

Mineral Nutrient Diagnostic and Site Specific Nutrient Management: Key to sustain agricultural productivity in salt affected agro-ecosystems

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Decline in soil fertility seldom gets the same public attention as floods and droughts, since it is a gradual process and not associated with catastrophes and mass starvation. Site Specific Nutrient Management (SSNM) is a major component of Precision Agriculture and relates to the differential management of soil nutrients between landscape zones. Spatial variability assessment of soil and water quality vis-à-vis soil fertility status of RKVY adopted Mundri village revealed that nearly one-third of area is sodicity affected (soil $pH_s > 8.2$), only 30.3% having good quality underground water sources with 36.5% being marginally alkali, 31.5% alkali and 1.7% marginally saline in nature. Half of the fields were deficient in zinc (available Zn < 0.6 ppm) while boron (water soluble boron < 0.5 ppm) deficiency was observed in 90% of area. Systematic and extensive nutrient indexing of purposefully selected 3 farmers revealed that farmers are applying 10-15% higher N, 15-20% lesser phosphorus without any consideration to zinc and boron application in wheat crop in predominant rice-wheat production system. The soil nutrient status of selected sites is given in Table 1.

Table 1. Soil and water quality status of selected sites

Parameters	Sube Singh s/o Phool Singh	Surjit Singh s/o Sundra	Dalip Singh s/o Sher Singh
Soil Parameters			
Soil pH_s	0.65	0.85	0.44
Electrical conductivity (EC_e) (ds/m)	8.21	8.51	8.00
Available N (kg/ha)	124	86	147
Available P (kg/ha)	2.7	3.8	6.0
Available K (kg/ha)	228	228	420
Available Zn (ppm)	0.20	0.55	0.44
Available B (ppm)	0.11	0.38	0.25
Water Quality			
Electrical conductivity (ds/m)	0.71	1.22	0.64
Residual Sodium Carbonate (RSC)(meq/l)	4.40	7.20	3.80
Sodium Adsorption Ratio (SAR)	1.06	1.84	1.12

With this backdrop, three demonstrations on site specific nutrient management, currently recommended blanket fertilizer dose (State recommendation) and farmer's practice (as control) were carried out in farmer's participatory mode by dividing the whole field into three equal compartments at each site. Site Specific

nutrient management (SSNM) based on soil nutrient supply potential and nutrient use efficiency resulted in 12% higher yield with 6.1% lesser fertilizer input use, better fertilizer use efficiency (21.9 kg grain/kg fertilizer applied) and benefit-cost ratio (2.77). It is interesting to note that balanced fertilization through SSNM recorded better returns for each rupee invested on fertilizer application (3.63) as against the currently recommended blanket fertilizer recommendations in wheat crop. Additional nutrition through B application seems to be more economically efficient over recommended dose (NPKZn). The selected farmers got convinced to harvest sustainable wheat yields through soil test based field level fertilizer management practices and themselves started motivating other farmers of the area for wider adoption. Further, efficient fertilizer use is critical to produce enough food for the growing population and avoid large-scale degradation of ecosystems caused by excess use of fertilizer application, thereby, requiring immediate correction of the existing recommendations.

Enhancing wheat production through balanced nutrient management in salt affected soils of Haryana

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Depletion of soil fertility in terms of ever-widening deficiencies of macro and micro-nutrients is not only responsible for stagnation or slowing down the productivity of major rice-wheat cropping system but also enhanced susceptibility of crops to biotic and abiotic stresses. With this backdrop, a systematic study was initiated at farmer's field to study the effectiveness of site specific nutrient management in augmenting wheat productivity in salt affected soils of Haryana under RKVY project during 2017-18. Four villages, Jagsi Sonapat, Nain Panipat, Sanch Kaithal and Mundri Kaithal were selected based on soil testing values. The status of macro and micro-nutrients was analysed by analysis of samples on atomic absorption spectrophotometer. The success story of ShAnand S/o Satpal living in Jagsi village of Sonapat district, Haryana is briefly defined here. He is having 7.0 hectares of land out of which 2.5 ha land is salt affected. He could not get the appropriate crop yield due to imbalanced use/nutrient deficiencies for many years in salt affected fields. The status of soil in his field was with pH_s of 8.21, EC_e4.76 dS/m. Soil was deficit in nitrogen with 63 kg/ha, potassium less than 180 kh/ha and Zn as 0.36 ppm. The mineral nutrient diagnostic interventions were demonstrated at his field with corrective measure for the observed nutrient deficiencies of N, P & Zn. The demonstration was conducted with equal division of field in three segments, one as farmer practice, one as recommended dose and one with STV. Salt tolerant wheat variety of CSSRI, KRL-210 was used for filed demonstration. He followed the proper package of practices recommended for his area. A significant increase in wheat production was observed in STV field than the recommended or farmer's practice. The total yield with mineral nutrient interventions was 38 q/ha which is 15.2% higher than his routine practice. He was extremely delighted to see the increased crop yield with mineral nutrient supplements. The farmer realized the necessity of soil testing regularly and expressed his intention to get the soil health card as and when required and get the soil samples tested before sowing of crop in the coming seasons. Taking his success with enhanced wheat productivity by nutrient interventions, other farmers of the village also showed eagerness in following the technological interventions. Superiority of soil test based site specific nutrient management is established beyond doubt over other practices of nutrient management in increasing the wheat yield and soil health. This experiment was a successful initiation of SSNM demonstration at farmer's field.

