



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

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Received: 02/09/2017

Edited: 08/09/2017

Accepted: 12/09/2017

Abstract: The "Assessment of Soil Growth Media and Copper 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., Raburi. The experiment was laid out in factorial completely randomized block design and replicated thrice with four copper levels and five growth media. The Four levels of copper were 0.0, 0.025, 0.05, and 0.1, 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 10.02 were recorded in highest level of copper applied. The treatment 0.1 mg of copper per plant per alternate day recorded the highest dry matter yield 43.03g. The maximum flower head diameter was recorded (8.33cm) in 0.1 mg of copper/plant/alternate day treatments. The treatment in which highest level of copper 0.1 mg/plant/alternate day was applied recorded the maximum stalk length (43.91 cm). The highest stalk 8.24 mm thickness was recorded in 0.1 mg copper/plant/alternate day treatment.

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

Introduction:

The total gerbera exports are increasing at a faster rate. Therefore, it is necessary to device suitable growth media as well as the nutrient requirement by the gerbera crop. In Maharashtra, the growers are using coco peat, soilrite, perlite, compost, vermicompost and rice husk. These substrates are available in market at varying prices. To find out the suitable growth media, which would be profitable for farmers having low cost, is becoming prime important now-a-days. The substitute can be provided by different combinations of farm yard manure, coco peat, wheat straw, rice husk, sugarcane trash, etc in soil with variable proportion. This will not only reduce the cost of production but locally available material will also be utilized properly.

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).

The grower located in timber area will probably find tree bark or saw dust as an economical source. The sphagnum peat moss is also added to bark or saw dust to increase water holding capacity as well as to improve the nutrient retention (Nelson, 2001). Field soils are generally unsatisfactory for production of plants in containers.

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 copper, 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

copper requirement of gerbera grown in alfisol under polyhouse conditions.

Material and Methods:

The investigation on “Assessment of Soil Growth Media and Copper 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 0.0,0.025,0.05, and 0.1 (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 copper 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 copper 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 copper (Table 1). The Cu₃ treatment recorded maximum number of flowers (10.02) was significantly superior to rest of treatments. The highest number of flowers per plants (9.73) were recorded in Soil+ FYM+ Sugarcane trash (M4) growth media. The interaction effect between growth media and copper level in respect of numbers of

flowers per plant was found to be statistically significant.

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

The highest dry matter yield of gerbera (43.03 g) was recorded in Cu₃ treatment which was significantly superior to Cu₀, Cu₁ and Cu₂ (Table 2). The lowest dry matter yield of gerbera (29.86 g) was observed in Cu₀ treatment. The highest dry matter yield of gerbera (39.41 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 (29.59 g) was recorded in Soil+ FYM (M₁) which was at par with M₂. The interaction effect between growth media and copper level was found to be significant. The treatment combination M₃Cu₃ recorded highest (47.23 g) dry matter yield which was at par M₂Cu₃ M₃Cu₃, M₄Cu₂ and M₅Cu₃. The lowest dry matter yield of gerbera (27.34 g) was recorded with M₁Cu₀ treatment combination which was at par with M₂Cu₀, M₃Cu₀, M₄Cu₀, M₅Cu₀ and M₁Cu₁.

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

The flower head diameter was significantly increased due to application of graded level of copper in different growth media (Table 3) The highest flower head diameter (8.33 cm) was recorded in Cu₃ treatment. The Soil+ FYM+ Sugarcane trash(M4) media recorded the highest flower head (7.39 cm) was recorded and the lowest flower head (7.02cm) but the treatment differences were non-significant. The significant treatment differences were observed in all treatment combinations in respect of flower head diameter.

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

The stalk length was significantly increased due to application of graded level of copper in different growth media (Table 4). The highest stalk length (43.91cm) was recorded in Cu₃ treatment which was at par with Cu₁ and Cu₂. The Soil+ FYM+ Sugarcane trash (M4) media recorded the highest stalk length (42.54 cm) which was at par with

M3 and M5. The lowest stalk length (40.68) were recorded in Soil+ FYM (M1) The significant treatment differences were observed in all treatment combinations in respect of stalk length. The treatment combination M4Cu3 recorded highest stalk length (43.23 cm). However treatment differences were non-significant

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

The data on stalk thickness presented in Table 5 revealed that the flower stalk diameter increased due to graded level of application of

copper. The control (Cu0) treatment recorded (6.20 mm) lowest flower stalk diameter Whereas the Cu3 treatment (0.1 mg kg⁻¹) recorded highest (8.24 mm) flower stalk diameter. The perusal of data indicates that the highest flower stalk diameter (7.53 mm) was recorded in Soil + FYM+ Sugarcane trash (M4)

Conclusion:

The higher yield and good quality of gerbera may be achieved with application of copper at the rate of 0.1 mg / plant / alternate day in combination of the Soil + FYM(10%) +Sugarcane trash(10%) media.

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

Copper 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
Cu ₀ (0)	6	7	7	7	8	7
Cu ₁ (0.025)	7	8	8	9	8	8.18
Cu ₂ (0.05)	8	8.6	10	11	9.6	9.44
Cu ₃ (0.1)	8.3	9.6	11	11.6	9.6	10.02
Mean	7.33	8.30	9.08	9.73	8.88	8.66
	Copper(Cu)		Growth Media(M)		Interaction	
SE±	0.34		0.38		0.76	
CD @5%	0.94		1.05		2.12	

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

Copper 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
Cu ₀ (0)	27.34	28.43	29.71	32.35	31.46	29.86
Cu ₁ (0.025)	26.49	33.95	33.27	36.94	36.23	33.37
Cu ₂ (0.05)	30.59	37.94	40.28	42.30	39.43	38.11
Cu ₃ (0.1)	33.92	43.41	47.23	46.05	44.73	43.07

Mean	29.59	35.93	37.62	39.41	37.96	36.10
	Copper(Cu)		Growth Media(M)		Interaction	
SE±	0.89		0.98		1.99	
CD @5%	2.48		2.78		5.54	

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

Copper 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)	
Cu ₀₍₀₎	6.40	6.40	6.55	6.70	6.60	6.53
Cu _{1 (0.025)}	6.53	6.66	6.68	6.86	6.80	6.71
Cu _{2 (0.05)}	7.06	7.13	7.28	7.53	7.43	7.29
Cu _{3 (0.1)}	8.10	8.26	8.39	8.48	8.42	8.33
Mean	7.02	7.11	7.23	7.39	7.31	7.21
	Copper(Cu)		Growth Media(M)		Interaction	
SE±	0.17		0.20		0.39	
CD @5%	0.48		N.S		1.08	

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

Copper 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)	
Cu ₀₍₀₎	40.12	40.23	40.30	40.93	40.80	40.48
Cu _{1 (0.025)}	40.76	41.15	42.16	42.95	42.40	41.88
Cu _{2 (0.05)}	40.82	41.22	42.23	43.04	42.68	42.00
Cu _{3 (0.1)}	41.03	41.63	42.76	43.23	43.14	42.36
Mean	40.68	41.06	41.86	42.54	42.26	41.68
	Copper(Cu)		Growth Media(M)		Interaction	
SE±	0.50		0.56		1.12	
CD @5%	1.37		1.54		N.S	

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

Copper 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)	
Cu ₀₍₀₎	6.13	6.13	6.13	6.20	6.44	6.20
Cu _{1 (0.025)}	6.60	6.68	6.67	6.59	6.70	6.65
Cu _{2 (0.05)}	6.97	7.15	8.12	8.16	7.72	7.62
Cu _{3 (0.1)}	7.36	7.57	8.53	9.18	8.56	8.24
Mean	6.76	6.88	7.36	7.53	7.36	7.18
	Copper(Cu)		Growth Media(M)		Interaction	
SE±	0.15		0.17		0.33	
CD @5%	0.41		0.46		0.92	