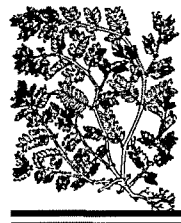
CHAPTER X

Mineral content analysis in components of Tribulus terrestris Linn



INTRODUCTION:

Flie concentration of mineral nutrient, type of ions and their balances in soil of cropland, dominates the exchange of cations and affects, the uptake and accLimufaiiou of nitrogen, sulphur, calcium, potassium, phosphorous etc. in the coiapo-1 nents of the legumenous (i.e. pulse plants) plants. However, these elements constitute I the most important portion of mineral nutrients of crop plants. Therefore any alteration and disbaiance in the ionic composition of soil and its pH directly and adversely affects the process of cation exchange, consequently the uptake and distribution of nineral nutrients in the pulse plants is disturbed resulting into their poor growth and biologica yield. The two important, pulse plants That is *Tribulus terrestris L.* was taken into consideration to investigate the impact of emission of Industries (SIC, MIN AND UCCI) altering the composition. The industrial emissions particularly affects concentration of these elements in ambient air which finally get sink into nearby crop land soils during the precipitation with water and exists in forms of sulphate nitrate, Ca^{++}, K^{+} etc. in soil plant continuous system affect the metabolism of later and the composinon of their tissues.

Much difference has been also observed in the mineral contents of plants growing in vicinity of industries of various nature and were compared with those of the plats growing in the unefiected areas to evaluate the impact of industrial emissions.

MATERIAL METHODS:

MINERALS ANALYSIS:

Representative leaves of agro fieds were collected from the *T. Terrestris L.* plants cropping around three industrial complex (S.i.C., MIN, UCCI) at all the sites. The fresh weight of leaves were taken and the samples where kept in the oven at 80^{0C} constant weight for the dry weight. The water content of leaves was also determined by using following formula.

$$\% \text{ Water} = \frac{\text{Fresh Wt.} - \text{Dry wt}}{\text{Dry wt}} \times 100$$

The oven dry and powdered 0-5 g. leaf samples were analysed for their N.S.P. Ca and K contents of the leaves by taking the samples in nickle crucible for $Ca^{++}K^{+}$, SO_4^{2-} and P anslysis. A 0.5 g. powdered leaf sample was taken in a nickle crucible containing. 2ml aqueous saturated magnesium acetate solution and digested for half an hour in a muffle furnace at 480^{0c} *Jackson (1958).* The digested material was added to 10ml of 1N HCL boiled on a hot plate so it was dissolve in acid solution. Then it was filtered and final volume of

the filtrates was made up 100ml with distilled water Ca^{++} and K^{+} contents were determined in digested material with the help of a flame photometer. (Parkin-Elmer type- 211) *Jackson (1958).*

TOTAL NITROGEN CONTENT:

The total nitrogen content in plant and soil samples were determined by using ***MICRO KJEDAHL METHOD*** *Jackson (1958).* The values were expressed on percentage basis.

SULPHUR CONTENT:

5g dry powdered plant material was mixed with 2 ml of saturated magnesium acetate slurry in nickle cruceble. The mixture was ashed at 480^{0C} in muffle furnace for 4 hours, cooled and the contents were dissolved in water, filtered and the volume was made up upto 100 ml with distilled water. The sulphur content in the digested samples was determined by following the turbidity method *Rossum and VWarruz (1961).*

PHOSPHORUS CONTENT:

Plant samples digested with magnesium acetate slurry for the determination of sulphur content were used for the determination of phosphrus hy using stannous chloride method *Jac/ison (1958).* The obtained values are statistically analysed Chapter-X for the calculation of bivanate 'F' ration *Misra & Misra (1983).*

RESULT AND DISCUSSION:

The percentage seasonal variations in the minerals viz. nitrogen sulphure. phosphorous, calcium and potassium were analysed in plant contents of *T. Terrestris L.* and values of various mineral contents are computed in (tables 10.1 to 10.5).

The percentage concentration of total nitrogen in to the plant parts showed remarkable seasonal variations at the various study sites during the present course of investigation. It ranged from a minimum value of 2,92% in winter season at the control site third (i.e. CS III) to a maximum 5.18% in rainy season at affected site first (AFS1) for *T. Terrestris L.* At the other yites the value for nitrogen con tent, ranged between above two extremes. However the percentage nitrogen content *T. Terrestris L.* was varied between a maximum value 6.68% in rainy season at the AFS1 and a minimum value of 1-91% winter season at site CS3. Furthur more it was recorded that the *T. Terrestris L.* possessed more percentage of nitrogen in comparision to *T. Terrestris L.* and the industrially affected sites have greater percentage than that of the control sites. The total nitrogen contents of the studied plant meterials were found to gradually increase in from winter to rainy season months.(Table 10.1).

Concentration of sulphur in the *T. Terrestris L.* plant tissues was found to be ranged from a minimum value of 1.64% in winter season months at CS3 to a maximum value of 4.65% in summer season at AFS1. Whereas the plants of*T. Terrestris L.* at other sites exhibited sulphur content between 1.74% to 4.16% in summer and rainy season respecptively *T. Terrestris L.* plant possessed some what higher percentage of sulphur, for which it fluctuated between 1.42% al CS3 to 5.97% at AFS1 in the summer and rainy season respectively. The sulphur content of plants were gradually reduced from rainy to winter season (Table 10.2))

The percentage of calcium content in c. arietinum was found to ranged from a minimum value to 2-10% at CS3 to 3-99% (maximum value) at AFS1 in winter and rainy season respectively. However The value of calcium in tissues *T. Terrestris L.* varied from a maximum value of 4.02% rainy season at AFS2 to 2.63% in winter season at CS3. A decreasing trend in calcium content of plant partswas observed with respect to the plants grown in increasing piluction condition.

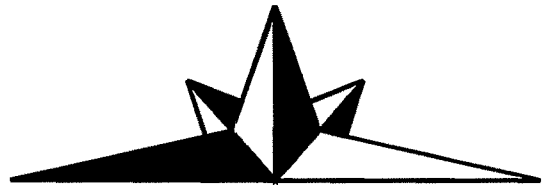


Table 10.1

Percentage Variation in Nitrogen Content of Plants Parts at the Various Study Sites

Study Sites	Plant Species		
	T. terrestris Linn		
	W.	S.	R.
CS 1	2.6	2.75	2.85
AFS 1	4.98	5.09	5.18
CS 2	2.1	2.15	2.22
AFS 2	4.05	3.95	3.89
CS 3	1.92	1.87	1.75
AFS 3	3.63	3.68	3.74

CS 1 = Control Site 1

AFS 1= Affected Site 1

W = Winter

S = Summer

R = Rainy

Table 10.2

Percentage Variation in Sulphur Content of T. terrestris Plants Parts at the Various Study Sites

Study Sites	Plant Species		
	T. terrestris Linn		
	W.	S.	R.
CS 1	1.83	1.92	1.98
AFS 1	3.94	4.65	4.15
CS 2	1.75	1.88	1.97
AFS 2	3.68	3.69	3.79
CS 3	1.64	1.74	1.85
AFS 3	2.96	3.1	3.24

CS 1 = Control Site 1

AFS 1= Affected Site 1

W = Winter

S = Summer

R = Rainy

Table 10.3

Percentage Variation in Calcium Content of T. terrestris Plants Parts at the Various Study Sites

Study Sites	Plant Species		
	T. terrestris Linn		
	W.	S.	R.
CS 1	2.46	2.57	2.62
AFS 1	3.25	3.34	3.39
CS 2	2.23	2.28	2.33
AFS 2	3.11	3.22	3.35
CS 3	2.1	2.18	2.26
AFS 3	2.93	3.05	3.12

CS 1 = Control Site 1

AFS 1= Affected Site 1

W = Winter

S = Summer

R = Rainy

Table 10.4

Percentage Variation in Potassium Content of T. terrestris Plants Parts at the Various Study Sites

Study Sites	Plant Species		
	T. terrestris Linn		
	W.	S.	R.
CS 1	0.789	0.813	0.916
AFS 1	0.899	0.924	0.927
CS 2	0.735	0.805	0.886
AFS 2	0.873	0.912	0.915
CS 3	0.713	0.795	0.895
AFS 3	0.862	0.875	0.907

CS 1 = Control Site 1

AFS 1= Affected Site 1

W = Winter

S = Summer

R = Rainy

Table 10.5

Percentage Variation in Sodium Content of T. terrestris Plants Parts at the Various Study Sites

Study Sites	Plant Species		
	T. terrestris Linn		
	W.	S.	R.
CS 1	1.85	2.12	2.5
AFS 1	2.98	2.64	3.14
CS 2	1.79	1.86	1.97
AFS 2	2.84	1.88	2.32
CS 3	1.68	1.44	1.76
AFS 3	1.43	1.58	2.16

CS 1 = Control Site 1

AFS 1= Affected Site 1

W = Winter

S = Summer

R = Rainy