LIFE HISTORY PLOTS AND INVENTORIES

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Inventories can be very expensive operations in the forest nursery system but they need not be so for large southern nurseries. No where else in the United States is nursery management so intensive. Seed lots are large. Carefully mechanized planting of these large, well mixed lots provides for uniform sowing which in turn minimizes variation. The smaller the variables - the fewer the counts needed for a given accuracy.

This is where history plots enter the picture. Random plots selected before planting avoid human bias later and if followed closely through the year provide greater knowledge for intensive nursery management. But of greater interest is the possibility of using these plots for inventory purposes. For accurate use, there are a number of precautions which must be taken. They are the basis of this discussion.

The problems of inventorying have been discussed by Mullin, etal.; Johnson, Barton, etal. and others. The use of history plots for inventorying has been reported (Belcher) as well as the use of IBM field cards to record such data (Thomas). However, many nurserymen have been disappointed by the inaccuracy of such plots for some lots. My investigation of these problems indicate that too often statistical guidelines are prepared for the nonstatistically oriented field personnel without giving due consideration to their knowledge of statistics. As a consequence omitted elementary steps are which actually make the guidelines work. In the case of history plots, the prime problem was failure to check the representation of these plots. Just because they are chosen randomly does not make them representative of a given area. At the time of spring inventory, the nurseryman should make counts on additional plots, besides the history plots. These should be selected systematically and should be two to three times the number of history plots. The history plots are then compared with the systematic temporary plots through a 't' test to establish how well the history plots represent the area. If the history plots do not differ statistically from the temporary plots then consider that they represent the area well and use only the history plots in the fall inventory. If, however, there is a difference which falls between significance at the 5% and 1% level of probability, the temporary plots are retained in the fall inventory <u>with the history plots</u> to insure that the desired accuracy will be maintained. At the spring count, analysis should

also be made to determine if more plots are needed to obtain this desired level of accuracy for fall inventory. If the history plots are significantly different from the temporary plots at a value greater than the 1% level of probability, the history plots should not be used for inventory purposes.

Rather than go into the formulas for these comparisons I will just mention that a computer program has been prepared to do all of this for you. Working with Jim Space, S&PF , Atlanta, we are presently testing a series of programs which will make the history plot - temporary plot comparisons, determine added plots for any given level of accuracy desired and compute inventories from any type plots in two grades. The great part is that the whole computer process takes about 6 seconds for the average seed lot planting.

Another major problem in good nursery management is in determining the cull percent. The accuracy of many inventories is won or lost on the grading table. Cull percents determined from dug samples graded by field workers or office workers is usually not consistent. To determine a cull percent that is meaningful requires that a sufficient number of dug samples be graded by your best in-season grader.

Maximum variation can be accounted for by increasing the number of dug samples. If one-half of the bed is a mirror image of the other half of the bed, the dug sample only needs to be a l'X2' sample taken from the edge of the bed toward the center. However, the side of the bed from which the plot begins should be randomly chosen or at least alternated so that all variation can be measured.

REFERENCES

BARTON, W. W. and C. M. CLEMENTS. 1961. A systematic sampling nursery inventory procedure. Tree Planters' Notes 46:19-25.

BELCHER, E.W. 1964. The use of history plots in the nursery. Tree Planters' Notes 64:27-31.

JOHNSON, F. A. 1943. A statistical study of sampling methods for tree nursery inventories. Jour. Forestry 41:674-679.

MULLIN, R. E., L. M. MORRISON and T. T. SCHWEITZER. 1955. Inventory of nursery stock. Ontario Dept. of Lands and Forests. Res. Report No. 33. 64 pp.

THOMAS, P. B. 1963. Nursery stock inventory using IBM compilation. Proc. R-9 Nurserymen's Conf. Rolla, No. Aug. 1963.