



RESEARCH PAPER

Status of irrigated soils of coastal Dev Bhumi Dwarka district of Gujarat

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Abstract : In order to evaluation the fertility status of each taluka of Dev Bhumi Dwarka district *viz.*, Kalyanpur, Dwarka, Khambhalia and Bhanvad, thirty representative surface (0-15 cm) soil samples were collected from cultivated farmer's field during May-2015. The chemical analysis of 120 surface samples indicates that soil were deficient with respect to available P_2O_5 , whereas medium in available N and high in available K_2O and S status. Among the DTPA extractable micronutrients, Mn and Cu were found high, whereas the soils were medium in Fe and Zn. The nutrient index values were low for available P_2O_5 (1.43), medium for available N (1.53) and S (2.10), Fe (1.92) and Zn (1.80) and high for available K_2O (2.60), Mn (2.66) and Cu (2.92) in the soils of Dev Bhumi Dwarka district.

Key Words : Available macronutrients, DTPA extractable micronutrients, Nutrient index

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INTRODUCTION

Soil fertility play an important role in sustaining crop productivity of an area, particularly in situation where input of nutrients application differs and the information as the nutritional status can go a long ways to develop economically viable alternative for management of deficient nutrient in the soil. Soil fertility must be periodically estimated as there is continuous removal of macro and micro nutrients by the crop intensively grown in every crop season. In order to achive higher productivity and profitability, every farmer should realize that fertility levels must be measured as these measurement can then be used to manage soil fertility.

Balanced nutrient use ensures high production level and helps to maintain the soil health. Fertilizing the soils to bring all the deficient elements at high levels as to provide sufficient ionic activity in soil solution for crop uptake is one of the most important consideration for maximization of the crop yield. Such information for newly formed Dev Bhumi Dwarka district of Saurashtra region of Gujarat was lacking. Therefore, an attempt has been made to study the fertility status of cultivated farmer's field of coastal Dev Bhumi Dwarka district of Gujarat.

MATERIAL AND METHODS

Thirty surface soil samples (0-15 cm) were

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collected from each of the four talukas of Dev Bhumi Dwarka district, viz., Kalyanpur, Dwarka, Khambhalia and Bhanvad during May, 2015. Soil samples were air dried, ground carefully with a wooden mortar and pastel to break soil lumps and passed through 2 mm sieve. The available N, P₂O₅, K₂O and S were determined as per the methods described by Jackson (1973), while DTPA extractable micronutrients were determined by Atomic Absorption Spectrophotometer as per method outline by Lindsay and Norvell (1978). The nutrient index (NI) values for available nutrients present in the soils were calculated utilizing the formula as suggested by Parker *et al.* (1951) and classified this index as low (< 1.5), medium (1.5 to 2.5) and high (> 2.5) giving undue weightage to medium category. Ramamoorthy and Bajaj (1969) modified the index classification as low (< 1.66), medium (1.67 to 2.33) and high (> 2.33).

$$\text{Nutrient index} = \frac{(\text{Ni} \times 1) + (\text{Nm} \times 2) + (\text{Nh} \times 3)}{\text{Nt}}$$

where, Ni, Nm and Nh are the number of soil samples falling in low, medium and high categories for nutrient status and are given weightage of 1, 2 and 3, respectively. Nt is the total number of samples.

RESULTS AND DISCUSSION

The data on available macro and micronutrients obtained from the present investigation are presented in Table 1. The highest value for available N (579 kg ha⁻¹) was observed in Dwarka, P₂O₅ (96.44 kg ha⁻¹) and K₂O (942 kg ha⁻¹) in Kalyanpur, S (58.90 mg kg⁻¹), Fe (15.35 mg kg⁻¹) and Mn (18.97 mg kg⁻¹) in Bhanvad and Cu (3.62 mg kg⁻¹) and Zn (2.83 mg kg⁻¹) in samples collected from Khambhalia taluka. The lowest values for available N (103 kg ha⁻¹), P₂O₅ (4.62 kg ha⁻¹), K₂O (91 kg ha⁻¹), and Fe (2.12 mg kg⁻¹) were observed in the soils of Khambhalia, S (1.90 mg kg⁻¹), Mn (2.87 mg kg⁻¹) and Zn (0.15 mg kg⁻¹) in Kalyanpur and Cu (0.18 mg kg⁻¹) were found in samples collected from Dwarka taluka. In general, the soils of Dev Bhumi Dwarka district were found medium in available nitrogen and low in available phosphorus and the values ranged from 103 to 579 and 4.62 to 96.44 with a mean value of 261 and 27.91 kg ha⁻¹, respectively. The medium and lower status for available N and P₂O₅, respectively in the soil is attributed to the adoption of intensive cropping systems by cultivators resulting in absorption of plant nutrient in higher amount, lower organic carbon content and less use of FYM in the semi arid tract. The soils of Dev Bhumi

Table 1: Talukawise range and mean value for available macro and micronutrients in irrigated surface soils of Dev Bhumi Dwarka district

Name of Taluka	Available nutrients in kg ha ⁻¹			DTPA extractable micronutrients in mg kg ⁻¹				
	N	P ₂ O ₅	K ₂ O	S	Fe ⁺⁺	Mn ⁺⁺	Cu ⁺⁺	Zn ⁺⁺
Kalyanpur	166-511 (309)*	13.85-96.44 (33.49)	131-942 (404)	1.90-56.8 (17.20)	3.11-10.36 (6.02)	2.87-15.41 (8.94)	0.37-2.98 (1.64)	0.15-1.94 (0.41)
Dwarka	158-579 (295)	20.01-80.53 (46.12)	188-900 (541)	4.42-56.79 (23.05)	2.66-14.41 (6.71)	5.27-17.57 (12.86)	0.18-1.65 (0.88)	0.18-2.82 (0.99)
Khambhalia	103-351 (221)	4.62-24.62 (13.66)	91-746 (310)	1.94-58.26 (27.10)	2.12-15.18 (7.64)	3.84-17.59 (12.48)	1.23-3.62 (2.36)	0.27-2.83 (1.07)
Bhanvad	143-339 (224)	10.77-27.70 (18.71)	114-865 (340)	4.20-58.90 (20.20)	3.54-15.35 (8.06)	6.31-18.97 (12.83)	1.49-3.10 (2.33)	0.26-2.09 (0.91)
Overall	103-579 (261)	4.62-96.44 (27.91)	91-942 (394)	1.90-58.90 (21.50)	2.12-15.35 (7.05)	2.87-18.97 (11.82)	0.18-3.62 (1.80)	0.15-2.83 (0.83)

*Values in parenthesis indicates the mean values

Table 2 : Nutrient index values of available nutrients status for irrigated soils of Dev Bhumi Dwarka district

Name of taluka	Macronutrients				Micronutrients			
	N	P ₂ O ₅	K ₂ O	S	Fe ⁺⁺	Mn ⁺⁺	Zn ⁺⁺	Cu ⁺⁺
Kalyanpur	1.83	1.53	2.77	1.67	1.80	2.20	1.13	2.60
Dwarka	1.63	2.17	2.93	2.33	1.77	2.83	1.93	2.67
Khambhalia	1.37	1.00	2.30	2.33	1.77	2.83	2.07	3.00
Bhanvad	1.30	1.00	2.40	2.07	2.07	2.90	2.07	3.00
Overall	1.53	1.43	2.60	2.10	1.92	2.66	1.80	2.92

Dwarka district were high in available K_2O and the values ranged from 91 to 942 with a mean value of 394 $kg\ ha^{-1}$. The high available K_2O status in surface soils could be attributed to more intensive weathering, presence of potassium-rich minerals like muscovite and biotite mica, release of labile-K from organic residues of cultivated crop plants and upward translocation of K from lower depth along with capillary rise of ground water (Malavath and Mani, 2014). The available sulphur status was found to be high and ranged from 1.90 to 58.90 with a mean value of 21.50 $mg\ kg^{-1}$. The soils of Dev Bhumi Dwarka district were high in available Mn and Cu and medium in Fe and Zn. The DTPA extractable Fe Mn, Cu and Zn varied from 2.12 to 15.35, 2.87 to 18.97, 0.18 to 3.62 and 0.15 to 2.83 with their corresponding mean values of 7.05, 11.82, 1.80 and 0.83 $mg\ kg^{-1}$, respectively. These results are in agreement with the finding of Polara and Kabaria (2006), Malavath and Mani (2014) and Polara and Chauhan (2015).

Based on nutrient index values of soils (Table 2) and the criteria as suggested by Parker *et al.* (1951), the soils of Dev Bhumi Dwarka district were low for available P_2O_5 (1.43), medium for available N (1.53), DTPA extractable Fe (1.92) and Zn (1.80) and high for K_2O (2.60), S (2.10), Mn (2.66) and Cu (2.92), while as per criteria suggested by Ramamoorthy and Bajaj (1969) similar results were found. These results confirmed the finding as reported by Polara and Kabaria (2006) for soils of Amreli district, Rajput and Polara (2012) for

Bhavnagar district, Polara and Chauhan (2015) for Gir Somnatha district of Gujarat and Malvath and Mani (2014) for Shivaganga district of Tamil Nadu.

REFERENCES

- Jackson, M.L. (1973).** *Soil chemical analysis*. Prentice Hall of India Pvt. Ltd., New Delhi.
- Lindsay, W.L. and Norvell, W.A. (1978).** Development of a DTPA soil test for zinc, iron, manganese and copper. *Soil Sci. Society American J.*, **42**: 421-428.
- Malavath, R. and Mani, S. (2014).** Nutrients status in the surface and subsurface soils of dryland Agricultural Research Station at Chettinad in Sivaganga district of Tamil Nadu. *Asian J. Soil Sci.*, **9**(2):169-175.
- Parkar, F.W., Nelson, W.L. and Miller, I.E. (1951).** The broad interpretation of soil test informations. *Agron. J.*, **43**:105-112 .
- Polara, J.V. and Kabaria, B.D. (2006).** Fertility status of irrigated soils of coastal Amreli district of Gujarat. *J. Indian Society Coastal Agric. Res.*, **24**(1): 50-51.
- Polara, J. V. and Chauhan, R. B. (2015).** Fertility status of irrigated soils of coastal Gir Somnath district of Gujarat. *Asian J. Soil Sci.*, **10** (2) : 263-265.
- Rajput, S.G. and Polara, K.B. (2012).** Fertility status of cultivated soils in coastal Bhavnagar district of Saurashtra region of Gujarat. *J. Indian Society Soil Sci.*, **60**(4) : 317-320.
- Ramamoorthy, B. and Bajaj, J.C. (1969).** Available nitrogen, phosphorus and potassium status of Indian soils. *Fertil. News*, **14** (8): 25-36.

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