Pruning Mature Trees

By
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THE PRUNING of mature trees by surgical methods to retain and strengthen the structure of the older tree goes back less than 80 years. We call this surgical pruning.

Pruning of young trees had been developed to a fine degree by nurserymen and gardeners many centuries ago in Europe, where the training of the smaller structure of the young tree was accomplished without damage, even though branches were stubbed and beneficial results were produced with sucker growth. Most good earlier pruning done on mature trees was on the small limbs.

Special gardener pruning effects of topiary, espalier, pleaching, and even pollarding emphasized clipping (which is stubbing) of small branches. This no doubt has contributed to the belief that stubbing can be done on all mature trees, even though it takes little study to show that these special-effect cuts are only made on terminal or second-year wood.

Pruning mature trees, on the other hand, must follow surgical principles to heal wounds quickly and create only normal healthy growth.

We must recognize two new factors in the mature tree: (1) all exposed heartwood must be protected by callus heal before heart rot decay weakens the tree, and (2) suckers in a mature tree do weaken the tree. Suckers are connected only to the outside sapwood layers making a ball and socket joint. If the sucker does not pull out when young, in later years a splitty crotch develops, and heavy end growth outgrows the strength of the sucker.

Healing Callus Can Be Induced

Tree surgery techniques do prove that a healing callus can be induced to cover cuts or trunk wounds much faster than untreated wounds. Callus can grow in two directions, outward or across, depending on the greater immediate tree need. When left untreated, it usually buttresses around the sides of the wound. If traced to allow the best sapflow around the wound, callus will heal thin and rapidly across the wound. This same principle, using nature's callus growth variation at the crotch, creates an equally fast thin callus heal around the cut. This area varies in each crotch, but can be identified. We call it "Davey shoulder ring area," as it was identified by Wellington Davey in his experimental work on trunk wounds before 1900.

Surgical pruning requires three judgments in every cut: (1) an exact positioning of the cut, (2) cutting to a strong enough lateral branch or leader to take the sap flow, and (3) keeping an overall balance between tops and roots. This point of balance is shown by natural divisions between the first and second top. It should never exceed more than 1/3 of the top, even when the four types of superfluous branches (dead wood, weak limbs, interfering branches, and suckers) are removed in a general pruning.

One final factor that will strongly affect good work is the ability of the man to climb the tall tree and reach the position to make the cuts properly. Rope climbing and rigging make the largest trees accessible, and are still considered the best methods of reaching these hard-to-get-at locations in mature trees.

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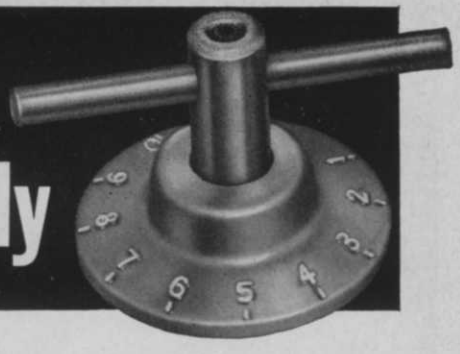

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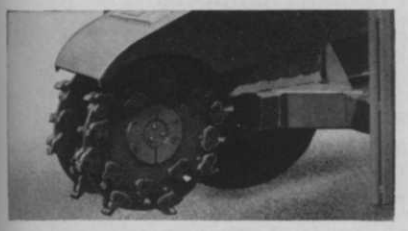

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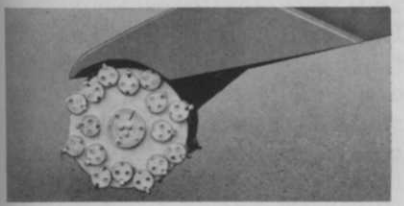

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Scrap into dollars. Contract applicators, arborists, municipal treemen, etc., can use their chippers to turn waste brush trimmings into valuable mulch which can be used in unlimited ways. Shown above is a Fitchburg chipper at work in photo (left); a Mitts & Merrill chipper is pictured right.

Where to Sell Those Wood Chips

WOOD CHIPS, a longtime favorite as a mulch for trees and plants, are finding ever-increasing numbers of applications in other areas and offering a potential new source of income to custom applicators, nurserymen, and tree surgeons.

Given a source of wood wastes or brush, and a woodchipper, a number of enterprising operators have converted wood scrap into dollars and cents, selling the end product at prices ranging from $6.50 to $12.00 per cord. Among the many novel new uses for wood chips are such applications as animal bedding, poultry litter, overall ground cover, paving, highway barriers and even as an emergency cattle feed mixed with molasses. Homeowners also use hickory and apple wood chips for backyard barbecuing.

The University of Massachusetts spreads wood chips on its ski slopes at Thunder Mountain instead of using straw as in the past. The Forestry Sciences Laboratory at Athens, Georgia, is trying to develop skiing into a summertime sport and is experimenting with ski slopes covered with sawdust and wood chips. Ski pros claim that a 20% grade of sawdust chips was " . . . not unlike some snow conditions . . ." Uses for chips, in fact, seem to be limited only by the imagination of chipper owners.

Cushioning cleats on golf shoes is the reason Walter Leix orders wood chips for the paths, rest areas, and golf cart paths at the Shannopin Country Club in Pittsburgh, Pa. Since the practice has caught on with other golf courses in the area, he claims competition for wood chips has created a demand which suppliers cannot meet. Leix cites one other additional benefit of wood chips: "If they get caught in the lawn mower," he says, "they don't harm the blades."

Davey Tree Expert Company is the supplier of the Shannopin Country Club. The reason for Davey entering the supplier field was simply as a convenient method for disposing of brush and scrap accumulated in large rights-of-way clearance projects. Currently the company is supplying wood chips for a number of users in the Buffalo, N. Y., area and discounting income derived from this source from its land clearance project.

Using wood chips as a mulch suggested one further use to nurseryman James Cookman, Southboro, Mass. As wood-chip mulch decays into organic humus (usually, in 6 to 7 years) it adds valuable nutrients and conditions the soil. Cookman speeded up the process to one year by composting chips in pits with alternate layers of garbage from local restaurants, saturating the compost with a 35% solution of urea nitrogen and bagging the finished product for sale at $1.79 per 10 pounds. Appearance of the compost after processing is similar to good black garden loam.

F. E. Maltby, Maltby & Co., Stoughton, Mass., claims that wood chips from his company's tree-service operations are worth roughly the same as loam soil, a price which might vary between $1.75 to $4.50 per cubic yard. "The general public," Maltby says, "is at last realizing that the easiest and cheapest way to control weeds in a landscaped area is with wood-chip mulch, which we make with our Fitchburg chippers. The watering ban in the Northeast has been a factor in this too.

Foresters for Saginaw, Mich., are helping to prepare the soil of a recreation area on Ojibawa Island by spreading it with chips from its three Mitts & Merrill chippers. Next year, these chips, when plowed into heavy soil, increase its workability, keep moisture in and weeds out. This is another market for waste chips.

Nurserymen supplying shrubs and trees to Connecticut State Highway Department also find that chips make maintenance easier. The state requires that spring-planted stock must be guaranteed for six months and fall plantings for one year. Under this same provision, the nursery must replace any stock

that dies during the guarantee period. Also, the nursery must water and weed the areas they landscape.

To help meet these three demands, wood chips were spread 4 inches deep around trees and shrubs after planting and the root area was thoroughly soaked. Results of the project show that the need for watering is cut by 60 to 70% and weed growth by 90%. With the current water ban in much of the Northeast, mulching with wood chips will probably increase this year.

From fertilizer to mulch, wood chips are catching on, not just as a means for disposing of wood wastes but also as a profitable sideline enterprise in themselves.

Vary Mowing Height According to Grass Species

In most respects, warm season grasses, such as bermuda, zoysia, or buffalograss, require different management than do cool season bluegrass or fescue lawns, according to Jim Nighswonger, Kansas State University extension landscape architect.

He points to mowing height as an example. "Warm season grasses prefer a mowing height of 1 to 1½ inches, while cool season grasses grow best when mowed to 2½ to 3 inches," Nighswonger explains.

Bermuda and zoysia lawns benefit most from fertilization in early May and July, while cool season lawns respond best to March and early September fertilization, he notes.

In Kansas, Nighswonger advises, 1½ to 2½ inches of water applied every 10 to 14 days provide the right moisture conditions. A simple water gauge, such as a coffee can placed near the sprinkler, can measure approximate applications of water.

Buffalograss, an extremely drought-resistant species, requires even less water. Nighswonger reports that buffalograss is preferred in the western one-third of Kansas if irrigation water is not available.

Safety
and the Tree Surgeon

By HORACE P. BRYAN
Bryan Tree Service, Dallas, Texas

SAFETY in the tree business, as in any business, begins by following the slogan, "work safely." In no business is this a meaningless, empty motto.

Tree workers, especially, because of the unusual hazards they encounter, should be conscious of the fact that by safe practices and constant alertness, tree surgery and maintenance can be done without mishaps. Chance-taking men who work trees for a living are going to get hurt. No man is safer than his methods, and neither fear nor refusal to do the tough, high job is part of a proper work program. There are rotten, dead trees and even faulty green trees which should not be climbed. To climb them and attempt to work on them is to risk a life.

One Fall: Too Much

Men who climb rotten trees or work without using ropes and safety saddles for security, or those who grab power saws and jump up ladders without being "tied in" with ropes or saddles are taking chances. Other climbers are tempted to climb ladders unbalanced or unsubstantially supported against a tree. Of course, workers may climb such hazardous steps many times without incident, but it takes only one fall to break a leg.

Fig. 1. (left) Safety rope fastened to the snap on the tree surgeon's saddle. A round turn is made in the eye of the snap, and is secured with a bowline knot. The upper knot on the right is the climber's sliding hitch knot.

Fig. 2. (below) The sliding hitch knot allows climbers to change their height to any desirable working altitude. It is used just above the saddle snap, well within reach of the tree surgeon.

Ladders should be shifted to secure positions on a steady foundation. A rope thrown through a crotch of the tree above the ladder provides climbers with a secure hold on which to balance their weight. We tie a knot in the end of a rope and throw it like an old seaman's heaving line. On one end of the rope we fasten a safety snap (Fig. 1) which is latched to the climber's saddle, and we tie a big multiple knot on the other end. The knot acts as a weight when the tree surgeon hurls it, sometimes 25 to 40 feet high, through a tree crotch and then lets it fall to his reach. If the knot does not readily fall, after the rope is laid through a fork, workers flip the rope, and the knot soon drops to the right level.

Now the worker may climb the tree safely, with or without a ladder, by using the rope. Without a ladder, he can scale the tree by the traditional rope climber's technique: hand-over-hand pull-up with a safe foot hitch (Fig. 2), if he has the rope in the fork of a limb. If the rope is placed through a crotch near the tree trunk, a climber can snap the safety latch to his saddle and pull himself up with the free end of the rope, using his feet against the trunk for bal-

Fig. 3. With his rope looped through a fork near the tree trunk, tree surgeon, David Barnes, is suspended by his rope fastened to the saddle snap, and he's balanced on the tree trunk.

ance (Fig. 3). When a ladder is used that cannot be properly secured, a rope is essential, especially when climbers must ascend tall, almost limbless trees.

Lead Weight Rubber Covered

When we throw a rope through a very high crotch, a rubber-covered, lead throwing weight is tied to the line instead of a knot. We use bell-shaped, lead weights (4½" x 2¾") that average one-half pound. The weight carries the rope both upward and over tall limbs, and it makes the rope slide downward rapidly to within easy reach from the ground level. Throws with the lead weight are made not only to get safety ropes in position, but also to maneuver other ropes into their proper places to lower limbs to the ground.

On jobs where we cannot use a ladder safely or climb up on a rope, we use linemen's spurs. It is much better to do only slight damage to a tree than to have a man take chances. Spurs are useful assets in getting the job done, and any hazard to workmen comes through their inexperience and carelessness. We recommend the use of spurs particularly where safety outweighs the damage caused to the tree. They do some damage to the bark and cambium layers, but these layers heal rapidly in the top parts of the tree. Of course, when trees are removed, piece-by-piece, damage caused by spurs is negligible.

A climber's safety rope and saddle are tools just as important as the saw. We prefer ropes ½-inch thick made of blue-dot or red-dot manila and think there is no substitute. Many in the business have tried nylon rope, but they have found it inferior because it lacks firmness and other qualities which make a rope suitable for tying knots and hitching to saddles. When compared with manila rope, nylon affords a very poor grip for workers who depend on a rope for support while they climb trees. We use lengths of manila rope that vary from 75 to 150 feet depending upon the height of the trees and other needs.

Safety saddles may be purchased in several forms from different supply houses. We use the simple, two-piece saddle made of nylon web without the leather lining. Nylon webbing resists mildew and other forms of rot. Choice of a safety saddle, however, is largely a personal matter and is left to the individual climbers.

Each Climber Responsible

Surgeons should be given good equipment and taught to trust it. Each climber should have his own pruning saw, rope, and saddle, and it is his responsibility to take care of them. Saws must be protected against rust and gums caused by the trees' sap, bends or kinks in the blade, and broken or bent teeth. The latter two often are caused by rough handling or hauling.

Every man should know the condition of his rope; a safety-conscious tree surgeon literally examines every inch of the rope each time he uses it and as it passes through slide knots (Fig. 3) or rings in the saddle as he works. Ropes should be stored in dry places, kept away from heavy or sharp tools, and rigged with safety snaps properly. Periodically, the snap should be switched to the "knot end" of the rope, and the end to which the snap was attached can be used for the knot. The "snap end" wears out faster than the free end.

Safety saddles need only rou-

Fig. 4. The rope climber's foot hitch allows him to lock himself at any height on the rope. Rope is wound around his left foot and pressure from the right foot stops the rope in place. With combined arm and leg action, climbers can lift themselves without considerable strain and can rest at any distance from the ground.

tine care and inspection. They should be stored in dry places and protected when hauled. Most faults appear first in the saddle stitching and joints; however, they usually last for many years without causing trouble.

Spot Troublespots First

Trees are usually cut or trimmed from the top down. I first study a large tree from the ground and note buildings, lines, and other obstacles. Then I select a crotch or fork in the tree for my limb-lowering rope and another for a safety rope. A safety rope looped through a high crotch provides a long lead for more balance, greater working freedom, and maximum safety. It also allows long swings onto limbs and is still effective as a safety rope.

Many large trees can be trimmed or cut by looping the safety rope through a crotch only once, but in others the rope may need to be relocated once or twice. When a worker must swing to the side, supported by a single safety rope, to trim a limb, we use a 6-foot auxiliary rope. One end of this rope is permanently attached to the saddle, and the other end is thrown around a limb or branch and fastened to the saddle with a snap. This auxiliary rope is handy also to carry a power saw.

Trees: No Place For Jokers

The experienced climber's greatest hazard is "distraction." The most common distraction is anger at the groundman, the boss, or the client, but it can come from many places, even a tangled rope. If our climbers become distracted or upset in any way, they come down to the ground on their safety rope and relax. Only after they are fully in control do they return and finish the job.

Clients are rarely, if ever, allowed to give orders to a man working in a tree; this is the foreman's job. And trees are no place for practical jokers. The best tree crew I ever knew had a big time talking and laughing, and the days were short, but they knew when to talk and when not to talk.

"Timber" Stops Headaches

"Timber" is a call well known to all "small fry," it seems. We prefer that they do their "timbering" within the fence of their own backyards. The call, T-i-m-b-e-r, by a man sawing off a limb is, however, a sound practice. I learned this one day when working with a crew of seven climbers and two groundmen in a large parklike area. After a while, shouting "Timber" grew a little monotonous. I sawed off a short limb ("headaches" we call them) about 3 feet long and 6 inches in diameter, quickly glanced in all directions, I thought, and then pitched it out to fall. No sooner had the limb section started its fall, when I saw a ground worker directly under me. Luckily, it missed

him, but it was close enough to teach me to yell, Timber! Hard hats should be provided tree workers, especially groundmen. Also ground workers should give a warning call when they walk under trees being trimmed or cut.

Cautious Climbers Live

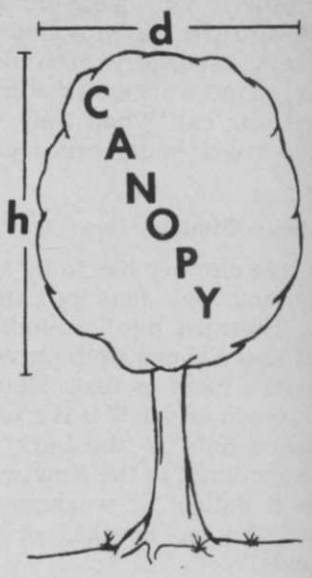
A tree climber has to be stout, agile, and well balanced in the tree. He must like to climb and must know every limb on which he puts a hand or foot. He asks, "Is it green or dead? is it a sucker attached only to the bark or a limb anchored to the heartwood? or is it hollow or weakened by rotten knots, breaks, or gall wounds?"

A limb which has grown up with the tree originates from the heartwood, but a sucker or "water-sprout" comes from a later bud and is never anchored deeper than the sapwood. They are not difficult to recognize, but young climbers should be made aware of the dangers caused by insecure limbs.

Climbers should know what kind of tree they're working in and the strength characteristics of each. Rotten knots, breaks, and gall wounds appear more often in some species than in others. Hackberry, for example, is often affected by gall wounds in the Dallas area, so we carefully examined every hackberry limb before trusting it with our weight. Visible wounds and weaknesses are, of course, detected easily, but the treacherous, invisible dangers are sensed many times only by experienced climbers.

Your "safety school" is actually on the job. Owners, foremen, or experienced climbers can be the teachers. Sometimes a good climber can pass along more "tips" and "pointers" to young climbers and groundmen than the boss can. If you have such an experienced climber, make teaching part of his job and pay him for it. Each new worker can be taken to a suitable tree where the object is not to get work done, but to teach the correct method. In the end it pays off in more work completed safely.

Calculate Tree Canopy To Regulate Treatment Time With Mistblowers



Volume of the tree canopy must be calculated to know how many minutes are needed to treat one tree with a mistblower where the output of the blower is known in cu. ft./min.

During mist blowing applications, it is important that static (dead) air held in the tree canopy is replaced by spray-laden air from the mistblower. Chemical-laden air blasted into the canopy will then yield small droplets of spray solution to leaves and twigs of the entire canopy.

To calculate the volume of a tree canopy, only two dimensions are needed (See Illustration):

d = diameter of tree canopy at the thickest portion, and

h = height of the tree *canopy* at the tallest point, not the entire tree.

These two values, diameter (d) and canopy height (h), are used in the following formula to calculate the volume of a tree canopy.

$$\text{Canopy volume (cu. ft.)} = \frac{(3.14 \times d)^2}{12.57} \times (1.16\ h - 0.36\ d)$$

For example, if canopy diameter (d) is 8 feet and canopy height (h) is 10 feet, letters in the formula are replaced by numbers to read:

$$\text{Canopy volume (cu. ft.)} = \frac{(3.14 \times 8)^2}{12.57} \times (1.16 \times 10 - 0.36 \times 8)$$

To find out how many cubic feet are in the canopy, first multiply 3.14 by 8; you get 25.12. The superscript (2) tells us to multiply 25.12 by 25.12; this gives 631.01. Divide 631.01 by 12.57; the answer is 50.19. The formula now reads:

$$\text{Canopy volume (cu. ft.)} = 50.19 \times (1.16 \times 10 - 0.36 \times 8).$$

Ten multiplied by 1.16 equals 11.6, and 8 multiplied by 0.36 equals 2.88. Subtract 2.88 from 11.6, and the answer is 8.72. Now the formula is stated: cu. ft. = 50.19 × 8.72, or canopy volume (cu. ft.) = 437.65. Thus, we have found there are 437.65 cu. ft. in a tree canopy 10 feet high and 8 feet in diameter.

To determine how much time it will take to treat 437.65 cu. ft. in the tree canopy, output of the mistblower must be known. Charts that accompany mistblowers tell the cu. ft. output for different nozzle settings and application speeds.

If, for example, blower output is 1,000 cu. ft. per minute, the time required to treat 437.65 cu. ft. is directly proportional to time required to mist blow 1,000 cu. ft. The proportion is stated:

$$\frac{1{,}000 \text{ cu. ft.}}{1 \text{ minute}} = \frac{437.65 \text{ cu. ft.}}{\text{X minutes}}$$

In other words, if the output of the mistblower is 1,000 cu. ft. per minute, how long (X minutes) will it take to produce 437.65 cu. ft.? To get the answer,

$$\text{cross multiply. } 1{,}000 \times \text{X minutes} = 437.65 \times 1 \text{ min.}$$

X min. times 1,000 equals 1,000 X, and 1 times 437.65 equals 437.65. The equation is now stated:

$$1{,}000\ X = 437.65.$$

To find the number of minutes (X) needed to produce 437.65 cu. ft. of air, divide 437.65 by 1,000, or:

$X = \frac{437.65}{1{,}000}$. The answer is 0.437, or 0.438 minutes if rounded to the nearest thousandth of a minute. For a mistblower that can produce 1,000 cu. ft. per minute, it takes 0.438 minutes (or about 27 seconds) to produce 437.65 cu. ft. of air.

To convert 0.438 minutes to more practical terms, multiply 0.438 by the number of seconds in one minute (60): 0.438 × 60 = 26.28 secs. It will take 26.28 seconds for a mistblower to replace 437.65 cu. ft. of air with insecticide in the tree canopy if the blower output is 1,000 cu. ft. per minute.