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Effect of organic formulations on growth and quality of muskmelon (*Cucumis melo* L.)

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Abstract
An investigation entitled "Effect of different organic formulations on growth and quality of muskmelon (*Cucumis melo* L.)" was conducted in Department of Agriculture, Khalsa College, Amritsar (Punjab). The investigation was laid out in RBD with eleven treatments replicated thrice. Among the various treatments T_1 - 100% RDF (Recommended Doze of Fertilizers) gives the best results. It was followed by T_5 – (Panchagavya + 3 Sprays of Vermiwash). Among the organic manures T_5 – (Panchagavya + 3 Sprays of Vermiwash) proved to be beneficial than other treatments, as it improved the growth and quality of muskmelon.

Keywords: FYM, jeevamrit, muskmelon, panchagavya and vermiwash

1. Introduction
Cucumis melo L. (Reticulatus group) commonly called as cantaloupe or muskmelon belongs to the family *Cucurbitaceae* (Bailey and Bailey 1976) [1]. Africa is considered to be the centre of origin of melon, though the recent data supports the view that the origin of genus *Cucumis* may be in Asia (Renner *et al.* 2007) [2]. Melon was first domesticated in Egypt and Iran during the second and third millennium BC (Pangalo 1929) [3]. The main centre of diversity is located in Asia, from the Mediterranean basin (Turkey) to Central Asia (Iran, Uzbekistan) to India to East Asia (China, Korea) (Robinson and Decker-Walters 1997) [4].
Melons are annuals with climbing, creeping or trailing vines of length upto 3m. The leaves of melons are shallow lobed and more or less rounded. Flowers are large, yellow, fragrant and edible fruits are extremely variable in size and shape. Skin may be soft or hard yellow, green, cream or orange in colour and plain, netted or prickly in nature. Flesh inside varies from white to cream-yellow, orange or green. At present most of commercial types have thin skin and thick orange pulp. Fruits are many seeded pepo (Anynomus 2010) [5].
Chand and Pabbi (2005) [6] made difference in organic and inorganic farming. Product produced by the organic farming are good in taste, flavour, nutritional and free from chemicals whereas the product under the inorganic farming are tasteless, less nutritious, may contain toxic residues of chemicals. It is increasingly felt that inorganic farming is become unsuitable as evidenced by declining crop productivities, damage to environment and chemical contaminations. The necessity of having an alternate agriculture method which can function in friendly eco-system and could sustain the crop productivity is widely spread. Hence, organic farming is recognized as the best known alternative to the inorganic agriculture. Panchagavya, Jeevamrit and Beejamrit are cheaper ecofriendly organic preparations made by cow products namely dung, urine, milk, curd and ghee. The Panchagavya is an efficient plant growth stimulant that enhances the biological efficiency of crops. It is used to activate soil and to protect the plants from diseases and also increase the nutritional quality of fruits and vegetables. It is used as a foliar spray, as soil application along with irrigation water, seed or seedling treatment etc. Three per cent Panchagavya is an ideal concentration for the foliar spray. Jeevamrit promotes immense biological activity in soil and makes the nutrients available to crop. Devakumar *et al.* (2008) [7] Beejamrit protect the crop from soil borne and seed borne pathogens and it improves seed germination also.
Organic farming was also successfully done in other *Cucumis spp.* A considerable data have been generated, which shows that combined and sole application of organic formulations increases the growth and quality of vegetables. However, information on the effect of different of different organic formulations on performance of muskmelon is lacking.

Keeping these point in view, the present investigation entitled "Effect of organic formulations on growth and quality of muskmelon (*Cucumis melo* L.) was carried out.

2. Materials and methods

The present investigation on "Effect of organic formulations on growth and quality of muskmelon (*Cucumis melo* L.)" was conducted at an experimental plot in the nursery of department of horticulture, Khalsa College, Amritsar. The cultivar used in investigation was Punjab sunheri. The seeds were obtained from the Punjab Agricultural University, Ludhiana. Seedlings of the cultivar of Muskmelon were produced from Centre of Excellence for Vegetables, Kartarpur. The seeds of cultivar sown in the plastic plug trays by using cocopeat, perlite and vermiculite in ratio 3:1:1 respectively inside the automatic ventilated polyhouse to get healthy and disease free seedlings. The investigation was laid out in RBD with eleven treatments replicated thrice in the end of the February.

The eleven treatments combinations were T_1 - 100% RDF (Recommended Doze of Fertilizers), T_2 – FYM- 20 t per ha, T_3 – 3 Sprays of Jeevamrit, T_4 – 2 Sprays of Vermiwash +2 Sprays of Jeevamrit, T_5 - Panchagavya + 3 Sprays of Vermiwash, T_6 – FYM + 3 Sprays of Jeevamrit, T_7 – Panchagavya + 3 Sprays of Jeevamrit, T_8 – FYM + 3 Sprays of Vermiwash, T_9 – Panchagavya + Vermiwash + Jeevamrit, T_{10} – FYM + Vermiwash + Jeevamrit, T_{11} – Control.

The whole experimental plot was prepared by repeated ploughing followed by harrowing and planking. All the weeds and stubbles of previous crop removed from the field completely.

Transplanting is done in evening hours. Observations were recorded of various growth and quality characters. Statistical analysis and interpretation of data was done by following the Fisher analysis of variance technique and results were tested at 5% level of significance.

3. Results and discussions

3.1 Growth parameters

3.1.1 Vine length (cm)

Maximum vine length was recorded by the recommended dose of fertilizers which was at par with the T_5 as mentioned in Table 1. Vine length was increased due to favourable nutrients in the root zone which is created by addition of organic manures. Also, according to Narayanamma *et al.* (2010) [8] the increase in growth parameter such as vine length may be due to the application of organic manure, which facilitates quick and greater availability of plant nutrients and thus provides a better environment for root growth and proliferation.

3.1.2 Leaves per vine

The maximal number of leaves was obtained under T_1 (RDF) which is significantly better other treatments and followed by T_5 (Table 1). Enujeke *et al.* (2013) [9] identified the most appropriate rate of application of organic manure to enhance number of leaves in bottle gourd.

3.1.3 Branches per vine

The more number of branches were recorded in treatment of recommended doses of fertilizers. It was comparability equal with the treatment T_5 (Table 1). Increase in the number of branches per vine which might be due to an increase in the organic matter by addition of organic and inorganic manures resulting in good vegetative growth. Shafeek *et al.* (2013) [10] also reported the same results on cantaloupe plants.

3.1.4 First flowering

Among the treatments, the early flowering was occurred in T_1 which was statistically at par with the treatment T_5 as mentioned in Table 1. The reduction in days to male and female flower initiation was due to stimulating effect of phosphorus on growth hormones which induce early flowering. On the other hand plants of the plots with addition of manure and bio-fertilizers along with inorganic fertilizers took comparatively lesser days for initiation of male and female flowers and minimum number of nodes at which first male and female flower appeared (Patle *et al.* 2018) [11].

3.1.5 50% flowering

The Days of 50% of flowering remarkably varied with different organic formulations at different days after transplanting (DAT). It was measured that the Recommended Dose of Fertilizers (T_1) takes minimum days (Table 1). The reproductive growth was also positively affected by panchgavya, resulting in earliness of flowering due to the cell differentiation and flower bud formation activity of the cytokinin present in panchgavya. Patle *et al.* (2018) [11] also concluded that the use of organic formulations influence the flowering in bottle gourd.

3.1.6 First harvest

The minimum days to first harvest was recorded from the treatment T_1 and T_5 (Table 1). It is due to luxurious supply of nitrogen, phosphorus, potash and their effect absorption which the various physiological and metabolic processed especially protein metabolism. The translocation of these nutrients to the fruiting nodes results in higher fruiting and fruit development. Similar findings with respect to nitrogen and phosphors on yield attributes were also reported by Anjanappa *et al.* (2012) [12].

Table 1: Effect of organic formulations on growth of muskmelon

Treatments	Vine length (cm)	Leaves per vine	Branches per vine	Days to first flowering opening	Days to 50% flowering	Days to first harvest
T_1	225.24	155.71	10.77	30.31	41.53	70.46
T_2	186.67	118.98	7.42	37.45	45.48	76.55
T_3	185.64	117.94	6.98	37.43	46.38	77.39
T_4	192.98	130.17	7.97	34.61	45.27	75.33
T_5	222.84	153.45	9.27	31.58	42.87	71.98
T_6	187.61	122.91	7.42	36.48	45.68	76.37
T_7	188.01	128.13	7.79	35.53	45.78	76.19
T_8	198.51	142.91	8.36	33.20	45.42	74.87
T_9	220.59	149.86	8.98	33.27	44.53	73.12
T_{10}	195.94	135.18	8.12	33.35	45.15	75.84
T_{11}	182.91	110.83	6.58	38.55	47.45	78.01

CD(p=0.05)	3.29	2.08	1.03	1.96	1.94	2.87

T_1 - 100% RDF (Recommended Doze of Fertilizers), T_2 – FYM-20 t per ha, T_3 – 3 Sprays of Jeevamrit, T_4 – 2 Sprays of Vermiwash +2 Sprays of Jeevamrit, T_5 - Panchagavya + 3 Sprays of Vermiwash T_6 – FYM + 3 Sprays of Jeevamrit, T_7 – Panchagavya + 3 Sprays of Jeevamrit, T_8 – FYM + 3 Sprays of Vermiwash, T_9 – Panchagavya + Vermiwash + Jeevamrit, T_{10} – FYM + Vermiwash + Jeevamrit, T_{11} – Control.

3.2 Quality parameters

3.2.1 TSS content (°Brix)

The maximum TSS was recorded under the treatment T_1 which was significantly better than the Treatment T_5 as shown in the Table 2. The increase in TSS content might be attributed to the quick metabolic transformation of starch and pectin into soluble compounds and rapid translocation of sugars from leaves to developing fruits. The present results are in support with the finding of Kameswari *et al.* (2011) [13] in ridge gourd.

3.2.2 Ascorbic acid content (mg per 100 g)

The maximum ascorbic acid content was recorded from the Recommended Doses of Fertilizers followed by the T_5 as mentioned in Table 2. The increase in ascorbic acid content might also be due to the quick metabolic transformation of starch and pectin into soluble compounds and rapid translocation of sugars from leaves to developing fruits. The increase in ascorbic acid had been reported by Meenakshi *et al.* (2007) [14] in bitter gourd.

3.2.3 Flesh thickness (mm)

The highest flesh thickness was recorded from T_1 which was at par with T_5 (Table 2). The increase in the quality attributes could be due to the increase in the efficiencies of microbial inoculants to fix atmospheric nitrogen and due to enhanced growth promoting substances which accelerates the physiological process like synthesis of carbohydrates. Fruit flesh thickness increased with increase in size of the fruit i.e. more thick flesh was observed in bigger sized fruits and less in small fruits.

These results are in conformity with those of Nirmal *et al.* (2008) [15] in muskmelon.

3.2.4 Shelf life (days)

The highest shelf life was recorded in the T_1 (Recommended Doses of Fertilizers) followed by the treatments T_5 and T_9 (Table 2). The shelf life may increase due to the reason being thickening of cell wall due to application of vermicompost as basal coupled with the foliar spray of panchagavya. The storage life of organically grown spinach was longer due to difference in free amino acid content. Respiration rate and enzyme activity will be lower in organically produced fruits which help in reduced storage losses. Kumar *et al.* (2016) [16] also reported the increase in number of shelf days by using organic manures in snake gourd.

Table 2: Effect of organic formulations on quality of muskmelon

Treatments	TSS (°Brix)	Ascorbic acid (mg per 100 g)	Flesh thickness (mm)	Shelf life (days)
T_1	12.08	44.66	24.51	3.65
T_2	10.45	37.29	17.29	1.53
T_3	10.24	36.42	16.36	1.67
T_4	11.14	39.93	19.16	2.11
T_5	11.83	42.33	22.33	3.19
T_6	10.65	36.73	17.91	1.85
T_7	10.96	39.73	18.85	1.96
T_8	11.58	40.81	20.65	2.65
T_9	11.62	41.51	21.06	2.86
T_{10}	11.26	40.16	19.59	2.42
T_{11}	10.15	35.47	15.84	1.49
CD(p=0.05)	0.23	NS	1.55	1.15

T_1 - 100% RDF (Recommended Doze of Fertilizers), T_2 – FYM-20 t per ha, T_3 – 3 Sprays of Jeevamrit, T_4 – 2 Sprays of Vermiwash +2 Sprays of Jeevamrit, T_5 - Panchagavya + 3 Sprays of Vermiwash T_6 – FYM + 3 Sprays of Jeevamrit, T_7 – Panchagavya + 3 Sprays of Jeevamrit, T_8 – FYM + 3 Sprays of Vermiwash, T_9 – Panchagavya + Vermiwash + Jeevamrit, T_{10} – FYM + Vermiwash + Jeevamrit, T_{11} – Control.

4. Conclusion

It can be concluded from the present investigation that with the combined application of recommended dose of fertilizers was found to be more beneficial for successful cultivation of muskmelon. However the use of organic formulations such as Panchagavya + 3 sprays of vermiwash also gave the close results to the RDF. Inorganic fertilizers no doubt have a positive impact on vegetative and other parameter but instead of all these they have more negative impact on soil, underground water, nutrient imbalance and human health which not been created by organic manures, moreover organic manures acquires prolonged benefits. As the data based on one year performance, so to confirm it, the same experiment may be repeated for three to four years on different varieties and locations.

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