Estimation of Soil Fertility Status under Sugar Cane – Wheat Farming System in Different Blocks of Rampur District of Uttar Pradesh

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ABSTRACT

The present study was undertaken during 2015-16 to assess the soil fertility status under sugar cane – wheat farming system in different blocks of Rampur district of Uttar Pradesh. Six blocks namely Milak, Chamrauva, Bilaspur, Shahabad, Saidnagar and Swar were selected. The soil sample was taken from 0-15 cm depth with the help of augur and physical & chemical properties of the soil were analyzed. It was observe that 93.30 per cent samples were normal (6.5-8.5), 2.49 per cent were alkaline (pH > 8.5) and 4.20 per cent were acidic (pH <6.5). The organic carbon content in the soil of the district revealed that 35.38 per cent samples were less than 0.5, 51.07 per cent samples were ranged between 0.5 to 0.75 per cent and 13.15 per cent samples were more than 0.75 per cent. The nitrogen content in soil indicated that soils were low in nitrogen. 82.48 per cent samples were less than 280 kg /ha, 17.52 per cent samples were ranged between 280 to 560 kg/ha and no sample was found more than 560 kg/ha. In case of available phosphorus 6.8 per cent samples were less than 10 kg/ha, 74.38 per cent samples ranged between 10 to 24.6 kg/ ha and 19.43 per cent samples were more than 24.6 kg/ ha. Regarding potassium content, 97.55 per cent samples ranged between 108 to 280 kg/ ha, only 2.10 per cent samples were found more than 280 kg/ha and 0.35 per cent samples were found less than 108 kg/ha.

Key Words: Nitrogen, Organic matter Phosphorus, Soil, Fertility.

INTRODUCTION

The physico-chemical properties of soils and their interaction with one another and variation in nutrients supplying capacity is a natural phenomenon. Therefore, the different management practices are required at different locations to sustained crop productivity hence, the nutrient status of soil is very important. It has been observed that soil differs generally in their morphological, physical, mineralogical and biological characteristics. (Kumar *et al,* 2017).

The sugarcane based crop sequences are being practiced extensively all over India. The crop is a heavy feeder of plant nutrients and removes about 1.2 kg N, 0.22 kg P, and 2.83 kg K for each tonne of cane production. the sugarcane – wheat cropping sequence is one of the most prevalent cropping sequences in the north western plains of Uttar Pradesh and Uttarakhand occupying 10 to11Per cent of net cropped area in the regions. It has been observed during the past years that yield of sugarcane and wheat has reached a plateau in these regions due to declining factor productivity. The loss in organic matter has been assigned as the prime reason for this decline in the productivity. The soil organic matter influences almost all the component of soil linked with crop production. Macro nutrient (N, P, & K) and micronutrients (Cu, Fe, and Mn & Zn) are important soil elements that control its fertility.

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The use of high yielding varieties, intensive cropping, increase use of high analysis fertilizers and restricted use of organic sources of nutrients has resulted in the deficiency of macro and micro nutrients in general particularly in the irrigated lands. Nutrient removed by crop depends on cultivar, soil moisture status, management levels and residue management. Macro and micro nutrients are important soil elements that control its fertility. Recent diagnostic survey indicated that in many intensively cultivated area farmers have resorted to use greater than recommended doses of fertilizer, especially N fertilizer, to maintained the crop productivity at levels attained previously with relatively small fertilization rates. In both agriculturally advanced irrigated ecosystems, nutrient replenishment through fertilizers and manures remain far below than the crop removal, thus causing the mining of native nutrient reserves over year. The deficiencies are so intense and severe that visual symptoms are very often observed in major crops (Kumar *et al,* 2013). Therefore, the present study was conducted to ascertain the soil fertility status under sugar cane – wheat farming system in different blocks of Rampur district of Uttar Pradesh.

MATERIALS AND METHODS

The study area covered all blocks of (Milak, Chamrauva, Bilaspur,Shahbad, Saidnagar and Swar) Rampur district of Uttar Pradesh. The soil samples of 0-15 cm depth were collected from 2569 sites covering six blocks and the collected samples were air dried in shade, crushed gently with a wooden roller and pass through 2.0 mm sieve to obtain a uniform representative sample. The samples were properly labeled with the aluminum tag and stored in polythene bags for analysis .The processed soil samples were analyzed by standard methods for pH and electrical conductivity (1:2 soil water suspensions), organic carbon (Walkley and Black, 1934), available nitrogen (Subbiah and Asija, 1956), available phosphorus (Olsen *et al,*1954), available potassium (Jackson, 1973). All the analysis of soil samples were carried out in the laboratory of Krishi Vigyan Kendra, Rampur, SVPUA&T, Modipuram, Meerut (U.P.) India.

RESULTS AND DISCUSSION

The farmers usually apply 130-150kg nitrogen per hectare along with 60-80 kg phosphorus per hectare and 50-60 kg potassium. Zinc application in farming system done by almost all the farmers and compost application was done by 45 percent of the farmers while green manuring practiced by 10-12 per cent farmers and biofertilizers use was not prevalent. It was noted that 85 percent farmers reported more use of fertilizers to harvest same level of yield.

Table 1. Soil fertility status under sugar cane – wheat farming system in different blocks of Rampur district.

Sr. No.	Name of Block	Total samples analysed	Percent Samples			Percent Samples		Percent Samples		
			pH < 6.5	pH 6.5-8.5	pH >8.5	EC <4.0 dSm-1	EC >4.0 dSm-1	OC < 0.5 %	OC 0.5-0.75 %	OC >0.75 %
1.	Milak	1904	2.78	94.9	2.31	100	0	36.55	49.89	13.55
2.	Chamrauva	92	16.30	81.52	2.17	100	0	44.56	48.91	6.52
3.	Bilaspur	132	6.06	93.93	0.00	100	0	18.93	40.90	40.15
4.	Shahbad	202	0.00	93.06	6.93	100	0	40.09	59.90	0.00
5.	Saidnagar	134	18.95	91.04	0.00	100	0	26.11	58.95	14.93
6.	Swar	105	19.04	77.15	3.8	100	0	29.52	60.00	10.47
Over all		2569	4.20	93.30	2.49	100	0	35.38	51.07	13.55

Soil pH

The soil pH or soil reaction is an indication of the acidity or alkalinity of soil and is measured in pH units. It was observed (Table 1) that soil pH of soil of different blocks under sugar cane –wheat farming system *viz*., Milak 94.9 per cent samples were normal (6.5-7.5), 2.31 per cent samples were alkaline (pH more than 8.5), 2.78 per cent samples were acidic (pH less than 6.5), Chamrauva, 81.52 0 per cent samples were normal (6.5-8.5), 2.17 per cent samples were alkaline (pH more than 8.5), 6.3 per cent samples were acidic (pH less than 6.5), Bilaspur 93.93 per cent samples were normal (6.5-8.5) and 6.06 per cent samples were acidic (pH less than 6.5), Shahbad 93.06 per cent samples were normal (6.5-8.5) and 6.93 per cent samples were alkaline (pH more than 8.5), Saidnagar 91.04 per cent samples were normal (6.5-8.5) and 8.95 per cent samples were acidic (pH less than 6.5) and Swar 77.15 per cent samples were normal (6.5-8.5), 3.80 per cent samples were alkaline (pH more than 8.5), 19.04 per cent samples were acidic (pH less than 6.5). Over all of district 93.3 0 per cent samples were normal (6.5-8.5), 2.49 per cent samples were alkaline (pH more than 8.5), 4.20 per cent samples were acidic (pH less than 6.5).

Electrical Conductivity

The electrical conductivity (EC) is the measure of the soluble salt present in the soil and is affected by cropping sequence, irrigation, land use pattern, and application of fertilizer and manures, and compost. The soil samples of all blocks under sugarcane –wheat farming system were falls under less then 4.0 dSm-1(Table 1) . On the basis of the limit suggested by Muhar *et al* (1973) for judging salt problem of soil all the samples found normal (EC 1.0 to 2.0 dSm-1).

Organic matter content

Theo organic carbon content of the soil in different blocks of Rampur district (Table 1) indicated that over all , 35.38 per cent samples were less than 0.5, 51.07 per cent samples were ranged between 0.5 to 0.75 per cent and 13.15 per cent samples were more than 0.75 per cent content of organic carbon. It was revealed that more than 50 per cent samples were found 0.5 to 0.75 percent organic carbon content .High temperature and more tillage practice in the soil increases the rate of oxidation of organic matter resulting reduction of organic carbon content.

Table 2. Soil fertility status under sugar cane – wheat farming system in different blocks of Rampur district.

Sr. No.	Name of Block	Total samples analysed	Percent Samples			Percent Samples			Percent Samples		
			N <280 Kg/ha	N 280-560 Kg/ha	N >560 Kg/ha	P <10 Kg/ha	P 10-24.6 Kg/ha	P >24.6 Kg/ha	K <108 Kg/ha	K 108-280 Kg/ha	K >280 Kg/ha
1.	Milak	1904	82.61	17.38	0	7.19	79.77	13.02	0	98.42	1.58
2.	Chamrauva	92	86.95	13.04	0	6.52	58.69	34.78	0	93.47	6.52
3.	Bilaspur	132	72.72	27.27	0	3.03	81.06	15.90	6.06	81.06	12.88
4.	Shahbad	202	87.12	12.87	0	0.00	40.09	59.90	0	100	0
5.	Saidnagar	134	78.35	21.64	0	5.97	55.97	38.05	0	100	0
6.	Swar	105	84.76	15.23	0	3.80	71.43	24.76	0.95	98.09	0.95
Over all		2569	82.48	17.52	0	6.18	74.38	19.43	0.35	97.55	2.10

Available Nitrogen Content

The available nitrogen content in soil of all blocks indicated that 82.48 per cent samples were possessing less than 280 kg /ha, 17.52 per cent samples ranged between 280 to 560 kg/ ha and no sample was found more than 560 kg/ha on the basis of rating suggested by Subbiah and Asija (1956).

Available phosphorous content

The data (Table 2) revealed that over all range of available phosphorus in soil of all blocks showed that 6.8 per cent samples were less than 10 kg /ha, 74.38 per cent samples were ranged in 10 to 24.6 kg/ha and 19.43 per cent samples were more than 24.6 kg/ ha on the basis of rating suggested by Subbiah and Asija (1956).

Available potassium content

The data (Table 2) revealed that over all range of potassium in soil of all blocks showed that 97.55 per cent amples were ranged in 108 to 280 kg/ ha, 2.10 per cent samples were found more than 280 kg/ha and 0.35 per cent samples were found less than 108 kg/ha. On the basis of rating suggested by Subbiah and Asija (1956).

According to limit suggested by Mahr *et al* (1963), all samples were medium (125 to 300 K_2O kg/ha) in potassium content. A significant positive correlation (r =0.615) was observed between organic carbon and available potassium. This might be due to creation of favorable soil environment with presence of high organic matter. Similar result was also reported by Paliwal (1996)

CONCLUSION

The study of soil samples revealed that the soil of all blocks of Rampur district in different block under sugar cane –wheat farming system did not followed a particular pattern with different block which may be due to variation in management practices and yield potential. The nutrient status regarding to the available macro nutrient in surface soil indicate that soils are low in available N and medium in available P and K. Normal to slightly alkaline in reaction, low to medium in organic carbon content.

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