



OPERATIONAL TRIAL OF BRUSH BLANKET® MULCH MATS FOR AFFORESTATION IN SOUTHERN ONTARIO

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BACKGROUND

Mulches placed around the base of planted seedlings for weed control are a potential alternative to herbicides. Preliminary results from trials conducted in Ontario and Quebec (Schwan 1993, Paquet 1994) have shown that consolidated mulches, such as sheets of plastic or natural fibers, were more effective than traditional unconsolidated mulches (e.g., wood chips, sawdust, bark and straw) in preventing the germination of competing vegetation. Despite their higher purchase price, consolidated mulches are easier to transport and to apply.

Brush Blanket® mulch mats, made of squares of porous green polyethylene plastic, prevent weed germination by blocking sunlight, improve growing conditions by increasing and maintaining soil temperature, and allow moisture to reach the soil and excess water to evaporate.

In 1995, Domtar Inc. and the Vegetation Management Alternatives Program (VMAP) of the Ontario Ministry of Natural Resources (OMNR) conducted an operational trial in Cornwall, Ontario, using Brush Blanket® mulch mats in a hardwood plantation to determine their cost and efficacy. FERIC conducted time studies to determine worker productivity and the application cost of the mulch mats.

SITES AND OPERATION

About 35 000 Brush Blanket® mulch mats were applied (Figure 1) on a property leased by Domtar Inc. through the Tree Farm Agreement program of the Eastern Ontario Forest Development Program (a partnership between Domtar and OMNR). The sites were flat, abandoned farm fields with moderate to poorly drained organic and silty-clay soils. The grassy fields were completely mowed, then sprayed in strips with glyphosate and later with simazine herbicide in the fall. In spring 1995, bareroot silver maple and green ash were planted at a density of 1100 trees/ha.

Workers installed 90- and 120-cm-square mulch mats immediately after completion of the planting operation. The

workers carried dispenser boxes of mats in a specially designed hip carrier, which also held galvanized steel staples for anchoring the mats. After tearing off an individual mat, workers laid each mat on the ground with the seedling protruding through a central slit. They then anchored the mat using five 10- to 15-cm-long staples, one to close the slit around the seedling and one at each of the four corners.



Figure 1. Worker installing a 90-cm-square Brush Blanket® mulch mat.

Workers were taught the proper method of applying the mulch mats by VMAP staff. At the time of the study, the workers had no previous experience at installing mulch mats but had several years of experience in tree planting. Worker productivity was monitored for both sizes of mulch mats and while working independently and in pairs.

WORKER PRODUCTIVITY

The productivity rates in this report include the time required to install the mats, replenish supplies of mats and staples, and walk to and from the provisioning site. Time lost to operational delays, lunch breaks and rest periods was excluded from the analysis.

The average productivity for three workers independently installing 90-cm-square mats was 61 mats per worker-hour on the first day, and increased to 91 mats per worker-hour after 3 days. Productivity increased as the workers became more familiar with the product and improved their work technique.

During the second day, independent workers applied 71 mats per worker-hour while installing 90-cm-square mats, whereas those working in pairs applied only 55 mats per worker-hour. This loss in productivity was caused by the workers waiting for each other to complete their respective tasks or by time lost while workers waited for their partners during provisioning.

After 6 days of operation, two workers installing 120-cm-square mats independently averaged 82 mats per worker-hour. The larger mats were harder to handle, took more time to apply and were packaged in boxes of 50 (rather than 100 for the 90-cm-square mats), increasing provisioning time. Workers spent 15 and 19% of their time provisioning with the 90- and 120-cm-square mats, respectively.

APPLICATION COSTS

The treatment costs for applying Brush Blanket® mulch mats are based on a worker's hourly rate of \$18.00, and material costs of \$0.53 and \$0.75/mat (including staples) for the 90- and 120-cm-square mats, respectively. The labor costs include a base pay rate of \$12.50/h plus fringe benefits, social costs, transport, supervision, and contractor administration and overhead (5%).

Based on the productivity rates of 91 and 82 mats/worker-hour (respectively) for the 90 and 120-cm-square mats that were obtained after several days of operation, the treatment costs (including labor and material) were \$0.73 and \$0.97/tree, respectively. The cost for three annual herbicide spot-spraying treatments in hardwood plantations in southern Ontario ranges from \$0.55 to \$0.85/tree, depending on the size of the spot spray and height of the competing vegetation.

BIOLOGICAL RESPONSE

The effectiveness of Brush Blanket® mulch mats for afforestation on abandoned agricultural land in southern Ontario is being evaluated by VMAP at test sites near Midhurst and Prescott. These trials compare survival and growth of red oak seedlings using two sizes of mulch mats (90 and 120 cm square) and of white pine seedlings using three sizes (60, 90 and 120 cm square). Glyphosate spot-spray treatments of equivalent area were also applied for both species.

Preliminary results show almost no significant differences in stem diameter between seedlings protected with either size of mulch mat, no differences based on the size of the herbicide spray, and no difference between the herbicide and mulch mat treatments. However, the stem diameters of white pine seedlings treated with the 120-cm-square mulch mats were much larger than those of white pine treated with the same-size herbicide spot spray. In both trials, seedlings with no weed control had smaller stem diameters, but there were no differences in survival among treatments (Wagner et al. 1995).

CONCLUSIONS

The study demonstrated that it took less time to install 90-cm-square mulch mats than to install 120-cm-square mats, and productivity working independently was higher than when working in pairs. Application costs should decrease with improvements in work organization and with incentive payment systems. The product's cost may also decrease with greater use. Although not as cost-effective as herbicides, mulch mats may be advantageous in sensitive areas, near inhabited areas where herbicide use is either undesirable or restricted, or if more than three spot-spraying treatments would be required to control competing vegetation.

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ACKNOWLEDGMENTS

The author thanks the following for their support and cooperation during the study: Adam Zulinski of Domtar Inc.; Jim Hendry, Paul Leale and Silvia Strobl of OMNR; and John Bols and his crew from Drentex Inc.

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