



Effect of Foliar Application of Zinc Sulphate on Onion

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ABSTRACT

A preliminary survey was conducted in the district and to gather information on problems faced by farmers in the cultivation of onion crop. The results revealed that farmers were facing problem of low productivity of onion. It was found that soils of district are deficit in zinc and due to this, the productivity of the crop was not up to the mark. To overcome this problem, an On Farm Trial (OFT) was conducted by KVK at 10 farmer's field during 2014-15 and 2015-16 to evaluate the effect of foliar application of zinc sulphate on bulb yield of onion in addition to recommended doses of NPK. Foliar application of zinc sulphate @0.5 per cent at 45 and 60d after transplanting was given along with NPK@100:50:50 kg/ha, respectively. For raising of the crop, recommended package of practices were followed. The data of the trial revealed that foliar application of zinc sulphate along with recommended dose of NPK (T1) gave maximum yield of onion (275 q/ha) along with the maximum B: C ratio (2.63:1) compared to the recommended practice (T2) which gave 231.25 q/ha yield along with B:C ratio of 2.19:1 and Farmers' practice (T3) where yield of 187.5 q/ha was recorded along with B:C ratio of 2.16:1 pooled over the two years. Foliar application of zinc sulphate in addition to recommended doses of NPK can be effective practice to deal with low productivity of the crop due to zinc deficiency.

Key Words: Bulb Yield, Fertilizer Onion, On Farm Trial, Zinc Sulphate.

INTRODUCTION

Onion (*Allium cepa* L.) is one of the most important commercial vegetable crops and is widely grown in almost all over the world. The intensive cropping, imbalanced fertilization and minimal usage of micronutrients and limited application of organic manures have resulted in the depletion of soil fertility. Zinc is one of the most important micro-nutrients and essential for cell division, nitrogen and carbohydrate metabolism and water relation in plant growth (Brady, 1990). Response of onion to zinc application has been reported (Lal and Maurya, 1981) in the literature. However, information on the use of micronutrient in combination with inorganic fertilizers for onion is scanty in India. Foliar application of micronutrients during crop growth was successfully used for correcting their deficits and improving the mineral status of plants as well as increasing the crop yield and quality (Kolota and Osinska, 2001). The foliar application of micronutrients had a significant effect

on plant growth, yield and quality (El Tohamy *et al*, 2009 and Alam *et al*, 2010). Therefore, an attempt was made to study the response of onion to zinc sulphate application in presence of nitrogen (N), phosphorus (P), potash (K), in the Mohali district of Punjab.

MATERIALS AND METHODS

District Mohali of Punjab falls under sub-mountainous zone (30.69°N latitude, 76.72°E longitude having an average altitude of 316 m from the sea level). The present study was carried out in 10 farmer's field during 2014-15 and 2015-16 to evaluate the effect of foliar application of zinc sulphate on bulb yield of onion in addition to recommended doses of NPK. The area under each trial was 0.4ha. The trial was conducted in randomized block design (RBD) with three replications. For raising of a crop, recommended package of practices were followed. The seedlings were sown during mid October to mid November

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and transplanting was done during mid November to mid December during both the years. The seedlings were planted at a spacing of 15 cm × 7.5 cm. Before fertilizer application, random soil samples were taken from the experimental site and were analyzed. The treatments included: T1: Farmers' Practice (No application), T2: NPK@100:50:50kg/ha (Recommended Practice or RP) and T3: foliar application of zinc sulphate @0.5% at 45 and 60 days after transplanting was given along with NPK@100:50:50 kg/ha, respectively (KVK Intervention). Based on the net plot yield, yield per hectare was calculated and expressed in quintal (q) per hectare. Statistical analysis was done using standard procedure given by Panse and Sukhatme (1978).

RESULTS AND DISCUSSION

Bulb yield

The data (Table 1) revealed that T1 gave 187.50 q/ha yield whereas T2 gave 231.25 q/ha and T3 gave 275 q/ha pooled over the years. Foliar application of zinc sulphate (ZnSO₄) significantly improved yield of onion and along with NPK gave maximum yield of onion (275 q/ha) along with the maximum B: C ratio (2.63) compared to the farmers' practice (187.50 q/ha) with B: C ratio of 2.16. These results were in conformity with those of Mishra *et al* (1990), Sliman *et al* (1999) and Acharya *et al* (2015) where application of zinc had significant effect on yield and yield contributing characters. The highest values of marketable (31.5 t/ha) and total yield (33.3 t/ha) were recorded with 0.5% ZnSO₄ while the lowest with control. Meena

and Singh (1998) in their investigation reported that zinc significantly increased dry weight of bulb. The favourable effect of micronutrients on plant growth might be due to their role in many physiological processes and cellular functions within the plants. In addition, they play an essential role in improving plant growth, through biosynthesis of endogenous hormones which are responsible for promoting of plant growth (Battal, 2004). The yield improvement was due to better growth and development. Higher photosynthates accumulation in the bulbs would ensure higher individual bulb weight, large bulb diameter and neck thickness.

Increase in yield over farmers' and recommended practices

Results of the present investigation (Table 1) revealed that T3 gave 46.67 per cent increase over farmers' practice i.e. T1 whereas T3 gave 18.92 per cent increase over recommended practice i.e. T2 pooled over the years. Thus, it can be concluded that, the foliar application of zinc sulphate@ 0.5% along with recommended dose of NPK significantly enhanced the yield and quality of onion in the district Mohali.

Economics

The inputs and outputs prices of commodities prevailed during both the year of demonstrations were taken for calculating cost of cultivation, net returns and benefit cost ratio. The results revealed (Table 1) that T1 gave net return of Rs. 44200/- with B: C ratio of 2.16:1 whereas T2 gave net return of Rs. 54780/- with B: C ratio of 2.19:1 and T3 gave net return of Rs. 68750/- with B: C ratio

Table 1. Yield performance and economic indicators of onion. (Average of 2 yr)

Treatments	Yield (q/ha)	% increase over FP	% increase over RP	Gross expenditure (Rs./ha)	Gross return (Rs./ha)	Net return (Rs./ha)	B:C ratio
T1:	187.50	46.67	18.92	20500	64700	44200	2.16
T2:	231.25			25000	79780	54780	2.19
T3:	275.00			26112	94862	68750	2.63
CD (P<0.05%)	28.78						

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of 2.63:1 pooled over the years. These results were in proximity with those of Shah (1999) who made an economic evaluation of onion production and its marketing in Maharashtra. Gaydhani (2005) who made an investigation on resource use efficiency in production of onion in Akola district of Maharashtra and Shrichand and Jain (2008) who conducted the study on onion production and its marketing in Madhya Pradesh. Favourable benefit cost ratio (BCR) was self explanatory of economic viability of the trial which further convinced the farmer about balanced fertilizer use in onion production.

CONCLUSION

The foliar application of zinc sulphate in addition to recommended doses of NPK can be effective practice to deal with low productivity of the crop due to zinc deficiency. Farmers of different villages showed positive response for the planning and execution of this technology however more awareness about judicious use of fertilizers is needed which can be done by proper soil testing and right interpretation of results. It was noticed that potential yield of crop can be achieved by giving scientific knowledge to the farmers, providing the good quality need based inputs and proper application of these inputs. However horizontal spread of recommended and improved technologies may be achieved by the successful implementation of results of on farm trials (OFT) and various extensions activities like training programmes, Kisan goshi, Khet Diwas, farmer field school, exposure visit to universities/institutes etc.

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Received on 31/12/17

Accepted on 20/01/18