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Impact of soilless media and nutrient spray frequency on growth and flowering of grape hyacinth (*Muscari armeniaca* L.) under open conditions

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Abstract

The experiment was conducted with four nutrient spray frequencies of NPK (20:20:20)@, 3 g/L at 3 days interval, at 7 days interval, at 10 days interval and at 15 days interval and four different types of growing media combinations viz; (Garden soil), (Vermicompost + Cocopeat + Perlite [1:1:1 v/v]), (Vermicompost + Cocopeat + Vermiculite [1:1:1 v/v]) and M₃ (Vermicompost + Perlite + Vermiculite [1:1:1 v/v]). The vegetative, floral and bulb parameters showed significant improvement in growing media (Vermicompost + Perlite + Vermiculite [1:1:1 v/v] and nutrient spray frequency NPK (20:20:20)@3 g/L at 3 days interval. The maximum number of leaves plant⁻¹ (7.33), plant spread (58.16 cm), number of spikes plant⁻¹ (4.00), spike length (22.50 cm), diameter of spike (2.31 mm), number of bulbs plant⁻¹ (3.33), diameter of main bulb (3.60), number of bulblets plant⁻¹ (16.33), weight of main bulb (37.33 g) and minimum days taken to flowering (102) were recorded by using growing media combination of Vermicompost + Perlite + Vermiculite [1:1:1 v/v] and nutrient spray frequency of NPK (20:20:20)@3 g/L at 3 days interval. So the growing media combination (Vermicompost + Perlite + Vermiculite [1:1:1 v/v] and nutrient spray frequency of NPK (20:20:20)@3 g/L at 3 days interval was found to be best for improving the vegetative, floral and bulb parameters of Grape Hyacinth (*Muscari armeniaca* L.).

Keywords: Muscari, Soilless media and Nutrient Spray.

Introduction

Grape Hyacinth (*Muscari armeniaca* L.) also called as “Touch of Snow” or “viper onion” is a species of flowering plant in the subfamily Scilloideae of the family Asparagaceae (formerly Hyacinthaceae). The genus *Muscari* originated in the Old World, including the Mediterranean basin, central and Southern Europe, northern Africa, western, central and south-western Asia (Hanson, 2002) [6]. The tiny, bell-shaped, cobalt-blue flower clusters resemble upside-down grape bunches, hence the popular name. The genus *Muscari* is named after the Greek word for musk, which refers to the aroma generated by the blooms of many species in the group. Grape hyacinth (*Muscari armeniacum*) is a perennial bulb that blooms in the middle of spring and is native to Southeast Europe. Long, linear, floppy green leaves sprout from the ground in early spring, followed by flowers. The foliage falls back after the blooms in the early summer, but unlike many other spring-blooming bulbs, it resumes vigorous growth in mid-fall and lasts through moderate winters. Each bulb generates one to three 4-8 inch tall flower stalks with 20-40 closely packed blooms per stalk. A narrow white band around the rim of each bell-shaped floret. As the top blooms open, the lower ones wither and the flowers open in a sequential manner from the bottom of the inflorescence upward. Seed pods that are in three halves follow pollinated flowers. The seeds are round, black, smooth, and net-wrinkled, and they are viable for about one year. The chromosome number is 2n=18; chromosome numbers are often 2n=18 or 36. Soilless media is a cultivation method that doesn't use traditional soil. Instead, it utilizes a mixture of materials like perlite, cocopeat, vermiculite, or other inert substances to provide support and nutrients for plant growth. This allows for more precise control over growing conditions in various agricultural settings. NPK (20:20:20) is a highly concentrated, balanced

plant fertiliser. It contains equal parts nitrogen, phosphorus and potassium. It is ideal for growing plants in poor quality soils as it provides a high amount of each of the three essential plant macronutrients. The balanced ratio of NPK (20:20:20) ensures that plants receive an equal proportion of all three essential nutrients. This balanced formulation provides comprehensive support for various growth stages, from seedling establishment to flowering and fruiting. This balanced formulation also ensures uniform and healthy plant growth, leading to better crop yields and improved quality. Open growth conditions refer to environmental settings where plants are allowed to grow without strict controls or enclosures, simulating natural or field like circumstances. These conditions typically include natural light, ambient temperature and humidity, open air, soil and nutrients and unrestricted space. Since no work has been done in the institute, on Grape hyacinth (*Muscari armeniaca* L.) with regard to the impact of soilless media and nutrient spray on growth and flowering under open conditions. Therefore, the present study aimed to examine the impact of soilless media and nutrient spray on growth and flowering of Grape hyacinth (*Muscari armeniaca* L.) under open conditions.

Materials and Methodology

The experiment was conducted in Completely Randomized Design (CRD) with 16 treatments of 3 replications. Bulbs were planted in the pots under open conditions at floriculture experimental farm of Division of Floriculture and Landscape Architecture, SKUAST-K during 2022-2023. Total number of treatment combinations were 16 with four soilless media i.e Vermicompost, Cocopeat, Vermiculite, Perlite and Garden soil as control and four nutrient spray frequencies at 3, 7, 10 and 15 days interval. The treatment combinations were T₁ (M₀F₁) Garden soil: NPK 3 g/L at 3 days interval, T₂ (M₀F₂) Garden soil: NPK 3 g/L at 7 days interval, T₃ (M₀F₃) Garden soil: NPK 3 g/L at 10 days interval, T₄ (M₀F₄) Garden soil: NPK 3 g/L at 15 days interval, T₅ (M₁F₁) Vermicompost + Cocopeat + Perlite: NPK 3 g/L at 3 days interval, T₆ (M₁F₂) Vermicompost + Cocopeat + Perlite: NPK 3 g/L at 7 days interval, T₇ (M₁F₃) Vermicompost + Cocopeat + Perlite: NPK 3 g/L at 10 days interval, T₈ (M₁F₄) Vermicompost + Cocopeat + Perlite: NPK 3 g/L at 15 days interval, T₉ (M₂F₁) Vermicompost + Cocopeat + Vermiculite: NPK 3 g/L at 3 days interval, T₁₀ (M₂F₂) Vermicompost + Cocopeat + Vermiculite: NPK 3 g/L at 7 days interval, T₁₁ (M₂F₃) Vermicompost + Cocopeat + Vermiculite: NPK 3 g/L at 10 days interval, T₁₂ (M₂F₄) Vermicompost + Cocopeat + Vermiculite: NPK 3 g/L at 15 days interval, T₁₃

(M₃F₁) Vermicompost + Perlite + Vermiculite: NPK 3 g/L at 3 days interval, T₁₄ (M₃F₂) Vermicompost + Perlite + Vermiculite: NPK 3 g/L at 7 days interval, T₁₅ (M₃F₃) Vermicompost + Perlite + Vermiculite: NPK 3 g/L at 10 days interval, T₁₆ (M₃F₄) Vermicompost + Perlite + Vermiculite: NPK 3 g/L at 15 days interval.

Results and Discussion

Soilless media and nutrient spray frequency

The soilless media and nutrient spray frequency of NPK 20:20:20 had significant effect on the vegetative, floral and bulb parameters. The results among the soilless media M₃ (Vermicompost + Perlite + Vermiculite [1:1:1 v/v] and nutrient spray frequency F₁ NPK (20:20:20)@3 g/L at 3 days interval were found to be best for enhancing the vegetative, floral and bulb parameters of Grape Hyacinth (*Muscari armeniaca* L.). Application of soilless media M₃ (Vermicompost + Perlite + Vermiculite [1:1:1 v/v] and nutrient spray frequency F₁ NPK (20:20:20)@3 g/L at 3 days interval recorded highest values for parameters like number of leaves plant⁻¹ (7.33), plant spread (58.16 cm), days taken to flowering (102), number of spikes plant⁻¹ (4.00), spike length (22.50 cm), diameter of spike (2.31 mm), number of bulbs plant⁻¹ (3.33), diameter of main bulb (3.60 cm), number of bulblets plant⁻¹ (16.33), weight of main bulb (37.33 g). The increase in vegetative parameters might be due to the physiological attributes of soilless media Nikrazm *et al.* (2011) [8] and due to the availability of essential nutrients NPK at the most critical stages of growth Sumathi *et al.* (2018) [14] (Table 1). Similar results were given by Chauhan *et al.* (2014) [3] in gerbera cv. Alchochete, Singh *et al.* (2009) [12] in Wax begonia and Riaz *et al.* (2008) [10] in Zinnia elegans cv. Blue point. The improvement noticed in floral parameters might be contributed to the physiological characteristics of soilless media (Rajan, 2020) [9] and due to the availability of balanced amount of essential nutrients NPK at crucial stages of bulb development (Singh, 2018) [13] (Table 1). These findings were in conformity with findings of Dabral *et al.* (2019) [4] in calla lily and (Fatmi, 2023) [5] in carnation cv. Master. Significant improvement in bulb parameters can be attributed to the effect of soilless media Bhandari *et al.* (2016) [1] and nutrient spray frequencies at critical stages of bulb development Sharma *et al.* (2008) [11] (Table 2). Identical results were obtained by Chaudhary *et al.* (2018) [2] in the LA hybrid (Red Alert) and Oriental (Avocado) groups of liliium, Khan *et al.* (2006) [7] in tulip.

Table 1: Effect of soilless media and nutrient spray frequency on vegetative and floral parameters of Grape Hyacinth (*Muscari armeniaca* L.) under open conditions.

Treatment Combinations		Vegetative Parameters		Floral Parameters			
Code	Symbol	Number of leaves plant ⁻¹	Plant spread (cm)	Days taken to flowering	Number of spikes plant ⁻¹	Spike length (cm)	Diameter of spike (mm)
T ₁	M ₀ F ₁	3.66	41.16	120.00	2.66	19.32	1.88
T ₂	M ₀ F ₂	3.00	38.66	123.00	2.33	18.67	1.85
T ₃	M ₀ F ₃	2.33	35.43	127.00	2.00	17.33	1.81
T ₄	M ₀ F ₄	1.66	33.12	130.00	1.66	16.54	1.78
T ₅	M ₁ F ₁	6.00	48.66	109.00	3.66	21.50	1.97
T ₆	M ₁ F ₂	5.33	45.43	111.00	3.00	19.76	1.92
T ₇	M ₁ F ₃	3.33	42.33	113.00	2.66	18.33	1.88
T ₈	M ₁ F ₄	2.66	40.00	110.00	2.33	17.00	1.75
T ₉	M ₂ F ₁	5.66	46.50	116.00	3.00	21.00	1.95
T ₁₀	M ₂ F ₂	4.33	44.33	119.00	2.33	18.76	1.92
T ₁₁	M ₂ F ₃	3.00	41.67	121.00	2.00	18.2	1.87
T ₁₂	M ₂ F ₄	2.33	39.66	124.00	1.66	17.86	1.82
T ₁₃	M ₃ F ₁	7.33	58.16	102.00	4.00	22.50	2.31
T ₁₄	M ₃ F ₂	6.66	56.15	105.00	3.43	20.11	2.23
T ₁₅	M ₃ F ₃	4.33	53.21	107.00	3.00	19.00	2.14
T ₁₆	M ₃ F ₄	2.66	51.33	108.00	2.33	17.88	2.11
C.D (<i>P</i> < .05)		0.316	0.333	7.693	0.188	0.158	0.140

Table 2: Effect of soilless media and nutrient spray frequency on bulb parameters of Grape Hyacinth (*Muscari armeniaca* L.) under open conditions

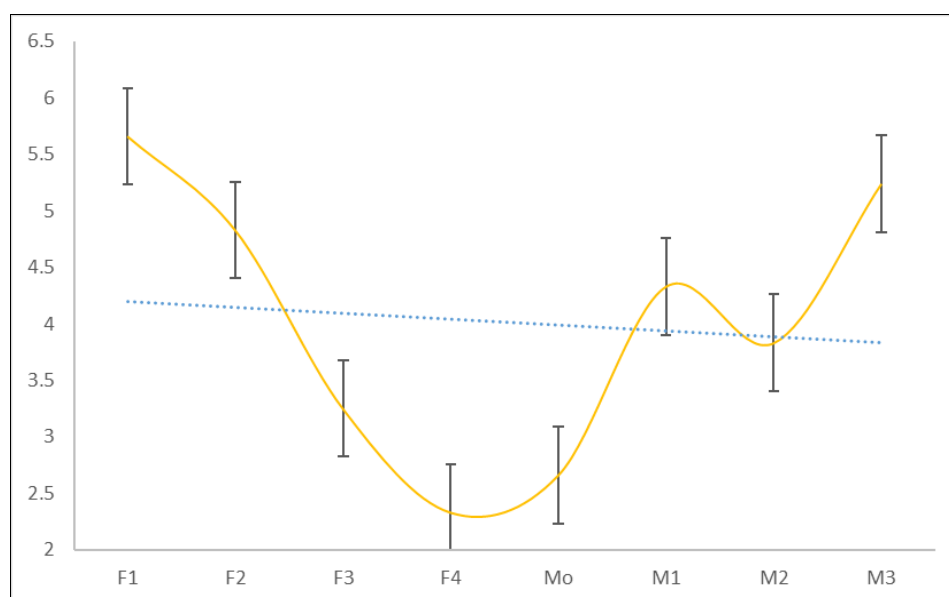
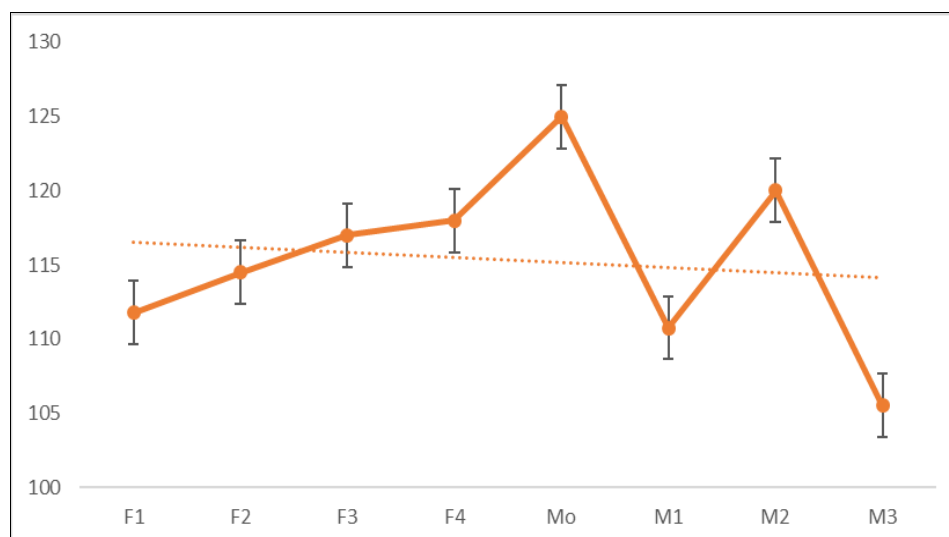
Treatment Combinations		Bulb Parameters			
Code	Symbol	Number of bulbs plant ⁻¹	Diameter of main bulb (cm)	Number of bulblets plant ⁻¹	Weight of main bulb (g)
T ₁	M ₀ F ₁	2.00	3.00	11.33	28.43
T ₂	M ₀ F ₂	1.66	2.76	9.76	26.33
T ₃	M ₀ F ₃	1.33	2.56	7.54	24.33
T ₄	M ₀ F ₄	1.00	2.33	6.33	22.33
T ₅	M ₁ F ₁	3.00	3.50	13.66	32.54
T ₆	M ₁ F ₂	2.66	3.43	11.43	30.00
T ₇	M ₁ F ₃	2.33	3.10	9.66	27.66
T ₈	M ₁ F ₄	2.00	2.87	8.00	25.76
T ₉	M ₂ F ₁	2.66	3.30	12.00	30.66
T ₁₀	M ₂ F ₂	2.33	3.21	10.11	27.89
T ₁₁	M ₂ F ₃	2.00	3.00	8.33	26.00
T ₁₂	M ₂ F ₄	1.66	2.88	6.87	24.11
T ₁₃	M ₃ F ₁	3.33	3.60	16.33	37.33
T ₁₄	M ₃ F ₂	3.00	3.43	14.21	35.11
T ₁₅	M ₃ F ₃	2.66	3.11	12.32	33.54
T ₁₆	M ₃ F ₄	2.33	3.00	11.66	31.32
C.D ($P \leq .05$)		0.149	0.130	0.123	0.112

M₀: Garden soil F₁: NPK (20:20:20) @3 g/L at 3 days interval

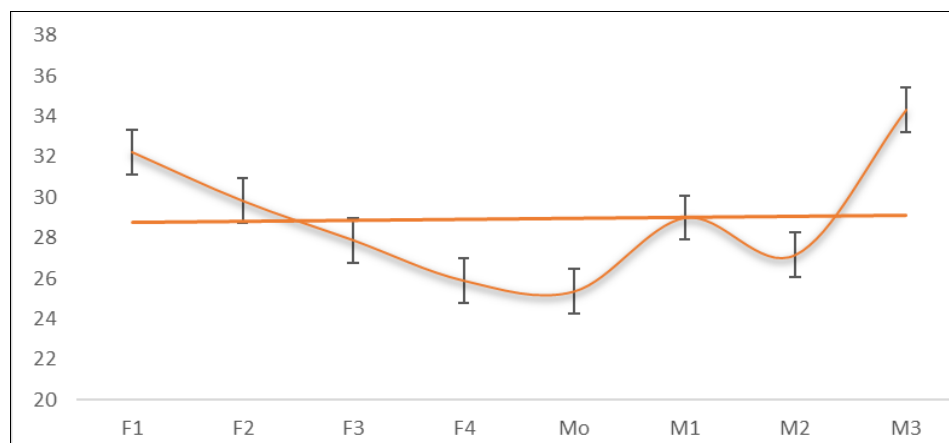
M₁: Vermicompost + Cocopeat + Perlite (1:1:1 v/v) F₂: NPK (20:20:20) @3 g/L at 7 days interval

M₂: Vermicompost + Cocopeat + Vermiculite (1:1:1 v/v) F₃: NPK (20:20:20) @3 g/L at 10 days interval

M₃: Vermicompost + Perlite + Vermiculite (1:1:1 v/v) F₄: NPK (20:20:20) @3 g/L at 15 days interval

Effect of soilless media and nutrient spray frequency on the number of leaves plant⁻¹ under open conditions

Effect of soilless media and nutrient spray frequency on the days taken to flowering under open conditions



Effect of soilless media and nutrient spray frequency on the weight of the main bulb(g) under open conditions.



Conclusion

The media application of Vermicompost + Perlite + Vermiculite and NPK (20:20:20) @ 3 g/L at 3 days interval was found superior in terms of significantly improving vegetative parameters (number of leaves plant⁻¹, plant spread), floral parameters (days taken to flowering, number of spikes plant⁻¹, spike length, diameter of spike) and bulb parameters (number of bulbs plant⁻¹, diameter of the main bulb, number of bulblets plant⁻¹, weight of the main bulb) whereas the Garden soil and NPK (20:20:20) @ 3 g/L at 15 days interval was far behind in vegetative parameters (number of leaves plant⁻¹, plant spread), floral parameters (days taken to flowering, number of spikes plant⁻¹, spike length) and bulb parameters (number of bulbs plant⁻¹, diameter of the main bulb, number of bulblets plant⁻¹, weight of the main bulb) under open conditions. Combined application of macronutrient (NPK: 20-20-20@ 3 g/L) in general improved all vegetative, floral and bulb parameters under open conditions.

References

1. Bhandari NS, Srivastava R, Kumar S. Effect of substrates on *Lilium longiflorum* L.) programming in container system. *Indian J Hortic.* 2016;73(3):456-9.
2. Chaudhary N, Sindhu SS, Kumar R, Saha TN, Raju DVS, Arora A, et al. Effect of growing media composition on growth, flowering and bulb production of LA hybrid (Red Alert) and Oriental (Avocado) group of *Lilium* under protected condition. *Indian J Agric Sci.* 2018;88(12):1843-7.
3. Chauhan RV, Varu DK, Kava KP, Savaliya VM. Effect of different media on growth, flowering and cut flower yield of gerbera under protected condition. *Asian J Hortic.* 2014;9(1):228-31.
4. Dabral M, Punetha P, Bohra M. Assessment of different substrates for pot culture in calla lily (*Zantedeschia sprengeri*). *Int J Chem Stud.* 2019;7(3):269-74.
5. Fatmi U. Influence of organic manures on growth, flowering, quality and yield of carnation (*Dianthus caryophyllus* cv. Master) under naturally ventilated polyhouse conditions of Prayagraj, India. *Int J Plant Soil Sci.* 2023;35(19):24-30.
6. Hanson B. Spring-blooming bulbs: An A to Z guide to classic and unusual bulbs for your spring garden. Vol. 173. Brooklyn: Brooklyn Botanic Garden; 2002.
7. Khan FU, Jhon AQ, Khan FA, Mir MM. Effect of NPK and Zn on growth, flowering and bulb production in tulip under polyhouse conditions in Kashmir. *J Hortic Sci.* 2006;1(2):129-34.
8. Nikrazm R, Ajirlou SA, Khaligy A, Tabatabaei SJ. Effect of different media on vegetative growth of two *Lilium* cultivars in soilless culture. *J Sci Technol Greenhouse Cult.* 2011;2(6):1-9.
9. Rajan EB. Studies on the effect of different growing media on the growth and flowering of *Gerbera* cv. Goliath. *Plant Arch.* 2020;20:653-7.
10. Riaz A, Arshad M, Younis A, Raza A, Hameed M. Effects of different growing media on growth and flowering of *Zinnia elegans* cv. Blue point. *Pak J Bot.* 2008;40(4):1579-85.
11. Sharma JR, Panwar RD, Gupta RB, Surender S. Nutritional studies in tuberose (*Polianthes tuberosa* L.). *Haryana J Hortic Sci.* 2008;37(1/2):85-6.
12. Singh AK, Gupta S, Singh AK. Influence of various potting media on vegetative and root characteristics in Wax begonia. *J Ornamental Hortic.* 2009;12(2):111-5.
13. Singh S. Effect of jeevamrit and different growing media on growth and flowering of gerbera (*Gerbera jamesonii* Bolus ex Hook.) [M.Sc. thesis]. Solan: Dr. Y.S. Parmar University of Horticulture and Forestry; 2018.
14. Sumathi T, Chawla SL, Ahlawat TR, Patil S, Gurjar RA. Effect of media and foliar spray of primary nutrients (NPK) on growth and yield of *Anthurium* (*Anthurium andreaeanum*) var. Tropical under greenhouse. *Indian J Agric Sci.* 2018;88(9):1403-6.