

Seedling Monitoring During the 1-0 Growing Season¹

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Abstract.--Describes a method for measuring seedling growth characteristics and environmental factors in a conifer tree nursery during the first growing season and how this data can be used for culturing seedlings.

INTRODUCTION

Knowing how well the seedlings at your nursery are performing at any given time is essential for good nursery management. The systematic 1-0 monitoring plan presented in this paper is one way of obtaining that information.

PROCEDURES

The procedure for monitoring 1-0 seedlings at J. Herbert Stone Nursery is designed to evaluate (1) seedling growth and environmental factors at individual plots (intensive monitoring) and (2) the overall condition of the stock across the entire field (extensive monitoring). The intensive and extensive monitoring are performed together at weekly intervals.

Extensive Monitoring

The purpose of extensive monitoring is to observe the entire growing area for overall condition of the crop and to identify any problems. This is accomplished by planning a course of travel so that seedlings in the entire growing area are observed from no more

than 40 feet away. A report is made upon completion of the walkthrough that addresses such things as stunted or chlorotic seedlings, poor germinating lots, insect and disease damage and plugged sprinkler heads. If any observations show up in a pattern, they are plotted on a map of the nursery. These maps are later used to correct the problems before sowing another crop in the same area. Field reports are circulated to appropriate nursery personnel to keep them abreast of the current condition of the stock.

Intensive Monitoring

The purpose of intensive monitoring is to record site factors and seedling growth trends at individual plots throughout the growing area. The plots are installed before seedling emergence. They are randomly located on the course of travel for the extensive monitoring in such a manner that all field conditions are monitored. Presently, we are monitoring approximately one plot per acre.

Data Collection

Mortality-- A four by one half foot permanent sampling area is marked at each plot using plastic "popsicle stick" markers in each row of seedlings. Dead and alive seedlings within this area are counted weekly. After each count, dead seedlings are removed from the sampling area. Mortality is expressed as a percent of dead seedlings for the week of collection over the total seedling count for that sampling area at the end of the season (dead plus live count).

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Lygus Damage. In the same sampling area, all seedlings with L.vgus damage in the top inch of the terminal leader are counted. Lvgus is expressed as percent damaged over total seedlings in the plot for that week.

Bud Set. All seedlings in the sampling area are observed for bud set. This is expressed as percent budset over total seedlings.

Seedling Height. Plastic rings are placed at the base of ten seedlings at each plot. Height is determined by measuring from the base of the tagged seedling to the growing tip of the terminal leader. Height can be expressed as either total mean height or mean incremental growth for that week.

Surface Soluble Salts. Salts rising to the surface due to capillary action is a problem at this nursery. We believe that the high salts have lead to mortality and stunting of several species of seedlings. Monitoring the surface salt levels helps us determine when to irrigate to bring the soluble salt levels down to acceptable levels for plant growth and survival.

Soil within 1/2 inches of the surface is collected from undisturbed areas outside of the sampling points. Electrical conductivity is measured at our facilities using a "quick test" for electric conductance (Wilde 1979).

Soil Moisture. At each plot, a permanent soil tensiometer is placed at 5 inches and read at least twice a week. Soil moisture as determined by the gravimetric method is collected occasionally at each plot.

Other Data Collected. Later in the summer, several of these plots are used as sampling areas for predawn plant moisture stress readings. Also, each of these plots are within 40 feet of a permanent soil nutrient sampling point. These soil sampling points are areas where soils are collected in the fall before sowing and sent to a lab for a complete soil nutrient analysis.

Use of Intensive Monitoring Data For Nursery Management

Plotting growth, site factors, and cultural manipulations over time will show annual growth

trends in relation to cultural and site factors. With several years of growth trend data, a manager can develop an idea of what to expect from the current 1-0 crop and what measures, if any, to take to produce the desired seedling for that year.

For example, the 1-0 crop in our 1985 field was several inches higher than desired. Using the 1985 data, we were able in 1986 to produce a shorter seedling by scheduling the last irrigation to be several weeks earlier than the last irrigation in 1985. This would not have been possible if we had not known the growth trends for the previous years irrigation schedule.

Understanding how site conditions affect seedling growth can lead to a better manipulation of the seedling environment to produce the desired seedling. Using two years of data, we have been able to characterize the moisture regimes for the optimum growth of several species. This has lead to a better irrigation schedule for all of our stock.

Evaluating site conditions and seedling growth can also clarify specific nursery problems. We have been able to determine when and to what extent Lvgus is damaging certain species. This understanding has lead us to better control of this insect.

DISCUSSION

1-0 monitoring does not take the place of an inventory, nor should the data be used for calculating survival factors. The sample size is too small. There is some question as to whether we are collecting enough data to give us a clear picture of trends. We intend to pursue this question. Nevertheless, our initial intention of monitoring was to make sure that the entire field was observed weekly in a relatively unbiased fashion. We feel that this monitoring system meets this objective at the least expense.

LITURATURE CITED

Wilde, S.A. 1979. Soil and Plant Analysis for Tree Culture. Fifth Revised Edition. 224 p. Oxford and IBH Publishing Co., New Delhi.