

The Place Of Fertilizers In Forest Tree Improvement

by

T. E. Maki, Head, Department of Forest Management
School of Forestry, N.C. State College

In various part of the silvicultural world, fertilizing is becoming recognized as a legitimate "tools" in some phases of professional forestry practice. Even in our own country serious exploration of its potentialities is getting underway. This development has been long in arriving, certainly overdue. Yet the lag in recognition of its possible utility is not strange, if we ponder a bit on the influence of tradition on our professional thought.

Traditionally, we foresters have been "anti-manurial" in our attitudes, and smugly proud that we are husbandmen for a crop considered capable of attaining economic size without benefit of fertilization or other intensive cultural measures. Indeed, we have been rather disdainful at the thought of stooping for, or leaning on, any agronomic aid in the lofty occupation of growing trees for timber. Quite early, and perhaps quite properly, we sensed that the rapidity and vigor of tree growth seemed to be largely associated with such physical factors as texture, structure and depth of soil horizons, aeration, and available moisture, and that the productive capacity of the land might be readily assessed from one or more of such factors. Soil fertility levels, more nebulous entities and difficult to measure at best, were relegated a subordinate place in the culture of forest trees and in, the evaluation of the productive capacity of forest land. Occasionally, we seem to have even derived some comfort from. noting that efforts to assess site quality from fertility levels have led, for the most part, to an impressive accumulation of negative results.

The development of this attitude and philosophy has been encouraged and abetted by our own observations and rationalizations, as well as by the elders at whose feet we may have osmosed much of our silvicultural wisdom. Only about three years ago, one of our outstanding silviculturists aptly expressed this philosophy when he wrote "Forestry....deals mostly with natural plants.....that through many centuries by natural selection. have been able to utilize the available site to best advantage for survival and development. In forestry the demand is for the stem rather than the fruit. Seeds, branches, and roots, which contain the greater portion of mineral nutrients, are in almost all cases left in the woods. As decomposition of this residue proceeds, essential elements are released and re-used by future forest crops. " So we have remained comfortably satisfied with the assurances that Natures wonderful nutrient re-cycling takes care of all the fertility problems in forestry. We have confidently continued to rest in the knowledge

that forest trees, growing on any given site over a long period, have time to integrate all the soil and site factors to the end that growth may be associated much more strongly with some one or more, readily-determined physical factor than with any particular level of available or total nutrient supply.

I do not wish to imply that any of our past rationalizations, reasonings and observations are wrong. But I submit that an unchallenged drift in this climate of complacency has culminated in failure to develop any solid understanding of the nutrient requirements of our commercial timber species, the fertilizer responsiveness of forest soils, the salt tolerance of seedlings, specific ion uptake and ion antagonisms, and a host of other important questions. In our pride of hard-headed practicality and our pre-occupation with the economic obstacles to employing fertilizers in silvicultural manipulations, we have overlooked the development of information on the physiological and biochemical aspects of forest tree nutrition. So now that forestry has become sufficiently intensified to require application of fertilizers in a number of common sense ways and situations, we find ourselves trapped, agronomically illiterate, and devoid of necessary experience, -- in effect like

"..... an infant crying in the night,
An infant crying for the light,
And with no language but a cry."

These prefatory remarks, which represent a sizeable digression from the subject that was assigned to me, were provoked by my search of literature which proved quite unrewarding for the purpose of this conference. I am mindful that much intensive study of fertilizing has been initiated in recent years by many agencies, industries, and individuals throughout the South, but scarcely any of this work has progressed far enough to yield definitive results. I shall now comment and make some observations, mainly in a speculative vein, on the place of fertilizers in the several areas, of tree improvement programs where immediate use appears warranted.

In the Nursery

As yet, it is only in the nursery where we have attained a reasonable degree of sophistication in handling of fertilizers. And nurseries, unless direct seeding makes them obsolete in the future, should continue to play a very important part in forest tree improvement.

Fertilizers enter the program at this stage mostly through the soil management phases which also affect general nursery production. We know vaguely that fertilizers can greatly affect quality of planting stock, not just the size of seedlings. Tremendous advances have been made over the years in nursery practises, and quality control, in so far as morphological grades

