

# SNOWMOBILE SEEDING

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Snow, seeds and snowmobiles are rapidly becoming a working combination for direct seeding on deforested tracts in the North Shore Area of northeastern Minnesota. The Division of Lands and Forestry, State of Minnesota, through the efforts of its field personnel and private individuals have devised and adopted an efficient and economical method of artificial reforestation for several native tree species in this part of the state. This is accomplished by use of an automatic broadcast seeder mounted on a commercial snowmobile.

Conventional methods of growing tree seedlings in the Nursery and later transplanting them to field sites is still and will continue to be the main technique for the establishment of plantations in most areas of the State. When seeds are planted properly, a high survival rate can be expected.

Climbing combined costs of Nursery operations, wages and transportation plus the poor accessibility and rough terrain which prevails in the glacial drift area of northeastern Minnesota makes standard planting operations very costly and they become almost prohibitive.

Direct seeding, under conditions that exist in this part of the State, has shown satisfactory results in the past. It appears to be a simple rapid reforestation method available at greatly reduced costs. This does not mean that direct seeding has totally replaced hand planting but, rather, supplements it on certain difficult sites.

In the very rocky boulder strewn areas that are found in many locations, direct seeding is especially advantageous since trees started from direct seeding operations can extend their roots around and between the rocks and base material, thereby assuring successful establishment. Normal planting methods are not only very costly on such sites but have shown only moderate success in the past.

Another factor which contributes to the success of direct seeding in this region is the rare occur

rence of drought conditions during and after, the germination period.

Cool climatic conditions, influenced by Lake Superior, reduce surface and soil temperatures so that drought injury to the germinated seedling is greatly minimized.

One of the base desirabilities for direct seeding is that tree seeds be partially embedded into the mineral soil to promote germination. To accomplish this, the seed is dispersed in the winter on the soft snow. The physical action of the melting snow, frost movement of soils and spring rains help embed the seed and thus hasten germination. The automatic broadcast seeder and snowmobile are especially valuable in dispersing seed during the mid- to late-winter months.

The first area seeded by this technique was initially prepared by a bulldozer. The machine cleared off the undesirable ground cover and piled it into windrows. Clearing the area exposed mineral soil. Bare mineral soil exposures and seed treatment are items of prime importance to direct seeding success in this region. Seed treatment consists of coating the seed with a bird and rodent repellent.

The windrows on the site prepared area were spaced to permit two passes with the snowmobile and seeder. The area between the rows (60 to 70 feet apart) thus was adequately seeded. Gaps or openings were spaced at intervals in the windrows to allow passage of this equipment from one windrow to another. The cost of this site preparation was \$26.95 per acre.

To bring out the advantage of this snowmobile seeder, a comparison was made with some large scale airplane seeding projects which had taken place in this vicinity. These comparisons largely reflect the work done with fixed wing planes. Helicopter aircraft are not readily accessible in this general area for this type of work.

The disadvantages noted in seeding with winged aircraft were as follows:

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- L Insufficient control of seed distribution conditioned by the air speed of the plane.
2. After seed release, there is a short interval during which there is no control of falling or drifting seed.
  3. A crew of flagmen are required to control each flight pass and pattern to completely cover the site.
  4. Favorable weather conditions are imperative. Operations in most cases must be suspended if the wind velocity exceeds 6 miles per hour.

- This factor creates the need for an organized standby crew, ready to move into action when weather permits. This adds to the total cost of operations.
5. An additional crew member must accompany the pilot to operate and refill the seeder while in flight.
  6. Approximately 15 per cent of the dozed area consists of refuse piles of trees and other debris. Seed falling on windrow strips are wasted.



Figure 1.—View of automatic broadcast seeder mounted on sled pulled by snowmobile. Later improvements now have seeder mounted directly on snowmobile, thereby eliminating the sled and speeding up the operation.

7. The repellents used to treat these seed are toxic and caution must be exercised to avoid pollution.

These disadvantages emphasized the need to develop a more efficient, less expensive method of dispersing seed on prepared sites. Through the combined efforts, talents and ingenuity of the state agency forester and a local mechanic, the first prototype snowmobile seeder was designed, built and field tested. The new machine eliminated many of the undesirable features encountered previously in both airplane and hand systems of direct seeding.

The seeder which resulted is fully automatic and distributes seed in a uniform pattern throughout the site since the rate of flow of seed is synchronized with the speed of the snowmobile. This eliminates the seeding gaps and overages that often occur in hand seeding methods.

The regulatory control point and the seed dispenser mechanism are at the seed hopper. A simple adjustment here allows the operator to vary the sowing rate per acre. A mechanical part replacement here also permits change for the various size of seed noted for different species. Since the dispersing mechanism, which is separate, is operated at a constant speed, the seed is broadcast at a uniform distance on each side of the machine. This automatic system makes the sowing operation a one man job thereby eliminating the need for flagmen and other field men.

Since a pattern of trails are left in the snow, full coverage is attainable and duplicate seeded areas are

minimized. Dependence on ideal weather conditions no longer need hold up the operation since, within reason, most winter weather is generally suitable for seeding.

Stream pollution can also be reduced to an absolute minimum because the operator has complete and instant control over the seed distribution pattern.

On the first project using this snowmobile seeder, it has been established that the potential ability of this machine can exceed an average of 20 acres of uniform seeding per hour.

In the winter of 1967-68 approximately 1,600 acres were seeded to white spruce in the North Shore area. White spruce direct seeding in this section of the State has shown a high success ratio over the past 4 years. Seeding on the snow also satisfies the embryo dormancy requirement necessary for the complete germination of this species. Other species have been tried but only at a moderate level.

The total cost of the seed distribution, on this first project amount to \$1.40 per acre. This, however, does not consider the cost of seed or supervision. When compared with the average of \$35.00 (again seedlings and supervisory costs are not considered) for hand planting on similar sites, snowmobile seedings provide a substantial savings.

Direct seeding by snowmobile has a definite place in the reforestation picture. It is another necessary and useful tool in our future total reforestation program.

NOTICE: The identification and description of commercial products in this publication are solely for information purposes. Endorsement of any commercial product is not intended and must not be inferred. Readers are cautioned to handle all pesticides, herbicides, and fungicides mentioned in this publication strictly in accordance with manufacturers' labels. These chemicals are harmful to people, farm animals, wildlife, and fish, and can contaminate water supplies.

# THIMET (PHORATE) APPLICATIONS

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Thimet (Phorate) in the 10 percent granular form is being widely accepted in the South by seed orchard managers for insect control. This chemical, a systemic insecticide, is applied on the ground surface for absorption by the tree roots and translocation to all living tree tissues.

Since Thimet is highly toxic to humans, extreme care must be used in its handling. For this reason the Virginia Division of Forestry designed and tested several new applicators for the safe handling and application of Thimet.

The Division's Tree Improvement Program is rapidly expanding with more than 150 acres of loblolly pine seed orchard established to date. A goal of 300 acres will be reached within the next 2 years. In addition, a 30-acre white pine orchard and an 8-acre shortleaf pine orchard are already established, and a 10-acre Virginia pine orchard will be established in 1968. With all these seed orchard areas, insect control on the grafted trees is an absolute necessity.

The first unit designed for Thimet applications consisted of a tractor drawn trailer-mounted platform, containing the Thimet reservoirs. These

reservoirs were simply two heavy duty steel garbage cans with spring-loaded lids. One-inch clear plastic tubing carried the chemical from the can to a plastic pipe (PVC) applicator (fig. 1). The applicator itself was light weight and designed so that one squeeze of the trigger discharged the measured amount of Thimet in a steady flow at ground level



Figure 2.—Tractor drawn trailer-mounted platform with reservoirs.

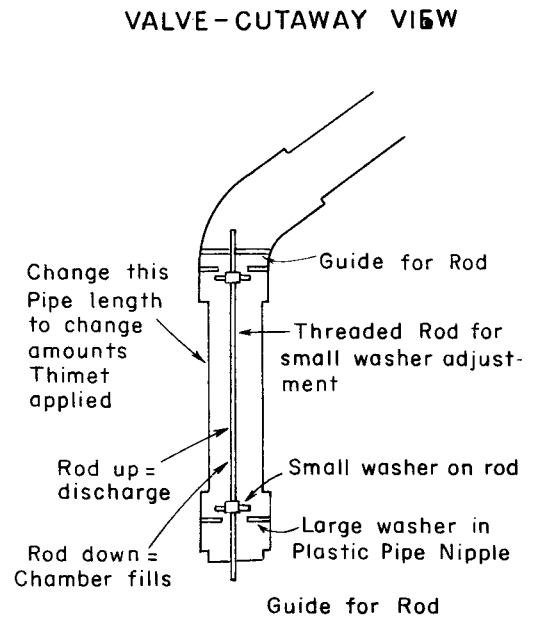
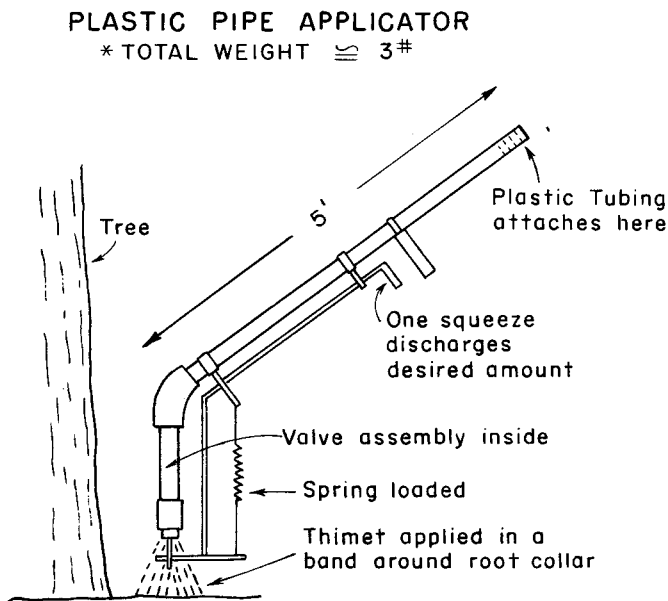


Figure 1.—Plastic pipe applicator. Total weight—3 pounds.  
Valve-cutaway view.