

# GUIDELINES FOR PLANTING AND MAINTAINING LOBLOLLY PINE AND OTHER COVER FOR ROADBANK STABILIZATION

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Lack of planting on roadbanks has produced unsightly areas and severe erosion. Even today, roadbanks are still responsible for much of the sediment in streams and rivers because roadside planting has not kept pace with other sedimentation control measures. Grasses are most commonly used, but loblolly pine is finding increasing favor for stabilizing roadbanks.

In 1942, eroding roadsides within the Little Tallahatchie Watershed in north Mississippi were reported<sup>1</sup> as producing 17 percent of the sediment causing damage in stream bottoms. During the last 12 years, more than 7 million loblolly pine seedlings have been planted on State and county roadsides in northwestern Mississippi. Other species are also being increasingly used. Conservation workers, too, have embarked on a wide scale stabilization and beautification program for roadbanks.

Broadleaf and conifer trees are well suited for roadside planting, but loblolly is particularly suited for this purpose. Erosion control is only the first of many objectives. Trees will lower right-of-way maintenance costs. Grasses need to be periodically fertilized to maintain good cover on roadbanks; trees do not, and yet they control erosion well. Trees eliminate the need for weed control and for maintenance mowing, which can cost \$10 or more per acre per year.

Trees are also used to screen distracting views, abate noise, reduce headlight glare, delineate curves and points of intersections, screen out sun in areas where it might blind motorists, reduce wind velocities, help control blinding rain and drifting snow, and provide shade in rest areas.

Planting areas must be carefully selected lest they interfere with the drivers' safety. Trees growing to a d.b.h. of at least 4 inches or larger should be planted 30 feet or more from the edge of the pavement,

smaller trees at least 20 feet. Care must be taken that as the trees grow they do not form a tunnel, causing drivers to crowd the centerline. On cut sections, plant at least 6 to 8 feet up the slope from the edge of the ditch and do not plant fills.

Screening headlight glare by planting trees on the median strip is most needed on level ground. Delineate the outside of curves but keep the inside clear. In general, it is good practice not to plant loblolly within the intersection.

Trees are also very effective in controlling excess moisture along the roadside. Trees must not be planted along drainage ditches, maintained by mowing.

Trees are increasingly used along roadways for their esthetic value and eye appeal. They can add interest, frame attractive views, and relieve monotony. Roadside landscaping is successful if each area looks as natural as possible. In general, roadside areas adjacent to open fields and cropland should be kept in grass, and areas adjacent to woodland should be planted with trees or allowed to reseed naturally to woody vegetation. Where loblolly is planted, native broadleaved shrubs and trees, such as sumac and sweetgum, should be retained to provide fall coloring and vista variety.

## Planting Prescription

Administrative studies and one formal experiment<sup>2</sup> with loblolly pine indicate that it has an important place and is well suited to roadbank stabilization. Working together, the highway engineer, landscape architect, soil scientist, and forester can develop planting prescriptions for almost any stretch of highway. Immediately following are some rough guidelines developed for use in the Yazoo-Little Tallahatchie Flood Prevention Area in north Mississippi.

<sup>1</sup> U.S. Department of Agriculture. Survey of the Little Tallahatchie Watershed in Mississippi. House Document No. 892. 77th Congress, 2d Session and Appendix. 1942.

<sup>2</sup> Williston, H. L. Improving loblolly pine survival in roadbank stabilization. *Tree Planters' Notes*, vol. 18, No. 3, p. 1-3. 1967.

*Planting chances.*-Roadbanks are difficult planting chances because they are subject to greater extremes of heat, drought, and cold than customary planting sites. The use of trees for erosion control on roadbanks should be judiciously coordinated with the planting of grass. Trees are not a cure-all. Blanket planting of all roadside areas is not recommended.

The wide expanses often encountered in the median strip of interstate highways and in large interchange islands offer the most practical opportunity for planting trees. Wide roadside areas along other State and county highways are also highly suitable for trees.

Refrain from planting trees under ordinary power lines. Telephone and electric light poles are normally set 8 feet from the road and require a right-of-way strip 13 to 15 feet wide. Vegetational maps of the roadside areas that take into consideration topography, drainage, beautification, and desired vistas should be prepared to guide tree-planting crews.

*Slope.*-The tree planter must accept roadbank conditions as he finds them. Although it has been done, planting trees on slopes greater than 2: 1 is not practical, even if the soil is stable. Unstable areas need topsoiling, planting, mulching, or postholing to insure good seedling survival. Otherwise the trees are easily washed out on the steeper slopes soon after planting. If the soil is more than 75-percent sand or 40-percent clay, the Mississippi Highway Department recommends topsoiling or planting prior to planting grass or trees.

Step 1: 1 slopes are not generally recommended for grass stabilization, but the use of such slopes in road construction is often unavoidable because of the tremendous cost of earth removal because of topography or lack of adequate right-of-way for establishing flatter slopes. Kudzu (*Pueraria thunbergiana*) or Japanese honeysuckle (*Lonicera japonica*) are frequently used on such steep slopes. The benefits of either must be carefully equated with the potential damage if they should escape into adjacent woodland. Kudzu is not recommended nor is honeysuckle. But rooted plants of honeysuckle set out on 12-inch centers provide good cover. Other species worth planting on steep slopes are sericea lespedeza (*Lespedeza cuneata*), a low growing sumac (*Rhus sp.*), and myrtle (*Myrtus sp.*).

*Mulch.*-Mulching, fertilizing, and seeding with grass should precede tree planting. Broadcast mulch where the soil has been disturbed. Mulch is

best applied with a mechanical spreader and topped with an asphalt sticker or film. Mulch anchors seed and fertilizer in place; provides protection against raindrop impact, runoff, and erosion; insulates the soil against frost damage and summer heat; and helps conserve moisture on the site. Formation of sod before tree planting is not necessary. Mulching combined with tree planting is often sufficient along secondary roads, for grass will develop from the seed in the straw. Loblolly planted in a mulch will survive better than those planted in sod. Mulching should be at the rate of 2 tons of crop straw per acre (4 tons per acre on highly erosive soils). Spot mulching can be used where ornamentals are planted singly or in small groups. Occasionally, along older roads, there will be sodded areas where no treatment is needed prior to planting trees.

*Fertilizer.*-Fertilizing is always part of a comprehensive treatment. Always fertilize if grass is to be sown. Soil testing, including a pH test, is advisable before fertilizing. If this is not done, fertilize at the time of grass sowing with 2 tons of lime and 1,000 pounds of 9-12-12 (or its equivalent) per acre. A followup fertilization with 500 pounds of 9-12-12 per acre 2 years later will help the sod hold until the trees are ready to take over. This must be cautiously applied, however, as the foliage of young loblolly is easily burned by fertilizer.

*Grass seeding.*-Most highway departments now require the stabilization of roadside areas with grass immediately after completion of construction. Along many old country roads, the roadbanks will have to be prepared by disking or harrowing before sowing with grass.

The Mississippi Highway Department sprigs Bermuda (*Cynodon dactylon*) first and then topseeds hulled Bermuda, which will germinate in 3 days. Sowing 5 to 10 pounds of Bermuda per acre in the spring will produce a stand that will spread. Too dense stands of Bermuda will winterkill. Crimson clover (*Trifolium incarnatum*) produces a good cover. Hairy vetch (*Vicia villosa*), widely recommended for roadbank stabilization, tends to strangle and kill loblolly seedlings. A good combination on droughty sites is weeping lovegrass (*Eragrostis curvula*) and loblolly pine seedlings. Kentucky fescue (*Festuca arundinacea*) does well when sown in the fall.

*Planting technique.*-Standard planting dibbles

are satisfactory for planting seedlings on most roadcuts where sands and clay loams predominate. Where the soil is a heavy clay, a partially cemented sandy material or part shale, planting in "postholes" dug with a power auger is recommended. Their use may improve survival 20 percent or more and help to avoid the development of flattened root systems. Sites on which trees are planted in postholes require heavier mulching than usual.

Planting is most easily and efficiently handled by employing experienced contractors. Planting contracts should not only specify the method of planting but also the first-year survival acceptable before payment is made. The desired survival rate is customarily related to the difficulty of the planting site. The rate should be 60 percent or better. Replanting will ordinarily require remulching at the rate of 3 or 4 tons per acre of mulch. Better survival is most easily obtained by training the planting contractors and by frequent inspections. All planted areas should be reviewed in September or October of the first growing season to determine how much replanting is necessary and whether or not the contractor should be paid in full.

*Tree spacing.*-Slope, aspect, and site quality all govern the spacing to use. Rigid adherence to a set spacing is not always desirable because it tends to increase monotony and driver tension. If the rows are planted perpendicular to the road rather than parallel to it, the trees will be staggered enough to introduce some variety to the view. Observation and limited experimental evidence suggest the following spacings:

<i>Slope</i>	<i>Site quality</i>	<i>Aspect</i>	<i>Spacing (feet)</i>
<b>2 : 1</b>	Average	North and East	<b>6 by 6</b>
	Average	South and West	<b>5 by 6</b>
	Tough, droughty	All	<b>4 by 6</b>
<b>3 : 1 or less</b>	Average	North and East	<b>6 by 8</b>
	Average	South and West	<b>6 by 6</b>
	Tough, droughty	All	<b>5 by 6</b>
<b>Flat</b>	All		<b>8 by 8</b>

of a single species can be relieved by planting other conifers or some of the hardwoods. Recommended conifers include shortleaf, slash, Scotch, white, Austrian, Virginia, and mugho pines; redcedar; and bald cypress. Likely hardwood candidates are blackgum, sweetgum,

The objectives of the above spacings are to give quick protection. Wider spacings are possible but will take longer to protect the site, and they may require additional fertilization to maintain a protective grass cover during the interim.

*Species.*-While loblolly pine is a good all-purpose species to plant in north Mississippi, the monotony

red and sugar maples, the oaks, yellowpoplar, magnolia, dogwood, redbud, plum, crabapple, and sumac. Most of the pines and some of the hardwoods can be obtained from State nurseries, the rest from commercial nurseries.

*Time of planting.*-Loblolly pine can be planted in north Mississippi from January 1 to April 1. The hardwood planting season extends from the first hard frost in the fall until time of leafing out in the spring.

*Early development.*-Spacing, such as that described, should result in at least 700 living loblolly pines per acre on nearly all planting areas at the end of three growing seasons in the field. This should adequately stabilize the site and fulfill all the other objectives of roadside planting. By the end of the third growing season, soil will begin to mound up behind the stems, and the loblolly will begin to cast needles. In 6 to 8 years after planting, the ground beneath the trees should be covered with a soilstabilizing mantle of litter.

### **Protection and Care of Plantings**

Periodic surveillance of the plantings by the roadside maintenance crews is necessary. Fire, disease, and insect attack are continuing problems. Some refertilization may be needed on tough sites to improve tree vigor. Sometimes liming is needed to improve temporary grass cover. To develop vistas and other desirable openings, planned appraisal by a landscape architect 4 or 5 years after planting is desirable.

*Fire.*-The susceptibility of roadside plantings to fire damage has been the biggest management problem so far. When the roadsides are properly maintained, fire rarely originates from the roadway. Many fires escape from adjacent ownerships onto the highway right-of-way. To prevent these fires a 10-foot, unplanted strip is left along the interstate highway fences to provide ready access and to allow room for a plowed firebreak to be maintained annually where values are high. Most fires, if promptly reported, can be limited to a small area since the plantations are easily accessible to the State fire crews.

*Mowing.*-Many young loblolly seedlings can be

destroyed during their first 2 years in the field if mowing is not carefully done. After the first mowing in the early summer, the mowing area is clearly delineated by a weedy growth in the planted area. In some places markers to guide the mowers may be used, but they are unsightly. Mowing limits should be set to provide for some meander in the exterior row of loblolly.

*Appearance.*-Growth of loblolly may be slow at first and survival poor because of severe grass competition resulting from initial fertilization. For the first few years, the roadside areas planted to trees will have a weedy look. These weeds help control erosion and are soon crowded out by the growing trees.

*Pruning.*-Pruning is frequently overdone. There is no reason for pruning all pines because trees within stands will prune themselves naturally at an acceptable rate. Sometimes the outer rows of trees are pruned to prevent lopsided growth. Occasionally the lower limbs are pruned for vistas. Pruning should always leave 40 to 50 percent of the live crown so that the tree may maintain a favorable rate of growth.

*Thinning.*-Periodic thinning will be needed to maintain the vigor of the loblolly. Some precommercial thinning when trees are about 6 years may be needed where survival of closely spaced trees has been exceptionally good, i.e., 1,000 trees or more per acre. Thin the plantations to 700 trees per acre at 12 years, 500 trees at 15 years, and 300 trees at 20 years. These stockings should be adequate to maintain a good cover of pine needles. Growth, of course, depends upon site quality. On good sites and in some of the larger acreages of roadside plantations, pine posts can be harvested at 12 years, posts and pulpwood at 15 years, and pulpwood at 20 years. After 20 years, occasional thinnings can provide a variety of products. While the harvesting of merchantable products can help pay for cleaning up the tops and limbs, it should be recognized that harvesting of such products will be practical only in exceptional instances and/or where there are broad expanses of loblolly.

*Insects and disease.*-Tip moth (*Rhyacionia frustrana*) attacks, often browns the tips of the pine branches and gives them a temporary unattractive appearance. The attacks do no permanent damage and generally cease when the trees are 15 to 20 feet tall. Pines whose beauty is valued because of their location, such as those around rest areas, can be protected from tip moths by spraying the trees with dimethoate.

*Fomes annosus*, a lethal root rot, spreading from the stumps of cut trees to live ones, is becoming a problem. Control is presently effected by sprinkling the stump with borax within 20 minutes after felling.

*Ice damage.*-Ice, sleet, or heavy wet snow may damage open-grown loblolly when planted much beyond its natural range. Leaders and limbs may be broken off, and trees bent far over. Stem form is not critical in roadside plantings and most broken-top trees will continue to protect the site. Pruning to remedy the breakage is rarely needed, for one or two of the laterals will turn upward and assume dominance. Most of the bent-over trees will gradually straighten and only a few, such as those leaning downslope towards the road, will have to be removed. Early thinning to develop sturdy trees with vigorous compact crowns will reduce the incidence of ice damage.

*Kudzu and honeysuckle control.*-Kudzu and honeysuckle frequently escape into neighboring woodland from the roadbanks on which they are planted. Kudzu can smother trees to death, and honeysuckle will prevent natural reproduction of trees from becoming established. If the area outside the right-of-way is grazed, there will be no problem as the livestock will keep kudzu and honeysuckle under control. Liquid Tordon herbicide, applied as a foliage spray, will kill kudzu and most other plants. Two foliar applications of an emulsion consisting of butoxy ethanol ester of 2,4-D and 2,4,5-T at a 2: 1 ratio, 2 pounds acid equivalent, of concentrate in 250 gallons of water, early in the summer and following resprouting, will practically eliminate honeysuckle. Both treatments can kill trees so control should be done before the vines reach private land.