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EFFECT OF FOLIAR APPLICATION OF FERTILIZERS ON YIELD AND FLOWERING OF MUSKMELON (*Cucumis melo*)

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ABSTRACT

Foliar fertilizer application efficiently meets the demand of crops during the periods of high nutrient demand particularly when nutrients become fixed in the soil. Hence, a field experiment was conducted at farmer's field in Kadapa district of Andhra Pradesh, to find out the efficacy of foliar application of chemical fertilizers such as borax (1%), KNO_3 (6%) and $CaNO_3$ (6%) alone or in combination, on flowering and yield of commercially important muskmelon variety Haramadhu. Combined application of nutrients were more effective in promoting early flowering, more number of fruits and higher yields than application of fertilisers independently. The plants treated with combined spraying of borax + $CaNO_3$ and borax + KNO_3 took less number of days for first staminate and pistillate flower appearance, more number of pistillate flowers/plant (50.0 and 52.50 days respectively) and recorded 57.9 and 31.6 per cent increase in number of fruits and 92.6 and 76.7 per cent higher yields, respectively compared with control (water sprays).

KEYWORDS:

INTRODUCTION

Melon is one of the most important vegetable crops cultivated throughout the world and popular for its taste, flavour and as a source of phytonutrients (Lestes, 2008). The area under muskmelon cultivation is increasing during the past decade owing to its nutritional benefits. Fast growing habit and short lifespan of muskmelon demands balanced fertilizer application in enhancing the yield and quality. Deficiency of major and micro nutrients has been widely reported in cucumbers (Carmona *et al.,* 2015) which hampers the production. Among the macro nutrients, potassium (K) and calcium (Ca) deficiency has been widely reported in cucumbers. Potassium (K) is not a constituent of any functional molecule, but it plays a vital role in plant growth, yield and fruit quality in many plant species. Potassium (K) uptake from soil occurs mainly during vegetative stage and reduces during reproductive development because of reduced root growth (Marschner, 1995). Similarly, when calcium is deficit in soils, new tissues in root tips, young leaves and shoot tips exhibit distorted growth due to improper cell wall formation. Lamikanra and Watson (2004) reported that, calcium regulates senescence and fruit softening in melons.

Among the micronutrients, boron is vital for growth and development and plays a major role in several physiological processes such as nitrogen metabolism, protein formation, cell division and cell wall formation (Ahmad *et al.,* 2009) and metabolic functions such as translocation of carbohydrates, germination of pollen tube, pollen tube growth, fruit formation (Mengel and Kirkby, 1982), movement of potassium to the guard cells of stomata (Cakmak and Romheld, 1997). The deficiency of boron occurs worldwide and also observed as one of the most common among plant micronutrient deficiencies (Ganie *et al.,* 2013). In India, boron deficiency has been widely reported in tropical and subtropical regions due to high soil pH, low organic matter, high boron adsorption and poor crop management (Singh, 2001).

Melon crop is sensitive to nutrient deficiencies particularly under dry climates due to deficit moisture (Cabello *et al.,* 2009). Soil application of mineral nutrients requires repeated irrigation and causes low fruit quality, since melons are sensitive frequent irrigations that impair fruit quality. Foliar fertilizer application is an efficient way to improve the yield by enhancing the crop nutrient status during the periods of high nutrient demand (Lovatt, 2013) particularly during flowering and fruiting stage. Therefore this study was conducted to elucidate the importance of foliar application of nutrients viz., potassium, calcium and boron for realising the higher yields in a commercially grown muskmelon hybrid Pusa sharbati.

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Table 1. Effect of foliar application of fertilizers on flowering and yield of muskmelon cv. Pusa sharbati

Treatment	Day to 1st staminate flower appearance	Days to 1st pistillate flower appearance	Number of staminate flowers/plant	Number of pistillate flowers/plant	Number of fruits/ plant	Average fruit weight (kg)	Yield/ plant (kg)
T_1	43.17	49.00	116.50	19.50	2.083	0.374	0.776
T_2	43.67	52.83	121.67	14.33	1.500	0.403	0.607
T_3	47.17	55.00	121.83	14.17	2.000	0.395	0.791
T_4	42.17	52.50	120.83	17.67	1.833	0.471	0.864
T_5	42.50	50.00	119.17	21.50	2.500	0.379	0.942
T_6	50.50	55.83	126.50	11.50	1.583	0.308	0.489
CD at 5%	**1.53**	**2.57**	**7.96**	**1.69**	**0.513**	**0.036**	**0.214**

T_1 : Foliar spraying of borox @ 1 per cent
T_2 : Foliar spraying of potassium nitrate @ 6 per cent
T_3 : Foliar spraying of calcium nitrate @ 6 per cent
T_4 : Foliar spraying of borox @ 1 per cent + potassium nitrate @ 6 per cent
T_5 : Foliar spraying of borox @ 1 per cent + calcium nitrate @ 6 per cent
T_6 : Water spray

MATERIALS AND METHODS

The study was conducted during the year 2011-12 in farmer's field at Kadapa district of Andhra Pradesh with a commercially important variety Pusa Sharbati in a randomized block design with three replications. Muskmelon was raised as rice fallow crop following standard commercial practices for summer muskmelon production including irrigation, fertilizer management and plant protection. The study was initiated with foliar spraying of analytical grade nutrient fertilizers viz., borax, KNO_3 and $CaNO_3$ at 30 and 50 days after sowing in six treatment combinations namely, T_1 – Borax @ 1 per cent; T_2- KNO_3 @ 6 per cent; T_3- $CaNO_3$ @ 6 per cent; T_4- Borax @ 1per cent + KNO_3 @ 6per cent; T_5- Borax @ 1 per cent + $CaNO_3$ @ 6 per cent and T_6- Control. Observations were recorded on days to first staminate flower appearance, days to first pistillate flower appearance, number of staminate flowers per plant, number of pistillate flowers/ plant, sex ratio, number of fruits per plant and yield per plant. Sex ratio was calculated as ratio of female flowers to male flowers. The data were statistically analyzed by WASP and the treatments were compared at 0.05 level of significance.

RESULTS AND DISCUSSION

The results from Table 1 indicated that , plants sprayed with 1per cent borax + 6 per cent KNO_3 (T_4) took significantly less number of days for appearance of first staminate flower (42.17) and was on par with the treatment T_5 (1 % borax + 6 % $CaNO_3$) (42.50 days). Similarly plants sprayed with 1 per cent borax + 6 per cent $CaNO_3$ recorded less number of days for first pistillate flower appearance and higher number of pistillate flowers per plant (21.50) and closely followed by T_4 treatment (1% Borax + 6 % $CaNO_3$) with 19.50 pistillate flowers/ plant. The control treatment with water sprays (T_6) recorded more number of days for first pistillate flower appearance (55.83) and less number of pistillate flowers/ plant (11.50). Foliar application of borax alone or in combination with KNO_3 and $CaNO_3$ resulted in early flowering and more number of flower but the effect is more pronounced in treatments where there was combination of fertilizers. The earliness in appearance of both male and female flowers, production of more pistillate flowers in plants treated with borax along with KNO_3 and $CaNO_3$ might be due to the fact that foliar application efficiently met the high nutrient demands of the crop during the period of experimentation. Rab and Haq (2012) also reported the superior plant growth in tomato with foliar application of Ca + B as compared to the nutrients applied alone.

Similarly the plants sprayed with borax and $CaNO_3$ (T_5) recorded more number of fruits/pants (2.50) and higher yield per plant (0.949) followed by 2.08 fruits/plant and yield of 0.864 kg/plant in T_4 treatment (borax and KNO_3) (Table 1). Application of boron alone resulted in less number of fruits per plant (1.83) and lower yield (0.776 kg/plant). Combined spraying of borax + $CaNO_3$ and borax + KNO_3 recorded 57.9 and 31.6 per cent increase in number of fruits and 92.6 and 76.7 per cent higher yields, respectively when compared to control (water sprays). The application of boron enhances fruit set (Desouky *et al.,* 2009) as it regulates the carbohydrate metabolism and helps in absorption of water. Similarly increase in number of fruits and yield with KNO_3 and $CaNO_3$ application might be due to the continuous supply of food material which play a vital role in plant growth and development. Jifon and Lester (2011) in cantaloupe reported the enhance yield with foliar application of potassium fertilizer. Similarly, Rab and Haq (2012) reported the higher yield in tomato with the combined application of $CaCl_2$ and borax.

The results of this research showed that properly timed foliar application of borax in combination with either KNO_3 or $CaNO_3$ successfully increased the yield of commercially valuable muskmelon.

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