



ASSESSMENT OF SOIL GROWTH MEDIA AND MANGANESE REQUIREMENT OF GERBERA CULTIVATION IN ALFISOL UNDER POLYHOUSE CONDITIONS

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Abstract: The “Assessment of Soil Growth Media and Manganese Requirement of Gerbera Cultivation in Alfisol under Polyhouse Conditions” was undertaken in polyhouse at the Department of Soil Science and Agril. Chemistry, Post Graduate Institute, M.P.K.V., Rahuri. The experiment was laid out in factorial completely randomized block design and replicated thrice with four manganese levels and five growth media. The Four levels of manganese were 0.0, 0.25, 0.50, and 1.00, mg per plant per alternate day was applied. The various growth media used were, Soil+FYM, Soil+FYM+Wheatstraw, Soil+FYM+Ricehusk Soil+FYM+Cocopeat and Soil+FYM+Sugarcane trash were studied. The proportion of FYM and other substrate used was 10 percent each on weight. The highest number of flowers per plant 11.36 were recorded in highest level of manganese applied. The treatment 3 mg of manganese per plant per alternate day recorded the highest dry matter yield 45.90 g. The maximum flower head diameter was recorded (9.43 cm) in 1.0 mg of manganese/plant/alternate day treatments. The treatment in which highest level of manganese 1.0 mg/plant/alternate day was applied recorded the maximum stalk length (44.30 cm). The highest stalk 8.64 mm thickness was recorded in 1.0 mg manganese/plant/alternate day treatment.

Key words: Gerbera, polyhouse, growth media, manganese, yield and dry matter.

Introduction:

Gerbera jamesonii is commonly known as Transvaal; African or Barberton daisy. The genus *Gerbera* was named in honour of the German naturalist Traugott Gerber and the species *jamesonii* in honour of Captain Jameson (Das and Singh, 1989). *Gerbera jamesonii* belongs to the family Compositae. Leaves are radial, petiolated, lanceolate, deeply lobed, sometimes leathery, narrower at the base and wider at the top arranged in a rosette fashion at the base. Flower heads are solitary in wide range of colors i.e. yellow, orange, cream, white, pink, pink-red, scarlet, salmon, terracotta, etc. Based on flower heads they are grouped into single, semi-double and double. Double cultivars have attractive bi-colored flowers. Flower stalks are long, thin and leafless.

Gerbera is an important commercial crop grown throughout the world in a wide range of climatic conditions. The area under Maharashtra is 5000ha with increase share in polyhouse (Kausar and

Haider, 2000). The flower production of Maharashtra state is 22.869 MT (Singh, 1999). Recently, Maharashtra has taken bolder initiatives by setting up large number of Hi - tech floriculture projects, mainly in private /corporate sector, in and around Pune and others districts of Western Maharashtra. There are 188 projects with an area of 33.5 acres under gerbera with daily production of 1, 19,800 flowers (Mahalle, 2002). Western zone offers climatologically advantage over rest of Maharashtra and India.

The nutritional requirement of gerbera crop so far studied includes, major nutrients like nitrogen, phosphorous and potassium. Limited information is available on the requirements of micronutrients like manganese, for improving quality and yield of gerbera crop. The recommendations given are so far on ad-hoc basis. Thus in view of above, it becomes necessity to find out suitable growth media and

manganese requirement of gerbera grown in alfisol under polyhouse conditions.

Material and Methods:

The investigation on “Assessment of Soil Growth Media and Manganese Requirement of Gerbera Cultivation in Alfisol under Polyhouse Conditions” was undertaken in polyhouse at the Department of Soil Science and Agril. Chemistry, Post Graduate Institute, M.P.K.V., Rahuri. The pot culture experiment was laid out in factorial completely randomized design (FCRD), replicated thrice with four levels of nutrients viz 0.0, 0.25, 0.50, and 1.00 (mg/plant/alternate day). The five media consisted of Soil + FYM (10%), Soil + FYM (10%) + Wheat straw, Soil + FYM (10%) + Rice husk (10%), Soil + FYM (10%) + Sugarcane trash, Soil + FYM (10%) + Cocopeat (10%). The common dose of other nutrient was applied for each plant. The sangria variety was used as the test crop for experimentation. The pure laboratory chemicals were used for preparing the stock solution for manganese as well as for other nutrients. The dose of nutrient as well as irrigation water was applied on alternate day. The observations recorded were number of flowers per plant as well as dry matter yield of each plant. The quality parameters viz. flower head diameter, stalk length and stalk thickness were recorded. The data recorded was statistically analysed using the factorial complete randomized design in each media (Panse and Sukhatme, 1985).

Results and Discussion

The result of research were presented under the appropriate head as given below

Effect of levels of manganese and growth media on number of flowers per plant

The number of flowers per plant was significantly increased due to application of graded level of manganese (Table 1). The Mn₃ treatment (11.36) was significantly superior to rest of treatments. The highest number of flowers per plants (9.83) were recorded in Soil+ FYM+ Sugarcane trash (M4) growth media. The interaction effect between growth media and manganese level in respect of

numbers of flowers per plant was found to be statistically significant.

Effect of levels of manganese and growth media on dry matter yield of gerbera:

The highest dry matter yield of gerbera (45.90 g) was recorded in Mn₃ treatment which was significantly superior to Mn₀, Mn₁ and Mn₂ (Table 2). The lowest dry matter yield of gerbera (29.86 g) was observed in Mn₀ treatment. In case of growth media the highest dry matter yield of gerbera (40.02 g) was recorded by Soil+ FYM+ Sugarcane trash (M4) media which was at par with M3 and M5. The lowest dry matter yield of gerbera (33.54 g) was recorded in Soil+ FYM (M1) which was at par with M2. The interaction effect between growth media and manganese level was found to be significant. The treatment combination M3Mn₃ recorded highest (50.13 g) dry matter yield of gerbera which was at par with M4Mn₃ and M5Mn₃. The lowest dry matter yield of gerbera (27.34 g) was recorded with M1Mn₀ treatment combination which was at par with M2Mn₀, M3Mn₀, M4Mn₀, M5Mn₀, M1Mn₁ and M2Mn₁.

Effect of levels of manganese and growth media on flower head diameter of gerbera:

The data presented in Table showed that each level of manganese applied increased the flower head diameter significantly (Table 3). The highest level of manganese (Mn₃) recorded the maximum flower head diameter (9.43 cm) which was significantly superior to Mn₀ and Mn₁ but was at par with Mn₂.

In case of growth media the treatment differences were non significant. The interaction effect between growth media and manganese level was found to be significant. The maximum flower head diameter (9.66 cm) was recorded in M4Mn₃ which was at par with M1Mn₂, M2Mn₂, M3Mn₂, M4Mn₂, M5Mn₂, M1Mn₃, M2Mn₃, M3Mn₃ and M5Mn₃.

Effect of levels of manganese and growth media on stalk length of gerbera

The data reported (Table 4) indicates that the stalk length for gerbera flower increased significantly

due to manganese treatment. The maximum stalk length (44.30 cm) was recorded in Mn3 treatment which was at par with Mn2. The Mn0 treatment minimum recorded (40.48 cm) least stalk length. The differences in case of growth media were non-significant. The interaction effect of manganese level and growth media for stalk length of flower was found to be statistically significant. The treatment combination M4Mn3 recorded maximum stalk length (44.75 cm) that was significantly superior to other treatment combinations but was at par with M3Mn1, M4Mn1 M5Mn1, M2Mn2, M3Mn2, M4Mn2, M5Mn2, M1Mn3 M2Mn3, M3Mn3 and M5Mn3. Whereas the minimum stalk length (40.12 cm) was observed in M1Mn0 which was at par with M2Mn0 M3Mn0, M4Mn0 M5Mn0 M1Mn1 M2Mn1 and M1Mn2.

Effect of levels of manganese and growth media on Flower stalk thickness of gerbera: The data on flower stalk diameter as influenced due to graded

level of manganese application is presented in (Table 5). The flower stalk diameter due to the treatment Mn3 was significantly higher (8.64 mm) than rest of the treatments. Significantly higher flower stalk diameter (7.86 mm) was observed in Soil + FYM+ Sugarcane trash (M4) growth media which was at par with M2 and M3 growth media. The lowest flower stalk diameter (6.83 mm) was noted in Soil + FYM (M1) which was at par with M5. The interaction effect of manganese level and growth media for flower stalk diameter was found to be statistically significant. The highest flower stalk diameter (9.53 mm) was recorded due to the interaction effect of M4 Mn3.

Conclusion: The higher yield and good quality of gerbera may be achieved with application of manganese at the rate of 1.0 mg / plant / alternate day in combination of the Soil + FYM (10%) +Sugarcane trash (10%) media.

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Table 1: Effect of manganese levels and growth media on number of flowers per plant

Manganse levels (mg/plant/alternate day)	Growth Media					Mean
	Soil +FYM (M ₁)	Soil +FYM +Wheat straw (M ₂)	Soil +FYM +Rice husk (M ₃)	Soil +FYM +Sugarcane trash (M ₄)	Soil +FYM +Cocopeat (M ₅)	
Mn ₀₍₀₎	6	7	7	7	8	7
Mn _{1(0.25)}	8.4	8.2	8.6	9.3	8.3	8.56
Mn _{2(0.50)}	9.3	9.4	10.2	10.8	10	9.94
Mn _{3(1.0)}	10.2	11	11.6	12.2	11.8	11.36
Mean	8.48	8.90	9.35	9.83	9.53	9.22
	Manganse (Mn)		Growth Media(M)		Interaction	
SE±	0.26		0.29		0.58	
CD @5%	8.48		0.80		1.59	

Table 2: Effect of manganese levels and growth media on dry matter yield (g) of gerbera

Manganese levels (mg/plant/alternate day)	Growth Media					
	Soil +FYM (M ₁)	Soil +FYM +Wheat straw (M ₂)	Soil +FYM +Rice husk (M ₃)	Soil +FYM +Sugarcane trash (M ₄)	Soil +FYM +Cocopeat (M ₅)	Mean
Mn ₀₍₀₎	27.34	28.43	29.71	32.35	31.46	29.86
Mn _{1(0.25)}	31.20	31.58	35.26	37.06	34.49	33.92
Mn _{2(0.50)}	35.37	34.83	37.43	40.71	37.76	37.22
Mn _{3(1.0)}	40.23	43.03	50.13	49.95	46.18	45.90
Mean	33.54	34.47	38.13	40.02	37.47	36.71
	Manganese (Mn)		Growth Media(M)		Interaction	
SE±	1.08		1.21		2.42	
CD @5%	2.99		3.34		6.69	

Table 3: Effect of manganese levels and growth media on flower head diameter (cm) of gerbera

Manganese levels (mg/plant/alternate day)	Growth Media					
	Soil +FYM (M ₁)	Soil +FYM +Wheat straw (M ₂)	Soil +FYM +Rice husk (M ₃)	Soil +FYM +Sugarcane trash (M ₄)	Soil +FYM +Cocopeat (M ₅)	Mean
Mn ₀₍₀₎	6.40	6.40	6.55	6.70	6.60	6.53
Mn _{1(0.25)}	7.13	7.03	7.18	7.36	7.16	7.17
Mn _{2(0.50)}	8.12	8.20	8.50	8.64	8.74	8.44
Mn _{3(1.0)}	9.26	9.29	9.36	9.66	9.56	9.43
Mean	7.73	7.73	7.90	8.09	8.02	7.89
	Manganese (Mn)		Growth Media(M)		Interaction	
SE±	0.46		0.47		0.86	
CD @5%	1.24		N.S		2.32	

Table 4: Effect of manganese levels and growth media on stalk length (cm) of gerbera

Manganese levels (mg/plant/alternate day)	Growth Media					
	Soil +FYM (M ₁)	Soil +FYM +Wheat straw (M ₂)	Soil +FYM +Rice husk (M ₃)	Soil +FYM +Sugarcane trash (M ₄)	Soil +FYM +Cocopeat (M ₅)	Mean
Mn ₀₍₀₎	40.12	40.23	40.30	40.93	40.80	40.48
Mn _{1(0.25)}	41.43	41.50	41.53	42.15	42.13	41.75
Mn _{2(0.50)}	42.65	42.15	43.45	44.05	44.28	43.32
Mn _{3(1.0)}	43.46	44.16	44.49	44.75	44.62	44.30
Mean	41.92	42.01	42.49	42.97	42.96	42.46
	Manganese (Mn)		Growth Media(M)		Interaction	
SE±	0.41		0.46		0.91	
CD @5%	1.12		N.S		2.50	

Table 5: Effect of manganese levels and growth media on stalk thickness (mm) of gerbera

Manganse levels (mg/plant/alternate day)	Growth Media					
	Soil +FYM (M ₁)	Soil +FYM +Wheat straw (M ₂)	Soil +FYM +Rice husk (M ₃)	Soil +FYM +Sugarcane trash (M ₄)	Soil +FYM +Cocopeat (M ₅)	Mean
Mn ₀₍₀₎	6.12	6.13	6.13	6.20	6.44	6.20
Mn _{1(0.25)}	6.58	6.60	7.00	7.66	7.00	6.97
Mn _{2(0.50)}	7.04	8.20	8.60	8.05	7.60	7.90
Mn _{3(1.0)}	7.57	8.80	9.32	9.53	7.99	8.64
Mean	6.83	7.43	7.76	7.86	7.29	7.43
	Manganse (Mn)		Growth Media(M)		Interaction	
SE±	0.15		0.17		0.35	
CD @5%	0.43		0.48		0.96	

Table 6: Effect of manganese levels and growth media on vase life (mm) of gerbera flower

Manganse levels (mg/plant/alternate day)	Growth Media					
	Soil +FYM (M ₁)	Soil +FYM +Wheat straw (M ₂)	Soil +FYM +Rice husk (M ₃)	Soil +FYM +Sugarcane trash (M ₄)	Soil +FYM +Cocopeat (M ₅)	Mean
Mn ₀₍₀₎	4	4	5	4	4	4.2
Mn _{1(0.25)}	5	4	5	7	6	5
Mn _{2(0.50)}	6	6	8	8	6	6.8
Mn _{3(1.0)}	6	7	9	9	7	7.6
Mean	5.3	5.3	6.8	7	5.8	6
	Manganse (Mn)		Growth Media(M)		Interaction	
SE±	0.41		0.57		1.02	
CD @5%	1.11		1.55		2.81	