Mapping Soil Fertility of Mewat, Haryana

Institute of Rural Research and Development
(An initiative of S.M. Sehgal Foundation)

The Rationale

India introduced the **"Green Revolution"** in early 1960s and, within three decades, it became self-sufficient in food-grain production. But despite having achieved such breakthroughs in agriculture, universal access to food remains uncertain in India, especially to the rural poor. India continues to be home to some of the poorest people on the globe. Of India's 1028 million people (in 2001), around 300 million people were classified as "poor" (GTZ, 2006), with the majority of these living in rural areas. The State of Food Insecurity in the World 2008, released by the FAO, estimates that India is home to more than 230 million undernourished people, 21 percent of the national population (WFP and MSSRF, 2001).

Most people in rural India still depend, directly or indirectly, on farming for their livelihood. Sadly, however, that hasn't brought any additional attention to agriculture. Bearing in mind the fact that there is rapid reduction in agricultural land holdings and increasing pressure on land, agricultural production has to keep pace with demand for food in the country. Out of the several factors that can lead to increased agricultural production, soil health management is key and requires immediate attention. Soil fatigue affects most parts of the country though, predictably, it is more prevalent in areas where intensive agriculture is practiced. For long term sustainability in agriculture, land fertility has to be improved and maintained.

Haryana and Punjab have been the most progressive states post-green revolution in India, but they now suffer from continuous decline in crop production. One of the reasons is the imbalanced use of chemical fertilizers, causing land degradation. The diminishing availability of water resources for agriculture is also a formidable impediment in boosting farm production (Sud, 2009). In fact, this is already adversely impacting output in several key agricultural tracts, more notably in states such as Punjab and Haryana, which have been producing surpluses for the Indian market.

Mewat is one such backward district in Haryana where rain-fed agriculture is the main source of livelihood. Adoption of conventional farm practices, skewed application of major plant nutrients and the use of purer forms of chemical fertilizers has resulted in widespread deficiency of several micronutrients, which are as essential for healthy crop growth as macro nutrients (Sud, 2009). This has made agriculture non-remunerative for most farmers.

Soil in Mewat is deficient in most essential macro and micronutrients (IRRAD, 2010). As a result, average productivity of its main crops viz. Mustard, Wheat and Millet is lower than the State-level average productivity of these crops .The ever decreasing use of organic manure adversely affects the physical, chemical and biological properties of soil.

There is an urgent need to alter fertility management practices that necessarily include the use of balanced fertilizers, with its emphasis on revitalizing the soil for depleted micronutrients. This needs to be combined with the knowledge on how to adopt these practices, aiming at maximizing agronomic use, improving efficiency of applied nutrients and crop productivity.

A Step Towards Better Soil Health

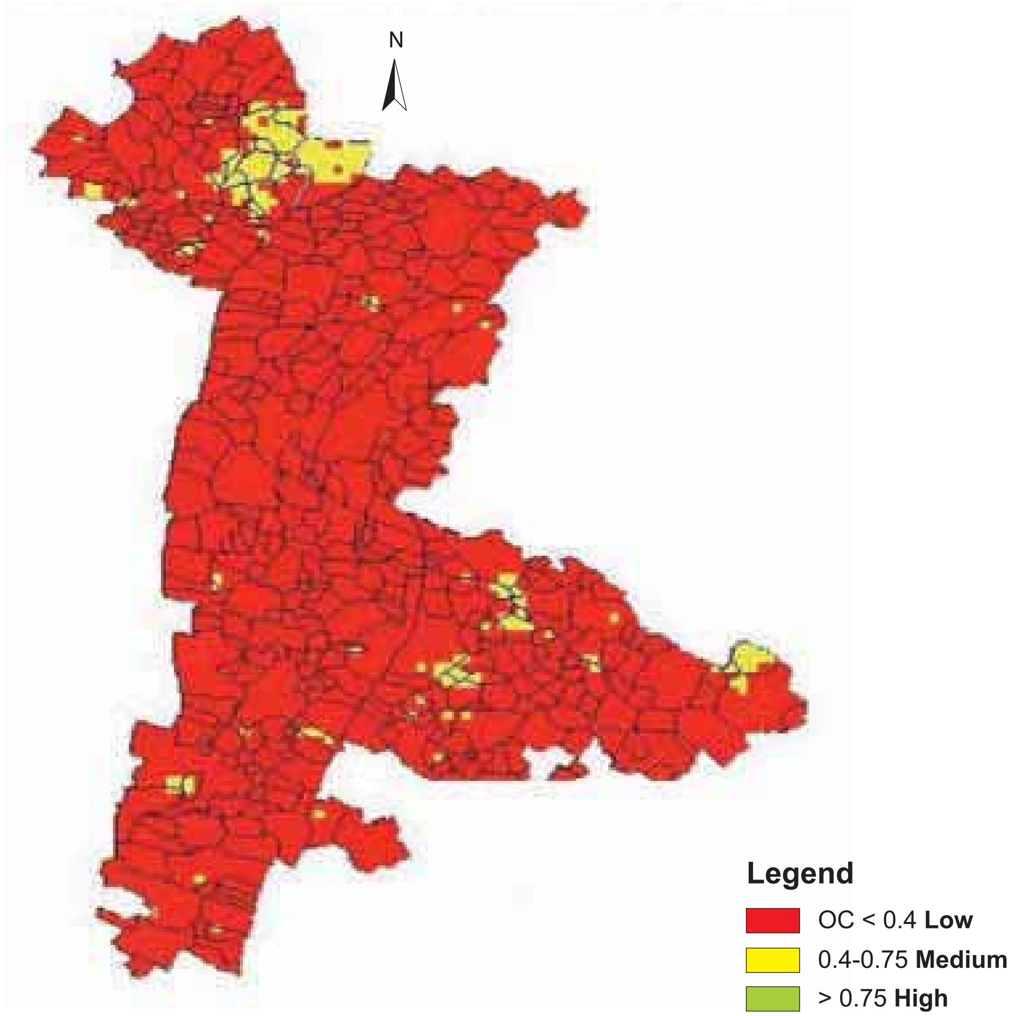
Soil Mapping in Mewat

To understand the current status of soil fertility in Mewat, the Institute of Rural Research and Development (IRRAD), an initiative of S. M. Sehgal Foundation, in collaboration with the Haryana Agriculture Department, took the initiative to prepare the current soil fertility maps of Mewat.

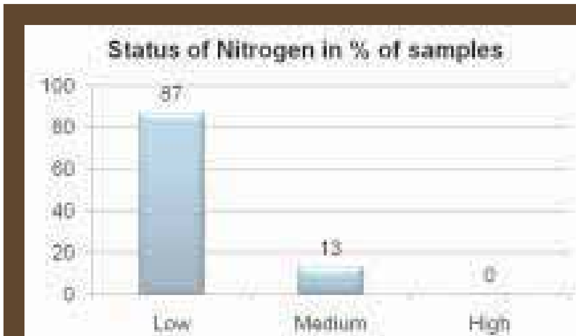
These maps would serve as a baseline for soil fertility, facilitate availability of a reference database for the soils of Mewat, provide location-specific status of macro and micronutrients and would develop a strategic model for integrated soil health.

A total of 1565 samples, with geographical coordinates of sampling sites, were collected across 432 villages of district Mewat, using Global Positioning System (GPS) at one kilometer grid. This soil mapping exercise involved analyzing the status of Nitrogen, Phosphorous, Potash, micronutrients like Manganese, Sulphur, Zinc, and Iron in soil and assessed soil type based on Electric Conductivity (EC) and Alkalinity of soils (pH).

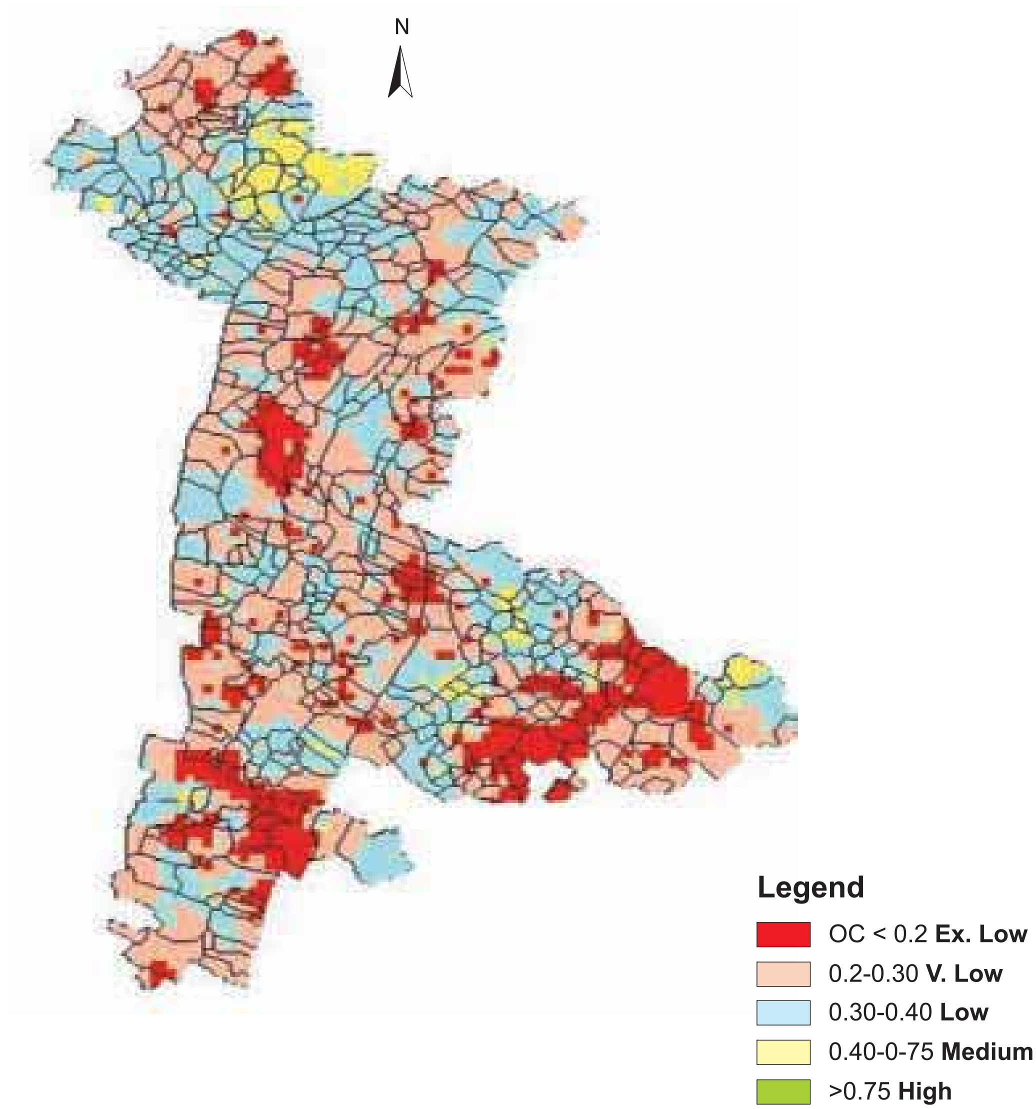
Status of Nitrogen (N)



ORGANIC CARBON		
Status	# sample	%
Low	1360.00	86.90
Medium	203.00	12.97
High	2.00	0.13
Total	1565.00	100.00

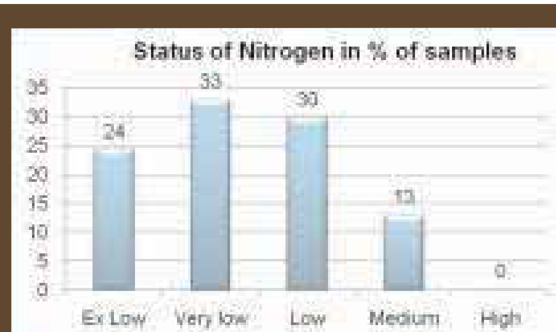


Status of Nitrogen (N)

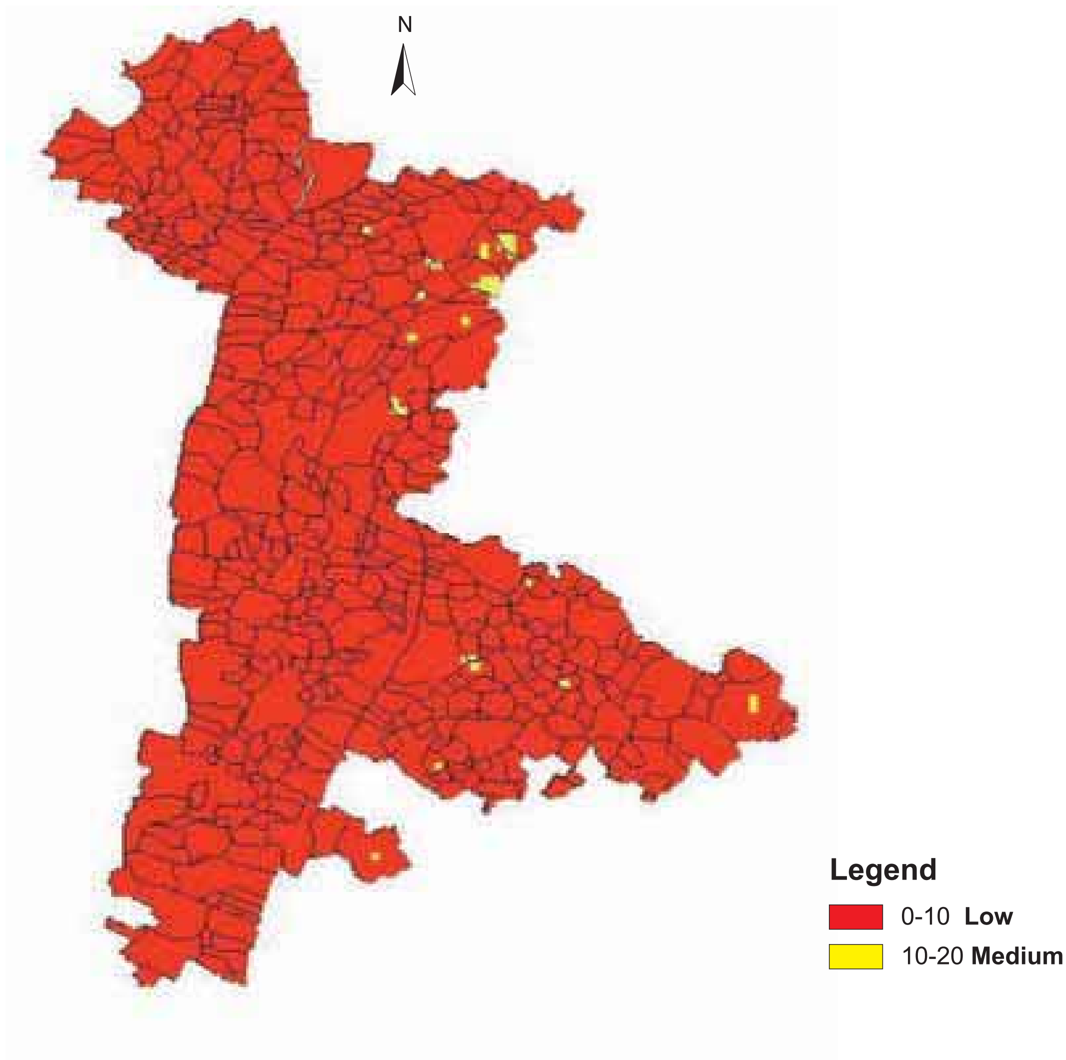


MICRO ANALYSIS OF NITROGEN

Status	# sample	%
Ex Low	379	24.22
Very low	515	32.91
Low	466	29.78
Medium	203	12.97
High	2	0.13
Total	1565	100

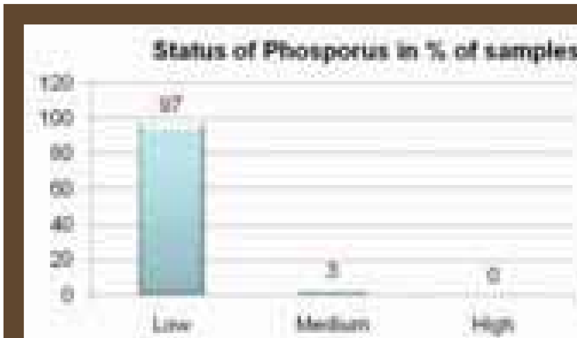


Status of Phosphorus (P)

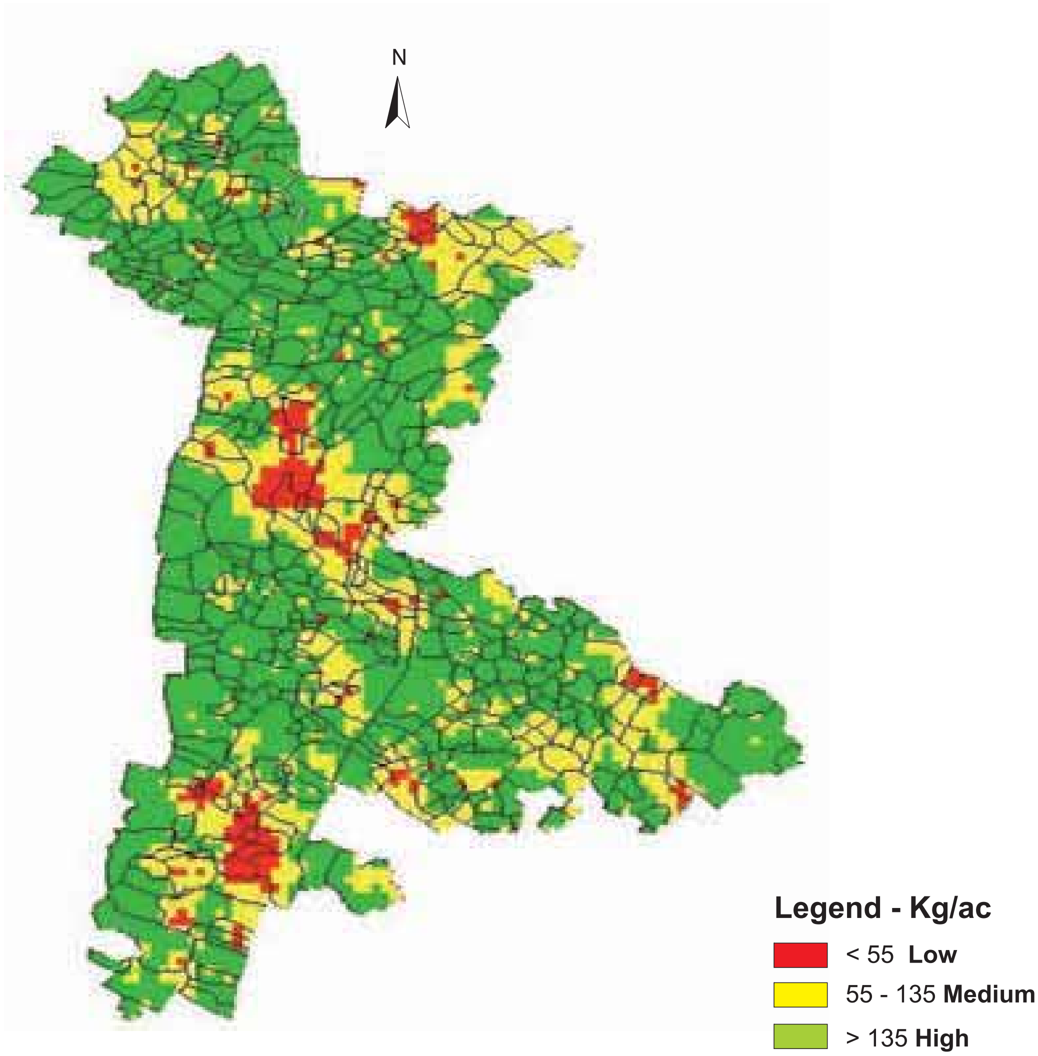


PHOSPHORUS

Status	# sample	%
Low	1515.00	96.81
Medium	46.00	2.94
High	4.00	0.26
Total	1565.00	100.00

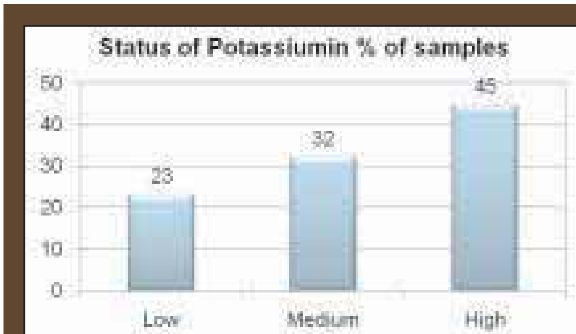


Status of Potash (K)

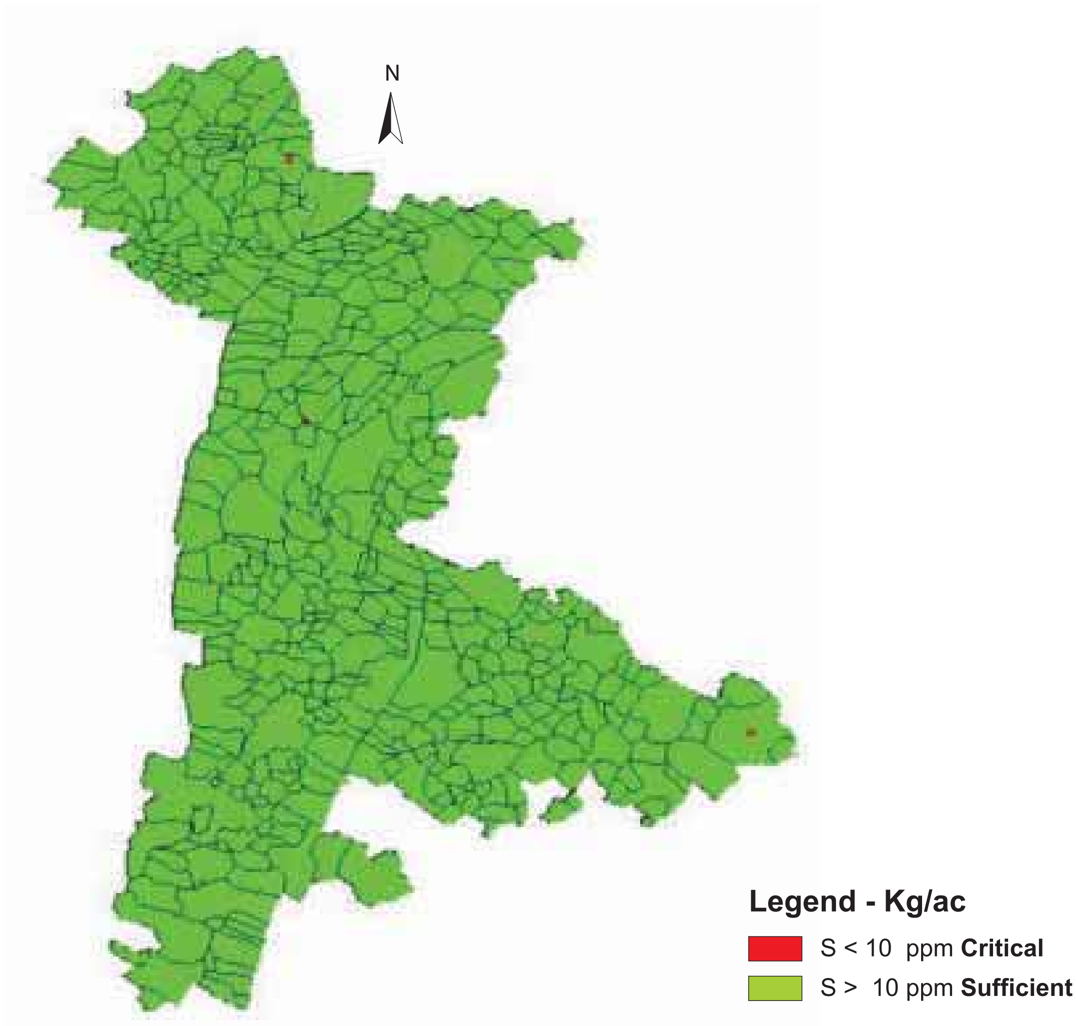


POTASSIUM

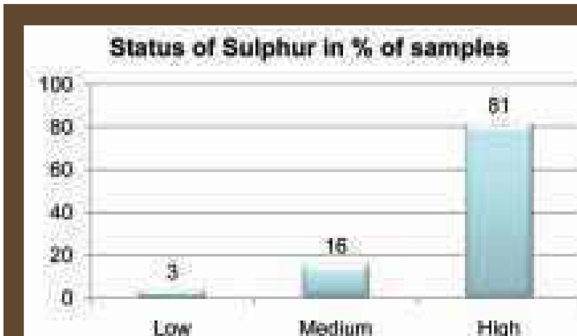
Status	# sample	%
Low	361	23.07
Medium	504	32.20
High	700	44.73
Total	1565.00	100.00



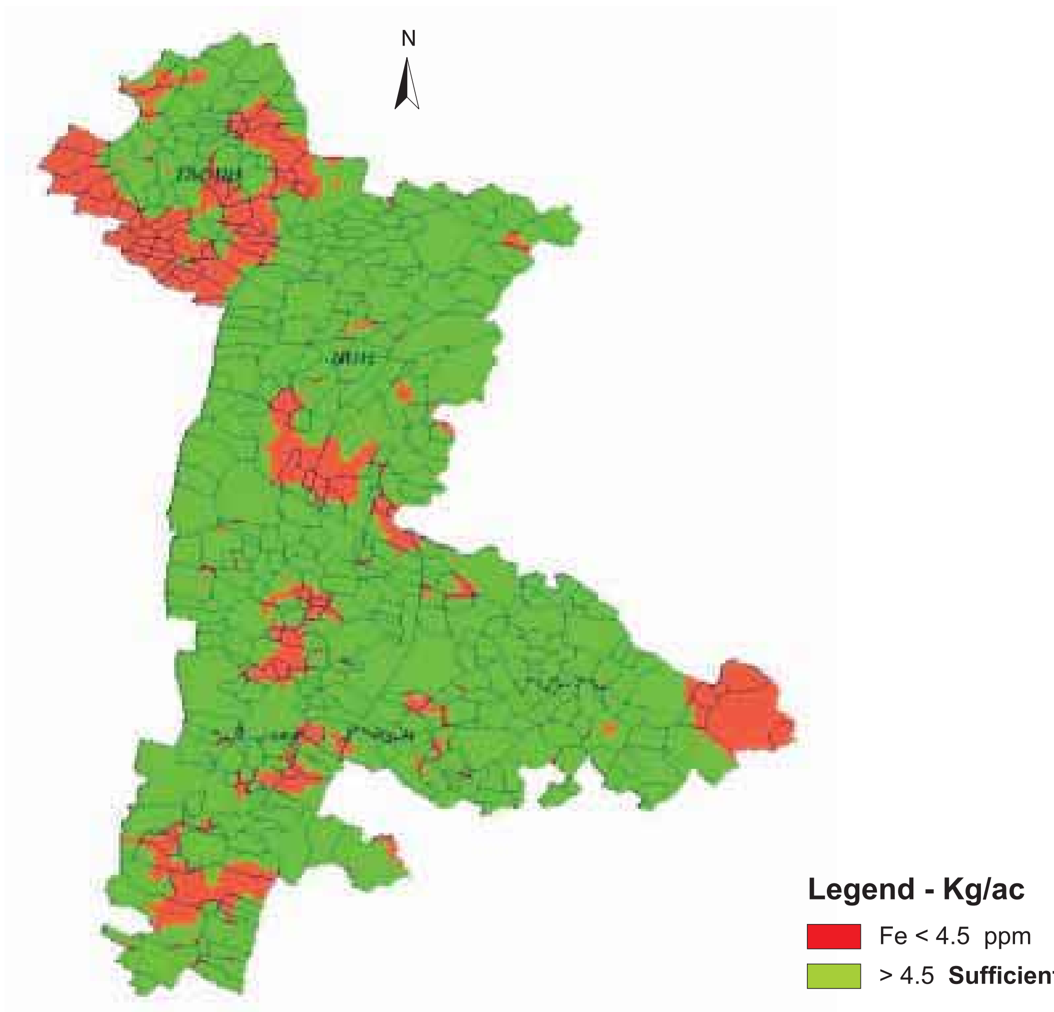
Status of Sulphur (S)



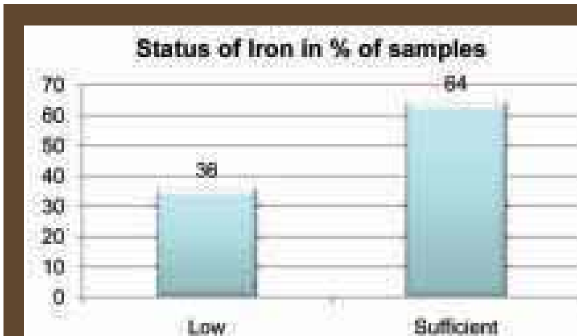
SULPHUR		
Status	# sample	%
Low	51	3.26
Medium	243	15.53
High	1271	81.21
Total	1565.00	100.00



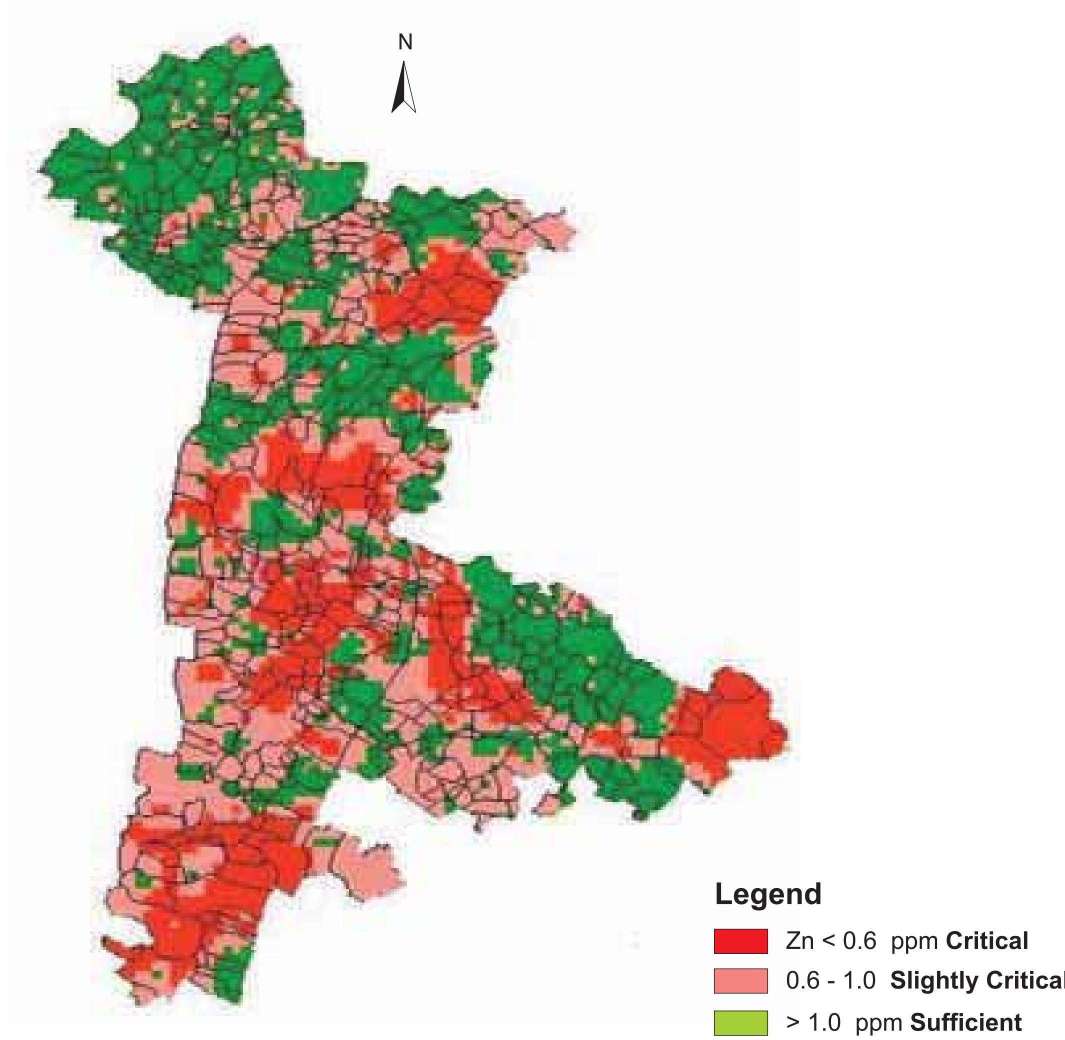
Status of Iron (Fe)



IRON		
Status	**# sample**	**%**
Low	558	35.65
Sufficient	1007	64.35
Total	1565	100.00

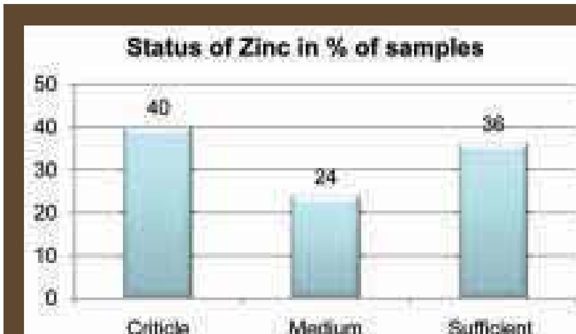


Status of Zinc (Zn)

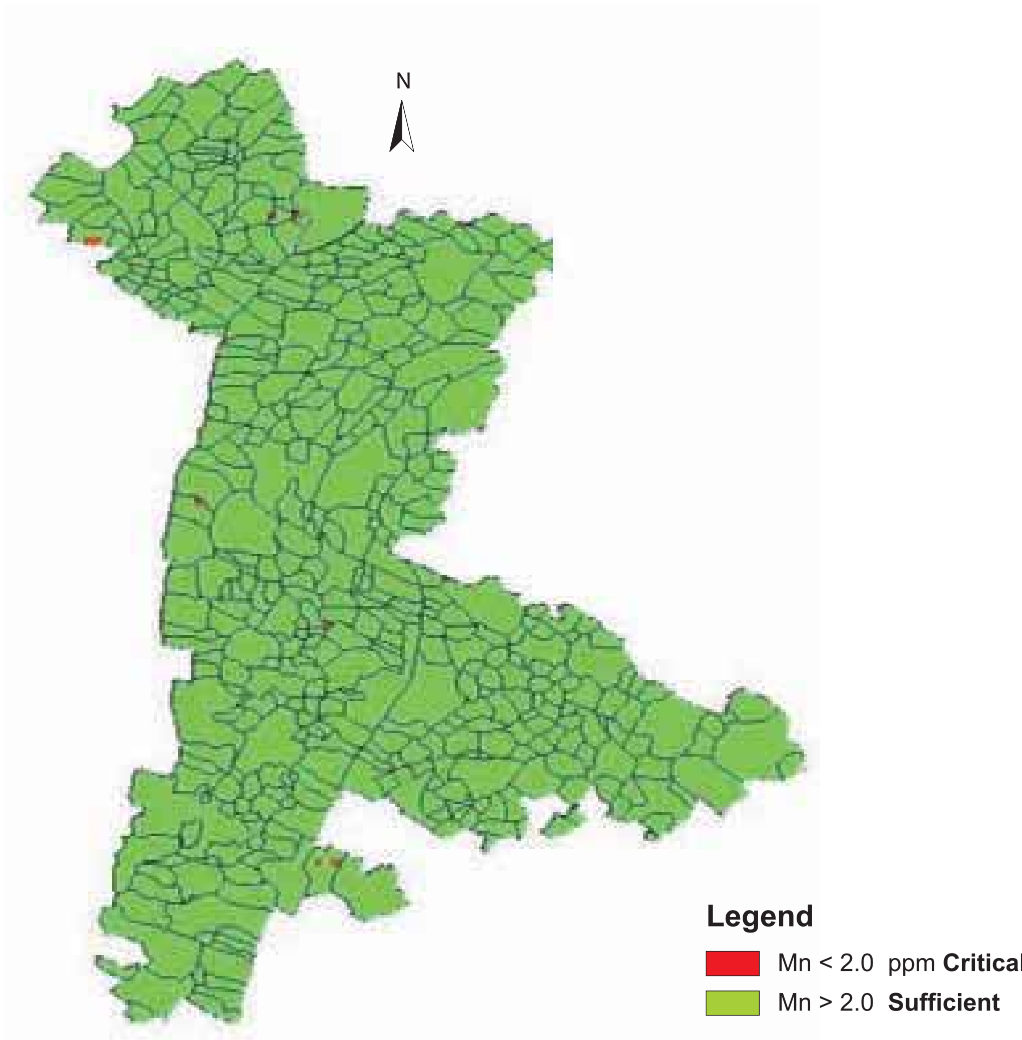


ZINC

Status	# sample	%
Critical	626.00	40.00
Medium	373.00	23.83
Sufficient	566.00	36.17
Total	1565.00	100.00

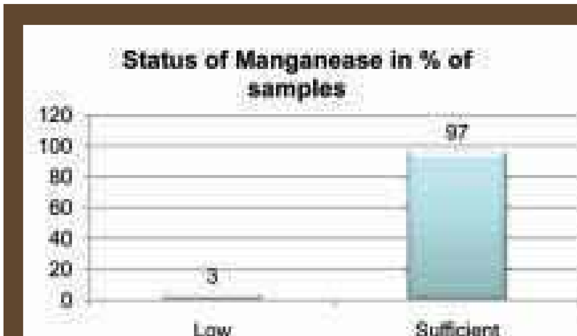


Status of Manganese (Mn)

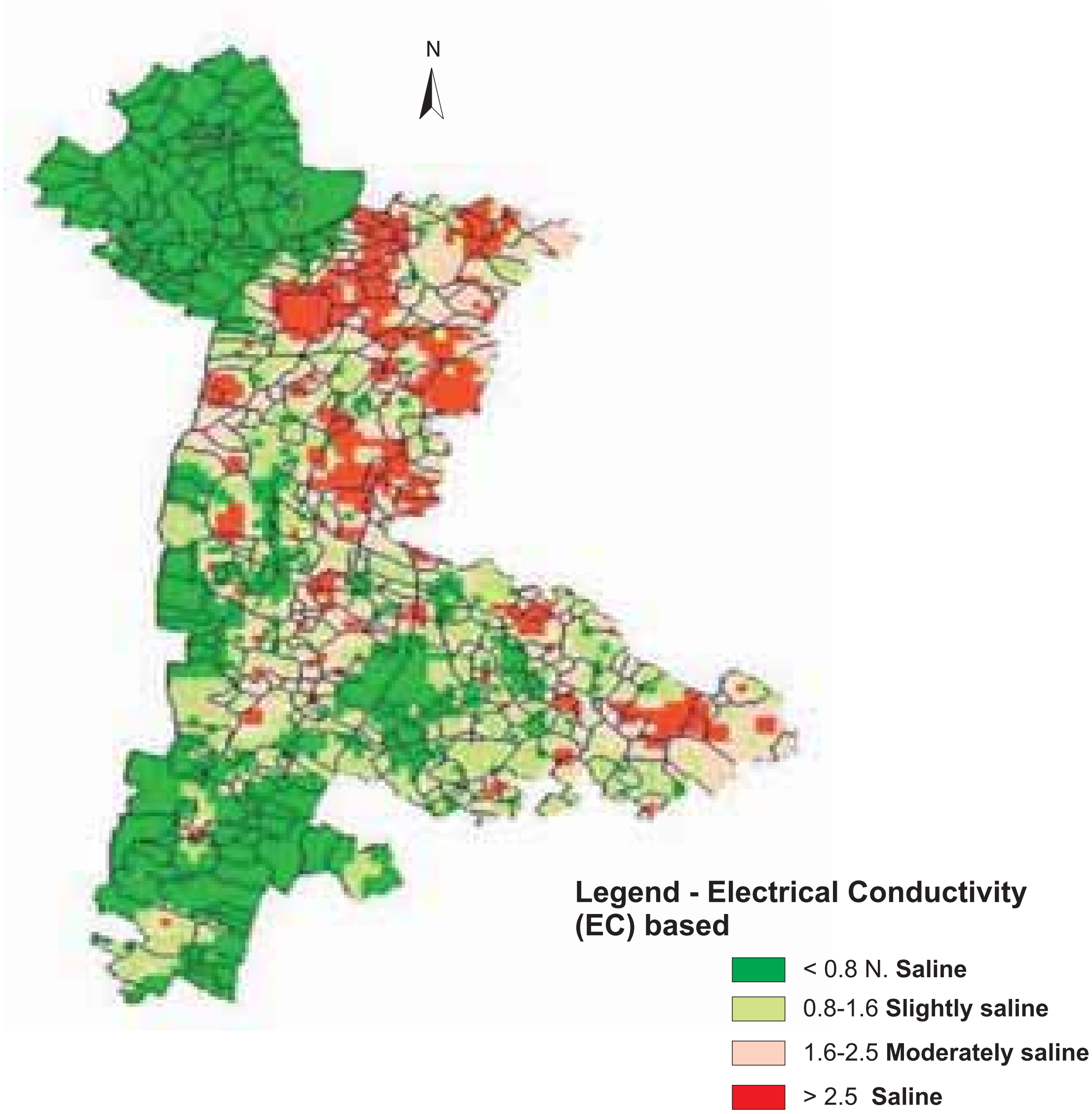


MANGANESE

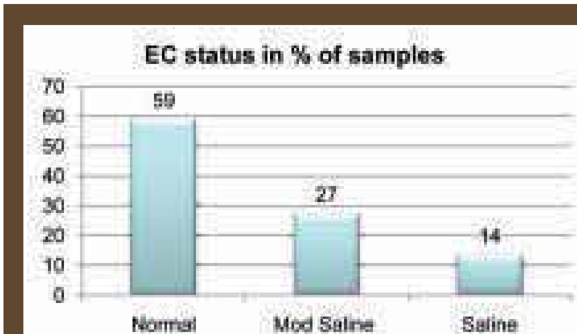
Status	# sample	%
Low	54	3.45
Sufficient	1511	96.55
Total	1565.00	100.00



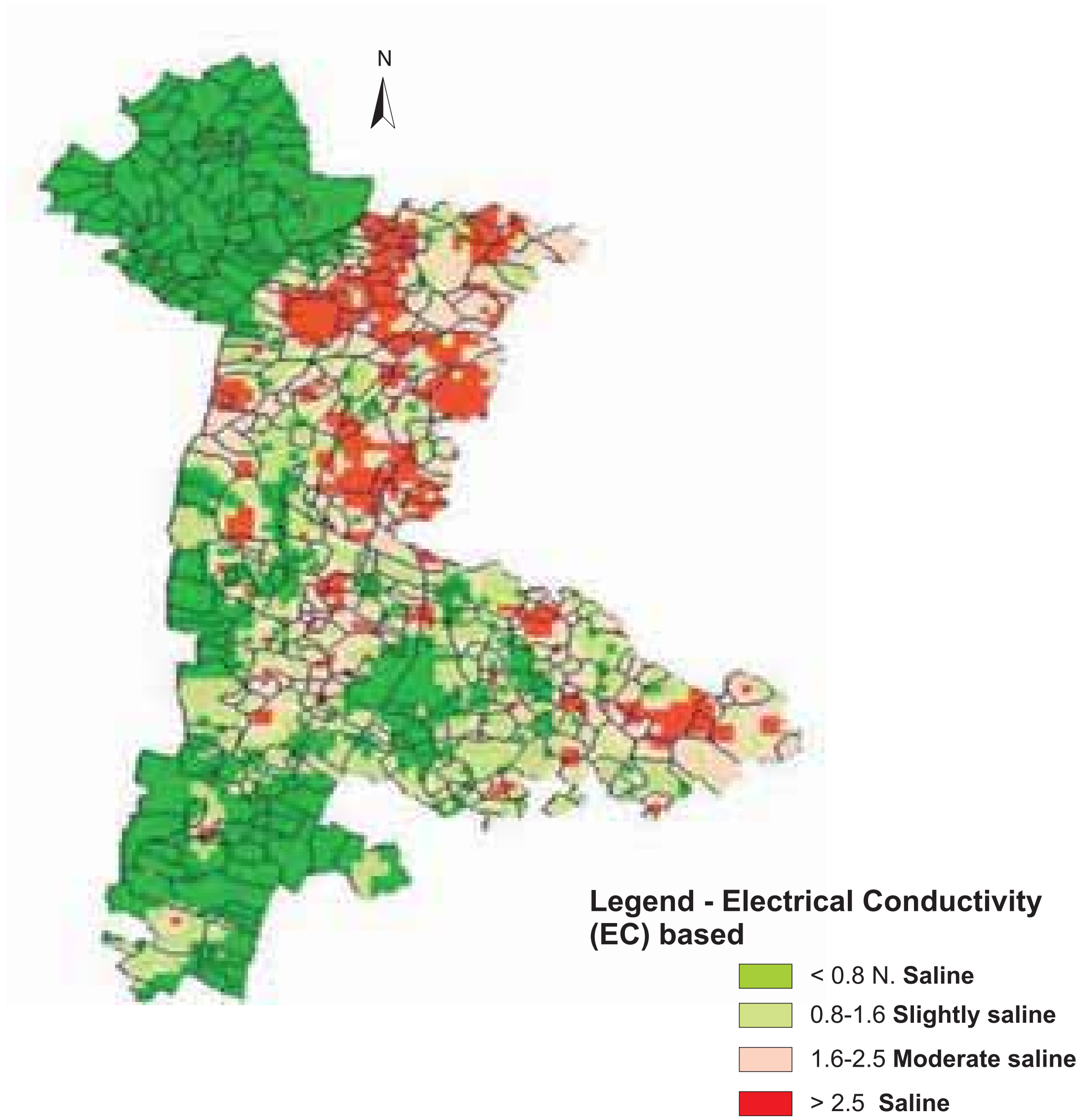
Saline Soils



EC		
Status	**# sample**	**%**
Normal	925.00	59.11
Mod Saline	428.00	27.35
Saline	212.00	13.55
Total	1565.00	100.00

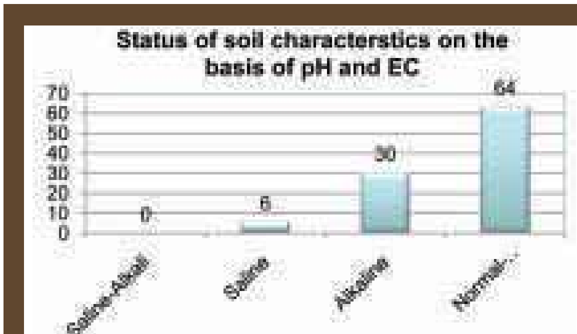


Soil Characteristics on the basis of pH and Electrical Conductivity (EC)

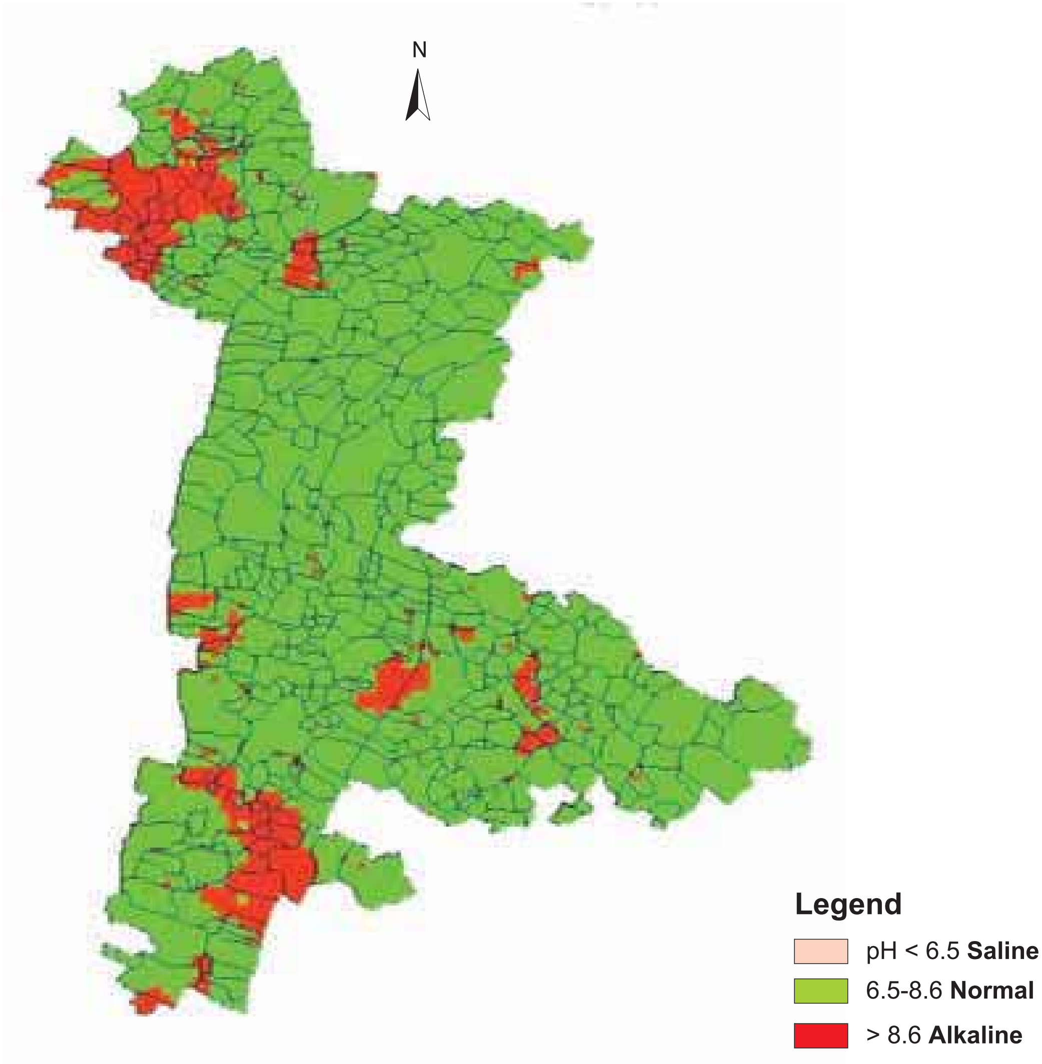


SOIL CHARACTERISTICS

Type of soil	%	# samples
Saline-Alkali	0	3
Saline	6	92
Alkaline	30	476
Normal-Acidic	64	994
	100	1565

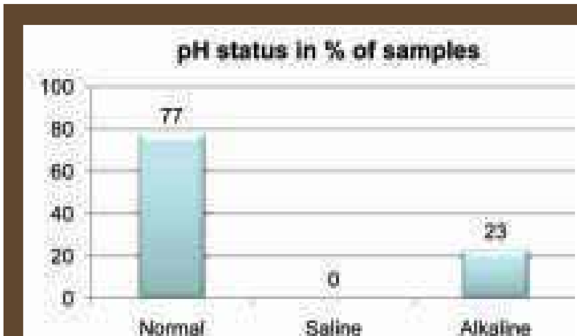


Status of Alkaline Soils



pH

Status	# samples	%
Normal	1211.00	77.38
Saline	0.00	0.00
Alkaline	354.00	22.62
Total	1565.00	100.00



RESULTS

- The soil of Mewat is deficient in nitrogen, phosphorus, potash, zinc and boron. Sulphur and manganese is present in sufficient quantities.
- Taoru block is better off as compared to other blocks in Mewat as far as Zinc application is considered. Otherwise, Zinc deficiency is widespread all over Mewat.
- On the basis of EC (Electrical Conductivity), there are a few pockets in Taoru and Firozepur Jhirka where soil is slightly normal. There is moderate to highly salinity in the rest of the district.
- The pH-based soil alkalinity is normal in Mewat, except in some pockets of Taoru and Firozepur Jhirka.
- Though Iron deficiency is found in a few pockets in Mewat, the general status of Iron in the district is satisfactory.

WAY FORWARD

- Based on this analysis, farmers across 424 villages in Mewat have been issued soil health cards by the Haryana Agricultural Department, which is reflective of the present soil situation of their farms.
- These cards also contain recommendations on dosage of essential soil micronutrients to ensure improved crop productivity and farm income. The exercise has helped in identifying the pockets which need immediate attention.
- The results can help government departments and educational institutions, to explore the reasons for such a situation and take remedial measures.
- A cropping pattern suitable for different regions within Mewat can be developed and recommended.

IRRAD is an initiative of the S.M. Sehgal Foundation, registered as a trust in India since 1999 to further the well-being of rural communities in India. IRRAD envisions rural people across India motivated and empowered to make their lives more secure and prosperous through education, better health, improved skills, and supportive governance. IRRAD conceived and launched the Integrated Sustainable Village Development (ISVD) model which aims to empower people to participate in furthering their own development. ISVD is implemented in select village clusters, through its four centers; Natural Resource Management, Capacity Building, Rural Research and Policy, Governance and Advocacy that serve as resources of talent and infrastructure for the execution of IRRAD's programs. IRRAD has been working in the semi arid region of Mewat for the past several years.

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