## Nurseries

# For Invigorating Stunted Stock

bv J.G. lyer and J.R. Love 1,2 Department of Soil Science University of Wisconsin Madison.

nursery stock does not exhibit any readily detectable changes the so called "deficiency diseases." in its appearance. Nevertheless, low concentrations of these minute but essential

This article is from the Department of Soil Science, Univ. of Wisconsin. In collaboration with the Wisconsin-Department of Natural Director, Research division, College of Agricultural and Life Science, Univ. of Wisconsin.

2. Lecturer and professor of soil science respectively.

constituents of soil fertility cause serious abnormalities to the internal, anatomical and physiological makeup of young trees. Under unbalanced nutritional Conditions, elements can he either prevented or corrected with partially stared nursery

seedlings often is not obvious. Until the supply of these major nutrient fertilizers, and may succumb to the attack of micro-nutrients, alone or ill combination with micronutrients-including iron, manganese, boron, copper, zinc, parasitic organisms. The latter outcome may not be fertilizers with the major nutrient elements (1). and molybdenum-reaches an extreme deficiency level, preceded by stunted growth of trees or other symptoms of Recently, liquid treatments have greatly increased their

> fungal populations parasitizing nursery stock-fur pincerlike structure of these chemical reduces the example. Lophodernium, Phytopthora, Scleroderis, . toxicity of trace elements and their tendency to form and Cylindrocladium spp -- may be directly related to the insoluble compounds in the soil. general depletion of nursery soil in micro elements. This assumption is not only plausible, but very routine analyses of nursery soils.

#### **Treatment Procedures**

Fortunately, in many cases a deficiency of trace The influence of trace or minor elements on tree stock shows a sluggish response to applications of the accomplish it is by applying solutions containing scope and effectiveness due to the production of soluble, The recent increase ill the taxonomic members of the chelated fertilizers of nearly all micronutrients. The

The solution that provided a safe amelioration in probable in view of the past history of nurseries our trials on non calcareous soils had the following producing reforestation material. During the past 40 composition, given on a pounds-per-acre basis tear.. soil of a very large proportion of Federal, applied in 1400 gallons of water: Sequestrenes of Stale, and private nurseries have failed to receive chelated 330 iron (10 percent Fe); manganese (12 even small amounts of micronutrient fertilizers. This  $_{\%}$  Mn) and copper (13 % Cu), each 8 pounds; failure has been largely due to the concealed effects of Sequestrene chelated zinc (14%Zn), 12 pounds; Resources. Published with the approval of the trace elements and limitations of the present methods of boric acid (10% B) 8 pounds, and, for leguminous stock soil analysis. Laboratory determinations of available or green manure crops, sodium molybdate (40 percent trace elements, whether chemical or biological, are Mo). 1 pound. The treatment can be repeated after an too laborious and costly to he incorporated into the interval of about 10 days. Depending on soil conditions, any of the components, except those of presumably

13



Figure 1.-A rapid growth response of greenhouse-raised 1-year-old white spruce, induced by a foliar spray of N-P-K and micronutrient fertilizers applied at rates of 100 (left) and 200 (right) pounds per acre. The additional growth materialized in 18 days after the spray.

critical importance, can be reduced or deleted. If sion spectrometer now provide, at a relatively However, solutions carrying major nutrient elements presence in a form unavailable to trees. tend to increase succulence and foliar growth, and A deficiency of micronutrients can also be morphological and physiological balance (2).

#### Discussion

by an emis-

desirable, the solution can be supplemented by 100 small expense, an accurate picture of the actual pounds of 11-48-0 mono-ammonium phosphate and uptake of nutrients by plants. An appreciable 200 pounds of 13-0-44 potassium nitrate, thus increase in the concentration of certain nutrient obtaining a nearly complete, and usually highly elements in the tissue of fertilized seedlings usually effective mixture to invigorate stunted stock. testifies to their deficiency in the soil or else their

their excessive use will yield stock lacking in corrected, at least temporarily, by foliar sprays. These treatments, using mobile tanks with the spraying equipment, are the least expensive; they are rapidly accomplished and require very small In general, it is advisable to leave some amounts of both fertilizers and water. In nursery beds without fertilizer application to serve as conservative treatments, the following amounts of controls. If circumstances permit, results of the chemicals should be dissolved in 100 gallons of treatments can he appraised at the end of the water and sprayed over 1 acre of nursery beds: growing season on the basis of foliar analyses of the Chelated 330 iron (10 per cent Fe) and zinc (14 fertilized and untreated stock. Rapid foliar analyses per cent Zn), each 1 pound; chelated manganese (12 per cent Mn)

and copper (13 per cent Cu), each .5 pound, and, for leguminous plants, sodium molybdate (40 per cent Mo). 4 ounces.

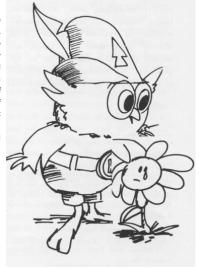
Sprays, including a mixture of trace and major nutrient elements quickly produce a spectacular recovery of the color and the growth of inferior nursery stock (fig. 1). However, this effect is of very short duration. The foliar sprays do not augment the nutrient supply of the soil and this form of fertilization, particularly where embracing major nutrient elements, is better suited to the production of ornamentals or Christmas trees, rather than reforestation material.

### Literature Cited

1. Wilde, S.A. 1958 Forest Soils. Ronald Press Co. New York, N.Y.

Wilde, S.A. 1960 Liguid Fertilizer treatments of nursery stock; their advantages and shortocmings. Tree Planters' Notes, 42:11-12.

Birds, animals and flowers are dying to tell us . . . no pollution, please!



14