being used to avoid the uncertainties associated with teneral adults. If blue-staining fungi are related symbiotically with beetles of this genus, the constant occurrence of fungi in individuals ready to fly may be expected.—S. H. Farris.

Severe Mineral Deficiencies in Douglas-fir Seedlings in a Newly Developed Forest Nursery.—Phosphorus deficiency symptoms appeared during August 1964 in 1 - 0 Douglas-fir seedlings growing in a new forest nursery, formerly farmland, at Duncan, B.C. The symptom severity varied in different parts of the nursery from only slight needle discoloration, to severe discoloration with stunting, to complete necrosis. However, throughout the whole area there were isolated patches of up to 30 seedlings with no deficiency symptoms.

Soil and foliage analyses made in November on samples from each symptom class (by J. T. Gillingham, Department of Agriculture, Experimental Farm, Saanichton, B.C.) showed low P and K values in several instances (Table 1). Average soil pH was 5.7.

TABLE I

Nitrogen, phosphorus, and potassium contents of soil and foliage samples from Douglas-fir nursery beds in relation to mineral deficiency symptoms

Symptom Class	Nitrogen	Phosphorus		Potassium	
	Needles[a]	Needles[b]	Soil[c]	Needles[b]	Soil[c]
Thrifty, slight discoloration	2.03	0.09	6.2	0.83	44.2
Stunted without discoloration	2.80	0.08	4.2	0.55	48.5
Stunted with discoloration	2.41	0.03	5.7	0.50	44.2
Dead	1.65	0.03	5.0	0.30	34.0
Isolated patches of thrifty	2.20	0.10	7.0	0.75	34.0
Adjacent patches of stunted seedlings	2.52	0.05	6.5	0.44	45.0

[a]% expressed on moisture free basis.
[b]% moisture free basis. Phosphorus determined by method of Smith, G. R. et al. Can. J. Research 17, 178–191, 1939. Potassium determined with an oxy-hydrogen flame using a Beckman Model B flame photometer.
[c]parts per million.

The following April, 285 lbs/acre of ammonium phosphate were applied to the area, followed by a further 240 lbs. in June. Also, 120 lbs./acre of potassium sulphate were added in June and again in July. By the middle of August, the deficiency symptoms had disappeared and growth was comparable to that in the older nurseries.

P and K deficiencies have not occurred in the older part of the nursery at Duncan, therefore one would suspect that some factor or factors connected with the previous or present treatment of the area had a bearing on the situation. For instance, there was an almost complete lack of deficiency symptoms from an area formerly producing potatoes in contrast to the widespread symptoms in areas previously under grass or grain crops. Secondly, the size and distribution of small patches of thrifty seedlings, surrounded by large areas of stunted stock, strongly suggested "Juno" spots, caused by cattle droppings in pastures. Thirdly, the continuous removal of heavy weed growth (mainly clover and equisetum) during the first summer of nursery operations is suspected to have contributed to depletion. It is necessary to point out that the author has never seen such abundant weed growth in nursery beds, and that approximately 25 weeders, fully employed during the entire growing season were unable to keep pace with the growth. Whole plants of equisetum had, on analysis, 0.16% P and 1.72% K (moisture-free basis) thus greatly exceeding the content of Douglas-fir seedlings and presumably representing a substantial drain from the soil.

Vancouver Island soils are known to be low in phosphorus (Gillingham, J. T., Soil Sci. *In press*) so that a logical interpretation of the evidence would include a low initial P and K level in the soil of the area in question, aggravated by depletion to the point of causing deficiency. Variations in P and K content of soil and tissues apparently related to previous land management, tend to support rather than refute this.—W. J. Bloomberg.

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