Timber.* U. S. Dept. Agr. Farmers' Bul. 1210.

Miller, F. G.
1928. *Black Locust and How to Grow It.* U. of I. School of Forestry Bul. No. 2.

## MAKING USE OF WOOD

Forest Products Laboratory, Forest Service.
1940. *Wood Handbook.* Basic information on wood as a material of construction with data for its use in design and specifications. For sale by Supt. of Public Documents, Washington, D. C. Price, 50 cents.

Ravenscroft, V. F. and Wohletz, Ernest.
1947. *Penta Cold Soak Wood Preservation. A Simple Inexpensive Method of Wood Preservation for Farmers and Small Commercial Plants.* U. of I. Research Bul.

## WATERSHED AND MISCELLANEOUS

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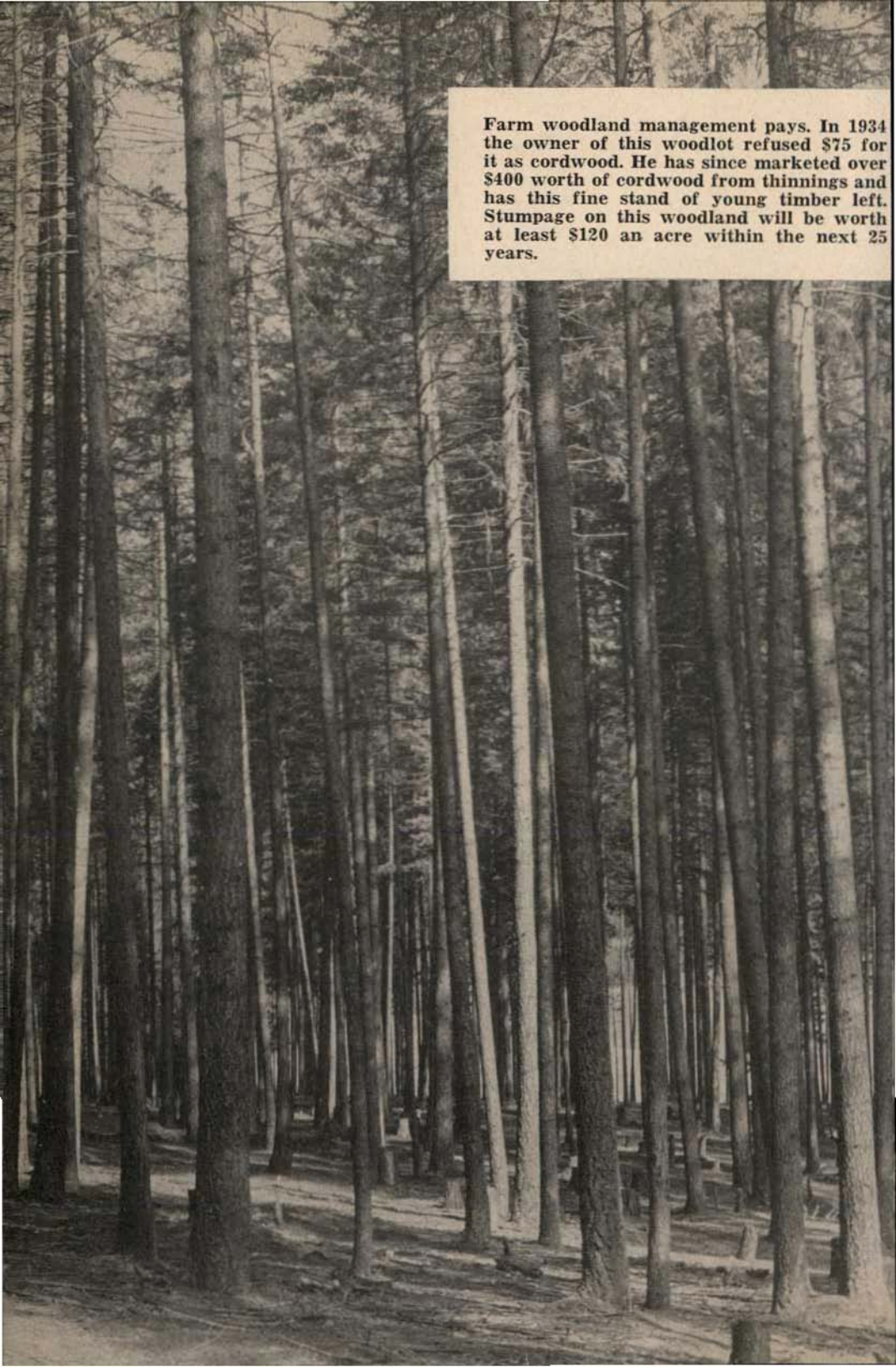
Cooperative Extension Service in Agriculture and Home Economics of the State of Idaho University of Idaho College of Agriculture and United States Department of Agriculture Cooperating

Issued in furtherance of the acts of May 8 and June 30, 1914.

IDAHONIAN, MOSCOW



Farm woodland management pays. In 1934 the owner of this woodlot refused $75 for it as cordwood. He has since marketed over $400 worth of cordwood from thinnings and has this fine stand of young timber left. Stumpage on this woodland will be worth at least $120 an acre within the next 25 years.