

Soil-Plant Nutrient Relationship in *Tephrosia Purpurea* Pers.

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Tephrosia purpurea Pers. (Family Fabaceae) is a widely distributed perennial plant species in the Thar desert of India. It is 0.3 to 0.6 m high and is copiously branched. Though the plant is not grazed by the herbivores, yet it forms a good cover to stabilize the sand. Investigation was carried out around Churu town (73°5' to 75°E and 27°5' to 29°N) of Rajasthan (India), to determine the foliar nutrient content of this plant, its accompanying soils, and the correlation between the two.

Morphology of shoot and root systems of *T. purpurea* were studied by collecting several specimens from *Tephrosia-Cyperus-Cenchrus* community on sand dunes and sandy plains.

Plant and soil samples from different depths of the pits near the plants growing in dunes and sandy plains were collected for analysis. Oven dried soil samples were analysed for exchangeable cations (Piper 1944), water soluble P and soil pH (1:5 soil

water). Dried leaf samples were powdered and were analysed for various elements content.

Table 1 Morphology of *T. Purpurea* on two habitats (n=5)

Growth Parameter	Habitat		T-value
	Sand dunes	Sandy Plains	
Shoot			
Height (m)	34.4	59.2	5.87
Spread (m)	22.0	30.2	1.69
Fresh wt. (g)	58.0	57.0	-
Dry wt. (g)	35.0	38.0	0.91
Root			
Depth (cm)	130.2	54.3	9.65*
Longest lateral (cm)	277.2	260.8	1.93
Diameter (cm)	0.2-1.1	1.3-1.8	-
Fresh wt. (g)	29.0	79.0	-
(Dry wt. (g)	15.0	53.0	9.59*

*Significant at 1% otherwise nonsignificant

Table 2 Soil nutrient (%) beneath *T. purpurea* at different depth and sites

	pH	Carbonates	Ca	Mg	K	P	Na
Depth							
Surface	7.5	1.0	1.36	2.69	2.32	0.091	1.46
15cm	8.0	2.5	1.36	1.00	1.76	0.081	1.54
30 cm	7.5	3.6	1.67	1.29	1.59	0.082	1.44
45 cm	8.0	3.9	1.78	0.72	1.76	0.092	1.51
60 cm	8.5	3.1	1.82	0.76	1.74	0.086	1.38
LSD	-	2.47*	NS	1.63*	NS	NS	NS
Sites							
Sandy plain							
I		2.00	1.21	0.86	1.53	0.098	1.23
II		4.70	3.64	0.67	1.70	0.084	1.55
III		2.90	1.11	1.58	1.76	0.080	1.40
Dunes							
I		2.10	0.96	1.97	2.00	0.086	1.64
II		2.40	1.04	1.37	1.99	0.084	1.51
LSD		1.66**	1.79**	1.06**	NS	NS	0.36**

The morphological features of the plants on sandy plains and sand dunes were significantly different with regard to shoot height, root depth and root dry weight but there was no significant difference in respect of shoot spread and dry weight and longest root lateral (Table 1).

The soil beneath *Tephrosia* were light yellowish brown upto 45 cm depth and brownish yellow below were alkaline (7.5 to 8.5) and predominantly sandy. Magnesium and K were higher in the surface and decreased in the lower horizons while the carbonates and Ca showed a reverse trend (Table 2). Higher content of potassium in the surface, can be ascribed to its return from the plant residues high in K content (3.4%) at the surface. Sodium was also least at 60 cm depth but like P it did not show any clear trend of increase or decrease with depth.

Bharucha (1960) in his analysis of soils from semi-desert and desert areas has reported 0.68% carbonates with plant cover of *Calotropis procera* and *Tephrosia purpurea* but this investigation revealed 1 to 3.9% carbonates, from surface to 60 cm depth, and 2 to 4.7% at the various sites. The results however conform with those reported by

Shankarnarayan et al. (1965) for stabilized dune soil (0.12 to 4.2%).

Foliar analysis showed the ash content (18.9+3.5%), nitrogen (7.3+0.1) was maximum followed by K which varied between 3.4+ 1.3 %, silica (2.2 + 1.3%), Ca (2.0+0.4%), Mg (1.03 +0.6%), Na (0.9+0.6%) and P (0.5+0.3%). The analysis shows that the plant is richer in N and K and could possibly be used as green fodder.

The coefficient of correlation between the foliar and soil elements was highest in case of p ($r = 0.91$). However, Na, Mg and K had a fairly high coefficient 0.79, 0.79 and 0.67 respectively.

References

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- Shankarnarayan KA, Cherian A & Gaur YD 1965 Ecology of dune vegetation at Osian, Rajasthan, *Journal Indian Botanical Society* 44 37-45

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