MR. HOPKINS,

I have read the attached paper with great interest, and before listing some comments, I would like to quote the following -

> "Apparently sensible people will ask you how often you water pines in summer, or what manure you use when planting young trees in a forest. A species which cannot exist without such attention will find no place in forestry."

This is taken from Mr. Lane-Pooles lectures for Forest Apprentices written in 1917, and is indicative of the very strong prejudice and opposition foresters had to contend with from fellow foresters when nutrition work was first inaugurated about 32 years ago. So allergic were foresters to the use of fertilisers for any purpose, that it was necessary to get the Conservator's approval to a requisition for a bag of super or blood and bone.

Page 2. Item A - Super at Time of Planting.
Para. 3.

A small point but 2 ozs of super per tree was always reckoned on as 1 cwt per acre with 7 x 7 planting. Following are the figures -

7' x 7' - 900 trees per acre. 2 ozs. = 1 cwt.

6' x 6' - 1200 " " " 2 ozs. = 1.1/3 cwt.

If superphosphate is to be broadcast over newly planted area, I am sure the rate of application would have to be increased. This could offset the saving in cost to be expected by using this method.

Experiments were done in the early stages of this work to determine the best place to deposit the fertiliser. Some of the treatments were -

1. Spread on the surface around the tree. 12" radius.
2. Mixed with the soil when planting.
3. Placed in the bottom of the planting hole.
4. Broadcast between rows.

The first three treatments produced an equally favourable result, but No. 4 gave a much lessened response. Proximity to the tree was the determining factor for optimum results.

As you state Hatch has thrown much light on this matter, and it appears that any phosphate not put within 12" to 18" of the newly planted tree is lost. Even with our application along the rows (drilling) a proportion of the super is probably wasted.

Page 5. Discussion - 1st para.

A very interesting observation, and I feel convinced this is the case. It explains our lack of success with line plots on older stands. Pinus pinaster has a radial root spread of 30' in 3 years

(Nancy Burbridges work at Somerville)

If broadcasting superphosphate (initial application) is contemplated it might be worth while investigating the possibility of delaying the application until the little pines are one year old, when they would have a greater root spread.

Page 5. Is Phosphate the main deficiency - Para 1.

All our early work with balanced fertilisers proved negative. Phosphate was the only element that produced a response. This has always seemed a bit ridiculous when one considers the chemical make-up of these soils. The Department of Agriculture in its work often finds after a period of years that other elements than phosphate become limiting although responses to these elements could not be obtained initially. Our picture is a little different however as we have not removed a crop and the farmer has removed several. We think that some sort of balance is reached by a crop of pines and that the minerals taken up by the tree are largely returned to the soil by leaf or needle fall. However, on these very poor soils and in view of our lack of knowledge about the mineral up take of the tree empirical tests with elements other than phosphate are justified from time to time.

Page 6. Table III - Plot No. 3.

This appears to be a much greater growth increase than one would expect. Zinc deficiency symptoms have never been seen at Gnangara so far as I am aware. The 2½% and 3½% zinc sprays are about equal to the untreated control. Are you sure that the 5% zinc spray plot has not been subject tc influence from a nearby superplot. Buffers in this experiment were not really adequate. The plot could have been given super by mistake perhaps. If this figure 7.1% is the mean of a number of plots then the result is exceedingly interesting.

Plot No. 5.

The response to phosphate on this plot appears to be Nil. Possibly on one of the better soil types.

These figures are most encouraging in view of the fact that the effect of the application is still evident 5 years later. The plot, Forester Clover and I treated with

Super and Boletus sp. spores in Compt. 16 is 8 or 9 years old, and the response is still most noticeable. This plot was put down about 1950.

The fact that a plot of pines has been improved from S.Q.2 to S.Q.4 would sound even more impressive if the difference were stated in wood and money.

Page 7. Item D - Para. 4.

The statement contained in the first sentence is interesting and shows how difficult the answers are to come at. After 30 years and hundreds of plots and experiments we still do not have the answers we want.

Page 8. Thinnings.

The statement made in the first sentence is possibly correct if you do not infer that thinning will produce more wood.

A given area will, if fully utilised, and in response to standard nutritional treatment produce a certain amount of wood. How many trees it is best to put this wood on can be determined without difficulty. It is not possible to make an area produce more wood by thinning it.

Page 10. Conclusion - 1st sentence in 2nd paragraph.

I very much doubt if this is the case. The Department of Agriculture still carries out a great many explanatory fertiliser tests and I think we will have to do the same. Your own suggestion under the heading "Possible Future Lines of Research" items 3 and 6 would suggest you yourself feel there is still room for work of this nature.

Some fundamental work to supplement this would undoubtedly be of great value.

There appears to be no short cut at this stage to determine how well a tree will grow on a given site. It is necessary to grow the tree on the site and deal with nutritional and management problems as they arise to get the answers.

SENIOR FORESTER.

DHP:PM.
COMO.
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