

GROWTH RESPONSE OF BLUE PINE (*Pinus wallichiana* A. B. Jackson) TO FERTILIZATION IN NORTHERN PUNJAB (MURREE)

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Abstract

Fertilizer studies on 20-year-old crop of blue pine (*Pinus Wallichiana*) were conducted in Bhurban, Murree Forest Division. The results indicated that N.P. and K fertilizers applied alone and in different combinations did not significantly influence the height and diameter growth of the trees. Likewise, fertilization did not significantly affect the foliar contents of P or K except N which changed with the rates of fertilizer applied.

Introduction

The constant search for increasing the yield from forest area to the requirements of an ever-increasing population necessitates the use of fertilizers. Among other growth factors, fertilizers increase plant height, promote diameter growth and improve the quality and quantity of the sustain crop. Moreover, they make forest crops resistant to frost, injuries, insects-pests attack and other diseases. Forest crops cause tremendous drain on site productivity and therefore regular fertilization and manuring practices are important in maintaining soil fertility. In view of this, the effects of various levels of N.P. and K fertilizers alone and in different combinations were studied on 20-year-old crop of *P. wallichiana* at Bhurban (Murree) during 1979.

Materials and Methods

20-year-old uniform crop of *P. wallichiana* at Bhurban near Murree (Punjab) was selected for this study. Randomised complete block design was followed with 4 replications (each treatment consisting of 5-10 trees) and N. P. and K fertilizers alone and in combinations were broadcast in circular experimental plot in 3 metre radius on 9-8-1979.

FERTILIZER DOSES:

1. C = No Fertilizer
2. N = 3 kg urea (46% N)
3. P = 3 kg single superphosphate (20% P_2O_5)
4. NP = 3 kg urea + 3 kg single superphosphate
5. NPK = 3 kg urea + 3 kg S.S.P. + 3 kg. P.S. (50% K_2O)

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Collection of Soil Samples

Soil samples at the time of fertilizer application, (i.e. single pit/treatment) from various depths (Table-1) were collected and thoroughly mixed. In all four samples were collected, marked with reference number, Labelled in double polythene bage and brought to soil laboratory at Pakistan Forest Institute, Peshawar. These were air-dried, ground in mortar, passed through 2 mm sieve and analysed for physico-chemical parameter using the standard methods of Chapman and Pratt (1961); Lambert (1976); and Khan and Rafiq (1980).

Collection of Foliage Samples

After fertilization and just before the fall season foliage samples in August 1980 were collected from the upper, middle and basal branches from randomly selected single tree in each treatment and mimixed to get a composite sample for a single treatment. These were packed in double paper bags, indentification number allotted to them according to the treatmment and were brought to the soil laboratory. Samples were dried in oven at 75 °C for 24 hours, ground in electric crushing mortar and passed through 2 mm sieve. They were then analysed for N, P and K contents after drying in oven at 105 °C, using the standard method of Chapman and Pratt (1961); and Lambert (1976).

Table 1

Physico-Chemical Analysis of the Soil Samples of Blue Pine Stand at Bhurban, Murree.

A. Physical Parameters:		Depth in Cm			
		0 - 30	30 - 60	60 - 90	90 - 120
(i)	Sand percent	58.4	52.4	54.4	16.4
(ii)	Silt percent	24.0	26.0	22.0	44.0
(iii)	Clay percent	17.6	21.6	23.6	39.6
Text. Class (Isss system)		Sandy Loam			
B. Chemical Parameters:					
(i)	PH-Sat. Paste	7.7	7.7	7.8	7.9
(ii)	CaCO ₃ Eq. percent	8.3	6.5	9.5	11.0
(iii)	E _c C x 10 ³	0.24	0.15	0.16	0.22
(iv)	TSS percent	0.077	0.048	0.051	0.071
(v)	O.M percent	1.55	1.41	1.17	1.10
(vi)	Total N percent	0.138	0.115	0.092	0.090
(vii)	P ₂ O ₅ ppm	11	7	11	32
(viii)	K ₂ O ppm	112	107	105	180

Table 2

Growth Rate and Foliar Mineral Contents of *P. Wallichiana* as affected by Fertilization

S. No.	Fertilizer treatments	Dia. (cm)	Height (m)	N %	P %	K %
				avg. values		
1.	C = Control	12.5	8.8	0.46	0.14	0.50
2.	N = 3 kg Urea	12.7	9.1	1.44	0.17	0.53
3.	P = 3 kg single superphosphate	12.4	8.8	1.73	0.15	0.52
4.	NP = 3 kg urea + 3 kg ssp	12.3	8.9	2.00	0.20	0.84
5.	NPK = 3 kg urea + 3 kg ssp + + 3 kg P.S.	12.7	9.1	2.00	0.16	0.52

Results and Discussions

Information about the mineral requirements of tree species is needed for use in basic studies of forest soils and for use as a guide in fertilization practices in nursery or in forest stand. The soil of the experimental area was sandy loam and poor in nutrient contents. Growth and foliar nutrient analysis data (Table – 2) indicated that the application of N,P and K fertilizers alone and in combinations neither affected the diameter and height growth of trees nor the foliar nutrient contents significantly. However, the foliar N content significantly increased by the application of these fertilizers. The non-significant response of fertilizers in respect of plant growth and in foliar mineral contents could be attributed to the poor physical properties of the planting site which probably did not have the capacity to retain and supply the available plant nutrients regularly throughout the growing season.

Studying the mineral composition of different pine species, Vail *et al* (1961) and Will (1871) have reported 0.52 – 2.47% N; 0.13 – 0.3% P; and 0.38 – 2.18% K content respectively in healthy needles of Lodgepole pine (*Pinus contorta*) Monetary – pine (*P. radiata*) and Mexican weeping pine (*P. patula*); and 1.00 – 2.2% N; 0.05 – 1.17% P; and 0.32 – 1.04% K content in diabeck needles . . . Sheikh and Bangash (1984) have reported similar results for deodar (*Cedrus deodara*) planted at different sites in Azad Kashmir valley.

Acknowledgement

This experiment was carried out as part of the PL-480 Research Programme of USA for which the authors are highly obliged.

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