

MAPPING THE CONDITION OF NURSERY STOCK AND COVER CROPS IS VALUABLE GUIDE TO DIFFERENTIAL FERTILIZATION AND OTHER SOIL AMENDMENT

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Many public and industrial forest nurseries in the Upper Midwest, as well as many private nurseries growing Christmas tree stock, are located on sandy soils. These soils, in spite of their many advantages, usually have some patches of impoverished droughty sand where tree stand and quality are poor, especially for most broad-leaf species and the more nutrient-demanding conifers such as spruces, firs, junipers, and cedars. These spots of depressed growth rate often occur naturally on slight ridges or knolls. Or they may be caused by filling, grading, or leveling with soil material varying in silt-plus-clay content, organic matter, and nutrient level.

Test Individual Soil Samples

Many nurserymen rely on tests of soil samples taken in substantial numbers in different areas to decide on the general level of soil fertilization needed in each compartment for the species to be grown there.

Soil testing is a fairly good means of assessing the general level of the soil fertility, but it has some drawbacks. The sample from a specific compartment may be a composite of 4 to 6 cores taken at fairly uniform spacing and to a depth of 6-2/3 or 8 inches (20 centimeters). Consequently, the composite consists of soil from good and poor spots. The average for the tests may indicate reasonably satisfactory conditions, but it will mask the true condition of the poor spots.

If samples are kept separate by areas of good and poor growth or by apparent texture differences within pipe-line units, the number of samples becomes rather large, thus increasing the cost of the tests considerably. Nevertheless, this is still the better of the two methods.

Finally, the soil tests do *not* tell anything about

the topographic condition or about low spots which are periodically flooded or covered with ice sheets in winter.

Crop Condition Map Supplements Soil Tests

Nurserymen can reduce their costs of soil testing and maximize fertilization benefits by observing and mapping the condition of the trees, shrubs, or cover crops occupying the area.

Practically all nurseries in the north central United States are laid out in a rectangular or nearly rectangular pattern that includes hedges, windbreaks, slat-wire wind barriers, or irrigation pipelines. With these for reference, it is easy to sketch accurately on the base map (most nurseries have one) the irregular areas of good, average, and poor productivity and to indicate any special problems. In the latter category are low spots requiring fill, and slight ridges or knolls that may require some shaving down, the addition of good quality soil, and then replacement of the good topsoil.

May Map Pines Separate From Spruces, Firs

If both conifer and broadleaf species are grown in the nursery, it may be desirable to map tree condition (good, average, or poor) for (a) pines and other species of rather low nutrient requirement, and (b) spruces, firs, and broadleaf species of higher nutrient requirement.

A simplified version of the mapping technique is to sketch in on the base map only the areas that need special attention: specifically areas of poor fertility, sandy knolls and ridges, or low spots requiring fill. Many low spots may be only 3 to 6 inches below the general level of the surrounding land and quite fertile, but the number of trees may be much smaller (sometimes 50 to 75 percent fewer) than on the higher ground because of poor drainage and poor oxygen conditions.

In addition, one may map the condition of cover crops as good, average, or poor. Cover crops such as oats, rye, lupines, and other legumes are sensitive

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indicators of the general productivity of the soil, and information on crop condition can supplement soil tests. Alternatively it can form the basis of judging where soil samples should be taken; this will reduce the number of samples needed but will make them more meaningful in relation to "problem" areas.

Such maps are useful in several ways. They can delineate the more fertile parts of a nursery, which can then be set aside for the more nutrient-demanding hardwoods and for spruces, firs, and cedars. The less fertile blocks may be acceptable for the pines or other species with lower nutrient requirements, or they can readily be brought up to standard.

The maps may also indicate (1) the relative needs by area for emergency fertilizer applications on the current crop of trees and shrubs, or (2) the areas where a different crop should be sown.

Topsoil, Clay, Organic Matter Improve the Poor Spots

Besides the obvious chore of filling low swales and basins, considerable soil amendment will be needed in the poorer areas that have a high sand content or thin topsoil. These are invariably below par in cation-exchange capacity, organic matter, and water-holding capacity. They will need as much as 100 or more tons per acre of good topsoil or medium-acid clay, or 50 or more tons of organic matter such as peat or muck, or-better-a combination of both.

By selective treatment of "problem" spots, stock of uniform size can be produced throughout the nursery with the least expenditure for the nursery as a whole. Once the physical condition of the poor spots has been amended, a complete N, P, K fertilizer will generally correct the major nutritional problem.