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ON FARM ASSESSMENTS OF FOLIAR APPLICATION OF SOLUBLE NPK ON YIELD AND ECONOMICS OF WHEAT AT FARMERS FIELDS IN HUMID SOUTH-EASTERN PLAIN (V) OF RAJASTHAN

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Abstract: On farm trial were conducted during Rabi 2014-15 and 2015-16, to assess the impact of foliar application of soluble NPK on yield and economics of wheat at farmers' fields in humid south-eastern plain (v) of Rajasthan. Treatment comprising 150 kg N + 30 kg P_2O_5 per ha (T_1), 120:40:30 kg NPK per ha (T_2) and 120:40:30 kg NPK per ha + two spray of soluble NPK 19:19:19 at 0.5 per cent at 40-45 and 65-70 DAS (T_3). Application of recommended dose of fertilizer along with foliar spray of soluble NKP (T_3) resulted in significantly higher grain yield, net returns and B:C ratio over T_1 and T_2 during both the years of experiment but at par with T_2 in respect to grain yield during 2015-16 and B:C ratio during both the years. On mean basis, T_3 registered higher by 4.87 per cent in grain yield, 6.61 per cent in net return and 2.02 per cent in B C ration as compared to applied recommended dose of fertilizer alone.
Keywords: Wheat, soluble NPK, yield, economics.

Introduction

Wheat is a major rabi season crop grown in the Bundi district of Rajasthan, despite the relatively high temperature that occur during the growth cycle. Heat stress is an important constraint to wheat productivity affecting growth stages specially anthesis and grain filling. It has already been established that heat stress is significant factor in reducing the yield and quality of grains. Wheat sown in late season condition is being affected by the heat stress during anthesis period which leads to decreased productivity of crop due to spikelet sterility, shriveled grains with inferior quality traits. Late sown wheat suffers drastic yield losses which may exceed to 40-50 per cent (Joshi *et al*., 2007). Among major abiotic stresses, drought stress is one of the factors that drastically affect crop production around the globe (Shahbaz *et al*., 2011). Exposure to drought stress poses serious challenges for the survival of plants, because it results in impaired germination and seedling growth (Ashraf *et al*., 2006) and affects plant growth (Xu *et al*., 2007), and reduced harvestable yield of plants (Nawaz *et al*., 2012). Foliar application gives guarantee for the availability of nutrients to crops for obtaining higher yield (Arif *et al*, 2006). Foliar application of major nutrients like NPK shall

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be more effective than soil application and also avoiding the depletion of these nutrients in leaves, thereby resulting in an increased photosynthetic rate, better translocation of these nutrients from the leaves to the developing grains. Foliar application is credited with the advantage of quick and efficient utilization of nutrients, eliminating of losses through leaching and fixation and helps in regulating the uptake of nutrients by plants (Manomani and Srimathi, 2009). Among major nutrients, nitrogen plays a vital role in increasing the yield of crop. Application of proper amount of nitrogen is considered key to obtain bumper crop of wheat. Foliar application of nitrogen has more effect on yield and yield components of wheat because it is more effective as minimum losses involved in foliar spray (Sud *et al*., 1990). Phosphorus has been identified as the most deficient essential nutrient after nitrogen. Phosphorus originates from the weathering of soil minerals and other stable soil geologic materials and exists in both inorganic and organic forms of which the inorganic fraction is dominant (Mosali *et al*., 2006). Potassium is a "work horse" plant nutrient. Perhaps this is why it is not bound into any specific plant compound. Therefore, potassium is free to travel and to wheel and deal within the plant almost at well. It should not be surprising that a shortage of potassium can result in loss of crop yield, quality and profitability. Foliar spray of potassium in combination with nitrogen had significant effect on grain yield of wheat (Eman and Mogied, 1998). In view of these facts, present investigation was carried out 'On Farm Assessments of Foliar Application of Soluble NPK on Yield and Economics of Wheat at Farmers Fields in Humid South-Eastern Plain (V) of Rajasthan'

MATERIALS AND METHODS

The study was conducted in Bundi district of Rajasthan to assess the effect of foliar application of soluble NKP on yield and economics of wheat at farmer's fields in humid south-eastern plain (v) of Rajasthan. The On Farm Trial (OFT) was conducted at farmer's fields at eight different locations during rabi, 2014-15 and 2015-16. The soils of experiment locations were sandy loam to loam in texture, normal in soil reaction (pH 7.75-8.15) and electrical conductivity (0.131-0.325^{-1} dSm), low in organic carbon (0.358 -0.421%), medium in available phosphorus (11.5-24.1 kg/ha) and available potassium (118-163.7 kg/ha). The experiment (OFT) was laid out using Randomized Block Design (RBD). Plot size 40 m × 50m having 22.5 cm row spacing were used in OTF. Treatment consisting farmers practice *i.e.* 150 kg N + 30 kg P_2O_5 per ha (T_1), recommended practices *i.e.* 120:40:30 kg NPK per ha (T_2) and assess technology (T_3) *i.e.* recommended practices (120:40:30 kg NPK/ha) + two spray of soluble NPK 19:19:19 at 0.5% at tillering stage (40-45 DAS) and boot stage (65-70

DAS). Full dose of phosphorus and potash were applied at basal with seed cum fertilizers drill, nitrogen were applied in three equal split 1/3 at basal, 1/3 at first irrigation (crown root initiation) and remaining 1/3 at second irrigation (jointing stage). Sowing of wheat crop was done in between 20-22 and 25-27 November during rabi 2014-15 and 2015-16, respectively. All other practices during crop growth period were as per the package of practices for rabi crops recommended by Zonal Packages of Practices of Humid South-Eastern plain (V) of Rajasthan. The crop was harvested and threshed manually and yield was computed at 8% moisture content. Data on crop grain yield were recorded at the time of crop harvest then after economics of the crop was calculate treatment wise to draw valid conclusions. Randomized block design (RBD) was employed to test the significant of the differences in different parameters.

RESULTS AND DISCUSSION

Yield: The grain yield of wheat was significantly influenced under different fertilizers application treatments (Table 1). During both the year of experimentations, the grain yield of wheat recorded significantly higher under T_3 treatment comprising 120:40:30 kg NPK/ha+ two spray of soluble NPK 19:19:19 at 0.5% at 40-45 and 65-70 DAS over T_1 (150 kg N + 30 kg P_2O_5 per ha) and T_2 (120:40:30 kg NPK per ha) but at par with T_2 during 2015-16. T_3 treatment resulted in 6.72 and 12.84 per cent yield increment over T_2 and T_1 respectively in the year of 2014-15. While the corresponding increase in 2015-16 were 4.86 and 9.24 per cent, respectively. On mean basis, T_2 and T_3 brought 4.87 and 10.87 per cent higher grain yield of wheat over T_1, respectively. Gosavi et al., (2017) from Nasik (Maharashtra) also reported 8.02 per cent higher grain yield of wheat with recommended dose of fertilizer along with three spray of soluble NPK over the alone recommended dose of fertilizer (41.76 q/ha). The results of wheat yield enhancement through foliar application of soluble NPK along with recommended dose of fertilizer in present investigation are in cognizance with that of Hasina *et al*., (2011), Sabbir *et al*., (2015), Emam and Borjian (2000)

Economics: Cost of cultivation of various treatments was estimated on the basis of approved market rates for inputs by taking into account cost of seed, fertilizer, herbicides, pesticides, hiring charges of human labour and machines for different field operations. Gross returns were calculated on the basis of market rates. The data (table.2) reveal that during both the year of study, significantly higher cost of cultivation were recorded in T_3 treatment over T_2 and T_1 but at par with T_2 during 2014-15. On mean basis, T_3 treatment registered 5.03 and 6.77 per cent higher cost of cultivation over T_2 and T_1, respectively. It is evident from results

that foliar application of soluble NPK along with recommended dose of fertilizer (T_3) gave significantly higher net return over T_2 and T_1 during both the year of study. On mean basis, T_3 treatment recorded 6.61 and 14.76 per cent higher net return over T_2 (Rs 30632 /ha) and T_1 (Rs 28457/ha) respectively. Similarly, B C ratio was also significantly higher with T_3 treatment over T_1 but statistically at par with T_2 during both the year of study. Mean data revealed that foliar application of soluble NPK along with recommended dose of fertilizer (T_3) resulted 2.02 and 6.32 per cent higher B C ratio over T_2 (1.98) and T_1 (1.90), respectively. These results are in conformity to the work of Mudalagiriyappa *et al*., (2016), according to which high gross and net return with foliar application of soluble fertilizers in chickpea, Parasuraman. (2001) in cowpea and Premsekhar and Rajashree (2009) in tomato crop.

Table 1. Effect of foliar application of soluble NPK on grain yield of wheat crop

Treatment		**Yield (q/ha)**			**Per cent increase over T_1**
		2014-15	**2015-16**	**Mean**	
T_1	150 kg N + 30 kg P_2O_5 per ha	34.50	41.88	38.19	-
T_2	120:40:30 kg NPK per ha	36.48	43.63	40.05	4.87
T_3	120:40:30 kg NPK per ha + two spray of soluble NPK 19:19:19 at 0.5 per cent at 40-45 and 65-70 days after sowing (DAS)	38.93	45.75	42.34	10.87
	CD (0.05)	1.42	2.31		
	CV (%)	2.56	3.4781		

Table 2: Effect of foliar application of soluble NPK on economics of wheat crop

Tr.	**Cost of cultivation (Rs/ha)**			**Net return (Rs/ha)**			**B C Ratio**		
	2014-15	2015-16	Mean	2014-15	2015-16	Mean	2014-15	2015-16	Mean
T_1	29783	36475	33129	29825	27089	28457	2.06	1.74	1.90
T_2	29902	37450	33676	32358	28906	30632	2.17	1.79	1.98
T_3	31572	39175	35373	34850	30465	32657	2.22	1.81	2.02
CD(0.05)	1756	1040		1616	697		0.064	0.042	
CV (%)	3.81	1.82		3.29	1.60		1.95	1.56	

CONCLUSION

From the on farm experiment conducted on effect of foliar application of soluble NKP on yield and economics of wheat crop, it is concluded that foliar application of soluble NPK 19:19:19 at 0.5 per cent solution at 40-45 and 65-70 days after sowing along with recommended dose of fertilizer i.e. 120:40:30 kg NPK/ha enhance grain yield, net return and B C ration as compared to applied recommended dose of fertilizer alone.

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