MANAGING THE FARM WOODS FOR PROFIT

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### Cover Illustration

The picture on the front cover of this circular shows a profitable piece of Illinois farm woods in northern Fayette county from which trees have been harvested continuously for the past fifteen years. There are still plenty of merchantable trees in the stand and an abundance of young timber.
THE PROPER MANAGEMENT of a piece of farm woodland should make it a profitable part of any farm. The average farm woods, if well cared for, will produce all the firewood, fence posts, and rough lumber required on the farm and also some wood to sell in the form of standing timber, saw logs, and other products. If abused and neglected, it will deteriorate and eventually reach a condition where it can no longer be considered a woods but merely a wooded pasture, producing no timber of value and very little grass. The purpose of this circular is to explain the methods of caring for farm woods so as to make them produce the greatest net profit to the owner.

The majority of farm woodlands are much in need of improvement. A great number of them are pastured, others are burned, and in general, cutting is carried on without considering the welfare of the stand. Many of the trees are diseased; undesirable species or poor timber trees are often in the majority and are crowding out the better ones. Crooked or bushy-topped trees crowd out the straighter, more desirable ones. In some dense stands of timber the competition between trees for plant food and light is so great that none of them grow well, while in other stands overmature trees occupy too much space.

These conditions can be remedied in a large measure by keeping out all livestock, protecting the woods from fire, and using axe and saw properly.

VALUE OF ILLINOIS FARM WOODLANDS

About one-third of the total area of forest land in the United States is in farm woodlands. Practically all this area lies east of the plains region. These farm woods have an enormous producing power, but under present methods are producing only one-third to one-half of their capacity. According to the Census figures for 1930 there is a wooded area of 25 acres for every farm east of the Mississippi river. The same Census shows an average of 12.7 acres of woodland for every farm in Illinois. While this figure is an average for the state as a whole, the acreage of farm woodlands in some sections of the state is much higher per farm. Figures compiled by the Illinois State Natural
History Survey\(^1\) show that the farm woods in Illinois are capable of producing as much wood annually as is required on the farms, yet they are producing much less wood each year than the farms are consuming and farmer timber owners are paying high prices for imported lumber that in many cases is inferior to native Illinois timber. The proper management of farm woods in growing timber crops will change these conditions and make the woods an income-producing unit of the farm (Fig. 1).

**FIG. 1.—A WELL-MANAGED FARM WOODS**

Defective trees and tops of other trees that have been cut for logs or fence posts are concentrated at a central point to be later worked up with a buzz saw for firewood.

FIRE—A DESTROYER OF VALUABLE TIMBER AND YOUNG GROWTH

Fire is without doubt the worst menace of our woods. Illinois does not have the extensive forest area found in some states, having only about 3 million acres in timber at the present time, but does have more than her share of forest fires. While no figures are available for the area burned in Illinois, anyone who travels thru the wooded portions of the state can vouch for the vast amount of damage done by fire each year. These fires are a needless waste, annually costing the people

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of Illinois thousands of dollars in timber, forage, and improvements, to say nothing of the damage being done by erosion on areas that have been deforested.

The early settlers in Illinois burned the woods to help clear the land, but there is no reason now to burn for that purpose. However, burning is still being done in various sections of the state for purposes thought to be beneficial—the destruction of chinch bugs, cattle ticks, disease germs, or to improve the grazing—but the insects, bugs, and disease germs are not destroyed and the grazing areas are seriously damaged.

Fire hot enough to destroy the leaf litter in a stand of timber kills the young growth. A temperature of 129 degrees Fahrenheit will kill the cambium, or living layer, between the bark and the wood of a tree. If the cambium is killed all the way around the trunk, the tree dies. Even tho leaves and litter are raked away from the bases of the larger trees to prevent their injury, the loss of the young trees is serious, for they are coming on to produce another crop when the larger trees have been cut.

Large trees containing merchantable material, if burned severely, are killed in the same manner as the small trees. Even tho in many cases such trees are not killed outright, they are severely injured by the heat of the flames. Patches of the bark and living layer are often killed, and later these patches of bark drop off and expose the sapwood to the weather. Fungus and insects immediately start work on this exposed area and spread to other parts of the trunk, causing the tree to have a defective butt. If fires occur on the area from time to time, each fire will burn a little deeper into the base of the tree until finally it burns down or is only a shell. While the bark may not be burned from the tree, the intense heat to which it is exposed will cause it to grow more slowly (Fig. 2).

The financial returns from a stand of timber are often materially reduced not only by the actual destruction of good timber by fire, but
also because severely burned trees may have to be cut and marketed during times of low prices. Furthermore, good kinds of trees killed by fire are often replaced by others that have little commercial value.

**Losses of Litter and Wild Life Detrimental**

Loss of timber is not the only damage wrought by fire. It also destroys the accumulation of leaves and litter on the ground. This accumulation is of vital importance to the health and growth of trees. It acts as a mulch, absorbing large amounts of rainfall and storing it up in the ground for the use of the trees during dry periods. Constant decomposition of this layer of litter adds plant food to the soil. When the area is burned over, all the plant food contained in the forest litter, with the exception of phosphoric acid and potash, is lost. Even these mineral salts left in the wood ashes may be blown away, washed away, or leached out thru the soil.

A forest floor well covered with litter also furnishes protection from erosion and prevents the shifting of sand. After this sponge-like litter is burned off, there is little left to absorb the rainfall and feed it out slowly thru springs. There is a rapid run-off from the bare soil and erosion is inevitable; floods are caused and high and low water stages made more pronounced. Stream beds are filled with the silt from adjacent eroding lands, and fertile fields are buried under worthless subsoil.

Every fire that burns over an area of forest land drives out or destroys the game in the vicinity. Wild life is dependent on the forest, but in a measure the forest is also dependent on wild life. Birds feed on the insects that prey on the trees. Squirrels and other rodents feed on the nuts, and many of the nuts that they bury for food are never found but grow to produce succeeding stands of timber. The nests of most of the game birds are on the ground or in low bushes, and it is not at all uncommon to find nests of eggs that have been partially burned. Sometimes the parent bird occupied in incubating the eggs waits too long and is burned with them.

**Causes Often Due to Carelessness**

Lightning is responsible for starting some fires, especially in the western part of the United States, but here in Illinois human ignorance and carelessness are responsible for starting by far the largest majority of fires. Burning matches and cigar and cigarette stubs thoughtlessly thrown out of trains or automobiles are the cause of hundreds of fires. Burning the weeds and trash off fields before plowing is responsible for many more; while others are started by careless hunters and fish-
ermen who build a fire to warm themselves or to cook a meal, and go away without extinguishing it. These causes, added to the occasional malicious setting of fires, are responsible for destroying each year in Illinois thousands of dollars worth of valuable timber, farm crops, farm buildings, and fences and robbing the soil of its plant food.

Fire Lines Help to Prevent Disasters

Fires in the type of timber that grows in Illinois do not become so hot but that they can be effectively controlled by simple measures. The timbered areas are readily accessible, and the majority of fires could easily be put out before they do much damage.

While all fires cannot be prevented, the owner can keep his timber protected with fire lines, or breaks, so that if a fire does start, it cannot run unchecked over the entire area. Constructed around and thru a piece of timber these fire lines will keep the majority of fires from entering and will prevent the spread of fire started on the inside. Such fire breaks are both simple and inexpensive to make. They consist of strips 6 to 10 feet wide which have been either plowed or disked until the mineral soil is exposed. Two strips plowed around a woods with a two-bottom plow, one trip each way, will make an excellent fire line that will be considerably wider than the width of the bottoms, as the furrows need not be thrown together. In the woods where it is impossible to plow deep enough to turn a furrow, a harrow, preferably of the cut-away type, is the best farm tool to use. A fire line thru the woods need not be straight but may wind between the trees wherever it can get thru.

Unless a fire is fanned by a brisk wind it will not cross one of these lines. In case a fire does get into the timber and has a strong wind behind it, the fire line will serve as an ideal point from which to start a back fire and check its progress.

Fire lines may be made at any time of the year but they should be gone over with a harrow after the leaves have fallen and each spring or summer if the leaves have blown back over them. Two or three trips over the ground with the harrow will be necessary to break it the first time but after the fire line has once been established, a single trip over it two or three times a year should keep it in excellent condition. Fire lines made thru a piece of timber may be used as roads to take out timber that is being cut.

PROTECT WOODS FROM GRAZING ANIMALS

Next to fire, grazing causes the most damage to farm woodlands. The extent to which the woods are injured depends entirely on the
number of stock turned into them. A heavily pastured woods is indicated by the total absence of desirable young growth except possibly hickory. The buds and leaves of the hickories are bitter, and while sheep and goats will eat them, other stock will not eat young hickory unless it is the only forage available.

If undisturbed by fire and grazing, a wooded area has a heavy mulch of leaves on the ground and a growth of underbrush so thick that it is often difficult to walk thru it (Fig. 3). As soon as stock is turned into such a woods, the underbrush begins to disappear and the leaf mulch dries out and is blown away. Sod forms, and soon the larger trees begin to show the effects of the grazing. The first reaction is a retarding of their growth. This is the result of the loss of the plant food which the decaying leaf mulch was returning to the soil,
and to the compacting of the soil about the roots of the trees by constant trampling of the stock. Foliage becomes less abundant and the tops of the shallower rooted trees begin to die (Fig. 4).

Under the above conditions grass will make its appearance in a short time. If the land is of more value for pasture than for timber, the timber, with the exception of some for shade, should be cut off and the better grasses allowed to grow, but if the tract is to produce

the maximum amount of wood, the stock should be taken out and the woods permitted to develop. The fact is that hardwood timber and grass cannot be successfully produced on the same land at the same time. Not only is the growth of grass in timberland less abundant but it is "considerably less nutritious than the same species grown in full sunlight."

**FUTURE PROFITS LARGELY DETERMINED BY CUTTING METHODS**

The method used in cutting timber determines not only the present returns from the woods but its future productive capacity as well. The usual practice is to sell the entire stand to some timber buyer who proceeds to cut every tree having any merchantable value. Trees so small that they will make only one crosstie or one mine prop are often cut, and in such cases nothing more in the form of wood crops can be expected from the area for thirty or forty years.

Even when the owner is cutting timber for his own use he has a tendency to select the choice trees and leave crooked, diseased, and undesirable trees standing. This practice soon converts the timber into a stand of very little value.

To preserve and increase the productive capacity of a stand of timber attention should be given to removing diseased trees, cutting crippled and low-grade trees, and thinning crowded stands. Not all trees in these classes should be removed at one time, or the stand is likely to be opened up too much; the trees should always be left close enough together to force each other upward and produce long clear trunks.

**Remove Diseased Trees First**

Diseased trees should be removed first, for two reasons: the longer a badly decayed tree stands, the smaller the amount of merchantable material there will be in it; and a disease present in one tree is apt to be transmitted to near-by healthy trees. So even tho a diseased tree contains no usable wood, it should be cut to make room for healthy trees and to eliminate the source of infection.

Trees may be considered diseased when they show the fruiting bodies of fungus on the trunk or limbs, decayed knots and cavities on the trunk, or decaying areas on the butts from which the bark has been removed by fire.

Diseased trees wanted for reproduction purposes may be left until after the other trees have been removed (Fig. 5).

**Cut Crippled and Low-Grade Trees Next**

Crippled and low-grade trees are the next to be removed. Deformed or crooked trees, "wolf" trees (those with large spreading branches), and trees of little value for timber, either because of unfavorable markets or extremely slow growth, comprize this class.

The composition of the individual farm woods has a great deal to do with determining which species of trees in a stand are undesirable. A species may be undesirable in some sections of Illinois and very
desirable in other sections, depending upon available markets. Elm, for instance, has a ready market in the vicinity of box and barrel factories, and rapidly growing hickory is desirable when located within hauling or shipping distance of handle factories. In other sections both elm and hickory are undesirable because of their low market value, slow growth, and inferior quality. Hard maple, when present only as an occasional tree, is usually too slow growing to be profitable, but when available in large enough numbers for sirup-making to be profitable, it is a desirable tree to have.

In Illinois woods the following trees are usually undesirable from the standpoint of timber:

- Box elder
- Pawpaw
- Dogwood
- Red cedar
- Elm
- Hard maple
- Hickory
- Persimmon
- Hop hornbeam
- Crabapple
- Buckeye
- Hackberry
- Beech
- Scrub oak
- Hawthorn
- Shadbush
- Redbud
- Butternut
- Arbor vitae
- Deformed trees should be cut out, for even if allowed to mature, they will contain much less merchantable material than perfect trees of the same diameter. Crooked trees, and trees forked or branching close to the ground are included in this group.

Wolf trees are in one sense deformed, for they have big bushy tops and very little clear merchantable length. They are usually the result of the stand having been opened up too much at some earlier time. They take up too much room for the material in them and "wolf" the ground space, sunlight, and plant food that other trees should have. They should be removed if for nothing more than firewood.

**Take Out Mature Trees**

After the diseased trees and other undesirables have been removed, the ripe or mature trees should be taken out. If a stand is being grown for piling or crossties, the trees will be mature for that purpose when they reach a diameter of 16 inches or larger, breast high (4½ feet above the ground). Trees can be used for saw timber when they reach that same diameter, but if left until they are 20 inches in diameter, breast high, each tree will yield more than twice as much lumber and the lumber will be of much higher quality.

The size to which trees can be allowed to grow and still yield sound timber depends partly on their species. Black oak, especially in hill timber, is susceptible to injury by grubs and several fungus diseases which are more prevalent in large timber. For that reason it yields a higher percentage of sound timber if cut at a diameter of 16 to 20 inches than if left to reach a larger size. Pin oak, a rapid-growing
tree of wet lands in Illinois, is often wind-shaken and of poor quality when left to a large size, but if cut under 2 feet in diameter it may produce very good lumber. If high-grade veneer logs are wanted, the

![Image of pin oak forest](image)

**Fig. 6.—Thick Stands Often Need Thinning**

This dense stand of pin oak has come in on land in Crawford county which was abandoned for farming fifteen years ago. In 1930 these trees were 4 to 8 inches in diameter, breast high, and 30 to 35 feet tall. Some of them should be removed to enable the remainder to continue to make a rapid growth. (Photograph by U.S.D.A.)

trees will have to be left to reach a larger diameter than for any other purpose, but the additional price paid for logs of veneer quality is often more than offset by the time required to reach that size.

**Thin Crowded Stands**

Following the removal of the poor, diseased, and mature trees, younger trees often remain that stand too close together and should be thinned. A condition calling for a thinning is found more frequently
in thick, even-aged stands of young timber, but in stands of trees of all ages thinning is sometimes necessary.

Thinning consists of removing some of the trees, even tho they are desirable, in order to give the remaining trees opportunity to develop more rapidly. In a natural stand that has been undisturbed the young trees will be so close together that they will force each other up and produce straight trunks free of limbs. Usually about the time the trees reach a diameter of 4 to 6 inches the competition for plant food and sunlight becomes so keen that none of the trees make much growth and the entire stand appears to have stagnated. A stand of timber in this condition is badly in need of thinning. Nature will remedy this condition in time and the trees that succeed in getting their tops above the others will begin to grow rapidly once more (Fig. 6). This struggle for survival, however, which usually takes many years of slow growth, can be eliminated. All the weak, deformed, and slow-growing trees should be taken out. By leaving the sound trees of good timber form, or crop trees, uncrowded yet close enough to prevent them from becoming bushy, no pronounced slowing down of growth need occur.

**Leave Good Timber of All Sizes for Future Cuttings**

Stands that consist of trees of all ages usually have more trees to the acre than even-aged stands and therefore require more frequent cuttings to keep them growing at the maximum rate. The ideal all-aged stand contains trees of all sizes, from the smallest seedlings to mature trees. This type of woods fits in well with good farm management and permits the owner to cut some timber every year for home use or for sale.

In harvesting the all-aged stand selectively, which is the method most profitably applied to the farm woods, each cutting should consist of those trees that have matured and others that should be removed to improve the stand. The removal of mature trees will allow those remaining to grow more rapidly and the space which was occupied by the mature trees will be taken by young trees coming in. Large holes should never be made between the tops of the trees, for the ones remaining will have a tendency to become bushy and of poor quality.

After all the undesirable and mature trees and some of the others that stood too thick have been removed, the stand should be made up of trees ranging in size from seedlings to about 16 inches in diameter. Those above 2 to 3 inches in diameter should be sound, of a good timber variety, straight and tall and, as a result of proper cutting and
management, as rapid-growing as possible for their species on the existing type of soil. Trees smaller than 2 to 3 inches in diameter should not be disturbed but should be left to reach a size large enough to use.

![A Good Stand of Timber Left After Logging](image)

This piece of farm woods in Whiteside county has been properly cut. Enough trees have been left standing to furnish a second crop in a few years' time.

By carefully cutting the farm woods as lumber or firewood is needed or can be sold to advantage, the largest financial returns will be realized and the woods will be renewed without difficulty (Fig. 7).

**CAREFUL UTILIZATION OF TIMBER NECESSARY FOR BEST RETURNS**

Proper utilization of the timber after it is cut is the final and too-often-neglected factor in getting the maximum return from the farm woods. Many a farmer who would not cheat himself by using good hay for bedding his stock makes an equally bad mistake when he puts the products of his woods to one use when they are worth more for another. The chief products of the woods used on the farm are lumber, fence posts, and firewood. These are often cut without consideration for the rest of the stand. The straightest, smoothest trees are sometimes cut only for firewood, and large choice white oaks are felled and made entirely into fence posts. Many trees that have been cut for logs are not completely utilized, over a cord of wood and often a tie cut or fence post cut being left in the woods to rot. Trees 10 to 12 inches in diameter are cut for crossties, and small trees that will yield only a 4-inch mine prop are removed from a stand.
These bad cutting practices must be discontinued if the maximum returns are to be secured. It does not pay to cut a tree that measures less than 16 inches in diameter, breast high, unless it is wanted for some special purpose or will improve the stand. When a tree reaches this size it is just getting to the point where it will lay on some valuable material each year. Small trees have a larger proportion of sapwood and knotty heart than larger ones; cutting them can be compared with harvesting a crop of grain before it is ready and expecting to receive top market price for it. If cut into logs, the average 16-inch tree will produce only one 16-foot log about 12 inches in diameter at the small end. When logs of this size are sawed into lumber by a competent mill man, each log will yield about 100 board feet. If logs of this same size are sold by the Doyle Rule, which is the standard in Illinois, only 64 feet, a little over one-half of the actual volume, will be their scaled content, the only part for which the owner is paid. If these same trees are left until they reach a diameter of 20 inches, the butt log will scale more than twice as much as the butt log of a 16-inch tree and the lumber will be of much higher quality.

The trees that are best suited to produce the desired materials should be selected with care. Trees for saw logs should be of the largest diameter available, straight, and sound. Crooked trees, if cut in the crook, will produce reasonably straight logs that can be sawed without unnecessary waste. Never cut a tree for fence posts only. Butt cuts and clear logs long enough to make lumber are far too valuable for that purpose. In cutting saw logs there will be plenty of larger limbs and cuts too short for lumber that can be used for fence posts. There is an erroneous belief in some sections of the state that fence posts cut from the top of a tree will not last as long as those cut from the butt. The position of the wood in the tree has nothing to do with its durability and if a post from a large limb contains as high a percentage of heartwood as butt posts, it will last just as long. The cleanest, straightest trees will split more easily but by no means should they be used for firewood, as they will produce logs or lumber of far greater value. Dead trees, tops, and trees unfit for other products will make firewood with as much heat value as the best timber trees.

The uses to which most farm lumber is put do not demand material that is free from knots and other defects. This allows the owner of farm timber to sell his high-grade logs, that will make veneer or other products of fine quality, to some sawmill or veneer plant and have the poorer logs made into lumber to use at home.

Just as the better portions of choice trees should not be sacrificed to be made into fence posts, neither should they be used for crossties
and mine props. Crossties can be made from short cuts out of the tops of the trees and in some cases from limbs of sufficient size. Railroads accept crossties produced from most of the less valuable kinds of trees; this is often the best way of utilizing them. Mine props are of little profit, and it is a waste of good material to utilize anything for that purpose except limbs, cuts that are too small for other purposes, and undesirable trees.

In order to make the farm woodland a profitable part of the farm the owner will do well to observe the following rules:

1. Protect woods from fire and grazing of livestock.
2. Cut out diseased and undesirable trees.
3. Cut mature trees for the product to which they are best suited.
4. Utilize all the material in each tree.
5. Sell high-grade logs direct to the consumer and use the lower grades for farm lumber.