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Effect different nutrient compound on pumpkin msmayy (*Cucurbita pepo* L.) under different irrigation levels

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Key words: Vermicompost, Compost, Urea, Fruit weight, Plant growth.

Abstract

This experiment was carried out as factorial experiment base on CRD with three irrigation levels included and nutrient compound included control, vermicompost, urea with 3 replications. The result of present study showed that low irrigation level decreased internode and all nutrient compound enhanced internode at all irrigation levels. The highest shoot length was observed in high irrigation level combination with compost. Male and female flower were decreased in low irrigation levels and all nutrient compound increased flower at all irrigation levels. Fruit number increased by all nutrient compounds at all irrigation levels and compost application was more effective than other nutrient compound. The lowest fruit weight was in low irrigation level and all nutrient compound improved fruit weight at all irrigation level and compost application was more effective. All nutrient improved fruit diameter at all irrigation levels. Based on our result, compost application was more effective than vermicompost and urea at low, normal and high irrigation levels.

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Introduction

Drought stress is one of the environmental factors that most strongly threaten agriculture globally (Keeling *et al*, 2003). In arid and semi-arid regions of the world, water deficit and salinity stress are becoming the most limiting factors to the successful establishment of a crop (Canellas *et al*, 2002). A number of study showed that application of VC had desirable effect on plant growth and yield. Application of sheep manure VC in tomato cropincreased plant height and yield (Munns, 1993). Result of Singh and Wasnik revealed that application VC and fertilization of NPK (150:25:25 kg ha-1) produced optimum herbage and oil yield of rosemary compared to non-fertilizer and fertilizer with NPK (300:50:50 kg ha-1).

Compost and vermicompost improved soil aggregate, physical and chemical properties; so it can useful for improving drought stress damage on plant. The result of (Aryafar *et al.,* 2013, Al-Omran *et al*., 2005) showed that compost application enhanced yield and quality parameter of Nigella sativa under drought stress and the best treatment was compost application under non drought stress condition.

Alleviation of drought stress by nutrient compound is normal way to reduce stress damage on plant. On the other hand, reduce amount of chemical fertilization and use organic substrate is necessary in sustainable agriculture.

So, the aim of present experiment was to study 1) influence of irrigation level 2) effect different nutrient source under different irrigation level on growth and yield of *Cucurbita pepo*and choosing best nutrient treatment and irrigation level.

Materials and methods

Factorial experiment

The experiment was conducted as factorial experiment base on CRD with 2 factor irrigation levels included low (every three day), normal (every two day) and high irrigation level (every day) and fertilizer included compost, vermicompost, urea and non-fertilizer as control with 3 replications. Irrigation level and amount of fertilizer was selected based on chemical and fertilizer properties of soil. After field preparation; compost, vermicompost and urea were applied to soil base on treatment and were irrigated. Squash seed were sown in soil 40 cm distance from each other.

Experiment long and analysis method

Fruit were harvested 40 days until 4 month after sowing. Fruit weight, fruit diameter were measured by caliper and digital balance. Male and female flower was counted during experiment and shoot length was measured by ruler. Data were analysis by SAS using LSD at 0.5%.

Results and discussion

All of nutrient compound increased internodes at all irrigating levels and it's more effective by compost application. The highest internode was achieved in high irrigation level combination with compost (Fig. 1).

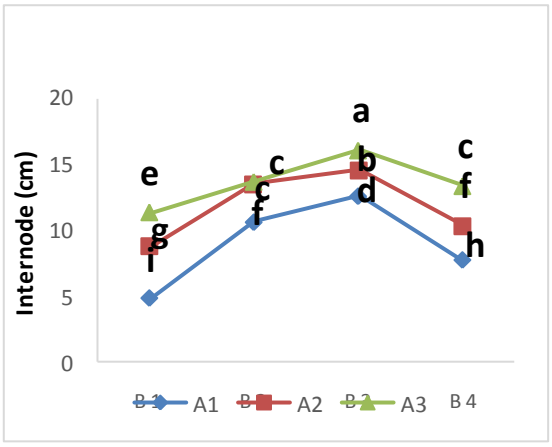

Fig. 1. Interaction effect of irrigation level and nutrient compound on internodes.

Shoot length were decreased in low irrigation level and stimulated by all nutrient compounds and the best treatments were compost, vermicompost and urea respectively. In general, compost enhanced shoot length at all irrigation levels (Fig. 2).

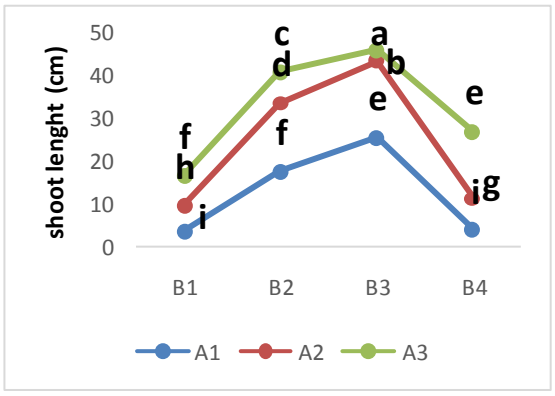

Fig. 2. Interaction effect of irrigation level and nutrient compound on shoot length.

Female flower decreased in low irrigation level and increased in high irrigation level as compared to normal irrigation. All nutrient compounds enhanced female flower at all irrigation levels and the highest female flower was in high irrigation level with compost (Fig. 3).

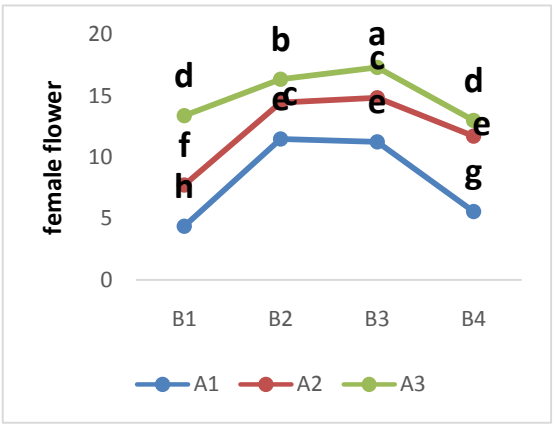

Fig. 3. Interaction effect of irrigation level and nutrient compound on female flower.

As same to female flower, male flower enhanced by all nutrient compound and its more effective in order compost, Vermicompost and urea as compared to non-fertilizer application (Fig. 4).

Fruit number decreased in low irrigation level and increased in high irrigation level as compared to normal irrigation. In low and normal irrigation level, compost and vermicompost as the same increased fruit number and urea it's less effective than compost and vermicompost. The highest fruit number was in high irrigation level with compost and vermicompost, respectively (Fig. 5).

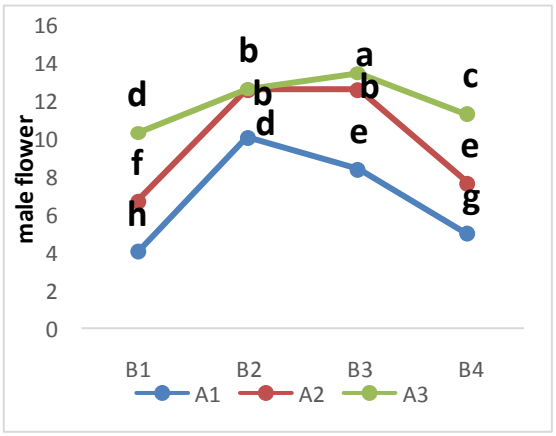

Fig. 4. Interaction effect of irrigation level and nutrient compound on male flower.

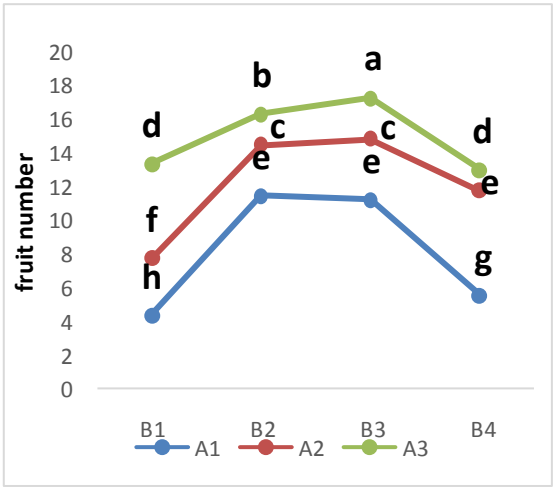

Fig. 5. Interaction effect of irrigation level and nutrient compound on fruit number.

The lowest fruit weight was in low irrigation level without nutrient compound application and improved by all nutrient compounds. Nutrient compound application enhanced fruit weight at all irrigation levels and the highest fruit weight was in high irrigation level and compost (Fig. 6).

Fruit diameter were decreased in low and normal irrigation as compared to high irrigation level and all

nutrient compound as same enhanced (except urea in low irrigation level) fruit diameter (Fig. 7).

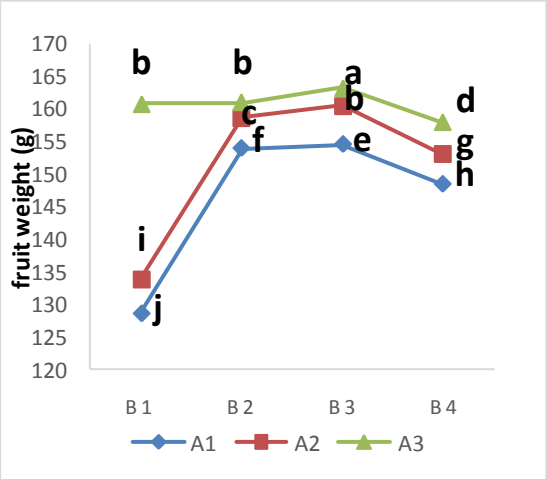

Fig. 6. Interaction effect of irrigation level and nutrient compound on fruit weight.

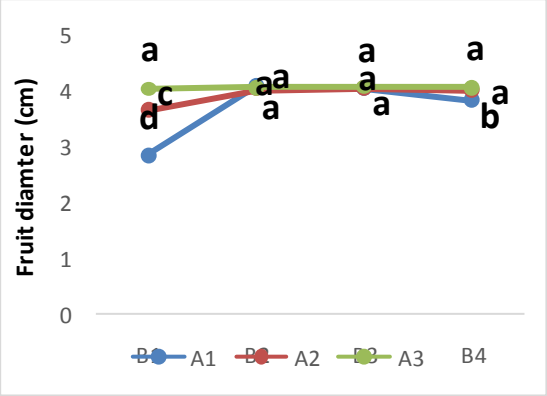

Fig. 7. Interaction effect of irrigation level and nutrient compound on fruit diameter.

Result of (keeling *et al.*, 2003, Higashi *et al.*, 1999) showed that vermicompost application caused an increasing root development and result in improving plant growth. Humic acid from vermicompost application increased root length in zea mays (Sarker *et al.*, 2005).

In present experiment, drought stress significantly reduced shoot length and vermicompost enhanced shoot length under low irrigation levels. Munns (Manivannan *et al.*, 2009) stated that drought stress decreased plant nutrition and caused a reduction in plant growth, on the other hand, vermicompost supplementation improved NPK statues in plant and soil structure.

The result of present study showed that male flower decreased in low irrigation level as compared to control and usage of all fertilizer caused an increasing in male flower in all irrigation levels. Also, the result showed that compost and vermicompost was more effective than urea in male female flower production and the highest female flower was achieved in high irrigation level in combination of vermicompost and caused the highest fruit number in this treatment.

Compost increased flower number and fruit yield through improving chemical, physical properties soil, pH regulation and increasing water holding capacity in root.

The fruit number increased with increasing irrigation as compared to low irrigation level and also, all fertilizer increased fruit number at all irrigation levels while compost and vermicompost was more effective than urea. In agreement with present study, Al omran *et al.,* 2005 and Swaider *et al.*, 1994) reported that irrigation deficit caused reducing fruit number and yield of *cucurbita* pepo. In present study, compost and vermicompost was more effective than urea in improving fruit number and yield under drought stress and it may be due to high nitrogen value in compost and vermicompost.

Fruit diameter in pepo reduced in normal and low irrigation levels and all of fertilizer stimulated fruit diameter under drought stress and urea fertilizer in less effective than compost and vermicompost. Like with present study, Highashi *et al.* (1999) reported that drought stress in earliest fruit development have negative effect on fruit cell number and caused final fruit size. Believed that defect irrigation reduced yield and caused production of small fruit.

In present study, fruit weight decreased in drought stress as compared to high irrigation level. Similar

result was observed by Sarker *et al.* (2005) who believed that weight losses under drought stress may be due to reduction on photosynthesis and leaf senescence. On the other hand nutrient availability reduced by low and high irrigation level (Munns, 1993) and caused reducing fruit yield in present study. However, compost and vermicompost expiated nutrient availability and enhanced fruit yield in present experiment. In our study, all fertilizers were used in present study, enhanced fruit weight under low irrigation level. In normal and high irrigation level fruit weight increased by all fertilizer while, compost was more effective than other treatment. Manivannan *et al.* (2009) stated that reduction of sunflower leaf area under drought stress caused a reduction of sunflower yield. On the other hand, N usage expiated leaf area and result in increasing plant yield under drought stress. Similar result was reported by Swaider *et al.* (1994) who reported that N usage increased plant yield under drought stress.

Conclusion

The highest shoot length was observed in high irrigation level combination with compost. Male and female flower were decreased in low irrigation levels and all nutrient compound increased flower at all irrigation levels. Fruit number increased by all nutrient compounds at all irrigation levels and compost application was more effective than other nutrient compound. The lowest fruit weight was in low irrigation level and all nutrient compound improved fruit weight at all irrigation level and compost application was more effective. All nutrient improved fruit diameter at all irrigation levels. Basedon our result, compost application was more effective than vermicompost and urea at low, normal and high irrigation levels.

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