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SPATIAL VARIABILITY OF SOIL NUTRIENTS AND SITE SPECIFIC NUTRIENT MANAGEMENT IN MAIZE

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Abstract

A field study was conducted during *kharif* 2014 and *rabi* 2014-15 at Southern Transition Zone of Karnataka under the jurisdiction of University of Agricultural Sciences, GKVK, Bangalore, India to know the spatial variability for available nutrient content in cultivator's field and effect of site specific nutrient management in maize. The farmer's fields have been delineated with each grid size of 50 m x 50 m using geospatial technology. Soil samples from 0-15 cm were collected and analysed for major nutrients in all the selected 694 grids. Soils varied spatially for soil pH (5.62 to 7.65), organic carbon (0.35 to 0.65 %) and available NPK (219 to 480 kg N, 15.2 to 48.7 kg P_2O_5 and 144 to 189 kg K_2O ha^{-1}). This was managed through site specific nutrient management (SSNM) strategy. SSNM plots recorded higher maize grain yield during *kharif* and *rabi* seasons (9.56 and 9.46 Mg ha^{-1}, respectively) as compared to farmers practice (7.94 and 8.01 Mg ha^{-1}, respectively) which was 20.40 and 18.18 per cent higher yield respectively. The increased yield was mainly attributed to increased growth and yield parameters.

Key words**:** Spatial variability, site specific nutrient management and maize

Introduction

Maize (*Zea mays* L.), king of cereals is one of the most important crops next to wheat and rice in terms of total production in the world. In India, maize is grown in an area of 9.43 m ha with a production of 24.35 m t with an average productivity of 2583 kg ha^{-1}. In Karnataka maize is grown on an area of 1.38 m ha with a production of 3.98 m t with a productivity of 2883 kg ha^{-1} (Agristat, 2014). Being exhaustive crop, nutrients plays a key role.

Traditional blanket nutrient recommendations has led to low nutrient use efficiencies, lower profits and increased environmental problems (Pampolino *et al.,* 2012). Precision nutrient management increased efficiencies by understanding and dealing the natural variability found within a field. The goal is not to obtain same yield everywhere, but rather to manage and distribute inputs on a site specific basis to maximize long term cost: benefit. Applying the same inputs across the entire field may no longer be the best choice. This

increased level of management emphasizes the need for sound agronomic practices. SSNM within field on cluster basis is known to enhance the nutrient use efficiency. In this background, variable nutrient management at farmer's field was under taken.

Materials and Methods

After conducting a preliminary farmers interaction, demonstration was conducted in ten villages of periyapatna taluk. The farmers fields have been deleniated with each grid of 50 m X 50 m using geospatial technology. After grids making soil samples from 0-15 cm were collected and analysed for major nutrients in all the selected grids. They varied spatially for soil pH (5.62 to 7.65), organic carbon (0.35 to 0.65 %), available NPK (219 to 480 kg N, 15.2 to 48.7 kg P_2O_5 and 144 to 189 kg K_2O ha^{-1}). Variability was managed through site specific nutrient management (SSNM) strategy, and for comparision Farmer's practice was included. Based on the soil test values of each grid, total grids were classified into low, medium and high NPK grids and soil test based fertilizer recommendation for each grid were applied accordingly.

Results and Discussion

Site specific nutrient management practices recorded significantly higher maize grain yield during *kharif* and *rabi* seasons (9.56 and 9.46 Mg ha^{-1}, respectively) as compared to farmers practice (7.94 and 8.01 Mg ha^{-1}, respectively) which was 20.40 and 18.18 per cent higher yield respectively (Table 1 and 2). This increased yield in variable nutrient applied plots was mainly due to increased growth and yield parameters. The increased growth and yield parameters were mainly attributed to uniform growth of maize due to balanced supply of nutrients. The results are in corroborated with the findings of Trinh *et al*., 2008. The analysis of two season data showed that precision nutrient management recorded 20.40 and 18.10 per cent higher maize yield during *kharif* and *rabi* respectively, over farmer's method of cultivation.

Table 1. Influence of precision farming practices on growth and economics of maize (*kharif 2014)*

Sl. No.	Technology	No. of farmers	Area covered (ha)	Yield (Mg ha^{-1})	Net returns (Rs.ha^{-1})	B:C ratio
1	SSNM	19	36	9.56	85,368	2.91
2	Farmers Field	2	2.5	7.94	54,846	1.36
	t-test (*p*=0.05)	-	-	0.27	-	-

Table 2. Influence of precision farming practices on growth and economics of maize (*rabi 2014)*

Sl. No.	Technology	No. of farmers	Area covered (ha)	Yield (Mg ha^{-1})	Net returns (Rs.ha^{-1})	B:C ratio
1	SSNM	61	100	9.46	80363	3.42
2	Farmers Field	08	2.5	8.01	61190	2.76
	t-test (*p*=0.05)	-	-	0.25	-	-

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