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Estimation of Nutrients (N, P, K, Zn) in Soils of Gandhinagar District with Referrence to Selected Weeds

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ABSTRACT   *Gandhinagar is the capital city of Gujarat State. The paper deals with the estimation of nutrients (pH, EC, N, P, K, Zn) in soil of different talukas of Gandhinagar district. This district has four talukas with 290 villages and 10 urban habitations in the district. For the study purpose, the entire district was divided into 20 sites. Five sites of each talukas were selected. Total 20 sampling sites were selected to collect samples. The study was carried for a period of 2 year (2011 to 2013). Soil samples were colleted and analysed for their parameters like pH, EC, Nitrate, Phosphorus, Potassium and Zinc (Zn) at monthly. Zn was recorded critical in Mansa and Dehgam taluka and quite low in Kalol taluka. The occurrence types and distribution of Amaranthus viridis L., Achyranthus aspera L., Trianthema portulacastrum L, Boerhavia diffusa L., Cyperus rotundus L., Cynodon dactylon (L.) Pers., Tridex procumbens L., Parthenium hysterophorus L., Euphorbia hirta L., Vernonia cinera (L.) Less., Digera muriata (L.) Mart., Cassia tora L., Chenopodium album L., Portulaca oleracea L. in the study area of Gandhinagar showed relations with the soil in which they occur.*

KEYWORDS :

INTRODUCTION
A good knowledge of the soil properties and their relationships with weeds distribution is said to be highly essential for integrated weed management programs (Akobundu, 1993). Fertile soil is the most important source for the entire living world. Apart from providing a solid substratum on which we live, the soil provides us most of our necessities through the plant and animals communities which develop on it (Asthana and Asthana, 2003). Soil testing is one of the best available tools to ascertain the physical characteristics and nutrient status of a field so as to assess the fertilizer requirement (Singh, 2007). Different plants are known to have different requirements. Differences in the distribution of weed flora could be an indication of the variation in soil properties. Understanding the relationship between certain soil properties and specific weed species could act as a guide to the farmer to understand the likely soil conditions that could e suitable for a particular purpose. Such knowledge may also aid in mineral prospecting (Veeranjaneyulu and Dhanaraju, 1990).

MATERIAL AND METHODS
The present study was undertaken for the period of 2 years. The collection was made with repeated field trips. Soil samples were collected monthly from selected sites and analyzed for their parameters like pH, EC, Nitrate (N), Phosphorus (P), Potassium (K) and Zinc (Zn). The sampling was done by method of Piper (1950). Samples were analyzed as per methods suggested by Trivedy and Goel (1986). Micronutrient Zinc (Zn) was estimated in Atomic Absorption Spectrophotometer (AAS).

RESULTS AND DISCUSSION
The standard values of parameters by District Agriculture Plan (DAP) in soil of Gandhinagar district are given in Table-01 and standard values of requirement of different nutrients of weeds by Anand Agriculture University (AAU) are given in Table–02. The values of parameters like pH, EC, Nitrate (N), Phosphorus (P), Potassium (K) and Zinc (Zn) analysed in soil in present study are given in Table-03. In present study the soil properties of 20 selected sites were observed with reference to 20 selected weeds. Results showed that among the families, Poaceae was dominant, followed by Asteraceae and Amaranthaceae. pH was recorded lowest (7.71) in Sample$_{14}$ and highest (8.34) in Sample$_{11}$ in summer. EC was ranged between 0.38 to 0.73 m mho/cm in present study. The requirement of N by selected weeds is high in percentage (Table – 01). Nitrogen (N) was ranged between 0.038 (Sample$_{7}$) to 0.061 (Sample$_{13}$) in present study. In monsoon the N was recorded highest in all of the soil samples due to blue green algae in soil. The weed species also recorded in high number following by *Cynodon dactylon* (L.) Pers., *Amaranthus viridis* L., *Achyranthus aspera* L., *Trianthema portulacastrum* L, *Boerhavia diffusa* L. and *Cyperus rotundus* L. in monsoon because of the high N value in soils which indicate the contribution of N for the occurrence of weeds. So the requirements of nitrogen by weeds show the association between soil and weeds.

The value of Phosphorus was recorded higher in summer than monsoon and winter. In summer it was ranged between 1.19ppm to 5.46ppm. Among the selected weed species, very few species were found in summer following by *Tridex procumbens* L., *Parthenium hysterophorus* L. and *Euphorbia hirta* L. Phosphorus is limiting factor for living organisms. Due to the high density of weeds the phosphorus was absorbed by weeds so the P values in soils were lower in monsoon and winter than summer season. The value of Potassium (K) was recorded more than 20 as per the DAP standard. Results showed that presence of high value of K may be due to leaching and gradual decrease occurs due to uptake by plants. Because of the requirement of K by weeds, *Portulaca oleracea* L., *Vernonia cinera* (L.) Less., *Digera muriata* (L.) Mart., *Cassia tora* L., *Chenopodium album* L., *Solanum sp.*, *Amaranthus viridis* L., *Amaranthus lividis* L. were strictly associated with the soils of study area. Zinc (Zn) is essential for the transformation of carbohydrates and regulates consumption of sugars. It is the part of the enzyme systems which regulate plant growth. In present study Zn values were recorded high in some soils and medium in remain soil samples. The highest weed density was observed for *Achyranthus aspera* L. The requirement of zinc for *Achyranthus aspera* L. is higher among the selected weeds (Table – 02). Decreased Zn value in monsoon is may be due to contribution of Zn to weeds and high density of *Achyranthus aspera* L. A Weed species in the study area showed relation with the soil properties and nutrients in which they occurred.

Woo et al. (1991), Malik and Born (1988) and Frick (1984), in their various studies observed that weed species distribution was influenced by soil series.

CONCLUSION
This study has shown that weed species in the study area of Gandhinagar showed relations with the soil in which they occur. Also, the occurrence types and distribution of specific weed species influenced by certain soil properties in the study area.

ACKNOWLEDGEMENT

TABLE – 01 Standards (DAP Gandhinagar)

Taluka	Parameters	
	pH	**EC** (m mho/cm)
Gandhinagar	6.5 to 7.5	0.25 to 0.75
Dehgam	6.5 to 7.5	0.25 to 0.75
Kalol	6.5 to 7.5	0.25 to 0.75
Mansa	6.5 to 7.5	0.25 to 0.75

Taluka	Parameters		
	Available N (kg/ha)	Available P (ppm)	Available K (ppm)
Gandhinagar	> 250	1.36 to 2.73	> 20
Dehgam	> 250	1.36 to 2.73	> 20
Kalol	> 500	1.36 to 2.73	> 20
Mansa	> 500	1.36 to 2.73	> 20

Source: Soil fertility indices (DAP) - Gandhinagar

TABLE – 02 Requirements of nutrients by selected weeds (in %)

No.	Weed Species	Nitrate (N) %	Phosphorus (P) %	Potassium (K) %	Zinc (Zn) %
1.	Digitaria sp.	1.90	0.55	1.08	-
2.	Cynodon dactylon (L.) Pers.	2.08	1.01	1.22	0.50
3.	Cyperus rotundus L.	1.61	1.52	1.13	0.54
4.	Argemon maxiana L.	1.01	1.36	1.33	0.53
5.	Portulaca oleracea L.	1.26	1.51	2.21	0.52
6.	Vernonia cinera (L.) Less.	2.56	1.53	3.12	0.54
7.	Eclipta alba L.	1.61	1.49	1.52	0.55
8.	Digera muricata (L.) Mart.	3.24	1.63	3.15	0.55
9.	Amaranthus lividis L.	1.86	1.56	3.13	0.51
10.	Achyranthus aspera L.	2.21	1.63	1.32	0.60
11.	Chenopodium album L.	2.59	1.51	4.34	0.51
12.	Phyllanthus fraternus L.	2.43	1.53	1.85	0.53
13.	Solanum sp.	2.56	1.63	2.12	0.56
14.	Boerhavia diffusa L.	2.01	1.54	1.12	0.50
15.	Trianthema portulacastrum L	2.64	0.43	1.30	-
16.	Euphorbia hirta L.	1.91	1.53	1.22	0.49
17.	Tridex procumbens L.	2.24	0.73	1.08	-
18.	Amaranthus viridis L.	2.16	0.60	4.51	-
19.	Cassia tora L.	3.08	1.56	2.31	-
20.	Parthenium hysterophorus L.	2.68	0.60	1.45	-

Source: Krishigovidhya, Anand Agriculture University (AAU)

TABLE – 03 Recorded parameters in soil in present study (Year 2011 to 2013)

Parameters	Samples									
	1	2	3	4	5	6	7	8	9	10
pH	7.98	7.78	8.11	8.04	7.96	8.16	7.94	7.85	8.12	7.92
EC	0.64	0.43	0.46	0.47	0.64	0.41	0.55	0.38	0.38	0.47
N	0.045	0.042	0.050	0.044	0.050	0.040	0.038	0.046	0.042	0.043
P	2.88	3.62	4.16	4.44	4.56	3.13	3.20	5.46	1.86	2.58
K	30.8	31.6	29.4	31.5	26.7	43.9	42.1	38.0	20.9	27.1
Zn	1.42	2.01	1.76	1.46	2.48	0.81	2.49	2.23	0.95	1.83
	11	12	13	14	15	16	17	18	19	20
pH	8.34	7.92	8.28	7.71	7.96	7.79	7.79	7.78	7.77	7.96
EC	0.73	0.44	0.31	0.52	0.40	0.42	0.45	0.41	0.60	0.59
N	0.047	0.052	0.061	0.039	0.042	0.051	0.049	0.050	0.060	0.060
P	2.13	4.23	3.92	5.04	4.38	3.34	2.28	2.12	3.75	1.19
K	29.2	20.7	46.4	32.8	30	28.9	27.6	30.6	33.5	31.3
Zn	1.26	0.85	0.93	1.21	1.92	0.83	1.05	0.88	1.24	1.24

Parameters in ppm, except pH, EC = m mho/cm.

TALE-04 Physico-chemical characteristics and nutrient status of soil of different talukas of Gandhinagar District (Year 2011 to 2013)

No.	Parameters	Taluka			
		Dehgam	Mansa	Gandhinagar	Kalol
1.	pH	7.97	7.99	8.04	7.81
2.	EC	0.52	0.43	0.48	0.49
3.	Nitrogen [N]	0.046	0.041	0.048	0.054
4.	Phosphorus [P]	3.93	3.24	3.94	2.53
5.	Potassium [K]	30	34.4	31.8	30.3
6.	Zinc	1.82	1.66	1.23	1.04

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