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Effect of yield target based nutrient management on yield of *rabi* maize

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Abstract
An experiment was conducted on clay loam soil of Western Ghat region to study the Effect of yield target nutrient management in *rabi* maize during *rabi* 2016 and 2017 at Post Graduate Research Farm, Mahatma Phule Krishi Vidyapeeth, Rahuri, Ahmednagar (M.S.). The experiment was laid out in randomized block design with nine replication. The treatments consists of T_1-Absoulte control; T_2- GRDF (120:60:40, kg N, P_2O_5, K_2O ha^{-1}); T_3- Fertilizer dose as per STCR equation (80 q ha^{-1} yield target); T_4- Fertilizer dose as per STCR equation (90 q ha^{-1} yield target); T5- Fertilizer dose as per STCR equation (100 q ha^{-1} yield target). The grain and stover yield noticed significantly higher when crop was fertilized with STCR equation (100 q ha^{-1} yield target) during both the years.

Keywords: Maize, STCR equation, yield

Introduction
Maize (*Zea mays* L.) is one of the most important cereal food crop grown in India. It ranks third position among the cereal crops after wheat and rice. Globally, maize is known as "Queen of cereals" because it has the highest genetic yield potential among the cereals. In India, maize is grown over an area of 8.38 million ha with annual production of 21.76 million tones with an average productivity of 2476 kg ha^{-1} during 2016 (Anon, 2017) [1]. In addition to staple food for human being and quality feed for cattle's, maize serves as a basic raw material as an ingredient to several industrial products such as starch, oil, protein, alcoholic beverages, food sweeteners, pharmaceutical, cosmetic, film, textile, gum, package and paper industries etc.

Since maize is an exhaustive crop, the nutrient requirement cannot be supplied only through native nutrient reserves; the additional nutrients can be met by fertilizer application. In maize yield is low due to imbalanced application of fertilizers. The recommendation of a fertilizer dose is a challenge to scientists as it should meet both nutrient demand of crop and sustain the production system.

Application of imbalanced and/or excessive nutrients led to declining nutrient-use efficiency making fertilizer consumption uneconomical and producing adverse effects on atmosphere (Aulakh and Adhya, 2005) [2] and groundwater quality (Aulakh *et al.* 2009) [3] causing health hazards and climate change.

The soil test crop response (STCR) are cost effective and plant need based approaches. The STCR approach provide principles and tools for supplying crop nutrients as and when needed to achieve higher yield. The STCR approach not specifically aim to either reduce or increase fertilizer use. Instead, they aim to apply nutrients at optimal rates and time to achieve higher yield and high efficiency of nutrient use by the crop, leading to more net returns per unit of fertilizer invested.

Material and Methods
The field experiment on Maize (*Zea mays* L.) was conducted during *rabi* season of 2016 and 2017 at the Post Graduate Institute Research Farm, Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist. Ahmednagar (M.S.). The soil of experimental plot was clay loam in texture and alkaline in reaction (pH 8.17) with organic carbon (0.57%). It was low in available nitrogen (123.48 kg ha^{-1}) and medium in available phosphorus (15.64 kg ha^{-1}) and very high in available potassium (380.80 kg ha^{-1}). The experiment was laid out in randomized block design with nine replication. The treatments consists of T_1-Absoulte control; T_2- GRDF (120:60:40, kg N, P_2O_5, K_2O ha^{-1}); T_3- Fertilizer dose as per STCR equation (80 q ha^{-1} yield target); T_4- Fertilizer dose

as per STCR equation (90 q ha^{-1} yield target); T_5- Fertilizer dose as per STCR equation (100 q ha^{-1} yield target) The gross plot size was 3.60 m X 4.00 m and net plot sizes was 2.40 m X 3.20 m. The crop was sown at spacing of 60 cm X 20 cm. Healthy, unbroken and well developed seeds of maize of variety Rajarshee were treated with fungicide and inoculated with bio fertilizer (PSB and KSB @ 25 g kg^{-1} seeds) before sowing of the seeds. The periodical growth observations were recorded at an interval of 30 days and crop was harvested at physiological maturity and data on yield were recorded.

Result and Discussion

Effect of yield target nutrient management on yield of *rabi* maize

Application of Fertilizer dose as per STCR equation (100 q ha^{-1} yield target) to *rabi* maize recorded significantly higher grain yield (92.23, 93.90 and 93.07 qha^{-1} respectively) during both the years and on pooled mean basis. Whereas, the absolute control treatment recorded significantly lowest grain yield of maize (43.89, 41.50 and 42.70 qha^{-1}) during first, second year and on pooled mean basis.

The increased grain yield of maize in application of fertilizer as per STCR equation (100 q ha-1) with FYM might be due to higher growth attributing characters like leaf area and higher dry matter production and its accumulation into different parts of plant and yield attributing characters like rows cob-1, grains cob-1 and weight of cob which resulted higher grain yield. These findings are in corroborative with Verma *et al.* (2005) [13], Kolawole and Joyce (2009) [8], Jitti S. (2012) [7], Birdar *et al.* (2012) [5], Biradar and Jayadeva (2013) [4], Parihar *et al.* (2015) [10],

Data presented in Table 1 implicated fertilizer dose as per STCR equation (100 q ha^{-1}target yield) with FYM recorded significantly maximum stover yield of maize than rest of the treatments during both the years and on pooled mean basis. Significantly minimum stover yield was observed in control treatment during both years and on pooled mean basis. Application of fertilizer as per STCR equation for 100 q ha^{-1} target yield increased the higher uptake of nutrients by the crop reflected on higher plant growth and yield attributes which in turn increased total biomass of crop. These results are in conformity with those reported by Patra and Biswas. (2009) [11], Jitti S. (2012) [7], Nagavani and Subbian (2014) [9], Shinde *et al.* (2014) [12], Vikram *et al.* (2015) [14] and Desai *et al.* (2017) [6].

Table 1: Grain and stover yield of *rabi* maize as influenced by different treatment

T. No.	Treatment	Yield (q ha^{-1})					
		Grain			Stover		
		2017	2018	Pooled	2017	2018	Pooled
T_1:	Absolute Control	43.89	41.50	42.70	65.80	63.69	64.75
T_2:	GRDF(120:60:40, kg N, P_2O_5, K_2O ha^{-1})	71.01	73.16	72.09	99.82	102.94	101.38
T_3:	Fertilizer dose as per STCR equation (80 q ha^{-1} target yield	80.86	82.08	81.47	119.87	122.65	121.26
T_4:	Fertilizer dose as per STCR equation (90 q ha^{-1} target yield)	84.80	86.46	85.63	130.30	134.19	132.24
T_5:	Fertilizer dose as per STCR equation (100 q ha^{-1} target yield)	92.23	93.90	93.07	142.75	147.64	145.20
	S.E.M. ±	0.99	0.55	0.80	1.52	2.06	1.81
	C.D. at 5%	2.85	1.58	2.26	4.39	5.93	5.12
	General mean	74.56	75.42	74.99	111.71	114.22	112.97

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