# NURSERY STOCK INVENTORY USING IBM COMPILATION

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Inventory of nursery stock is normally a detailed, time-consuming activity, both the plot counting and office compilation. Kimberly-Clark Corporation had IBM facilities that had been used for such forestry purposes as continuous forest inventory. It was decided to design an inventory system to utilize these facilities for inventory of nursery stock at the Lake Mary Nursery, maintained by the corporation near Norway, Mich. It was felt that this system could maximize accuracy, make the data available faster, and release supervisory and clerical personnel for other work. The system was first tested in 1960 and has since been used in the annual inventory.

# IBM Cards

Inventory data is recorded on two cards, the inventory master card 800 and the plot card 801A (figs. 1 and 2). These cards are marked with an electrographic pencil at the plot and in the office. One master card is prepared for each group of plots, and during the compilation the master card data is punched into the plot card.

The master card 800 is prepared in the office and is placed on top of each group of plot cards for identification. Certain information is coded for use on the cards. There is an identifying species code list, for example, 01 - white spruce, 02 - black spruce, and 10 - red pine. Another code list numbers the various seed sources; this information is listed on the maps of all seedling and transplant beds. The master card data that must be supplied follows:

\Block number - Taken from maps and recorded directly.Species- Refer to code list.Age class- Entered directly, e.g., 2-1 is 21.

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Tree Planters' Notes No. 64

Figure 1.

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#### Figure 2.

Source	- Refer to code list. This refers to seed lot numbers of the various ' beds.
Bed feet	- Record directly, entering all columns. Data comes from maps where
	it was recorded after measurement. Total bed feet of a species, age
	class, and source within a block should be used.
Season	- Show (1) for spring or (2) for fall inventory.

The plot card 801A is mark-sensed at the plot from counts within a frame. The tallyman marks in directly the Block Number, Bed Number, and Plot Number, being careful to fill all spaces; e.g., he marks 012 for Bed Number 12. The columns Total Trees and Usable Trees are defined by the nurseryman. Transplants at the Lake Mary Nursery, considered the total number of living trees on the plot, are usually listed under Total Trees, and those that meet shipping specifications are listed under Usable Trees. When seedlings are inventoried, only one column, Total Trees, is filled because most seedlings are transplanted, and these are graded according to a separate height inventory.

### **Transplant Inventory**

The method of laying out plots in the transplant beds is generally based upon a report (1) on inventory in Ontario nurseries. Within a block all trees of the same species, age class, and source are sampled as a unit by a 2-foot counting frame placed across the bed. The number of plots taken in each bed is determined by dividing 120 by the number of beds in the unit. For example, if there are 40 beds of 2-2 white spruce, 120 - 40 = 3 samples per bed. However, if there are only two beds in the unit, probably not more than 10 samples would be taken in each bed. Accuracy is sacrificed, but such a small number of species and age classes is not of major importance in planning. The pattern of sample plots is varied in a zig-zag manner by having the men pace varying distances for the groups of plots. This creates a random distribution of plots.

# Seeding Inventory

Seedbeds at the Lake Mary Nursery are broadcast. Sampling is done at 10-foot intervals within each bed; the count of trees is made within a bed-width, 3-inch counting frame. Since these are permanent points for as long as the seedling is in the bed, they are marked with a large nail so that the next inventory can be taken at the same point.

#### Computation

The corporation's IBM service prepared a program for computation of the inventory that basically replaced the hand computation and was according to the following formulas previously used:

For transplants:

Number of trees = number of bed feet x <u>sum of sample counts</u>

2 x number plots

For seedlings:

Number of trees in bed = bed length x sum of trees all plots in bed  $\frac{1}{x 4}$  number of plots in bed

A "Printout" of all cards is initially prepared and returned to the nursery for checking prior to computation. The "Printout" is a printed record of each card, with the master card listed first. This master card is spotted in the list by having zero listings for Total Trees and Usable Trees.

Following checking of the "Printout," the data is computed according to the instructions maintained by the IBM service. A report showing the computed number of trees for each block, species, age class, and source is returned to the nursery. There is an additional listing of the numbers of trees available at the upper and lower limits of 95-percent confidence levels. This statistical computation is a definite "plus" factor for IBM computation since the time-consuming computation would seldom be undertaken for all trees in a nursery. The. report prepared by the corporation's IBM service is used as a basis for the annual report of inventory for the nursery.

The detailed report from the IBM service is further used during the shipping season because the number of trees per foot of bed are shown for every block, species, age class, and source. An order for 25,000 trees of a certain species and age is filled by dividing 25,000 by the number of trees per bedfoot; e.g., 25,000 = 21.8 trees/foot = 1,147 feet. The crew chief of the lifting crew is then instructed to lift 1,150 feet of this species. This lifting procedure has resulted in greater accuracy, particularly with large samples of trees.

# Literature Cited

 Mullin, R. E., Morrison, L. M., and Schweitzer, T. T. 1955. Inventory of nursery stock. Ontario Dept. of Lands and Forests. Res. Rpt. 33.