HAND LIFTING AND PROCESSING OF SEEDLINGS AS

PERFORMED AT MACMILLAN BLOEDEL NURSERY

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I. PRODUCTION PLANS

Desired production must be decided upon and the whole lifting and processing capability planned accordingly. In the case of the 30-million capacity nursery as operated by MacMillan Bloedel Inc., production parameters are dictated by the following: 1) lifting and processing must be done within 12 weeks time; 2) a continuous flow of seedlings must be maintained to several large planting programs and to smaller customers; and 3) the seedlings must get to the field in excellent plantable condition as to source, quality, and numbers while dormant.

From above, at least 750 thousand seedlings per day must be processed in order to stay within the 12-week parameter considering that an average of only four days per week is available for work during the winter months. It appears wise to have some extra capacity above 750M per day to keep from getting "caught short" at peak periods of demand. Experience reveals times when everyone wants seedlings at once creating "panic" in the field and at the nursery. Hence, the MBI nursery processing system is planned for a production capacity of 850-900M per day when in full force. Forty-four grader/counters on two production lines require a flow of seedlings to the shed from an available 8,320 linear feet of beds per day or an average of 16 beds per day of the 520-foot length beds at MBI nursery.

II. ORGANIZATION - MANPOWER REQUIREMENTS

Hand lifting is labor intensive requiring a number of hands to accomplish the job. Generally, a puller (one actually pulling seedlings from the beds) can pull adequate seedlings for up to three grader/counters on the production lines. Hence, 16 pullers are assigned to pulling - each pulling one-half (four rows) of a seed bed. One puller pulls from right side of a given bed while his partner pulls from the left. Eight beds are pulled simultaneously. The pullers shake soil from the roots and place the seedlings in neat piles as they go.

Four "tubbers" place the seedlings in containers by collecting the piles. Each tubber serves four pullers or takes two beds. The tubber sets the containers upright in place.

The seedling pick-up crew consists of two men plus the tractor operator pulling the trailer.

The nursery equipment operator undercuts seedlings and acts as crew leader in the field toward organizing the crew and coordinating kind (seed sources, species, etc.) required.

III. PREPARATION FOR HAND LIFTING

A root development and root training regime is performed at the MBI nursery which greatly enhances the hand lifting process. At the time the seedbeds are formed a blade is run beneath the beds at a controlled depth of approximately six inches. This establishes the depth of undercuts that start in August when seedlings have reached about ten inches height growth. A combination blade rig with depth control wheels plus drain lay-of plows not only establishes the depth of cut beneath the beds but regulates the depth of drains, also. The result is that the seedlings are uniformly cut at approximately six inches depth by the blade just prior to lifting and the soil is pulverized. Seedlings pull very easily and most of the roots and some of the mycorrhizae are retained during lifting.

It is not possible to cover all details here of the root training, pruning, size regulation and stressing that is involved. It is sufficient to say that the three to four undercuts plus about three vertical prunings (pruning lateral roots) sets the stage for hand lifting. Obviously, the purpose of the above is not solely to enhance hand lifting but is intended to create a uniform seedling with a compact root system containing as much mycorrhizae as possible as they go to the fields. Incidentally, mycorrhiza development (primarily Pisolithus tinctorius) is greatly enhanced when the soil is kept pulverized during the fall. Apparently, the aeration creates an ideal climate for P. tinctorius development.

Irrigation is necessary when the soil becomes dry during the lifting season. Good moisture at time of lifting eases pulling and moist soil clings to the roots lessening exposure and moisture loss while processing.

IV. EQUIPMENT REQUIRED

At least a 60-horsepower farm tractor with Category II three point hitch is needed to operate the lifter blade. A larger tractor is used at MBI because of heavy work (subsoiling, discing, chiseling, etc.) that this tractor performs at other times.

At least a 45-horsepower farm tractor is needed to pull the seedling transport trailer. Actually, a 64-horsepower tractor is used for this chore at MBI to have more utility for spraying, leveling soil, heavy mowing, etc. from this tractor during other seasons.

A seedling trailer capable of hauling at least 22 seedling containers per trip is necessary for transporting seedlings from field to processing shed. Each trip will "load" one processing line. By alternating "loads" to the lines a continuous supply of seedlings is available for processing.

About 200 seedling containers are needed so that an inventory of unprocessed seedlings can be maintained. MBI uses plastic tubs that fit the receptacles on the grading lines. Each container holds an average of 1,200 to 1,500 seedlings.

Personal equipment needed consists of rain gear, gloves, and rubber boots.

A truck is needed to transport the field crew to and from the processing shed.

V. DISCUSSION (ADVANTAGES, DISADVANTAGES)

Hand lifting requires less capital outlay as lifting machines require a rather large investment.

By preparing the seedling crop for the lifting season by the aforementioned root training regime most of the root systems and a portion of the mycorrhizae can be preserved. The system is not perfect. Carelessness toward pulling and exposure of roots are points of concern because the mycorrhizae and small roots are so very fragile until a portion of them are lost even with the most careful work. However, the results equal or exceeds most machine lifting.

Hand lifting is very labor intensive. Especially, when counting and culling is done along with baling as done at MBI. This process gives seasonal employment for more people in an area of chronic unemployment.

Effort is required to keep production at acceptable levels and of good quality. Monitoring by supervision must be continuous, checks and observations must be made constantly and corrections or adjustments must be performed when necessary.

Organization of work and constant monitoring yields acceptable results.

Hand lifting is more expensive to perform but when the total cost of reforestation is considered, the few additional dollars required per acre appears insignificant.

To summarize -- hand lifting and processing can be a successful way to get a quality product to the consumer.

This does not say that MBI will always stay with hand lifting. Machines are currently available that can do excellent work if operated properly. Machines can stabilize production removing some personal attitudes toward production, i.e. Monday morning blahs and end of season "string-out". If the last statement is in question, I will gladly clarify personally.

MANPOWER - WOMANPOWER FOR HAND LIFTING,
PROCESSING SEEDLINGS -- MBI NURSERY

I. FIELD CREW - MEN
- TRACTOR/EQUIPMENT OPERATOR, LEADER ... 1
- TRACTOR OPERATOR/TRAILER/LIASON 1
- SEEDLING PULLERS 16
- TUBBERS 4
- LOADERS/UNLOADERS 2

TOTAL 24

II. GRADER/COUNTERS
- WOMEN ON TWO LINES - 22 EA 44

III. CHECKERS
- MEN ON TWO LINES - 1 EA 2

IV. TABLE SERVICE CREW
- MEN ON TWO LINES - 2 EA 4

V. BUNDLING TABLES
- MEN ON TWO TABLES - 2 EA 4

VI. STRAPPER CREW
- MEN ON STRAPPER 2

VII. FORKLIFT OPERATOR
- MAN ON 1 MACHINE 1

GRAND TOTAL 81

Note: Due to absenteeism, two women and at least 1 man extra is on payroll during middle of lifting season.