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Effect of foliar application of fertilizers on flowering and yield of muskmelon (*Cucumis melo*) CV. madhuras

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Abstract

A field experiment was conducted during the year 2018-19 in farmer's field at Chennur, Kadapa district of Andhra Pradesh with a commercially important variety 'Madhuras' grown as a rice fallow crop to elucidate the effect of foliar application of nutrients nitrogen, potassium, calcium and boron for realising the higher yields. The study was initiated with foliar spraying of six treatment combinations namely Borax @ 1 %, KNO_3 @ 6%, $CaNO_3$ @ 6%, Borax @ 1% + KNO_3 @ 6%, Borax @ 1 % + $CaNO_3$ @ 6 %, water sprays as control with two spraying frequencies (30 and 50 days after spraying). 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. According to the findings of the present study it can be concluded that foliar application of combination of 1% borax + 6 % calcium nitrate twice at 30 and 50 days after planting significantly enhanced the fruit yield by recording early flowering, more number of fruits per plant.

Keywords: Muskmelon, Foliar Spray, Potassium Nitrate, Calcium nitrate, Boron, Yield

Introduction

Melon is one of the most important vegetable crops, cultivated throughout the world and is popular for its taste, flavour and as a source of phytonutrients (Lester, 2008) [13]. 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) [6] which hamper its 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 K uptake from soil occurs mainly during vegetative stage and reduces during reproductive development because of reduced root growth (Marschner, 1995) [16]. Calcium is an essential element for growth of young tissues, roots and fruits (Yildirim *et al.*, 2007) [2]. Lester (1996) [14] reported that foliar application of calcium delays fruit senescence in melons. When calcium is deficit new tissues in root tips, young leaves and shoot tips exhibit distorted growth due to improper cell wall formation. A disturbance in calcium nutrition also effects the fruit growth and quality. Calcium deficiency reported water core (Odet and Dumoulin, 1993) [18] and fruit softening (Lamikanra and Watson 2004) [12] in melon.

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) [2] and metabolic functions like translocation of carbohydrates, germination of pollen tube, pollen tube growth, fruit formation (Mengel and Kirkby, 1982) [17], movement of potassium to the guard cells of stomata (Cakmak and Romheld, 1997) [5]. Plant reproductive growth was considered more sensitive to B deficiency than vegetative growth (Dell and Huang 1997) [7] and B deficiency is considered to reduce fruit set more than vegetative growth. The deficiency of boron occurs worldwide and also observed as one of the most common among plant micronutrient deficiencies (Ganie *et al.*, 2013) [8]. In India also, 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 (Srilatha *et al.*, 2015) [21].

Melon crop is sensitive to nutrient deficiencies particularly under dry climates due to moisture deficit (Cabello *et al.*, 2009) [4]. Soil application of mineral nutrients requires repeated irrigation and causes low fruit quality, since melons are sensitive frequent irrigations which impair fruit quality, foliar fertilization is an efficient way to improve the yield by enhancing the crop nutrient status during the periods of high nutrient demand (Lovatt, 2013) [15] particularly during flowering and fruiting stage. Khamwaree and Khurnpoon (2010) reported that spraying of calcium and boron had significantly increased the plant growth, yield and quality of muskmelon. Ansary and chowdrury (2018) [3] suggested that the significant increase in growth, sex-expression and fruit characters of bottle guard would be obtained by the spraying of ethrel at 2 and 4 true leaf stages along with the seed soaking by boron (0.05%) for 12 hours. Little information is available on the calcium and boron nutrition on flowering and yield of melon. The present investigation aimed at determining the importance of foliar application of nutrients nitrogen, potassium, calcium and boron for realising the higher yields in a commercially grown muskmelon cultivar Madhuras.

Materials and methods

The study was conducted during the year 2018-19 in farmer's field with a commercially important variety 'Madhuras' 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 borax, KNO_3 and $CaNO_3$ in six treatment combinations namely Borax @ 1 %, KNO_3 @ 6%, $CaNO_3$ @ 6%, Borax @ 1% + KNO_3 @ 6%, Borax @ 1 % + $CaNO_3$ @ 6 %, water sprays as control with two spraying frequencies (30 and 50 days after spraying). 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 ration of female flowers to male flowers. The data were statistically analyzed by WASP and the treatments were compared at 5 % level of significance.

Results and discussion

From the results (Table 1) it was observed that, among the foliar fertilizers, plants sprayed with 1% borax + 6 % KNO_3 took significantly less number of days for appearance of first staminate flower (42.17) and recorded more number of pistillate flowers per plant (21.50) which was onpar with the application of 1 % borax + 6 % $CaNO_3$. Similarly plants sprayed with 1% borax + 6 % $CaNO_3$ recorded a higher sex ratio (0.163) and it is closely followed by 1% Borax spray (0.147). While the control treatment with water sprays (W) recorded more number of days for first pistillate flowers (55.83), less number of pistillate flowers/plant (11.50) and low sex ratio (0.075). The effect of number of sprays were non significant on days to appearance of first staminate and pistillate flower, but sparing twice at 30 and 50 days after flowering (N_2) has recorded significantly higher pistillate and stamiate flowers and sex ration as compared to single spray at 30 days after planting (N_1). Similarly, the interaction effects of foliar fertilizers and spraying frequency was significant on days to first pistillate flower appearance, number of pistillate flowers per plant and sex ratio. Foliar spraying of 1 % borax and the combined spraying of 1 % borax + 6 % $CaNO_3$ twice at 30 and 50 days after sowing recorded more number of pistillate flowers followed by (22.33 and 20.67, respectively) and higher sex ratio (0.170 and 0.157, respectively) than other treatments. Boron involves with the growth of cell wall, shoot growth, cell differentiation, and enhance the flowering number and fruit yield. Application of boron in bottle gourd also significantly increased yield due to increased number of female flowers and fruit set as well as fruit size (Hooda *et al*., 1981) [9]. Boron is an immovable element that directly is uptake via cucumber roots during flowering and fruiting. Since the root system of cucumber is weak, foliar application with boric acid has a remarkable impact on fruiting and subsequently the total yield.

The effects of foliar fertilizer, spraying frequency and their interaction was found significant with respect to number of fruits per plant, average fruit weight and yield per plant (fig. 1). The plants sprayed with boric acid + calcium nitrate (BCa) and those sprayed with boric acid + potassium nitrate (BK) recorded the maximum yield (Fig.) because of more number of fruits and enhanced fruit weight. Among three-way interactions, statistically remarkable impact was observed on the fruit yield and the maximum was recorded by the plants sprayed twice at 30 and 50 days after planting with boric acid + calcium nitrate ($BCaN_2$) (0.951 kg/plant) and those sprayed with boric acid + potassium nitrate (BKN_2) (0.933 kg/plant).

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Conclusion

According to the findings of the present study it can be concluded that calcium nitrate played the eminent role on most traits, after that boric acid and finally nitrogen carried this role. Among the interaction, foliar application of combination of 1% borax + 6 % calcium nitrate twice at 30 and 50 days after planting significantly affected the fruit yield.

References

1. Abduljabbar IM, Ghurbat HM. Effect of foliar application of potassium and IAA on growth and yield of two cultivars of squash (*Cucurbita pepo* L.). Journal of

Tikrit University for Agricultural Sciences. 2010; 10(2):229-242.
2. Ahmad W, Niaz A, Kanwal S, Rahmathulla, Rashid MK. Role of boron in plant growth: a review. Journal of Agricultural Research. 2009; 47(3):330-338.
3. Ansary AM, Chowdrury BM. Effects of boron and plant growth regulators on bottle gourd (*Lagenaria siceraria* (Molina) Standle.). Journal of Pharmacognosy and Phytochemistry. 2018; 1:202-206.
4. Cabello MJ, Castellanos MT, Romojaro F, Martinez C, Ribas F. Yield and quality of melon grown under different irrigation and nitrogen rates. Agricultural Water Management. 2009; 96: 866-874.
5. Cakmak I. and Römheld V. Boron deficiency-induced impairments of cellular functions in plants. Plant Soil, 1997; 193:71-83.
6. Carmona VV, Costa LC and Cecílio Filho AB. Symptoms of Nutrient Deficiencies on Cucumbers. International Journal of Plant and Soil Science. 2015; 8(6):1-11,
7. Dell B, Huang L. Physiological response of plants to low boron. Plant Soil. 1997; 193:103-120
8. Ganie AM, Farida Akhter, Bhat AM, Malik AR, Jan Mohd Junaid, Abas Shah M, Arif Hussain Bhat and Tauseef AB. Boron – a critical nutrient element for plant growth and productivity with reference to temperate fruits. Current Science. 2013; 104(1):76-85
9. Hooda RS, Pandita ML, Sidhu AS. 1981. A note on the foliar application of calcium and boron on growth and yield of un pruned and pruned musk melon (*Cucumis melo* L.). Haryana Journal of Horticultural Science. 1981; 10(1/2):11-112
10. Jifon JL, Lester GE. Foliar Fertilization of Muskmelon: Effects of Potassium Source on Market Quality and Phytochemical Content of Field-Grown Fruit. Potash & phosphate Institute-Foundation for Agronomic Research. 2006; 52:1-8.
11. Khamvaree N, Khurnpoon L. Effect of calcium, Boron solution and non irrigation before harvesting on growth and quality in muskmelon (*Cucumis* mIelo L. Var *reticulata*). International Journal of Agricultural Technology, 2016; 12(7.1):1297-1305
12. Lamikanra O, Natson MA. Effect of calcium treatment and temperature on fresh cut cantaloupe melon during storage. Journal of Food Science. 2004; 69:468-472.
13. Lester GE. Antioxidant, sugar, mineral, and phytonutrient concentrations across edible fruit tissues of orange-fleshed Honeydew melon (*Cucumis melo* L.). Journal of Agricultural and Food Chemistry. 2008; 56:3694-3698
14. Lester G. Calcium alters senescence rate of post harvest melon fruit disks. Post Harvest Biology and Technology. 1996; 7:91-96.
15. Lovatt CJ. Properly timing foliar applied fertilizers increase efficacy: A review and update on timing foliar nutrient applications to citrus and avocado. Horticultural Technology. 2013; 23(5):536-541.
16. Marschner H. Functional mineral nutrients: Macro nutrients in mineral nutrition of higher plants. 2nd edition. Academic press, New York, 1995, 299-312.
17. Mengel K, Kirkby EA. Principles of plant nutrition. 3rd edition. International potash institute. Bern Switzerland, 1982, 125.
18. Odjet J, Dumoulin J. Un accident physiologique complexe: la vitrescence du melon. Info-CTIFL. 1993; 89:31-34.
19. Sensory S, Ertek A, Gelik I, Kukukyumuk C. Irrigation frequency and amount affect yield and quality of field grown melon (*Cucumis melo L*.). Agris. 2007; 88(1-3):269-273.
20. Singh R, Sharma RR, Tyagi SK. Preharvest foliar application of calcium and boron influences physiological disorders, fruit yield and quality of strawberry (*Fragaria ananassa* Duch.). Scietia Horticulturae. 2006; 112:215-220.
21. Srilatha V, Sunil Kumar K, Padmodaya B, Kiran Kumar Reddy C. Effect of foliar application of boron on leaf boron content and yield of papaya cv. Red Lady. Journal of Applied Horticulture. 2015; 17(1):76-78
22. Yildirim E, Guvenc I, Turan M, Karatas A. Effect of foliar urea application on quality, growth, mineral uptake and yield of broccoli (*Brassica oleracea* L.) var.italica. Plant, Soil and Environment. 2007; 53:120-128.