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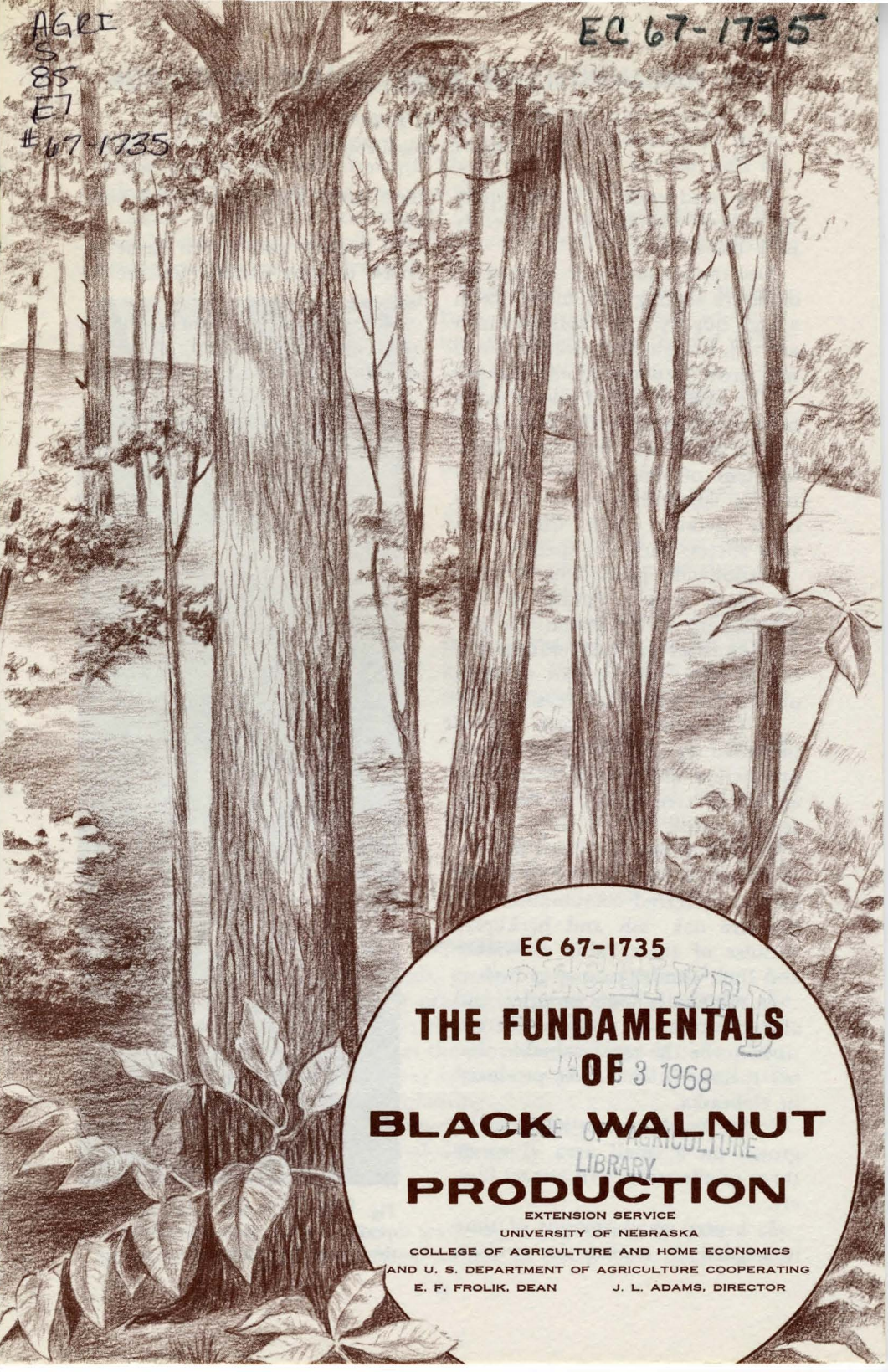

EC 67-1735

THE FUNDAMENTALS OF BLACK WALNUT PRODUCTION

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THE FUNDAMENTALS OF BLACK WALNUT PRODUCTION

Ellsworth H. Benson
Agricultural Extension Forester

The production of a high quality veneer walnut log starts early in a tree's life.

You cannot start with a crooked, defective sapling and end up with a high quality tree. Saplings which are tall, straight and clear-stemmed will grow into the money-makers.

The aim of this bulletin is to help you growers make proper decisions as to site selection, establishment of stands, pruning, control of competing vegetation and other details which will affect your success with this species.

Nationwide, production of quality black walnut timber is not keeping up with demand. Its production deserves consideration and honest effort on the part of landowners for numerous reasons.

1. The value of a farm can be increased by converting to walnut production land which is now occupied by tree species of little potential value.

2. Walnut can be grown in either mixed or pure stands. In mixed stands, preferred combination species are oak, ash and hackberry because of their value as timber and their similar rate of growth.

3. Walnut is high in price and all indications are that it will continue to be the most valuable timber species which can be produced in Nebraska.

4. Marketable quantities can be grown on a small area. Two or three quality trees will attract buyers.

5. A very small amount of time is needed in caring for walnut trees after they become 15 years old.

6. Present production must increase to have enough for the future.

Nut production should not be overlooked as a source of yearly income from a walnut plantation.

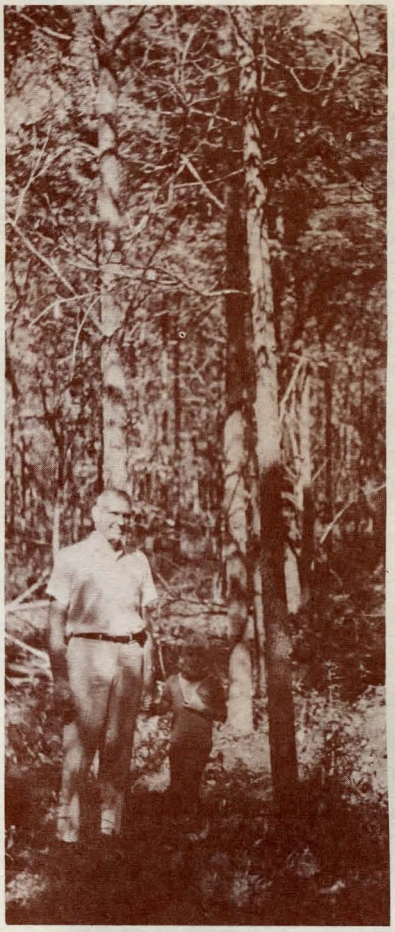


Fig. 1. Some of the future need for quality walnut logs will be met by this almost pure stand.

Choosing the Site

The amount and quality of walnut produced will depend, to a large extent, on your selection of the site. The soil should be deep, fertile, porous and well drained. Black walnut will not do well on either waterlogged soils or dry, severely eroded hillsides.

Land which floods occasionally is often ideal, providing it has good internal drainage. Soils which remain moist for extended periods throughout the year are desirable.

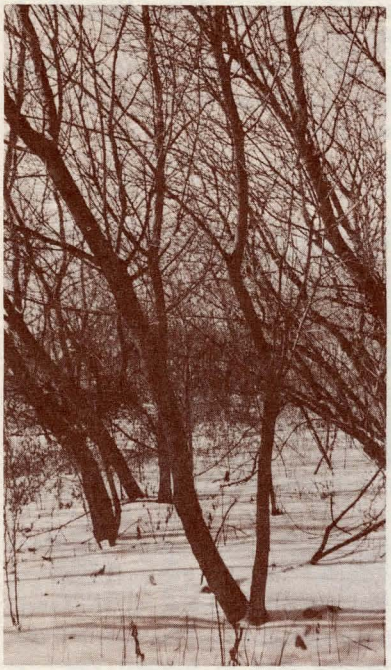


Fig. 2. Walnut planted on such areas would increase the value of the farm.

However, walnut can be successfully produced on land which is not extremely valuable for other crop production. In fact, areas hard to utilize for any other practical purpose are good possibilities. Examples of such areas which may meet requirements are:

1. Isolated patches of good land too small to farm.
2. Lower slopes of steep canyons have been observed to produce satisfactory growth.
3. Land along active streams or the bottoms and sides of dry drainage ways. (Soil fertility and moisture are usually favorable in these areas.)
4. A cove adjoining a running or a dry creek is excellent.
5. Areas which flood too often for safe crop production.
6. Weed patches and undesirable timber stands are good possibilities for growing walnut.

Site Preparation

In establishing walnut stands, ground preparation need not be extensive. In many instances, a practical approach will limit the site preparation to the breaking of existing sod or destroying larger vegetation, such as brush and trees at the spot where walnut is to be planted. In open fields, the easiest way is to thoroughly work the soil with power farm machinery before planting.

When planting on tree covered land, there are varied situations each of which should be treated differently.

Scattered Tree Situation

Where existing tree cover is scattered, a conversion to walnut can be made by simply establishing walnut in open spots. Leaving the

established older trees is a good practice as they will provide needed protection.

Young walnut trees are subject to damage from wind. Seedlings, however, should not be planted so close to older trees that they will not receive direct light from above.

Wilderness Situation

If there are no natural open areas, some may be created by destroying worthless trees. There are several ways of doing this which are satisfactory; these will be presented later.

The openings need to be large enough to let light come in from overhead. The killing of one worthless, large-top tree will provide space for the planting of several walnut trees.

In preparing a space for planting, it is not necessary to remove unwanted trees; deadening will let light reach the walnut seedling which is all that is needed. The shade cast by the bare branches will not be enough to hinder growth. Use chemicals to kill unwanted trees (2-4-5T mixed with diesel fuel).

Spacing and Plantation Layouts

The main objective in the early stages of walnut growing is to establish saplings which are straight with as long, limb-free trunks as possible. The quality of the logs you produce will depend on how successful you are in the management of the stand during this formative period.

An ideal timber growing situation during these years is to have trees so close together that growing space for side branches is limited. If this principle of management is followed correctly, your young walnut will grow rapidly in height, grow straight and have relatively few side branches.

These are all desirable growth characteristics at this stage of developing a quality veneer log. Creating the proper level of competition during the first 15 years stimulates natural pruning of the side limbs also.

Competition is not needed for proper development of the leader; nothing should be allowed to get in the way of its growing straight up. Diameter growth will be slightly less than it otherwise would be because of limited space to grow but this is only temporary, and obtaining proper tree form is much more important than the rate of diameter growth at this stage of development.

The advantages of a thick sapling stand are:

1. Height growth of your trees will be more rapid.
2. Natural pruning of side limbs is stimulated because they lack light and space to grow.
3. The diameter of the side branches will increase slowly. This is desirable since many side branches will need to be removed by hand.

4. Breakage by wind will be less because crowns do not sprawl out but are confined and catch less wind; also, trees support each other.

5. There are more trees from which to select your final crop of trees.

Table 1 gives general guidelines to follow as to when stands should be thinned.

Table 1. Suggestions for thinning stands.

Spacing (feet)	Average tree diameter when stand should be thinned to next spacing (inches)	Trees to Acre
6 x 6	3.0	1210
10 x 10	6.0	435
18 x 18	12.0*	130
25 x 25	Final spacing	70

* The trees removed can be sold as small sawlogs.

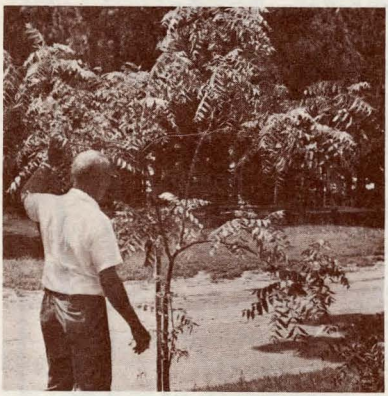


Fig. 3. Young trees grown in the open are more inclined to have crooked main trunks.

Random Spacing

In situations where no cultivation is possible or anticipated, there is no advantage to planting in rows. An example of this is when you are planting in existing timbered areas. In such cases, planting trees at random throughout the timber, wherever space is available, is suggested.

Trees should be planted in the openings no more than 10 feet apart. This rate of planting should give enough choice when selecting crop trees later.

Laying Out in Rows

Where cultivation is possible, planting in rows is desirable. Your final spacing to grow veneer logs should be approximately 25 feet between trees. One simple way of working toward this end is to lay out the planting with rows 25 feet apart.

If seedlings are to be planted, they should be spaced 30 inches apart in the row. When planting nuts, spacing should be reduced to 20 inches.

This system gives the benefits of competition from two sides only but does have distinct advantages from the standpoint of weed control and cultivation. A band treatment of the row with a suitable herbicide will help you in controlling the weeds hard to get by cultivation. The space between the rows can be used for crop production while trees are being established.

In planting either nuts or seedlings, you should aim for approximately 500 established seedlings to the acre. Thin out the trees in the row when you are able to recognize the poor ones and when more growing space is needed.

The Use of Herbicides to Control Competing Vegetation

In cases where the planting is made in rows, a band treatment of the row with a herbicide can be of great help in controlling annual grasses and broadleaf weeds.

Publication EC 60-1733, "Chemical Weed Control in Windbreaks," University of Nebraska, can be obtained through your county agent. This circular gives details of application which should be followed closely.

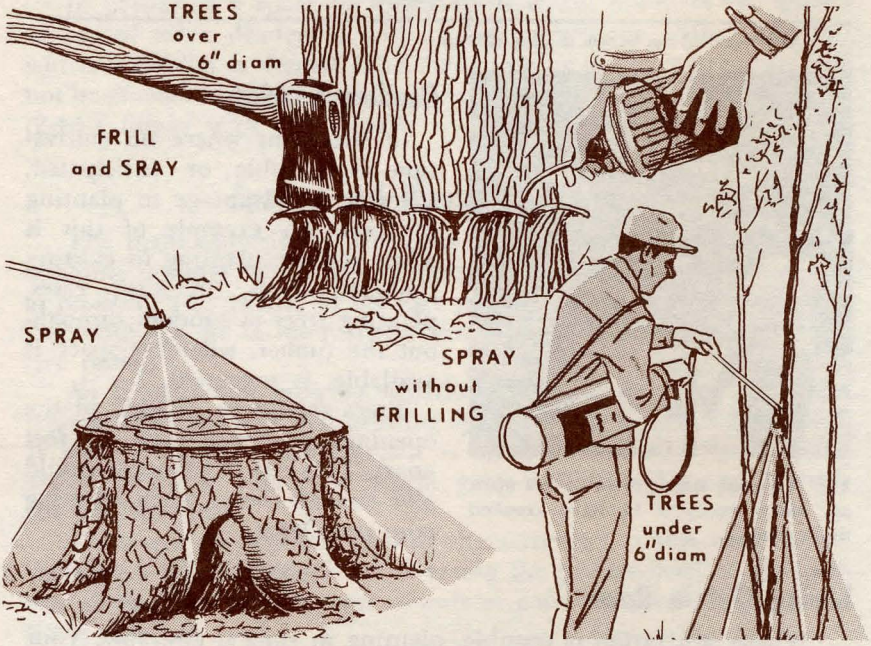


Fig. 4. Methods of killing unwanted trees.

Where it is necessary to remove the competition of trees and shrubs on a planting site, herbicides can be used to good advantage. 2-4-5T and 2-4D mixed as recommended by the manufacturer are effective in killing many different species of trees and shrubs.

For the latest recommendations in regard to herbicides contact your county agent or forester. Also Extension Circular EC 67-130, "Chemicals that Control Weeds," University of Nebraska, can be obtained at the county agent's office and will be helpful.

Caution: The use of 2-4D in established walnut stands during the growing season (while leaves are on the trees) should be avoided.

Protection from Squirrel Pilferage

A method of protecting nut plantings from squirrels by using 1 inch chicken netting cut 3 feet square is as follows:

1. Dig planting spot 3 feet by 3 feet and 2½ inches deep.
2. Place 16 nuts 8 inches apart and 6 inches from edge of wire netting.
3. Cover nuts with 2 inches of soil. Firm soil.
4. Put netting in place, then cover it with ½ inch of soil.

Use netting which is not galvanized so it will rust out in a few years. If galvanized netting is all that can be obtained, the galvanizing can be removed by treating with concentrated hydrochloric acid.

Another way which has proven to be satisfactory is to use galvanized netting, wait until the leaves have dropped in the fall, then simply remove the netting by lifting it straight up over the seedlings. The netting can then be used to protect other future plantings.

Walnut seed is appetizing to squirrels as long as 8 weeks after germination. It is best to leave the netting in place until after the leaves have fallen. Removing it anytime before this will damage the leaves. It is recommended that the planting spots be spaced 18′ apart.

Black Walnut Establishment

Black walnut plantations can be established either by planting one-year-old seedlings or by seeding the nuts directly in the field.

There are several advantages of direct seeding. The resulting seedlings will have normal root systems that have neither been disturbed nor damaged by transplanting. There is usually less dying back of the terminal shoot which simplifies the job of pruning in early stages of the tree's development. It is an inexpensive and easy method providing squirrels are not a problem.

Planting Seedlings

Seedlings which have a stem diameter of 8/32 of an inch and a top one foot long survive well and are preferred to those either larger or smaller.

Walnut seedlings can be successfully planted by machine; however, the planter should be run deep enough so that the root, as well as the top of the seedling, is straight up and down.

Choice of a planting method will depend upon equipment available, size of the area to be planted, density of existing cover and other factors.

In some instances, hand planting may be the most practical method. A long-bladed spade is the favorite tool when planting by hand.

Planting Techniques

Only dormant stock should be planted, and as soon as possible after it has been lifted from the nursery bed. If the trees cannot be planted for several days after being received, they should be placed in cold storage at 35° Fahrenheit. If cold storage is not available, they can be heeled-in and watered down well in a shady place such as the north side of a building.

In planting seedlings, care must be taken to avoid drying out the roots. Placing them in a pail of water, wrapping in wet sacks or placing roots in wet peat moss are all ways of keeping your supply of trees in good condition while planting operations are in progress.

Plant trees in an upright position so that the swelling at the base of the stem is covered, and press moist soil firmly around the roots.

Avoid planting either under extremely wet or dry soil conditions. Seedlings must be planted in an absolutely vertical position to grow into straight, desirable saplings.

Direct Seeding by Planting Nuts

This method of establishing walnut stands is considered to be best if squirrels are not so numerous as to be a problem. Following is information relative to securing stands by the direct seeding method:

1. Nuts may be planted either in the fall or spring.

2. It is not necessary to remove the husk for fall planting. Plant the nuts soon after they fall to the ground. They need no treatment but they should not be allowed to dry out completely.

3. Plant only stratified nuts in the spring. Stratification can be accomplished by storing nuts over winter in a pit. Six inches of sand should be placed in the bottom of the pit to provide drainage. Fill the pit with layers of sand and layers of nuts. The pit should be covered with at least 6 inches of sand, then protected with a screen to keep squirrels out. Apply enough water to thorougly soak the sand in the pit.

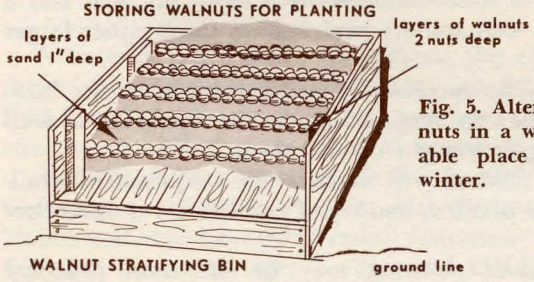


Fig. 5. Alternate layers of sand and walnuts in a wooden box outdoors is a suitable place to store walnuts over the winter.

4. Walnut seeds planted 1 inch deep have as high a germination rate and seedlings are taller at the end of the first season as if planted at any other depth. Walnut will tolerate much deeper planting, however.

Fig. 6. Index finger points to a germinating walnut seed. A seedling 12 to 16" high will develop in two months after seed germinates.

5. Broadcasting 2,000 walnut seeds per acre in the fall and covering with a disc or other suitable farm implement is a good method of establishing stands in some instances. Fall planting is best and seed cost usually very reasonable at this time of year.

This method can only be successful where squirrels are controlled. Destroying surplus trees is not a hard job or too time-consuming when all aspects of establishing a good stand are considered.

When you do not plan to spend much time in caring for the planting during the early stages of growth, this system is worth considering.

Protecting the Planting

Insects and disease are usually not serious problems. However, you should visit all new plantings periodically during late fall, winter and early spring to see that rabbits are not damaging your young walnut trees.

After the third season, rabbits usually will be of no further concern. A satisfactory rabbit repellent can be made by mixing enough sulfur in lard to give a yellow color. A paint brush or mitten can be used to apply the mixture to the main stem of the tree. There are also several commercial repellents which work well.

Caution

Fire and livestock should, of course, be kept out of your plantation. Walnut logs which contain metal (wire, staples, etc.) are not wanted by buyers.

Guiding Through the Sapling Stage

A one-inch increase in diameter every 2½ years is considered to be satisfactory growth. This can mean a very good annual acre income or a very poor one depending on whether this growth is being added to long straight boled trees or short crooked boled trees.

In the production of timber your goal is, of course, to produce both as much quality and quantity as you can. However, producing quality in the sapling stage is far more important than attempting to stimulate diameter growth by large crown development.

There are two good reasons why too much development of the crown is not wanted at this stage.

1. Coarse side limbs are harder to prune and leave larger scars.

2. Young trees with large crowns are very subject to wind damage unless they are growing in a completely protected area. Your trees will usually have enough strength to support a sizable crown by the time the main stem is 6 inches in diameter. The size of the crown can be controlled by completely removing the lowest side branches and by lopping back other long, gangling side branches which will later be completely removed as the tree increases in height. You should confine pruning to side branches; the terminal bud of the leader should not be cut off.

Reducing the leaf area too severely is not recommended because a satisfactory rate of growth should be maintained and growth is directly related to the amount of leaf area on the tree.

There is only one opportunity to obtain tree quality; this is in the sapling stage. Growth can be stimulated later by thinning to eliminate competition. Fertilization and irrigation may be profitable in some instances also.

Genetically improved planting stock will eventually be used to get faster growth. Such seed is not available in quantities at present.

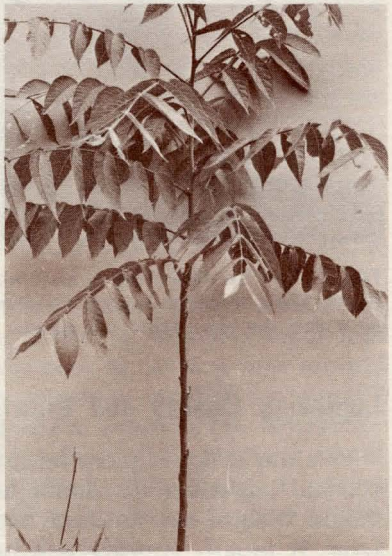
When and How to Prune (Young Trees)

It pays to prune because of the premium paid for veneer logs. It is safe to say that clear logs will continue to sell within the present range of 5 to 10 times the price paid for logs containing knots.

Pruning is a cultural practice which should start the first season after planting and continue until the tree cannot be benefited enough to make the extra work worthwhile.

Fig. 7. Side branches should be cut off flush with trunk.

Figs. 8 and 9. Start removing side branches early. Photos show before and after branches were removed on a two-year-old tree.



During the first 5 years, it is desirable to go through your planting 2 or 3 times during the growing season to remove multiple leaders or other undesirable branching which may be developing.

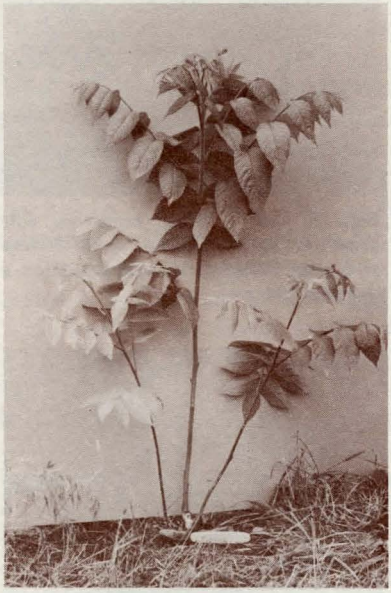
Walnut grows extremely fast if you are following good management practices, and once a year pruning may not be enough to produce the best possible form. You should schedule your pruning for these 5 years during the months of May, June and July because this is the period of year when your trees will be growing fast and are most apt to need attention.

This type of pruning can be completed quickly. A sharp knife or pruning shears will work well as pruning tools.

Walnut Coppicing

Coppicing is a practice which can be used in walnut production. Trees which are under 4 years old can be cut off just above ground level, making a clean slanting cut. The stump will usually develop one or more vigorous sprouts. If more than one sprout develops, retain the best shoot and prune out all others.

Coppicing is frequently used when the original seedling gets off to the wrong start and there is no way of making a straight tree out of the original top growth. It should not be done between the dates of June 1 and October 1 in Nebraska. Sprouts must have a full season's growth to go through winter without being damaged.



Figs. 10 and 11. Coppicing is used when original seedling gets off to a bad start. Photos show seedling during first season of growth after coppicing and one year later after the two smaller side sprouts were removed.

Improving Quality and Growth Rate of Natural Walnut Stands

Walnut is not as plentiful in our natural hardwood stands as elm, ash and box elder. It should be planted in many of these existing stands. Walnut has, however, reproduced naturally in many timbered areas. It usually appears as scattered individual trees growing along with other hardwoods.

Almost pure, even aged walnut stands have become established naturally on some farms. As a general rule, these are thick stands and the tree form is quite good. A great deal can be accomplished by thinning and pruning such stands. Excellent quality logs can be produced from these trees by improving management practices.

The following are some broad statements which should be kept in mind when working with these tree stands.

1. Pruning will pay on many pole-sized natural stands.

2. Spend your time on trees which will have at least a nine-foot straight butt log when pruning is completed.

3. When trees reach 9 inches in diameter, they are too large to accomplish much by pruning.

4. Branches 3 inches in diameter are the maximum size which you should attempt to remove. Your success will be much better if limbs are removed at 1 inch and 2 inch diameters.

5. Use a sharp saw as your main pruning tool; cut limbs flush with bole of tree.

6. Pruning of pole size trees can be done at any season of year. Judgment should be used in the number of limbs removed at one time. A sharp reduction in leaf area will tend to limit growth and encourage sprouting along the trunk of the tree.

In some situations your choice may be limited to either taking more than you would like, or leaving a branch which is already to the upper size limit and must be removed now or never.

The removal of no more than ⅓ of the leaf area at one time is recommended as a guide.

7. In dense, pure or nearly pure pole size walnut stands, there is no need of pruning all trees. You are actually making your preliminary selection of your final crop trees and there is no reason to use time in pruning substandard trees which will soon need to be destroyed to make more room. Aim to prune a tree at an average distance of 18 feet apart throughout the stand. A few of these trees may need to be removed to give room as the stand matures.

8. Select only thrifty trees as your future crop trees. Saplings which have been overtopped for several years have a doubtful future.

9. When a stand has been overcrowded for several years, two lighter thinnings a few years apart is better than removing all at one time.

10. Trees which have grown under severe competition, as is often the case in naturally seeded stands, will have a relatively small top. Opening up the canopy will permit the tops to develop in a normal fashion. It is believed, however, that to widen spacing too rapidly causes sprouting activity on the main trunk which is not desirable.

11. Trees can be severely damaged by climbing vines. Vines should be cut at ground level and chemical applied to the stump. It is suggested that 2-4D spray materials be used with caution in your timber during the months when leaves are on the trees.

12. Old timbered areas are not favorite places for squirrels to plant. They do most of their work outside the timber boundaries. Planting will be necessary to get better species composition in most of the older timber stands.

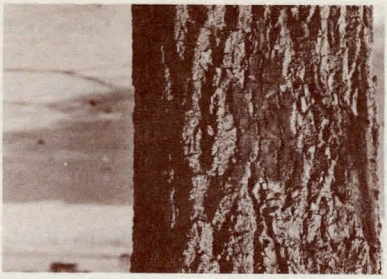


Fig. 12. Inner bark of walnut is a chocolate brown color.

Most people can identify black walnut during the growing season by its leaves. In the dormant season it may be more difficult. If you will use your knife to cut off a small piece of outer bark from the trunk of the tree, it will expose the inner bark, which is chocolate brown in color.

Selling Walnut

The harvesting of walnut trees should not be attempted by anyone but an experienced logger. A mistake in felling, which can result in a split log or a log cut made in the wrong place, can be very costly.

It is therefore best to sell standing trees. There are numerous good walnut buyers. High quality trees are especially wanted and buyers pay high prices for them.

The value of one tree as compared to another varies widely and unless you have a knowledge of log grades and current prices, it is wise to obtain help when marketing walnut. Your county agent and University forester can assist in selecting trees to be sold, grading the logs, determining board foot volumes and locating buyers.

Walnut trees can possibly be considered merchantable when they reach 12 inches in diameter measured 4½ feet above ground level; however, trees of this size are normally too small to sell and should be left to grow. Such trees are bought as lumber trees, at a relatively low price compared to what the same trees will bring when they reach 16″ diameter. However, in selling walnut, it is best to consider each tree individually as to its proper time to be sold. Selling 12″ diameter trees is justified in cases when defective trees are sold or when a stand is in need of thinning.

Quality trees which are healthy and making the normal rate of growth will be very profitable to let grow for another 10 or 20 years, even after they reach 20″ in diameter. The possibility of loss by wind or lightning should be recognized but this risk may be worth taking.

Fig. 13. Prime quality trees are very valuable. University of Nebraska foresters give help in marketing when needed.

Conclusion

It is impossible to outline here a course of action which would be best under all situations. This applies to both making a new planting and tending natural stands.

Many people will be making their first attempt at growing trees for timber production. It is good advice to obtain as much help as possible in such instances.

An hour spent at the site with an Extension Forester will be of benefit by getting his recommendations as to your best way to proceed. The services of a forester can be obtained by contacting your County Agent or writing directly to the University of Nebraska.

In most counties, the Soil and Water Conservation District provides a tree planting service. There are also a few individuals planting trees as a part of their business. Walnut seedlings and stratified nuts are available through the Clarke-McNary program. They can be ordered by contacting your County Agent.

The Agricultural Stabilization and Conservation Service assists financially through ACP payments. In counties where forestry practices are included in their county program, cost sharing payments are made for both establishment of new and management of old stands. Your ACP office can advise you as to rate of payment and practice requirements.