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4H Energy Tree, Windbreak and Wildlife Project Personal Membership Packet
Michigan State University Cooperative Extension Service

4-H Club Bulletin

Ruth Woods, Rosina Hauser, Dr. Lowell Rothert

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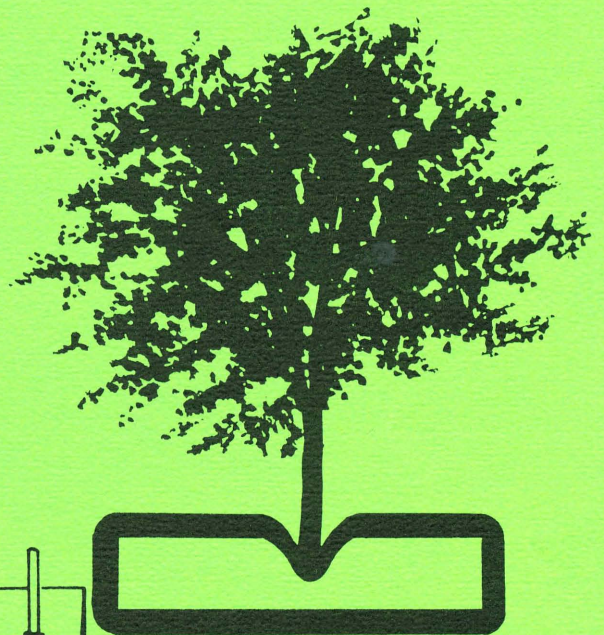
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4-H 1334

4-H ENERGY TREE, WINDBREAK AND WILDLIFE PROJECT

Personal Membership Packet



4-H Youth Programs Cooperative Extension Service
in cooperation with
The Department of Forestry Michigan State University

This publication is a revision of previous 4-H Energy Tree Personal Membership Packets. The original work was done by Ruth Woods, former MSU Graduate Assistant. Revisions by Rosina Hauser, former 4-H Forestry Graduate Assistant, and Dr. Lowell Rothert, Program Leader, 4-H - Youth Programs.

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INTRODUCTION

The 4-H Energy Tree, Windbreak, and Wildlife Project has been developed so you can plant trees to get the maximum benefit from them. It is designed for you to plant three species of trees: hybrid poplars, red maples, and Austrian or red pines. You may adjust the species mix to your site and plant only one or two species. The hybrid poplars and red maples are intended to be grown for firewood and/or shade. The pines are to be planted near your home to shelter it from winter winds.

If you live in the southern lower peninsula or along Lake Michigan, plant Austrian pines. If you live in the northern lower or the upper peninsula, plant red pines. Although trees can be purchased in small quantities, they are cheaper if purchased in lots of 100 or more per species, so try to get 20 or more people involved in the project.

History will recount that energy became a major concern of nearly every household in America during the 1970s. Thousands of homeowners seeking to reduce the size of their heating bills began using wood for fuel. In 1975, the Michigan Department of Natural Resources issued 1,000 permits for cutting firewood in the state forests; in 1980, 32,000 permits were issued to energy-conscious Michiganders. As this trend continues, the supply of fuelwood could be reduced, even in states such as Michigan where wood has been plentiful. Unless one owns a large woodlot, firewood at a reasonable price may be more difficult to obtain.

However, an alternative to high-priced cordwood exists for homeowners with initiative and a little idle land: you can plant your own firewood. In 10 to 15 years (maybe less), a plantation of fast-growing trees can produce substantial quantities of fuel for a wood stove or furnace.

What kinds of trees can be used in firewood plantations? There are several choices, but hybrid poplars are best under some conditions. Relatives of the native popple and cottonwood, hybrid poplars are true "supertrees." They are hardy throughout Michigan and grow faster than any other tree when carefully tended and planted in good soil. If you are willing to wait a little longer, black locust, red or English oak, sycamore, white birch, soft maples, tree-of-heaven, or larch (tamarack) also can be planted as firewood.

The wood of hybrid poplars is not as dense as most other wood; consequently, its heat value per cord is less (18.7 million BTUs for poplar versus 23.8 million BTUs for red maple). But it takes 20 years to get a firewood-sized red maple tree. A poplar tree will grow to that size in less time.

In addition to their rapid growth, poplars are amazing because they literally grow from sticks planted in the ground. These 10- to 12-inch lengths of 1-year-old dormant shoots, which are called hardwood cuttings, will root and grow if planted vertically in the spring after the frost leaves the ground. Many nurseries also sell rooted cuttings. Though more expensive, they have better survival and growth rates than unrooted cuttings.

Poplars have some disadvantages. Compared with many other trees they are more susceptible to a variety of diseases and pests, especially canker-causing fungi. Therefore, planting poplar varieties that are highly prone to cankers (e.g., Lombardy, Androscoggin, and Kingston) should be avoided. Instead choose more resistant varieties like Carolina, Norway, Ravendeaux, Robusta, Wisconsin #5, or native cottonwood.

Red maple is slower growing than the hybrid poplar but it is also denser so it provides more BTUs per cord. Both species are being used in this project so that you can compare the growth of the trees. Both can be used for firewood and for shade but if given proper care, the hybrid poplars should reach usable size before the red maples.

Information on reproducing your hybrid poplars is included in the section "Starting a Fuelwood Orchard" (pages 13-15). Use this only for the hybrid poplars; red maples and Austrian pines will not propagate in this manner. Starting a fuelwood orchard is an optional part of this project; you may utilize the information if you are interested in expanding your firewood production.

The pines you purchase are intended to be used for sheltering your home from cold winter winds. Wind as an environmental factor works both for and against us. The wind's greatest ability is to carry away heat. In winter, this can be devastating; in summer, it's a godsend. Wind also carries away moisture. Wind shadows behind barriers will therefore preserve heat and moisture. Channeled wind will carry both away.

Plants are natural air conditioners. They absorb light, sound, and heat. They also filter dust and humidity, moderate winds, and add a sense of comfort and security to our homes.

Hybrid poplars also make an excellent shade tree because they grow fast and tall and thus will provide shade in just a few years. The red maple is another good shade tree, but it will not provide beneficial shade as quickly. Although other trees such as oak, sugar maple, and varieties of honey locust also make excellent shade trees when mature, they take a long time to reach a large enough size. They have another advantage because they may live for 100 years or longer, but most homeowners are not concerned about how long a tree lives as long as it lives for more than 30 to 50 years.

Not only are you getting firewood, wind protection, and shade from your trees, you are also providing wildlife habitat. Many kinds of birds and mammals will use your trees to find food, raise young, and seek shelter from rain, wind, summer heat, winter cold, and snow and ice. Robins, bluejays, purple grackles, orioles, mourning doves, and red squirrels will be the animals most likely to nest in your trees when the trees become large. Song sparrows, gold finches, and cardinals may nest in them while they are small. Chipmunks will probably dig their burrow homes beneath them, and rabbits will find shelter under the low ground-touching branches of the pines. They may even nest there.

Many other birds and animals may use your trees from time to time. Migrating birds such as warblers may fill the trees by the hundreds as they search the branches for insects during their long journey. Winter visitors such as pine grosbeaks may eat the buds of the pines, and white-tailed deer may eat the tender twigs of the poplars and maples. Even a red fox may pass through the trees looking for chipmunks or young birds. Predatory birds like the great horned owl or a Cooper's hawk may hide in the pines on occasion so that they can surprise and catch another bird or mammal for themselves or their young.

The 4-H Energy Tree, Windbreak, and Wildlife Project is designed to show you how to produce your own fuelwood, protect your home from wind, and provide wildlife habitat. Specific instructions on planting, maintaining, protecting, and reproducing hybrid poplars, red maples, and Austrian pines are presented. The objectives of the project are to:

1. Demonstrate that individuals with small areas of land have the capability to grow enough fuelwood to heat their homes.
2. Demonstrate the growth potential of hybrid trees which are still in the research stage of development.
3. Compare hybrid poplar growth with the growth of red maples and Austrian pines.
4. Learn that the comfort of your house can be improved by planting trees.
5. Learn about the planting and care of trees.
6. Learn that wildlife in your yard can be promoted by growing trees and shrubs.
7. Learn about the other aesthetic values trees can provide.

When you plant a tree, you are planting one of nature's finest gifts. You not only plant for your own enjoyment, but for all people. If you plant it properly and provide a little care during the few months following planting, it will grow and develop into a thing of beauty and will positively contribute to the environment in several ways.

SITE SELECTION FOR HYBRID POPLARS

The quality of the site on which your hybrid poplars are growing is very important in determining the success of your fuelwood orchard. Hybrid poplars do not thrive on any site with a minimum of care. The planting site and care are determining factors in the growth of your trees. Planting your cuttings in a weed-free, well-drained area may make the difference between getting a foot of growth and getting four feet of growth. A poplar is a hybrid plant, exotic to this area, that is expected to grow at a rapid rate. Planting a fuelwood orchard is similar to farming crops that must yield huge amounts of a product from a small area of land. You must apply some of the helpful agricultural practices to growing hybrid poplars if you are to harvest the yields you expect and hope for!

The most important aspects to consider when picking a potential site are the soil and drainage conditions! Hybrid poplars will grow best on well-drained, medium-textured (sandy loam to silt loam) soil. Reduced growth can certainly be expected whenever drainage is less than "well-drained." Clay, sand, and undrained muck should not be considered. If you are not sure of your soil type and drainage class, ask the soil scientist from your local USDA Soil Conservation Office to help you evaluate your potential planting site.

Utilize the following list to help you select a site for your hybrid poplars.

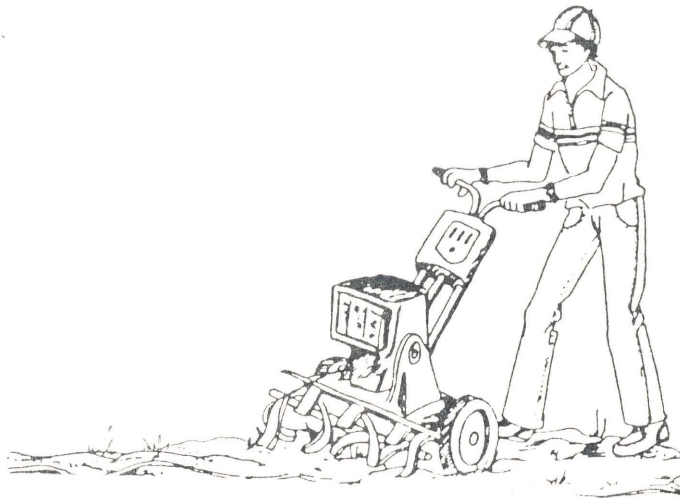
1. Soil characteristics are the most important factors in choosing a site, so find all the alternative sites around your home with suitable soil and drainage characteristics.
2. The area must be large enough to accommodate the trees.
3. Will there be any present or future obstructions in the way of your trees? Are there powerlines overhead or is a larger tree or building shading the area? Also, consider what obstructions may be under the area (such as a sewer or powerlines).
4. Ask your family what they think about your alternatives. Is your chosen area heavily used by your family? They might notice something you missed.
5. If there is a suitable area available which has already been cultivated, you may want to use it because it is already prepared for planting.

SITE PREPARATION

Preparation of the site before planting is essential. Competition from weeds and grasses greatly reduces the growth rate of hybrid poplars. In fact, many of the practices used to prepare soil for agricultural crops will benefit trees. Brush should first be cut and removed or chemically treated to prevent sprouting. The site may be cultivated using farm equipment to remove all grass and weeds. On small tracts, a garden tiller is sufficient. Plowed areas should also be disced to further prepare the soil for planting. As a minimum, a 3-foot circle of weeds and grasses must be removed around each cutting.

Alternatively, chemical herbicides may be used to prepare the site. Apply in 3-foot circles where the individual trees will be planted or in 3- to 4-foot-wide strips for each row. Chemical herbicides are not recommended because hybrid poplars are sensitive and can be killed easily.

Several chemical herbicides are available for controlling grass and weed growth. Each has characteristics and requirements which influence its use. For current recommendations, contact your local Cooperative Extension Service office. Always follow label instructions when using any herbicide.



PRECAUTIONS FOR USING HERBICIDES SAFELY

All chemicals should be regarded as hazardous.

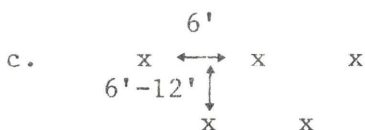
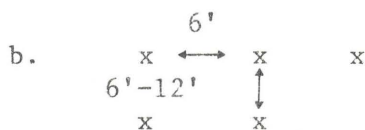
1. Follow directions! Read the instructions and follow all precautions printed on the container label--IT'S THE LAW!
2. Store chemicals under lock and key--out of reach of children, pets, and livestock and away from food and feed.
3. Keep chemicals in their original containers with labels intact.
4. Do not eat or smoke when working with chemicals.
5. Wear protective clothing and masks as directed on the label.
6. Protect your eyes and avoid inhaling chemicals. If a chemical is spilled on your skin, wash it off immediately.
7. Do not dispose of any herbicide or its container except as the label directs.

Applicator Certification

Private as well as commercial applicators of restricted-use pesticides must now be certified by the State of Michigan. Certification exams are now being given throughout the state. Consult your Cooperative Extension Service staff or the Michigan Department of Agriculture if you have any questions concerning certification.

CARE AND PLANTING OF HYBRID POPLAR CUTTINGS

1. Until you plant the cuttings, you will need to keep them cool and moist. Inside a plastic bag inside a refrigerator is an excellent place. Do not let the cuttings dry out. Keep them away from heat.
2. Twenty-four hours before you plan to plant the cuttings, take them out of the refrigerator and out of the plastic bag. Put them in a bucket of water so they are completely submerged if possible. Keep them in a cool place while doing this (garage, basement, etc.).
3. After the cuttings have soaked in water for about 24 hours, they can be planted in the cultivated plot. Below are possible designs for you to use. Each "x" marks where a tree should be planted. The distance between trees is also marked. The distance between rows can be adjusted to accommodate weed control machinery.

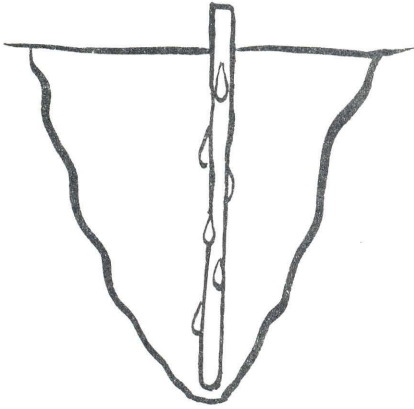


If the trees are planted in rows, the spacing between rows can be extended to 8 to 12 feet to accommodate weed control machinery.

Choose the design which best fits the planting site area.

4. To plant the cuttings, use a shovel to dig a small hole as deep as the cutting is long. Hold the cutting upright in the middle of the hole, with the buds pointing up (see picture) and push the dirt back into the hole. Pack the dirt down firmly with your foot. Make sure the dirt around the cutting is even with the rest of the ground. Leave about 1 inch of the cutting sticking above the ground.

Leave 1 inch above ground.

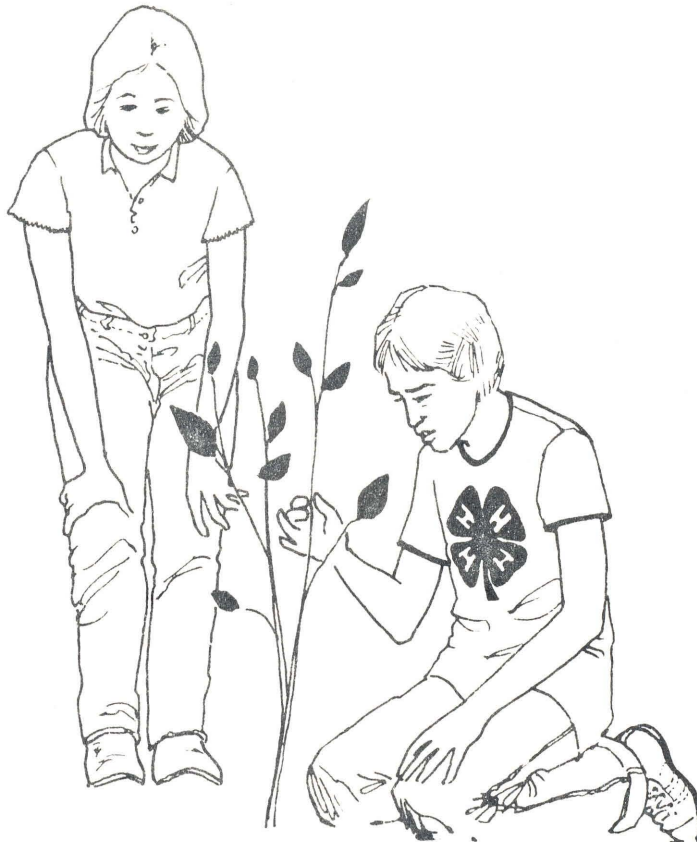


Make sure dirt around the cutting is even with the rest of the ground. Don't leave a depression!

Pack the dirt firmly around the cutting.

Make sure the pointed ends of the buds are pointed up--otherwise the tree will not grow.

5. It is not necessary but it will help if you water the cuttings right after you plant them (especially if the soil is very dry).



MAINTAINING YOUR HYBRID POPLARS

Proper maintenance and care is necessary to achieve full growth potential from your hybrid poplars. You cannot plant your cuttings and forget about them and expect to have a successful orchard.

Keep the ground totally weed-free around each tree and in the entire tree row for the first three years. Extend the time period if the side branches aren't almost touching. If vegetation between rows is just a light mixture of grasses by the second or third year, no further care may be needed. Denser vegetation will have to be controlled. If you use herbicides, be very careful. Do not get any on the trees! Chemicals can be very destructive on sandy soils. In this situation you might try pulling, hoeing, or very shallow tilling within the rows and mowing between the rows. Your time and equipment will determine the best course for you.

If it becomes extremely dry during the summer (especially in the first summer), you should probably water the cuttings. You don't need to drown them, but make sure the soil is soaked whenever you do water.

If your soil has a deficiency of some nutrients, fertilization may be required to improve the growth of your hybrid poplars. If fertilizers are necessary, one application during a fuelwood rotation will usually be sufficient.

A word about fertilizers--you are in agriculture not forestry so think like a farmer! What is good for corn is likely to be good for hybrid poplars! Know the nutrient status and pH of your soil. Obtain MSU Extension Bulletin E-498, Sampling Soils. Have a soil test made; one source for a test is the MSU Soil Test Lab where it will cost about \$4. Ask for lime and fertilizer recommendations. Soil test labs won't be too familiar with poplar requirements so ask for corn recommendations, particularly nitrogen and phosphorus. If the pH of your soil is too high or too low, fertilizer benefits will be reduced or lost altogether. If you have a very sandy site where fertilizer might be easily leached away, use a banded-strip fertilizer or a coated or "chelated" type which goes into solution more slowly. For recommendations consult your local garden or farm store and/or your Soil Conservation District office. Fertilization is not recommended during the first year or two after planting because it will either increase weed growth or be lost through runoff or leaching without really benefiting the tree.

The State 4-H office has a slide-tape show available with detailed instructions on the planting, care, and maintenance of hybrid poplars. Request a loan copy of the "4-H Energy Tree Project" through your county 4-H office.

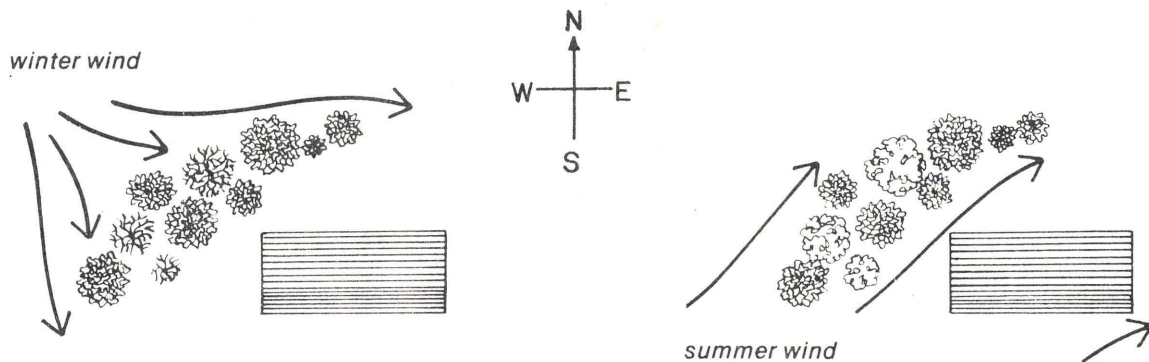
SITE SELECTION FOR RED MAPLES

When choosing a site for your red maples, follow the same general guidelines as for hybrid poplars. Red maples are hardier so you don't have to be as strict about site. Do not plant your poplars and maples intermixed. The poplars will grow faster and may shade the maples. Your red maples will benefit from the same site preparation and care as your hybrid poplars. Till the soil and keep the area entirely weed free. However, planting maples and pines is entirely different from planting hybrid poplar cuttings. (Planting instructions follow the next section.)

SITE SELECTION FOR PINES AND SHADE TREES

The best wind barriers have dense evergreen foliage all the way to the ground and a variety of bush species to better break up air flows. You may want to add other trees and bushes to your shelter belt to increase the length or density.

Wind barriers will reduce wind speed for two times the height of barrier. Pines will reach 50 to 80 feet in height. Therefore, plant your pines within 100 feet of the northwest side of your home. Plant your pines in a line according to the diagram below.



You may plant your shade tree or trees wherever you want summer shade but be sure to plant one or more south and southwest of your house if there is not already a deciduous tree there. Deciduous trees planted 15 feet to the south of the house will, when they become 40 feet tall, begin to shade the house from the hot summer sun and help keep it cooler. If the house is air-conditioned, the shade from the tree will reduce air-conditioning costs. When the trees lose their leaves in the fall, they will not shade the house from the warmth of the sun during the cold months. Do not plant your tree within 15 feet of the house. The closer trees are planted to houses, the more their fallen leaves, flowers, and seeds clog rain gutters and down spouts.

The pines should be planted about 5.5 feet apart.

PLANTING YOUR RED MAPLES AND PINES

These plants will generally benefit by having their roots soaked in warm water for 15 to 20 minutes prior to planting. If planting must be delayed more than a day or two, remove the plants from the package and "heel" them in--that is, dig a small trench in a shaded location, place the roots in the trench, cover with soil and then water. This procedure will prevent drying of the roots during this period.

1. Dig a hole about 12 inches wider than the spread of the roots and deep enough to contain the roots without crowding and establish the plant at the same level that it was growing previously. (A soil line will be visible on the stem of the plant.)
2. If the planting site is in heavy clay, it will be necessary to provide drainage, since most trees and shrubs do not grow well in clay soils, especially with excess water about their roots.

If the site has a sandy subsoil, this might be used to promote drainage by boring a hole through the clay to the sandy subsoil. Fill this hole with gravel or sand and proceed to the third step.

If the site does not have a sandy subsoil, the hole should be drained with a tile line connected to a free-flowing drain.

3. Place the plant in the hole carefully and position for the best effect.
4. Backfill the hole with a loam soil, avoiding clay subsoils. If the soil is sandy, add peat moss (1 part peat to 3 parts of soil). Fertilizer should seldom be added at the time of planting. However, if a fertilizer is used, it should be of the slowly soluble type. Do not use highly soluble fertilizers. Be sure to follow instructions on the container, since rates of application vary with products.

When the hole is about 1/3 filled, water thoroughly to settle the soil. Complete the backfilling to ground level and, if desired, form a shallow soil saucer around the perimeter of the hole to serve as a water reservoir.

5. Water the plant thoroughly every 10 to 14 days, provided it hasn't rained heavily in the interim period. DO NOT OVERWATER, as this can cause as much trouble as not enough water. Slow watering for 20 to 30 minutes is ideal for deep penetration. Automatic turf sprinklers usually do not apply enough water for deep penetration, and additional watering is often required for new trees.
6. Plantings on sandy soils may benefit from an application of two to three inches of woodchips, ground corncobs, or shredded bark on the soil surface, as a mulch to reduce loss of moisture by evaporation and the growth of weeds.

GLOSSARY OF TERMS

BTU	British Thermal Unit. The quantity of heat required to raise the temperature of one pound of water by one degree Fahrenheit.
CLONE	A group of organisms descended from a single common ancestor. (Trees which descended from one individual tree.)
CORD	Cut firewood stacked in a pile 4 feet high by 4 feet wide by 8 feet long.
FUELWOOD ROTATION	The period between planting and harvesting of fuelwood.
HYBRID	The offspring produced by breeding plants or animals of different varieties.
PROPAGATE	To produce offspring.
REPRODUCTION	The process by which plants and animals give rise to offspring.
SPECIES	A group of similar plants that are regarded as of the same kind and that are able to breed with one another.
VARIETY	A subdivision of a species consisting of individuals having varying characteristics.

STARTING A FUELWOOD ORCHARD

This information is provided for those of you interested in expanding your fuelwood production. Do this only with your hybrid poplars; don't do it with your red maples or Austrian pines.

If you are interested in moving beyond your small plot of trees, you can establish a fuelwood orchard with the capability of growing enough fuelwood to heat your entire home every year. To start a hybrid poplar orchard, you can purchase cuttings from a nursery each year that you plant, or you can provide your own continuous source of cuttings. This source is called a "cutting" or "stool" bed and requires a great deal of care and effort. Hybrid poplar cultivars (kinds, crosses) should be chosen for resistance to health problems and fast, vigorous growth.

The pilot study trees will give you some idea of which cultivars are suited or not suited to your particular site and climate conditions. If the cultivars you received grow well (3 to 4 feet or greater of vigorous growth), then you may decide to use these again. If they do poorly, you may wish to choose other cultivars. Pick the cultivar name (e.g. P. x euramericana cv. Eugenii) and note several source numbers (e.g. DN-34 or 5326). Use the cultivar name and any source number to obtain quality cuttings from a local nursery. (A list of local sources is also included; they are raised and tested in our specific area).

Purchasing Cuttings and Planning Size of Orchard

Purchase your cuttings for shipment to you in the spring from a nursery of your choice. Unrooted cuttings will be the most economical. How many should you buy? This depends on your future harvest goal, available space, and the time you have to put into the project!

When cut back to sprout, each cutting could produce an average of five vigorous side sprouts which could in turn produce about 20 to 25, 10-inch cuttings from each "stool" (a cutting which has been cut back and has resprouted) per year.

For example:

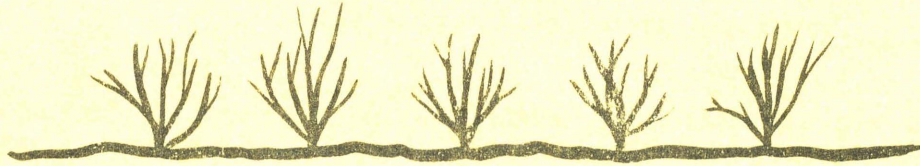
1st year: Cuttings which will be cut off at ground level (2 inches) after the first growing season.

Individual
cuttings



2nd year: Each stool will produce about five side shoots. If the shoots are 4 or 5 feet long, 20 to 25 cuttings could be produced from each stool or 200 to 250 cuttings from 5 original cuttings. About 250 to 300 cuttings could plant over half an acre at 8-foot x 10-foot spacing.

Stool



Preparing and Planting Cutting Bed

1. Prepare the site as you would for a well-maintained garden. Cultivate or till so the soil is loose and can be worked easily. Plant cuttings according to directions given for your pilot-study trees only closer together. Plant them 1 foot apart in a row. If you plant several rows, make rows 3 feet apart.
2. Water and fertilize the cuttings just as you do your vegetable garden (each year). You are expecting a high yield from this cutting bed for several years so it will need lots of moisture and nourishment. **THE QUALITY OF THE CUTTINGS COMING OUT OF YOUR CUTTING BED DETERMINES THE QUALITY AND SUCCESS OF YOUR ORCHARD!**
3. Keep cutting bed weed-free by pulling and hoeing. This is urgent! If you use an organic (natural) mulch around the cuttings and between rows, you will slow or stop weeds, conserve moisture, and add nutrients to the soil. (Do not use fresh sawdust for mulch as it uses the available nitrogen in the breakdown of the sawdust.)
4. When the leaves "fall" in the autumn, till or shovel them under the soil. **THIS IS VERY IMPORTANT!** Research shows that leaves on the ground harbor spores of disease which can infect the trees the next season. Turning them under stops this plus adds nutrients. **DON'T TILL MORE THAN 3 INCHES OR YOU'LL INJURE NEW ROOTS.**
5. At the end of the first growing season, cut the new cuttings right off about 2 inches from the ground. This will make a "stool" out of a "cutting" and the tree will produce multiple sprouts the next spring.
6. The size of next year's sprouts will depend on soil conditions, moisture, nutrients, drainage, quality of cuttings, etc. If the side shoots are greater than 1/4 inch at the end (tip), you can make cuttings back to the stool base (at ground) after the first year of sprouting. If they are less than 1/4 inch, then wait another year. Many large commercial nurseries find the stool beds must be 2 years old (3 years from the original

planting) before cuttings are made. The ideal diameter for cuttings is 1/2 inch. If your soil is sandy or loamy without a heavy clay subsoil (at 12 inches) 10 inches is a good length for a cutting. If you have a clayey subsoil (and no drainage problem), a longer cutting (16 or even 24 inches) will get roots started within the heavier soil, using less energy to penetrate it! For most situations, 10 inches is fine.

7. Stool beds can be used for 5 to 7 years if they are fertilized yearly. Then new beds should be established. If a stool bed becomes heavily diseased, eliminate it and start a new one in a new location.

Making and Starting Cuttings

In February or early March before bud swell and bud break, cut the side shoots down to the stool base. Cut all the shoots even if they are not usable. Cut these shoots into the length you want using a band saw, hand saw, or an instrument with a sharp blade for a clean cut. Place the cuttings in plastic bags. Store bags of cuttings in a refrigerator until planting time (after frost danger is over and the ground is warmed). If you live in an area where snow stays on the ground into early spring, you can store cuttings in plastic bags buried in snow banks (you can make one) in a shaded spot until planting time or close to it. Some people have kept cuttings in a freezer and had good luck with cuttings if they are allowed to thaw before planting. The ideal temperature for pre-planting storage, however, is just above freezing (about 34 to 36°F).

THE SUCCESS OF YOUR FUELWOOD ORCHARD DEPENDS ON CARE AND EFFORT GIVEN!!!

SOURCES OF HYBRID POPLAR PLANTING STOCK AND OTHER TREE SPECIES¹

Hramor Nursery
515 9th Street
Manistee, MI 49660
(616) 723-4846

Van's Pines, Inc.
West Olive, MI 49460
(616) 399-1620

Miles Fry & Son Nursery
R.D. 3 - Frysville
Ephrata, PA 17522
(717) 354-4501

Note: The only varieties sold by Fry that are recommended for Michigan are H.P. 101 (Red Caudina) and H.P. 308 (Charkowiensis Incrassata).

Land O'Pines Nursery
1056 N. Schoenherr Road
Custer, MI 49405
(616) 757-2141

Several Soil Conservation Districts (e.g. Clinton, Jackson, Otsego, Grand Traverse) sell hybrid poplars. Check your local district's offerings during their spring sale.

Better Trees Greenhouse
301 W. Every Road
Mason, MI 48854
(517) 676-2047

Coldstream Farm
2030 Freesoil Road
Freesoil, MI 48411-9752
(616) 464-5809

Musser Forest
Box 340M
Indiana, PA 15701-0340

¹Free catalogs are available from the commercial nurseries upon request.

This listing does not imply endorsement or discrimination by the Michigan State University Cooperative Extension Service and makes no attempt at completeness.

OTHER THINGS FOR YOU TO DO

1. Make a yearly record of growth of your trees by height and diameter.
2. Make a monthly record of at least one of the following:
 - a. amount of firewood cut
 - b. wind velocity in open and leeward of the pines
 - c. temperature in open and shade of shade trees
 - d. home fuel and air-conditioning bills from time of planting until trees are tall enough to become effective
 - e. wildlife using the trees (see 4-H Publication 4-H 1052, "Wildlife Where You Live--Member's Guide")
 - f. wildlife using feeders and houses
3. Build wildlife feeding stations and houses and erect them in and near your trees
4. Photograph the annual growth of your trees
5. Make a display of any of the above