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

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Abstract: *The "Assessment of Soil Growth Media and Zinc 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 zinc levels and five growth media. The Four levels of manganse were 0.0,0.125,0.25, and 0.5, 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 11.43 were recorded in highest level of zinc applied. The treatment0.5 mg of zinc per plant per alternate day recorded the highest dry matter yield 42.87 g. The maximum flower head diameter was recorded (8.45 cm) in 0.5 mg of zinc/plant/alternate day treatments. The treatment in which highest level of zinc 1.0 mg/plant/alternate day was applied recorded the maximum stalk length (43.91 cm). The highest stalk 8.35 mm thickness was recorded in 0.5 mg zinc/plant/alternate day treatment.*

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

Introduction:

The genus *Gerbera* consists of more than 40 species.The other species includes *G. asplenifolia, G. aurantica, G. kunzeana and G. viridifolia.* The commercial cultivars of the species *G. jamesonii* include Sangria, Venturi, Nevada, Rosa bella, Lila bella, Lyonella, Ornella, Magnum and Dardanella.

Gerbera is propagated asexually by division of clumps and by cutting. Seed propagation produces variations and increases the juvenile phase (Schiva, 1975). On an average six plants are obtained from the mother plants by division of clumps.Cuttings are ready for transplanting in two to three months (Schiva, 1975). Tissue cultured plants are commercially used now-a-days which start flowering within 2-3 months after planting. Harvesting is done when the first two rows of disc florets have opened and pollens are visible (Manohar *et al.,* 2000)

Field soils are generally unsatisfactory for production of plants in containers. This is because of lack of aeration, drainage, water holding capacity, unavailability of balanced nutrition, pest and disease free environment and having optimum pH values (Wilson, 1983).

A well drained, porous, rich, light, neutral or slightly acidic soil of 1m depth is most suitable to have better growth (Das and Singh, 1989). The salinity level should not exceed 2mS/cm.The pH is to be maintained between 5.5 to7.0 for maximum absorption of the nutrients.

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 zinc, 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 zinc requirement of gerbera grown in alfisol under polyhouse conditions.

Material and Methods:

The investigation on "Assessment of Soil Growth Media and Zinc Requirement of Gerbera Cultivation in Alfisol under Polyhouse Conditions" was undertaken inpolyhouse 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 leves of nutrients viz 0.0, 0.125, 0.25, and 0.5 (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 zinc as well as for other nutrient's. 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 zinc and growth media on number of flowers per plant

The Zn3 treatment recorded the highest number of flowers (11.43) per plant which was which was significantly superior to Zn0, Zn1, and Zn2 whereas the lowest number of flowers per plant (7.0) was observed in Zn0 treatment (Table 1). The interaction for number of flowers in different growth media and zinc level was found to be statistically significant. The maximum number of flowers (11.80) were obtained with treatment combination M4Zn3.

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

The dry matter yield of gerbera was significantly increased due to application of graded level of zinc in different growth media. The highest dry matter yield of gerbera (42.87 g) was recorded in Zn3 treatment which was significantly superior to Zn0, Zn1 and Zn2 (Table 2). The lowest dry matter yield of gerbera (29.86 g) was observed in Zn0 treatment. In case of growth media the highest dry matter yield of gerbera (39.07 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 (33.19 g)was recorded in Soil+ FYM (M1) which was at par with Soil+ FYM +wheat straw(M2). The interaction effect between growth media and zinc level was found to be highly significant. The treatment combination M4Zn3 recorded highest (45.69 g) dry matter yield of gerbera which was at par with M3Zn2 M4Zn2, M5Zn2, M1Zn3 M2Zn3 M3Zn3 and M5Zn3.

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

The data reported in Table 3 revealed that the each level of zinc applied increased flower head diameter significantly. The highest level of zinc (Zn3) recorded highest flower head diameter (8.45 cm). The flower head diameter in different growth media differ slightly. The highest flower head diameter (7.52 cm) was recorded by Soil+ FYM+ Sugarcane trash (M4) which was at par with M3 and M5.

The interaction effect in respect of flower head diameter between growth media and zinc level was found to be significant. The treatment combination M4Zn3 recorded highest flower head diameter (8.46 cm).

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

The data reported in Table 4 revealed that the each level of zinc applied increased stalk length significantly. The highest level of zinc (Zn3) recorded highest stalk length (43.91cm). The stalk length in different growth media differ significantly. The minimum stalk length (41.68 cm) was recorded

by Soil+ FYM (M1) while the stalk length (42.86cm) was recorded by Soil+ FYM+ Sugarcane trash (M4) which was at par with M2 M3 and M5. The interaction effect in respect of stalk length between growth media and zinc level was found to be significant. The treatment combination M4Zn3 recorded highest stalk length (44.34 cm) which was at par with M3Zn1, M4Zn1, M5Zn1, M2Zn2, M3Zn2, M4Zn2, M5Zn2, M1Zn3, M2Zn3, M3Zn3 and M5Zn3

Effect of levels of zinc and growth media on Flower stalk thickness of gerbera

The data presented in Table 5 showed that the flower stalk diameter was recorded highest (8.35 mm) in Zn3 (0.50 mg kg-$^{1)}$ which was significantly superior to the rest of treatment. The highest flower stalk diameter (7.86 mm) was noted in case of Soil + FYM+ Sugarcane trash (M4) growth media which was at par with M3.The Soil + FYM (M1) growth media recorded lowest flower stalk diameter (6.78mm) was which was at par with M2 and M5 .

The interaction effect of zinc level and growth media for flower stalk diameter was found to be statistically significant. The highest flower stalk diameter (9.51 mm) was recorded due to the interaction M4 Zn3.

Conclusion:

The higher yield and good quality of gerbera may be achieved with application of zinc at the rate of 0.5 mg / plant / alternate day in combination of the Soil + FYM (10%) +Sugarcane trash (10%) media.

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

Zinc levels (mg/plant/alternate day)	Growth Media					
	Soil +FYM (M_1)	Soil +FYM +Wheat straw (M_2)	Soil +FYM +Rice husk (M3)	Soil +FYM +Sugarcane trash (M_4)	Soil +FYM +Cocopeat (M_5)	Mean
$Zn_{0(0)}$	6	7	7	7	8	**7**
$Zn_{1(0.125)}$	8.2	9	7	9.4	9	**8.97**
$Zn_{2(0.250)}$	9.4	10.2	9.3	10.5	10.3	**10.1**
$Zn_{3(0.50)}$	11.2	11.2	10.1	11.8	11.3	**11.4**
Mean	**8.69**	**9.35**	**11.7**	**9.67**	**9.66**	**9.38**
	Zinc(Zn)		**Growth Media(M)**		**Interaction**	
SE+	**0.33**		**0.39**		**0.73**	
CD @5%	**0.89**		**1.00**		**1.99**	

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

Zinc levels (mg/plant/alternate day)	Growth Media					
	Soil +FYM (M_1)	Soil +FYM +Wheat straw (M_2)	Soil +FYM +Rice husk (M3)	Soil +FYM +Sugarcane trash (M_4)	Soil +FYM +Cocopeat (M_5)	Mean
$Zn_{0(0)}$	27.34	28.43	29.71	32.35	31.46	**29.86**
$Zn_{1(0.125)}$	31.20	31.58	35.26	37.06	34.49	**33.92**
$Zn_{2(0.250)}$	35.37	34.83	37.43	40.71	37.76	**37.22**
$Zn_{3(0.50)}$	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**
	Zinc(Zn)		**Growth Media(M)**		**Interaction**	
SE±	**1.08**		**1.21**		**2.42**	
CD @5%	**2.99**		**3.34**		**6.69**	

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

Zinc levels (mg/plant/alternate day)	Growth Media					
	Soil +FYM (M_1)	Soil +FYM +Wheat straw (M_2)	Soil +FYM +Rice husk (M3)	Soil +FYM +Sugarcane trash (M_4)	Soil +FYM +Cocopeat (M_5)	Mean
$Zn_{0(0)}$	6.40	6.40	6.55	6.70	6.60	**6.53**
$Zn_{1(0.125)}$	6.46	6.78	6.88	6.93	6.99	**6.81**
$Zn_{2(0.250)}$	7.12	7.20	7.54	7.82	7.76	**7.49**
$Zn_{3(0.50)}$	8.25	8.32	8.46	8.64	8.56	**8.45**
Mean	**7.06**	**7.18**	**7.36**	**7.52**	**7.48**	**7.32**
	Zinc(Zn)		**Growth Media(M)**		**Interaction**	
SE±	**0.09**		**0.10**		**0.20**	
CD @5%	**0.24**		**0.28**		**0.55**	

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

Zinc levels (mg/plant/alternate day)	Growth Media					
	Soil +FYM (M_1)	Soil +FYM +Wheat straw (M_2)	Soil +FYM +Rice husk (M3)	Soil +FYM +Sugarcane trash (M_4)	Soil +FYM +Cocopeat (M_5)	Mean
$Zn_{0(0)}$	40.12	40.23	40.30	40.93	40.80	**40.48**
$Zn_{1(0.125)}$	41.18	42.12	42.36	42.47	42.23	**42.48**
$Zn_{2(0.250)}$	42.23	43.48	43.59	43.68	43.60	**43.32**
$Zn_{3(0.50)}$	43.18	43.64	44.22	44.34	44.18	**43.91**
Mean	**41.68**	**42.37**	**42.62**	**42.86**	**42.70**	**42.44**
	Zinc(Zn)		**Growth Media(M)**		**Interaction**	
SE±	**0.30**		**0.40**		**0.76**	
CD @5%	**0.81**		**1.10**		**2.04**	

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

Zinc levels (mg/plant/alternate day)	Growth Media					
	Soil +FYM (M_1)	Soil +FYM +Wheat straw (M_2)	Soil +FYM +Rice husk (M3)	Soil +FYM +Sugarcane trash (M_4)	Soil +FYM +Cocopeat (M_5)	Mean
$Zn_{0(0)}$	6.12	6.13	6.13	6.20	6.44	**6.20**
$Zn_{1(0.125)}$	6.63	6.90	6.47	7.64	6.64	**6.86**
$Zn_{2(0.250)}$	7.11	7.32	8.03	8.09	7.17	**7.54**
$Zn_{3(0.50)}$	7.27	8.38	9.05	9.51	7.53	**8.35**
Mean	**6.78**	**7.18**	**7.42**	**7.86**	**6.95**	**7.24**
	Zinc(Zn)		**Growth Media(M)**		**Interaction**	
SE±	**0.20**		**0.22**		**0.45**	
CD @5%	**0.55**		**0.62**		**1.24**	