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

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Abstract: *The "Assessment of Soil Growth Media and Iron 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 iron levels and five growth media. The Four levels of iron were 0.00, 0.75, 1.50 and 3.00, 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 11.74 were recorded in highest level of iron applied. The treatment 3 mg of iron per plant per alternate day recorded the highest dry matter yield 46.39 g. The maximum flower head diameter was recorded (9.49 cm) in 3.0 mg of iron/plant/alternate day treatments. The growth media Soil+ FYM+ Sugarcane trash media (M_4) recorded maximum flower head diameter (8.36 cm) which was significantly superior to other growth media The treatment in which highest level of iron 3.0 mg/plant/alternate day was applied recorded the maximum stalk length (45.19 cm). Among the growth media the maximum stalk length (44.39 cm) was recorded in Soil+ FYM+ Sugarcane trash (M_4). The highest stalk thickness was recorded in Fe_3 treatment (3.0 mg/plant/alternate day). The highest stalk diameter (7.95 mm) was noted in Soil + FYM+ Sugarcane trash (M_4) growth media.*

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

Introduction:

In India, at present 75,536 hectares land is under floriculture with only 10,000 ha area under modern cut flowers. Among the floriculture products, exported cut flowers are the single most important item in terms of value and growth in recent years. This has been possible owing to the increase in the number of high-tech floriculture units set up in India during the last decade. Bangalore (Karnataka), Pune (Maharashtra), Gurgaon (Haryana) and Hyderabad (Andhra Pradesh) are some of the major locations where protected green house cultivation of cut flowers is concentrated (Jadhav, 2002). In addition to exclusive floriculture ventures, many corporate houses too, have entered in this field as part of their diversification measures.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).Several soil borne diseases have been reported in gerbera. Out of these phytopthera, botrytis and wilt are most serious (Bigre, 1980). So due care has to be taken with regards to the substrate media which need to be sterilized thoroughly. Pot cultivation is more economical. In case the plants get infected; the whole pot can be replaced thus limiting the infection to that plant only.

The physiological functions of soil-less culture may be considered from their major relationship. Such culture substitutes other agencies for soil as a source of mineral nutrients, moisture and plant support (Greer, 2002).Soil-less culture supplies the necessary inorganic nutrient elements, which are normally obtained by plant from soil. In case of

porous media, water is held within capillary interstices of particle i.e. cinders or haydite (Jadhav, 2002b).If the substrates weight is not a problem, the grower should mix it with the cheapest source textured component like sand. If the light weight source is required, expensive components like Perlite, Vermiculite, may be used. 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 iron, 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 iron requirement of gerbera grown in alfisol under polyhouse conditions.

Material and Methods:

The investigation on "Assessment of Soil Growth Media and Iron 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 0.0,0.75,1.5 and 3.0 (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 iron 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 iron and growth media on number of flowers per plant

The highest number of flowers per plant (11.74) was recorded in Fe3 treatment which was significantly superior to Fe0 and Fe1 but was at par with Fe2 (Table 1). The highest number of flowers per plant (10.68) was recorded by Soil+ FYM+ Sugarcane trash (M4) which was at par with M3 and M5. However, the lowest number of flowers per plant (8.32) was recorded in Soil+ FYM+ (M1) growth media which was at par with Soil+ FYM+ wheat straw (M2). The interaction between growth media, iron level in respect of numbers of flowers was found to be statistically significant. The highest number of flowers (13.00) was observed M4Fe3 in treatment combination which was at par with M2Fe3, M3Fe3, M3Fe2, M4Fe2 and M5Fe2.

Effect of levels of iron 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 iron in different growth media (Table 2). The highest dry matter yield of gerbera (46.36 g) was recorded in Fe3 treatment which was significantly superior to Fe0, Fe1 and with Fe2. In case of growth media the highest dry matter yield of gerbera (39.29 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 (34.74 g) was recorded in Soil+ FYM (M1) which was at par with M2. The interaction effect between growth media and iron level was found to be highly significant. The treatment combination M3Fe3 recorded highest (48.02 g) dry matter yield of gerbera.

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

The data presented in Table indicated that each level of iron applied increased the flower head significantly. The minimum (6.53 cm) and maximum

(9.49 cm) flower head diameter were noted in Fe0 and Fe3 treatments respectively (Table 3) The growth media Soil+ FYM+ Sugarcane trash (M4) recorded maximum flower head diameter (8.36 cm) which was significantly superior to other growth media but was at par with M3 and M5 The minimum flower head diameter (7.81cm) was recorded in Soil+ FYM (M1) growth media which was at par with M2. The data indicated positive interaction effect. The treatment combination M4Fe3 recorded highest flower head diameter (9.92 cm) which was at par with M1Fe3, M2Fe3, M3Fe3 and M5Fe3. The treatment combination which recorded lowest flower head diameter (6.40 cm) was M1Fe0 which was at par M2Fe0 M3Fe0, M4Fe0, M5Fe0, M1Fe1 and M2Fe.

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

The stalk length for gerbera flower increased significantly due to application of iron (Table 4). The Fe0 treatment recorded (40.48 cm) minimum stalk length while the treatment in which highest level of iron (Fe3) was applied recorded the maximum stalk length (45.19 cm). The treatment Fe3 was at par with Fe2 treatment. Among the growth media the maximum stalk length (44.39 cm) was recorded in Soil+ FYM+ Sugarcane trash (M4) which was at par with M2, M3 and M5. The minimum stalk length (42.15 cm) was recorded in Soil+ FYM (M1) which was at par with M2 and M3.

Effect of levels of iron and growth media onFlower stalk diameterof gerbera

The flower stalk diameter increased with increasing level of iron from 0 to 3.0 $mgkg^{-1}$ (Fe0 to Fe3). The treatment differences were statistically significant (Table 5). The flower stalk diameter in control treatment was minimum (6.20 mm) while the highest flower stalk diameter 8.66 mm was recorded in Fe3treatment. The flower stalk diameter showed variation in different growth media. The highest flower stalk diameter (7.95 mm) was noted in Soil + FYM+ Sugarcane trash (M4) growth media which was at par with M3 and M5 growth media. While the lowest flower stalk diameter (7.04 mm) was noted in Soil + FYM (M1) which was at par with M2. The interaction effect of iron level and growth media for flower stalk diameter was found to be statistically significant. The highest flower stalk diameter (9.64 mm) was recorded in treatment combination of M4 Fe3 which was at par with M3 Fe3.

Conclusion:

The the higher yield and good quality of gerbera may be achieved with application of iron at the rate of 3.0 mg / plant / alternate day in combination of the Soil + FYM(10%) +Sugarcane trash(10%) media.

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

Iron 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
$Fe_{0(0)}$	6	7	7	7	8	**7**
$Fe_{1(0.75)}$	7.6	8.3	9	10	9.3	**8.84**
$Fe_{2(1.5)}$	9.7	10.7	11	12.7	11	**11.01**
$Fe_{3(3.0)}$	10	11s	12.7	13	10.1	**11.74**
Mean	**8.32**	**9.25**	**9.93**	**10.68**	**10.08**	**9.65**
	Iron(Fe)		**Growth Media(M)**		**Interaction**	
SE±	**0.36**		**0.40**		**0.79**	
CD @5%	**0.98**		**1.10**		**2.20**	

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

Iron 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
$Fe_{0(0)}$	27.34	28.43	29.71	32.35	31.46	**29.86**
$Fe_{1(0.75)}$	31.11	31.06	33.01	35.22	33.25	**32.73**
$Fe_{2(1.5)}$	35.51	37.48	39.42	41.57	39.92	**38.78**
$Fe_{3(3.0)}$	45.00	45.71	46.27	48.02	46.81	**46.36**
Mean	**34.74**	**35.67**	**37.10**	**39.29**	**37.86**	**36.93**
	Iron(Fe)		**Growth Media(M)**		**Interaction**	
SE±	**0.83**		**0.94**		**1.88**	
CD @5%	**2.31**		**2.59**		**5.15**	

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

Iron 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
$Fe_{0(0)}$	6.40	6.40	6.55	6.70	6.60	**6.53**
$Fe_{1(0.75)}$	7.26	7.23	7.52	7.84	7.60	**7.49**
$Fe_{2(1.5)}$	8.53	8.63	8.60	8.96	8.83	**8.71**
$Fe_{3(3.0)}$	9.03	9.24	9.38	9.92	9.90	**9.49**
Mean	**7.81**	**7.88**	**8.01**	**8.36**	**8.23**	**8.06**
	Iron(Fe)		**Growth Media(M)**		**Interaction**	
SE±	**0.14**		**0.16**		**0.32**	
CD @5%	**0.40**		**0.44**		**0.88**	

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

Iron 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
$Fe_{0(0)}$	40.12	40.23	40.30	40.93	40.80	**40.48**
$Fe_{1(0.75)}$	41.60	42.16	43.54	43.80	43.60	**42.94**
$Fe_{2(1.5)}$	42.76	43.20	44.63	44.96	44.92	**44.09**
$Fe_{3(3.0)}$	44.10	44.52	45.73	45.86	45.72	**45.19**
Mean	**42.15**	**42.53**	**43.55**	**44.39**	**43.76**	**43.17**
	Iron(Fe)		**Growth Media(M)**		**Interaction**	
SE+	**0.47**		**0.55**		**1.09**	
CD @5%	**1.35**		**1.50**		**3.00**	

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

Iron 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
$Fe_{0(0)}$	6.12	6.13	6.13	6.20	6.44	**6.20**
$Fe_{1(0.75)}$	6.76	6.78	7.65	7.41	6.96	**7.11**
$Fe_{2(1.5)}$	7.34	7.33	8.24	8.53	8.60	**8.01**
$Fe_{3(3.0)}$	7.95	8.13	8.90	9.64	8.60	**8.66**
Mean	**7.04**	**7.09**	**7.73**	**7.95**	**8.70**	**8.66**
	Iron(Fe)		**Growth Media(M)**		**Interaction**	
SE+	**0.15**		**0.17**		**0.34**	
CD @5%	**0.41**		**0.47**		**0.92**	