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SCREENING OF MARIGOLD GENOTYPES FLOWER YIELD AND PIGMENT CONTENT

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ABSTRACT

African marigold (*Tagetes erecta* L.), a major source of Lutin (Carteniod family), is also grown as a cut flower and a garden flower in addition to being grown for its medicinal values. This pigment has acquired greater significance because of its excellent colour value. The experiment was carried out in the university new area plot, Department of Horticulture, Faculty of Agriculture, Annamalai University during 2011-12 laid out in randomized block design with three replications. Regular cultural practices were adopted to raise the crop successfully. Observations on plant height, number of branches, stem girth, leaf area, earliest flowering, stalk length, flower head diameter, flower yield, 35anthophylls content, biomass and dry matter production were recorded and statistically analyzed. Among the accessions the superiority of the accession TE-10 may be to the production of maximum yield, higher biomass production and maximum xanthophyll content.

Key words: African Marigold, flower yield and Xanthophyll content

INTRODUCTION

African Marigold (*Tagetes erecta* L.), which are yellow to orange red in colour, are a rich source of lutein, a carotenoid pigment. Nowadays, Lutein is becoming an increasingly popular active ingredient used in the Food industry and Textile coloration. This pigment has acquired greater significance because of its excellent colour value. Although marigold flower extract has been used in veterinary feeds, the potential use of marigold as a natural textile colorant has not been exploited to the full extent due to the lack of information on its safety, stability, and compatibility in textile coloration. Dyeing is an ancient art, which predates written records. It was practiced during the Bronze Age in Europe. Primitive dyeing techniques included sticking plants to fabric or rubbing crushed pigments into cloth. The methods became more sophisticated with time and techniques using natural dyes from crushed fruits, berries and other plants, which were boiled into the fabric and gave light and water fastness (resistance), were developed. In many of the world's developing countries, however, natural dyes can offer not only a rich and varied source of dyestuff, but also the possibility of an income through sustainable harvest and sale of these dye plants. Many dyes are available from tree waste or can be easily grown in market gardens (Ghorpade B., 2000). In areas where synthetic dyes, mordants (fixatives) and other additives are imported and therefore relatively expensive, natural dyes can offer an attractive alternative (Salikhov, S.A, *et.al*., 1978). In Ethiopia for example, there is a wealth of marigold flowers are available for producing natural dyes, but due to lack of knowledge of the processes involved in harvesting and processing the plants, little use is made of this natural resource. Presently there is an excessive use of synthetic dyes, which is estimated around 10,000,000tones per annum (Ghorpade B., 2000) whose production and application release vast amount of waste and unfixed colorants causing serious health hazard, by disturbing the eco-balance of nature. Currently, ecological considerations are becoming important factors in the selection of consumer goods all over the world during the mid 1980s, more interest have been shown in the use of natural dyes and a limited number of commercial dyes and small businesses have started to look at the possibility of using natural dyes for coloration (ManakBhawan, 1982). At present, large and small-scale industries have started exploring the use of natural colorants as a possible means of producing an ecologically round product, which would also appeal to the "Green" minded consumer. Hence, a study was conducted to identify suitable genotype for flower yield and xanthophyll content.

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MATERIALS AND METHODS

The present investigation was carried out in the university new area plot, Department of Horticulture, Faculty of Agriculture, Annamalai University during 2011-12. The experiment was laid out in randomized block design with three replications. Regular cultural practices were adopted to raise the crop successfully. Observations on plant height, number of branches, stem girth, leaf area, earliest flowering, stalk length, flower head diameter, flower yield, xanthophyll content, biomass and dry matter production were recorded and statistically analyzed.

Table 1. Performance of Marigold genotypes for growth, yield and xanthophylls content

Genotype	Plant height (cm)	Number of branches	Stem Girth (cm)	Leaf Area	Days to first Flowering	Stalk Length (cm)	Flower Diameter	Flowers per plant	Flower Yield	Xanthophyll content (mg g^{-1})	Biomass (g)	Dry matter (g)
TE - 1	89.40	14.66	3.63	38.30	35.66	6.00	6.70	23.00	170.23	6.18	223.92	98.89
TE - 2	104.20	14.00	4.06	38.41	35.62	6.56	5.83	21.33	176.16	6.42	232.82	100.72
TE – 3	116.56	19.66	4.56	40.36	37.33	6.33	6.73	23.67	212.23	6.93	182.75	79.43
TE – 4	117.50	16.56	4.16	42.47	37.00	6.36	6.60	47.32	229.23	7.29	178.24	76.60
TE – 5	90.91	16.23	3.60	35.53	43.66	6.60	6.80	29.33	135.00	5.75	208.62	91.68
TE – 6	119.90	18.31	3.40	43.60	41.68	5.93	6.56	45.62	262.03	7.54	204.93	88.40
TE – 7	102.20	15.36	3.96	36..32	39.23	6.16	5.86	40.36	180.53	6.24	198.82	65.34
TE – 8	101.90	15.65	3.80	36.42	41.52	5.86	6.33	33.32	173.00	5.93	175.25	73.13
TE – 9	121.86	18.00	4.16	32.21	38.76	5.70	6.93	29.67	136.60	5.42	166.97	72.84
TE – 10	97.76	22.68	4.16	52.30	34.33	7.50	7.26	64.68	307.46	8.02	256.86	108.55
TE – 11	114.83	19.01	4.93	43.65	34.27	6.52	5.76	42.67	253.83	7.62	170.00	58.31
TE – 12	91.70	13.69	3.90	27.13	41.23	7.03	7.06	17.89	116.30	4.62	165.52	57.64
TE – 13	119.33	20.67	3.33	41.72	42.00	6.86	6.86	40.62	271.06	7.93	183.04	63.89
TE – 14	86.20	18.33	3.76	31.36	40.32	5.53	5.70	19.21	147.56	4.87	167.95	60.46
S.Ed.	2.02	0.93	0.19	1.34	0.91	0.16	0.20	1.25	2.90	0.11	2.81	2.45
CD	2.85	1.31	0.26	1.89	1.28	0.22	0.28	1.76	4.10	0.15	3.97	3.46

RESULTS AND DISCUSSION

Significant variations were noticed among the fourteen accession for various characters studied. Among the accessions, the maximum plant height was observed in TE–9 at 30 DAT (58.13 cm) and the minimum plant height was in TE–14 at 30 DAT (31.10 cm). The same trend was noticed in 60 DAT and 90 DAT. The maximum plant height of 90.23 cm was recorded at 60 DAT in TE-9, the minimum plant height 63.06 cm was recorded in TE-14. At 90 DAT, TE-9 recorded the highest plant height (121.86 cm) and the shortest plant height was observed in TE-14 (86.20 cm). In this study, the maximum number of 11.00 branches was found in accession TE-3 and the minimum number of 5.56 branches was found in accession TE-12 at 30 DAT. The 60 DAT, plants produced maximum number of 16.33 branches in accession TE-13, followed by 15.66 in TE-14 and only 12.00 branches were recorded by TE-2. At 90 DAT, the maximum number of 22.68 branches was found in accessions TE-10 and the minimum of 14.00 branches was found in accession TE-2. Among the accessions, the maximum stem girth was observed in TE–11 at 30 DAT (4.30 cm) and the minimum stem girth was in TE–13 at 30 DAT (2.43 cm). The same trend was noticed in 60 DAT and 90 DAT. The maximum stem girth of 4.50 cm was recorded at 60 DAT in TE-9, the minimum stem girth of 2.66 cm was recorded in TE-13. At 90 DAT, TE-11 recorded the maximum stem girth (4.93 cm) and the minimum stem girth was observed in TE-13 (3.33 cm). The data pertaining to leaf area revealed that TE-10 registered the maximum leaf area (52.30). It was followed by TE-11 (43.65 cm^2). However, TE-11 on par with TE-6 (43.60 cm^2). The minimum leaf area (27.13 cm^2) was recorded in TE-12. Among the fourteen accessions, the earliest flowering was observed in TE-11 (34.27 days). This was on par with TE-10 (34.33 days), TE 2 (35.62 days) and TE1 (35.66 days). The late flowering was registered in TE 13 (42.00 days). Variability in the flower stalk length also noticed among the accessions. TE-10 resulted in the maximum flower stalk length (7.50 cm) followed by TE-12 (7.03 cm). The minimum flower stalk length (5.53 cm) was registered in TE-14. In this study, TE-10 resulted in the maximum flower head diameter (7.26 cm) followed by TE-12 (7.06 cm) and the minimum flower head diameter (5.70 cm) was registered in TE-14. Among the fourteen accessions, TE 10 gave the maximum number of flowers per plant (64.68 no) and it was followed by TE-12 (47.32 no) and the minimum number of flowers (17.89 no) was recorded in TE-14. Among the fourteen accessions, TE 10 gave the maximum flower yield (307.46 g) per plant and it was followed by TE-12 (271.06 g) and the minimum flower yield (116.30 g) per plant was recorded in TE-14. Among the fourteen accessions, TE 10 gave the maximum xanthophyll content (8.02 mg g^{-1}) and it was followed by TE-13 (7.93 mg g^{-1}) and the minimum xanthophyll content (4.87 mg g^{-1}) was recorded in TE-14.Significant variations were also noticed for biomass and dry matter production. The accession TE-10 produced the maximum bio mass of 256.86 g followed by 232.82 g in TE-12 whereas the least biomass was produced by TE-14 with 165.52 g. similar trend was noticed in dry matter production viz., The accession TE-10 produced the maximum dry matter production of 108.55 g followed by 100.72 g in TE-12 whereas the least dry matter production was produced by TE-14 with 57.64 g. Among the accessions the superiority of the accession TE-10 may be to the production of maximum yield, higher biomass production and maximum xanthophyll content. Based on the results, accession TE-10 has been identified as the best genotype and is considered for studying the effect of nutrients and hormones in the subsequent trials.

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