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Assessment of productivity and soil fertility of Saharanpur in irrigated agro-ecosystem of western Uttar Pradesh

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Abstract
The population of India is likely to reach by 1.4 billion in 2025 with 42.5% as urban. With per capita land availability <3 ha and net availability of cereals and pulses < 450 g d^{-1}, India is facing challenge in coping up with the national food security and environmental sustainability. Western Uttar Pradesh registered a high agricultural growth during the second wave of 'Green Revolution' in 1980s. However, rapid urbanization and developmental processes are increasingly in conflict with other forms of land use, especially agriculture. This study addresses the productivity trends and soil fertility status of Saharanpur district of western Uttar Pradesh.The Soil fertility has direct implication on the agricultural production scenario of the region. Soil samples from 16 villages covering 8 Blocks were collected during the period of 2016-17. Results showed that soil organic carbon content was 72-54%. However, entire district and area of 64%, 57% and 54% were low under nitrogen, phosphorus and potassium availability. Micronutrient in general, was low except copper, which indicated that 48% of the area was under low availability of micronutrients. A methodology was developed to enhance the individual nutrient status. The integrated nutrient status showed that the 48% of area had multi-nutrient deficiencies and fell under higher priority zone of UP that immediate nutrient management is needed for region to meet which indicated requirement of nutrients.Potential yields of major crops of the district were computed and current yields were obtained through field survey in selected land units and other collateral data. Yield gaps (potential-current) ranged 3.87-6.64, 2.85-4.89 and 30 t/ha in rice, wheat and sugarcane for a majority of land units. A few agri-technological levels were tested for the fertilizer inputs required to bridge yield gaps in rice, wheat and sugarcane in selected land units. It is argued that augmenting the production through assessment of biophysical potential of a district can ensure food security and sustainability of the system.

Keywords: Soil health card, productivity, grid, Soil fertility

Introduction
The Soil is the most important natural resource which is scientifically utilized for improving the productivity and economic condition of the farmers of western UP, soil fertility has direct effect on the agricultural production scenario of the region, parameters helps to relate the nutrient input rates with the crop demand and thus conserve the resources. The use of fertilizers without considering the soil fertility status and crop requirement may adversely affect the soil and crops. The imbalance and inadequate use of fertilizer with low efficiency of their inputs, response (production), and efficiency of chemical fertilizer nutrients has declined tremendously under intensive agriculture in recent years.

Saharanpur district lacks in comprehensive information about soil fertility status. Study to assess the fertility status of Saharanpur district through geographic information system (GIS) can help in making nutrient management decisions (Santhi, R., Selvakumari, G. and Rani Perumal 2010) [3]. Soil test based fertilizer recommendations under integrated plant nutrition system for rice-rice-pulse cropping sequence. The integrate variability of soil fertility parameters namely Soil Organic Carbon (SOC), Nitrogen (N_2), Phosphorus (P_2O_5), Potassium (K_2O), Iron (Fe), Manganese (Mn), Zinc (Zn), and Copper (Cu). It was tested at Krishi Vigyan Kendra, Saharanpur in soil Testing Laboratory and by developing a unique methodology to identify multi nutrient deficient area using by GIS tools, Sellamuthu, K. M., Santhi, R., Maragatham, S. and Dey, P. 2015 [4]. Balanced fertilizer prescription for glory lily through inductive-cum- targeted yield model on an Alfisol.

Materials and Methods

Saharanpur district is situated in the western part of Uttar Pradesh and comes under Western Plain Zone. The boundary state of District are Uttarakhand and Haryana. To study four blocks Baliya Kheri, Muzaffarabad, Nagal and Devband of District Saharanpur including two villages from each blocks were selected for the present study. First of all, collected the revenue map of all above villages from revenue department and 432 Grid were demarcated with the support of people's participation of related villages including village Pradhan. The average area of a grid was 3 to 4 hectares, depends on the irrigation facilities of those groups and 432 grid covered the 8 villages area's after that one sample from each grids group were collected and tested.

Results & Discussions

In soil analysis table-1, the average carbon percentage of all place of District Saharanpur is minimum and maximum and average is for maximum & quality production. It should be minimum and maximum and average should not be less than. The soil organic carbon not only stores nutrients in the soil but it is also a direct source of nutrients. The most fertile soil contain high amounts of organic matter. It is important to maintain soil organic matter (SOM) by adding fresh amount of animal and plant residue as it performs many functions. Available minimum nitrogen 183 kg/ha and maximum 325 kg/ha, the average nitrogen of the district is 254 kg. It is also less than required quantity (260Kg/ha).

The nitrogen plays the important role for the vigorous growth of crop and good yield (Tandon, H.L.S. 2017) [6] soil nutrient balance sheet in India importance status issues and concerns, Better crop India a crossed 2016, also supported. In table-1, 11.12 minimum available in the District is 11.12 kg/ha maximum 16.37 kg/ha and P_2O_5 is so much less as required level when P_2O_5 play the key role in the pulses

Table 1: Soil Analysis

S. No.	Name of Block	Village	SOC (%)			N (kg/ha)			P_2O_5 (kg/ha)			K_2O (kg/ha)		
			Min.	**Max.**	**Ave.**	**Min.**	**Max.**	**Ave.**	**Min.**	**Max.**	**Ave.**	**Min.**	**Max.**	**Ave.**
1.	Nagal	1	0.42	0.64	0.53	186	336	261	11	15	13	87	213	150.0
		2	0.51	0.77	0.65	178	322	250	9	13	11	91	207	149.0
		Av.	0.46	0.71	0.59	182	328	250	10	14	12	89	210	149.5
2.	Balia kheri	3	0.36	0.54	0.45	171	313	247	8	14	11	93	217	155.0
		4	0.38	0.56	0.47	189	337	263	13	17	15	96	240	168.0
		Av.	0.37	0.55	0.46	185	325	255	10	16	13	84.5	228.5	161.5
3.	Deoband	5	0.41	0.61	0.51	192	340	266	10	16	13	98	242	170.0
		6	0.39	0.57	0.48	178	306	242	12	16	14	86	216	151.0
		Av.	0.40	0.59	0.49	185	323	254	11	16	13.5	92	229	160.5
4.	Muzaffarabad	7	0.46	0.72	0.59	176	302	239	12	18	15	102	230	166.0
		8	0.48	0.74	0.61	184	342	263	14	22	18	106	236	171.0
		Av.	0.47	0.73	0.60	180	322	251	13	20	16.5	104	233	168.5
	District Availability		0.43	0.64	0.54	183	325	254	11.12	16.37	13.7	94.87	225.12	160.0
	Availability needed		0.60	1.20	0.90	190	340	260	18.00	25.00	21.50	220	280	250.0

Table 2: Soil Analysis

S. No.	Name of Block	Village	Manganese (Mn) (ppm)			Zinc ($ZnSO_4$) (ppm)			Iron (Fe) (ppm)			Copper (Cu) (ppm)		
			Min.	**Max.**	**Ave.**	**Min.**	**Max.**	**Ave.**	**Min.**	**Max.**	**Ave.**	**Min.**	**Max.**	**Ave.**
1.	Nagal	1	1.90	2.80	2.35	0.62	0.84	0.73	3.80	4.80	4.30	0.38	0.45	0.42
		2	2.10	2.60	2.35	0.65	0.91	0.78	4.20	5.80	5.00	0.42	0.52	0.57
		Av.	2.00	2.70	2.35	0.63	0.87	0.75	4.00	5.30	4.65	0.40	0.48	0.49
2.	Baliya kheri	3	2.30	3.10	2.70	0.20	0.50	0.35	4.60	6.20	5.40	0.32	0.38	0.35
		4	2.60	3.80	3.20	0.40	0.60	0.50	5.20	6.80	6.00	0.28	0.34	0.31
		Av.	2.45	3.45	2.95	0.30	0.55	0.42	4.90	6.50	5.70	0.30	0.36	0.33
3.	Deoband	5	2.80	3.50	3.15	0.80	1.00	0.90	2.80	3.80	3.30	0.48	0.58	0.53
		6	3.10	3.70	3.40	0.72	1.20	0.96	3.20	4.00	3.60	0.42	0.54	0.48
		Av.	2.95	3.60	3.27	0.76	1.10	0.93	3.00	3.90	3.45	0.45	0.56	0.50
4.	Muzaffarabad	7	1.30	1.90	1.60	0.30	0.58	0.44	1.80	2.60	2.20	0.15	0.19	0.17
		8	1.60	1.80	1.70	0.25	0.48	0.36	2.20	3.20	2.70	0.12	0.16	0.14
		Av.	1.45	1.85	1.65	0.27	0.53	0.40	2.00	2.90	2.45	0.30	0.17	0.15
	District Availability		2.21	2.90	2.55	0.49	0.76	0.62	3.48	4.65	4.06	0.32	0.38	0.35
	Availability needed		2.00	4.00	3.00	0.60	1.20	0.90	4.00	8.00	6.00	0.20	0.40	0.30

production and potassium K_2O is minimum average available 94.87 kg/ha maximum average-225.12 kg/ha. It is so much less in comparison to require need average 160 kg is available against 250 kg/ha, on the above study potassium play the healthy grain production and disease resistant in the crop. On the soil analysis based SOC, N_2, P_2O_5 and K_2O all are less in comparison to the required quantity. Kumar, M.V., Saliha, B.B. Kannan, P. and Mehendran, P.P., (2015) [1] delineation and geographic information system (GIS) mapping of soil nutrient status. To increase the quality production and sustainable agriculture, it is recommended to apply the recommended dose as per need as mentioned on soil health cards. Singh, V. V., Manoj Parihar., Singh, S. K., Sharma, P. K., Dey, P. 2015 [5]. Soil test based fertilizer prescriptions under integrated plant nutrient management system for maize in an Incept sol of Varanasi.

In analysis table-2, the minimum average of manganese is 2.21ppm and average need 3.0 ppm and same in maximum average is 2.9 ppm against available needs is 4ppm which is less than in District average need 3ppm. Zinc average minimum availability is 0.49ppm and maximum 0.76ppm and District average availability is 0.62ppm when needed quantity is 0.9ppm it is also less than require quantity. Iron average minimum availability is 3.48ppm and maximum 4.65ppm and district average availability is 4.06ppm when needed quantity is 6.0ppm it is also less than require quantity. Shukla, G., Mishra, G. C. and Singh, S.K., (2015) [2] Kriging approach for estimating deficient micronutrients in the soil. Average availability of copper is 0.35ppm which is at par 0.30pm, data reveales copper is available as per required quantity.

Conclusion

Studies on agricultural soil of District Saharanpur UP for enhancing productivity, the study was conducted in Saharanpur district during 2016-17, on selected 16 Villages covering four blocks of District Saharanpur, soil samples were collected by utilizing GIS with grid system and 432 soil samples collected, based on one sample from one grid and tested in soil testing laboratories of KVK Saharanpur delineation and geographic information system (GIS) mapping of soil nutrient status. Studies revealed that the SOC, N_2, P_2O_5 K_2O micronutrient except copper, Manganese, Zinc & Iron are below than the required label Kriging approach for estimating deficient micronutrients in the soil and enhancing the productivity, the integrated nutrient management are required as per need of the soil.

References

1. Kumar MV, Saliha BB, Kannan P, Mehendran PP. Delineation and geographic information system (GIS) mapping of soil nutrient status of sugarcane growing tracts of Theni district, Tamil Nadu. Afr. L. Agric. Res., 2015; 10(33):3281-3291. doi:10.5897/AJAR2013.7251.
2. Shukla G, Mishra GC, Singh SK. Kriging approach for estimating deficient micronutrients in the soil: a case study. Int. J Agric. Environ. Bio technol. 2015; 8(2):309-314, doi: 10.5958/2230-732X.2015.00038.8.
3. Santhi R, Selvakumari G, Rani Perumal. Soil test based fertilizer recommendations under integrated plant nutrition system for rice - rice - pulse cropping sequence. J Indian Soc. Soil Sci. 2010; 47:288-294.
4. Sellamuthu KM, Santhi R, Maragatham S, Dey P. Balanced fertilizer prescription for glory lily through inductivecum- targeted yield model on an Alfisol. Res. Crops. 2015; 16(3):555-561.
5. Singh VV, Manoj Parihar, Singh SK, Sharma PK, Dey P. Soil test based fertilizer prescriptions under integrated plant nutrient management system for maize in an Inceptisol of Varanasi. J Indian Soc. Soil Sci. 2015; 63:83.
6. Tandon HLS. Soil nutrient balance sheets in India: importance, status, issues and concerns, 2017, Better crops-India, accessed 26 June 2016.