

TREE PLANTING - STRIP-MINED AREA IN MARYLAND

Part II

Fred L. Bagley
Energy Resources Officer

This report is written to elucidate some of the problems encountered in the planting of trees on strip-mined areas in Maryland. When problems are recognized, normally a solution (or at least, an improvement) can be instituted to alleviate the problem.

The methods cited herein are those of experienced foresters engaged in strip-mine planting during the past seventeen years. Although these methods might seem very basic, the procedure and tools explained in this report give the best results with the least amount of confusion.

MECHANICS OF PLANTING

The State of Maryland does have certain guidelines for planting trees in the State. Briefly, these guidelines are as follows:

1. Spacing: 6' x 7' (or 1,000 trees per acre).
2. Planting season in Western Maryland: March 20 to April 20 for strip-mined areas. The earlier trees are planted the higher the survival will be.
3. Planting methods:
 - a. Hand - areas one acre or less in size, odd areas, coal-stripped areas, steep or rough areas.
 - b. Machine - Three acres or more on even slopes. Odd areas on machine sites are planted by hand.
4. Planting precautions:
 - a. Protect plantation from grazing and fire.
 - b. Plant as soon as possible after trees are received.
 - c. Keep seedling roots moist at all times.
 - d. Plant properly. Do not jam or push roots into the hole. Do not insert seedling at an angle. Plant at proper depth, which is the same depth as in the nursery.

Points b and c are usually overlooked but are extremely important to good survival.

5. Proper supervision must be maintained at all times.

Strip-mine planting is a special operation. In some respects, it is a better planting than old fields or woodlands because heavy sod, roots, brush, and stumps are not present. However, there can be problems. A strip-mine will dry out considerably faster; in fact, with the ever present winds, they can go from an extremely wet to a very dry condition within a few days. For these reasons, a rather heavy mattock is recommended. The five pound mattock head seems to be the best size available. With this size mattock, a good hole can be dug to plant the seedling without much over-exertion by the planter.

Slit planting has proven to give much lower survival than planting by digging a hole. Slit planting tends to produce a J-rooted condition and, unless the first few years after planting are extremely wet, many seedlings will die. Slit planting must NOT be used.

Digging a hole too shallow will produce the same results as slit planting. The correct (and best) method to plant seedlings is to dig a hole several inches longer and wider than the root system of the seedling. If a hole is dug properly, one side will be vertical to the width of the hole. Hold the tree at the root collar with the thumb and forefinger, and place the tree roots into the hole until the finger and thumb touch the original soil line.

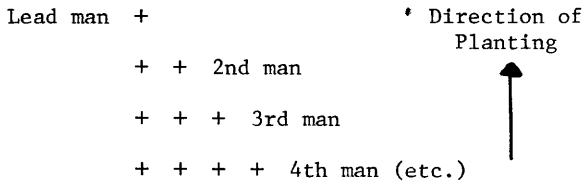
Be careful that the seedling is in an upright position. Then use the foot to push the freshly dug soil back into the hole around the roots. Care should be used not to put stones around the seedling roots. The final step in the planting order is to place the foot over this soil, to compact it around the seedling.

Another problem to be considered when planting is that of spacing. Two methods can be used to maintain the desired spacing. One method is to instruct the planter that, when he compacts the soil with his foot, he is to make one normal additional step and sink the

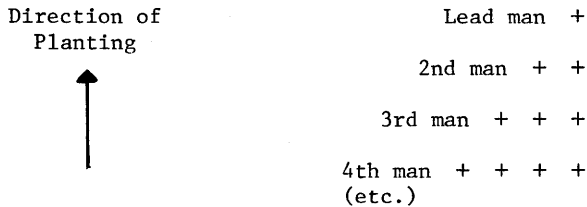
mattock into the ground in front of himself; this will provide approximately six feet between each tree. The other method is to maintain close supervision of the planting crew, with the foreman paying particular attention to the spacing of each planter. Also, the best planting method establishes a good lead man, with each planter to stay one tree behind the man he is using for a guide. See illustration:

Step Method

Guiding Left



Guiding Right



MECHANICS OF RUNNING A CREW

Before the actual planting operation begins, it is necessary that the planters be instructed as to what performance is expected of them. Then divide the men into crews and assign, or have, a crew boss or foreman. Each planter is then given his particular species of tree to be planted. In most cases, alternate rows of compatible tree species are required. When all members of the crew have trees, assign a lead man and place the crew. Normally, a lead man is a good planter and can follow instructions. Inform the lead man of the area he is to plant. Each crew should use the Step Method of planting, as previously described.

Crew size and necessary crew control will determine the best planting results. Without such control, it is better not to plant an area at all.

The best planting unit is composed of 8-10 men per foreman. When a planting unit grows any larger, control is lost by the foreman and, usually, poor planting results.

In Western Maryland, experienced crew

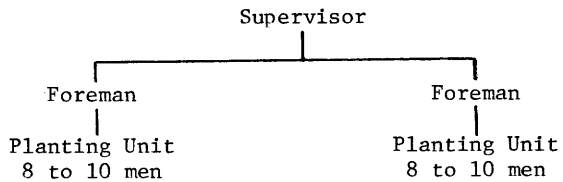
sizes have ranged from 4-65 men. As you can imagine, different crew sizes present different problems.

For best control, the smaller crew is desirable. A small crew is considered to be 20 men or less. With a crew of this size, less supervisors are needed and general confusion is minimized.

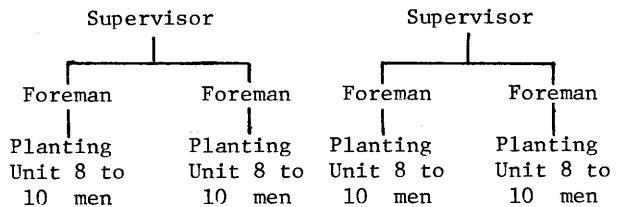
Unfortunately, small crews cannot be used at all times--especially when large acreages are to be planted in a short period of time. When large crews are used, it is advisable to have several experienced men to supervise the planting job. These supervisors will then instruct and reorganize the crew into the smaller planting units.

The following is a diagram of different size crews:

Small Crew Less Than 20 Men



Large Crew More Than 20 Men



The foreman's duties consist of maintaining spacing, supplying planters with trees, tools, etc., and maintaining good tree planting methods.

Prior to planting, a map should be studied by the supervisor to determine the size, the shape, and the hazards (if any) of the planting area. Although each strip-mine is unique, basic methods can be used to prevent confusion in tree planting. Normally, strip-mines are long narrow strip cuts around a hillside, and they vary in width at different points. If the crews do not plant properly or are not closely supervised, small areas are not planted. Also, if the crews are not supervised properly, near the end of the planting job all the planting units will converge, thus creating poor planting, confusion and, ultimately, time and money

lost. The ideal method is to keep the planting units working in one direction and as far apart as possible. This is best accomplished by the crews planting in a circular pattern.

MACHINE PLANTING

With the passage of recent strip-mining laws in Maryland, the requirements for backfilling were strengthened. Areas less than 12° are backfilled to the original contour creating, in many cases, relatively flat areas for planting. Also, the contour method of backfilling is creating better planting areas. With these better areas, a tree planting machine can be used. The planting machine has very definite advantages, which include:

1. Fewer men are needed (however it is imperative that the planting machine is followed for corrective planting where needed).
2. More trees can be planted in a given time.
3. Survival is better.
4. Planting is cheaper.

Disadvantages include:

1. Steepness of slope.
2. Stoniness.
3. Breakdowns.

Breakdowns could be somewhat eliminated if a tree planting machine especially designed for strip-mines would be purchased.

Steeper areas must still be planted by hand, and the Step Method is essentially the best planting method to use.

PLANTING CREW

Harmony of the planting crew and lead man importance have both been discussed. Our records of twelve years show that the average rate per man per eight hour day is 625 trees. Of course, individual planter rates may vary from 400-1500 trees per man per day.

CONCLUSION

Strip-mine tree planting seems to be a simple process. However, if the operation is carefully analyzed, the little operations within the total operation can be very important. Many people think that digging a hole and putting the tree in is all that is needed. With

any job there are "little tricks" which make the job easier. This report was written to bring to your attention some of these tricks which make tree planting easier, quicker, more economical and, more important, insure good results.

A quick review of the most important points to successful tree planting:

1. Planting stock must be properly cared for from time of lifting until planting. Do not recommend long storage periods.
2. Proper supervision of tree care and planting techniques at all levels.
3. Plant as early as possible in the spring. Recommend no more than a four week planting season. Do not extend planting season.
4. Scalping approximately 12-18 diameter area, where herbaceous material is planted.

If any of the above steps are shortchanged, planting results will suffer.

MARYLAND'S SEEDING MIXTURES

PART III

- I. Seeding Mixtures (per acre basis) for Hayland and Cropland.
 1. 50# Kentucky 31 tall fescue
10# Birdsfoot Trefoil or 10# Crown Vetch
 2. Other mixtures may be submitted and evaluated at the time of the tri-agency review.
- II. Mixture for Forestry where tree seedlings will be planted.
 1. 25# Kentucky 31 tall fescue
10# Orchard Grass or 10# Perennial Rye Grass
5# Red Clover
5# Birdsfoot Trefoil
- III. Mixtures for Forestry where tree seed will be direct seeded with legume tree species.
 1. 25# Kentucky 31 tall fescue
10# Orchard Grass or 10# Perennial Rye Grass or 10# Red Fescue or 10# Red Top
5# Red Clover or 5# Alsike + 1# Ladino Clover
2-3# Black Locust or Black Alder seed or Bicolor Lespedeza
- IV. Mixtures for Forestry where tree seed will be direct seeded for non-legume tree species.

1. 25# Kentucky 31 tall fescue
 10# Perennial Rye Grass or 10# Red
 Fescue or 10# Red Top
 5# Birdsfoot Trefoil
 3# Red Clover

Non -legume tree species that will grow in
 Western Maryland:

Austrian Pine	Black Cherry
White Pine	Sumac
Red Pine	Sycamore
Scotch Pine	Cottonwood
White Spruce	Tulip Poplar
Norway Spruce	Japanese Larch
Pitch Pine	Sweet Gum
Red Oak	Yellow Birch
White Oak	White Ash
Sugar Maple	Sawtooth Oak
Red Maple	

V. Mixture for wildlife planting.

1. 15# Kentucky 31 tall fescue.
 15# Orchard Grass
 10# Perennial Rye Grass
 5# Birdsfoot Trefoil
 5# Red Clover

With shrub plantings. (Recommended planting in blocks, rows, or clumps not as a solid planting. Spacing will be determined at the time of planting.)

1. Autumn Olive
2. Sawtooth Oak
3. Bush Honeysuckle
4. Hawthornes
5. Hybrid Poplar
6. Black and Speckled Alder
7. Crabapple
8. Silky Dogwood
9. Red Osier
10. Conifers in 1 acre blocks or strips
 30 feet wide at various lengths.

PART IV

MARYLAND'S PLANTING TIME AND SPECIES TABLE

Listed below are species which have been used and good results have been obtained. This list will be expanded when results are verified and does not mean other species are not acceptable.

SPRING (mid-March to June)	SUMMER (June to Aug.)	FALL (Aug. to mid-Sept.)
Kentucky 31 Fescue (P)	Kentucky 31 Fescue (P)	Kentucky 31 Fescue (P)
Orchard Grass (P)	Orchard Grass (P)	Orchard Grass (P)
Red Fescue (P)	Red Fescue (P)	Red Fescue (P)
		Timothy (P)
		Red Top (P)
Alsike T-2 (L)		
Birdsfoot Trefoil (P, L)		
Crown Vetch (P, L)		
		Hairy Vetch (T, L)
Alfalfa (P, L) (good sites only)		
Red Clover (T, L)		
Sweet Clover (T, L)		
Flat Pea (L)		
Ladino Clover (T, L)		
Oats	Japanese Millet	Balboa Rye
Perennial Rye Grass	Weeping Lovegrass	Annual Rye Grass
		Winter Wheat
		Winter Oats
S. Lespedeza (L) (South slopes only - Low elevations below 2000 feet)		

The time of planting is the best time and does not necessarily mean that other times for planting a particular species will not produce good results.

P = Permanent

T = Temporary

L = Legume (meaning having the ability to fix or produce nitrogen, thus reducing fertilizing requirements and topdressing).