RESPONSE OF *CEDRUS DEODARA* TO NPK FERTILIZERS AT AZAD KASMIR VALLEY

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Abstract:

N, P and K fertilizer studies on *Cedrus deodara* (deodar) of different ages were under taken at different planting sites in Azad Kashmir during 1979. The effect alone or in combinations, measured for diameter and height growth and Foliar nutrient composition was recorded during 1979–82.

At Sharda, the analysis of height measurements recorded in 1981 gave a significant response to NPK combined treatment whereas over all diameter and height growth from 1979–82 was not affected. Also the diameter and height measurements recorded at Authmuqam during 1981 and 1982 did not show any significant response to the application of fertilizers. However the height increments for the period 1979–82 were found significantly affected by NPK combined treatments due to cumulative effect over the past three years. Moreover the foliar N content increased significantly at both the sites.

Introduction:

The yield of wood from coniferous and irrigated plantations of Pakistan is 0.29 m^3 and 3-4 m^3/ha per anum which is very poor as compared to similar situations in other countries. This is attributable mainly to inherent slow growth, the deteriorating site conditions and in a way rather conventional management of the existing stands.

One possibility to increase the yield could be to see as to how for N, P and K fertilizers could effect the growth rate and foliar nutrients composition of different tree species. This study pertains to the application of NPK fertilizers alone or in combination on *Cedrus deodara* at two different sites in Azad Kashmir.

Material and Method:

SITE No. 1: 40–60 year old pure patch of deodar was selected at Sharda. N, P and K fertilizer treatments (i.e. C, N, P, NP and NPK) were applied on 28-5-1979 in four replications taking three trees per treatment, using the Randomised Complete Block Design. Fertilizer doses as indicated below were spread in 1 m radius around the base of each tree and mixed with soil thoroughly.

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0.5 kg Urea (46% N);
1 kg Single Superphosphate (20% P_2O_5)
0.25 kg Potassium Sulphate (50% K_2O).

SITE No. 2: 14 year old pure and uniform patch of deodar was taken for study at Authmuqam. N, P and K fertilizer treatments (i.e. N, P, NP and NPK) were added on 29-5-1979 in four replications taking six trees per treatment using Randomised Complete Block Design. Fertilizers were spread in 1 m radius around the base of each tree and mixed with soil following doses were used:

0.5 kg Urea;
2 kg Single Superphosphate;
0.25 kg Potassium Sulphate.

The crop at site No. 2 was watered on the same day.

Collection of Soil Samples:

Composite soil samples from each planting site were collected before application of fertilizer at a depth of 0–30, 30–60 and 60–90 cm. In total three samples were obtained from each planting site. These were packed in double polythene bags, labelled with reference number and brought to soil laboratory. These were ground, passed through 2 mm sieve and analysed for Physico-chemical properties (Table-1 and 2) using the standard mathods outlined by Chapman and Pratt (1961); Lambert (1976); and Khan & Rafiq (1980).

Collection of Foliage Samples:

Foliage sample of newly develop apical tissues from the upper, middle and basal branches from one random tree per replication were collected and made one composite sample. These were packed in double paper bags, labelled with identification number and brought to soil laboratory. These were dried in oven at 75°C for 24 hours, ground in a crushing electric mortar and analysed for N, P and K contents after drying in oven at 105°C (Table-3 and 4) using the standard analytical procedure

Results and Discussions:

The chemical analysis of soil and foliage is being used to an increasing extent for the estimation of fertilizer requirement of forest trees and to monitor fertilizer trials. Data presented in Table–1 and 2 indicate that the soils are poor in texture and in mineral nutrient contents at both the planting sites. Because of the poor textural class such soils would have low retention capacities for the mineral nutrients liable to leach whatever is mineralized. The height increment recorded for Sharda in 1981 and Authmuqam from 1979–82 gave a significant response to NPK treatment. Moreover the application of fertilizer significantly increased the foliar N contents at both the sites. Studying 20 year old *Pinus wallichiana* (Kail) crop planted at Bhurban (Murree), likewise observations have been reported by Sheikh and Bangash (1984).

TABLE – 1

Physico-Chemical Properties of soil of Planting site at Sharda-Azad Kashmir Valley under 40–60 year *Cedrus deodara* (Deodar) Stand

A. **Physical Parameters:**

		Depth in Cm		
		0–30	30–60	60–90*
i.	Sand percent	75.0	80.0	90.0
ii.	Silt percent	20.0	17.0	8.0
iii.	Clay percent	5.0	3.0	2.0

Textural Class-System Loamy Sand

B. **Chemical Parameters:**

i.	pH (Sat. Paste)	6.5	6.5	6.6
ii.	$EC_e X x 10^3 =$	0.7	0.2	0.2
iii.	$CaCo_3$ – Equivalent percent=	4.5	7.5	9.0
iv.	O.M. percent=	3.00	0.87	0.70
v.	N percent=	0.184	0.138	0.069
vi.	$P_2 0_5$ ppm =	20	13	11
vii.	$K_2 0$ ppm=	60	75	75

TABLE–2

Physico-Chemical Properties of soil of Planting site at Authmuqam–Azad Kashmir Valley under 14 year *Cedrus deodara* (Deodar) Stand

A. **Physical Parameters:**

		Depth in Cm		
		0–30	30–60	60–90*
i.	Sand percent=	53.0	59.0	60.0
ii.	Silt percent	39.0	33.0	30.0
iii.	Clay percent=	8.0	9.0	10.0
Text. Class (ISSS–System) =		Sandy Loam		

B. **Chemical Parameters:**

i.	pH-Sat. Paste =	6.3	6.5	6.4
ii.	$Ec_e \times 10^3$=	0.07	0.10	0.09
iii.	$Caco_3$–Eq. percent =	4.5	7.7	7.5
iv.	O.M. percent =	2.65	1.79	1.46
v.	N percent =	0.23	0.12	0.09
vi.	$P_2 0_5$ ppm =	15	17	21
vii.	$K_2 0$ ppm =	127	165	127

*Parent material beyond 90 cm depth.

TABLE–3

Effect of N, P and K Fertilizers on growth rate and Foliar Mineral composition of 40–60 year old Deodar crop at Sharda-Azad Kashmir Valley

S. No.	Fertilizer Treatments	Average Values				
		Diameter growth cm	Height growth m	N percent	P percent	K percent
1.	C = Control	32.9	16.0	0.91	0.12	0.40
2.	N = 0.5 kg Urea per tree	34.5	19.2	1.73	0.12	0.36
3.	P = 1 kg single Superphosphate per tree	31.5	19.2	1.55	0.12	0.37
4.	NP=0.5 kg Urea + 1 kg ssp per tree	30.1	17.8	1.67	0.13	0.43
5.	NPK = 0.5 kg Urea + 1 kg ssp 0.25 kg Potassium-sulphate per tree	33.9	20.6	2.30	0.13	0.41

TABLE – 4

Effect of N, P and K Fertilizers on Growth rate and Foliar Mineral Composition of 14 year old Deodar crop at Authmuqam–Azad Kashmir

S. No.	Fertilizer Treatments	Average Values				
		Diameter growth cm	Height growth m	N percent	P percent	K percent
1.	C = Control	15.7	12.5	1.00	0.11	0.40
2.	N = 0.5 kg Urea per tree	16.2	12.0	1.82	0.12	0.43
3.	P = 2 kg single Superphosphate per tree	16.5	12.1	1.82	0.12	0.60
4.	NP=0.5 kg Urea + 2 kg ssp per tree	17.3	12.9	2.28	0.12	0.40
5.	NPK=0.5 kg Urea + 2 kg ssp + 0.25 kg Potassium-sulphate per tree	16.2	13.4	2.31	0.12	0.41

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REFERENCES

1. Chapman, H.D and Pratt, P.F. (1961). Method of Analysis for Soils, Plants and Waters. Univ. Calif. Divi. Agric. Sci. Berkeley.

2. Khan, G.S and Rafiq, M. (1980). Chemical Analysis of Soil & Waters. Soil Survey of Pakistan. Bull. 14, Ministry of Fd. Govt. of Pakistan.

3. Lambert, M.J. (1976). Methods of Chemical Analysis. Tech. paper 25, Wood Tech. For. Resh. Divi. For. Comm. NSW–Australia.

4. Sheikh, M.I; and Bangash, S.H. (1984). Growth response of *Pinus wallichiana* (Kail) to fertilization in Northern Punjab (Murree). (Un-published).