

Seed Use Efficiency Meeting

Langley, BC July 30 & 31, 2008

Fernando Reyes

PRT – Pelton

Mini-Plug Transplants

Mini-Plug Transplants is recognized to be one of the best production systems for optimizing seed use efficiency. In the container conifer seedling production, this system allows nurserymen to maximize seed usage by single-sowing any seedlot regardless of its germination capacity into mini trays and by transplanting them into bigger containers to produce the requested stocktypes. Other benefits this system offers to seedling production includes reduction of heating costs by increasing greenhouse space efficiency, and by reducing thinning and manual transplanting operations.

The implementation of the mini-plug technology into conifer seedling production at PRT-Pelton (Former Pelton Reforestation) however, has taken several years to develop. The adaptation of existing technology used in the horticulture sector had to overcome limitation such as compatibility with the Styroblock container system and the lack of cohesiveness of mini-plug conifer seedlings to withstand handling through the different phases of production. At PRT-Pelton we use a heat sensitive fibre (Fibreneth®) blended with Coir medium to fill the trays and pre-form the mini plugs before seeding.

A successful mini-plug transplant program starts with accurate single-sow seeding of mini trays to optimize use seed efficiency. For optimal germination and early growth of mini-plugs seedlings, we have set up a “growth chamber” with insulated walls and supplementary lighting at photosynthetic levels of intensity. These environmental conditions promotes the production of compact seedlings to facilitate the subsequent phases of mini-transplants. Depending on the seedlot germination capacity, the mini-trays can have a number of blank cells. As the machines would transplant every cell from the mini-tray to the destination Styroblock, the blank cells are removed and replaced (gapped-up) by other mini-seedlings. This operation is accomplished by running the mini-trays through scanning equipment to blowout the empties and through another scanner that directs the robotic arm to gap the blank cells with seedlings from another mini-tray to produce a 100% filled tray. Gapping up the mini-trays makes the transplanting operation more efficient.

Mini plug trays can also be used to manually backfill empty cavities in conventional single-sown Styroblocs, reducing transplanting shock and producing a more uniform stand.

Early results and experiences of implementing this technology into seedling production presented different challenges. Optimal conditions of medium density in the mini-plug trays for germinant radicle penetration, optimal growing conditions to promote compact-seedling growth in high density trays, algae, and liverwort control to eliminate scanning interference for gapping up, and customer's acceptance of transplanted stock were some of the difficulties to overcome. Successful results of mini-plug transplants have included species like spruces, Douglas-fir, Western larch, Western hemlock, and Western red cedar. Using mini-plug transplants in 2008 has allowed us to produced extra seedlings from 80 to 300 K of spruces, Western larch and Douglas-fir over the conventional direct-seeded production system.

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There are great advantages of using mini-plug transplants in the production of conifer such as: efficient use of seed, 100% cavity fills on styroblock containers, lower thinning costs, reduction/elimination of manual transplanting and reduction of heating costs. However, there are some limitations of the system that can discourage its implementation such as: high capital cost, limited production capacity (slow process), higher production risks from its high seedling density in a small growing area, precise scheduling requirements of the different stages of production and the limited stocktype availability. Moreover, the increasing trend for the demand of smaller stocktype seedlings would make the mini-plug transplant system less effective as a powerful tool to increase use seed efficiency.