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GENOTYPIC EVALUATION OF AFRICAN MARIGOLD (*TAGETES ERECTA* L.) FOR FLOWER YIELD AND XANTHOPHYLL CONTENT UNDER VELLORE CONDITIONS

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Abstract

African marigold (*Tagetes erecta* L.), a major source of Lutien, is also grown as a traditional loose 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 Research Farm of Adhiparasakthi college of Horticulture, Kalavai, during 2018-19. 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, number of leaves, leaf area, days to first flowering, duration of flowering, number of flowers, flower head diameter, flower yield and xanthophyll content were recorded and statistically analyzed. Among the accessions, maximum plant height, number of branches, number of flowers per plant, flower diameter, single flower weight and flower yield were recorded in TE-9 (Pusa Narangi Gianda). However, the accession TE-4 recorded for more number of leaves, leaf area, days to first flowering, duration of flowering and xanthophyll content.

Keywords: 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, 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 *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 10,000,000 tones per annum (Ghorpade, 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 (Manak Bhawan, 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.

Material and Methods

The present investigation with 25 marigold accessions *viz.,* Lattoo Orange, Thiruvannamalai Local, Vedaranyam Local, Pusa Basanti Gainda, Suvarna Orange, Suvarna Yellow, Kaniyanur Local Orange , Kaniyanur Local Yellow, Pusa Narangi Gainda, Serapattu Local, Chengam Local Yellow, Chengam Local Orange, Hosur Local, Kavanur Local, Pollur Local, Mettur Local, Meruvathur Local, Vellore Local, Tindivanam, Local, Villupuram Local, Chakkaramallur local, Bondaguda local, Hataguda local, Dumbriguda local, Kerenga local was carried out in the Experimental farm of the Adiparasakthi college of Horticulture, Kalavai, during 2018-19. 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, number of leaves, leaf area, days to first flowering, duration of flowering, number of flowers, flower head diameter, flower yield and xanthophyll content were recorded and statistically analyzed.

Results and Discussion

Significant variations were noticed among the twenty five accessions for various characters studied (Table.10. The maximum plant height of 123.14 cm was recorded in TE-9 and the minimum plant height 87.48 cm was recorded in TE-14. In this study, the maximum number of branches (16.38) was found in accession TE-9 (Pusa Narangi Gainda) and the minimum number of branches (11.87) was found in

accession TE-14. Among the accessions, the more number of leaves (132.53) was observed in TE–4 (Pusa Basanti Gainda) which is followed by 130.03 in Hosur local (TE-13). The minimum number of leaves (90.05) was observed in in TE–12 (Chengam Local).

The data pertaining to leaf area revealed that TE-4 (Pusa Basanti Gainda) registered the maximum leaf area (124.57). It was followed by TE-11 (43.65 cm^2). However, TE-11 on par with TE-3 (120.35) in Vedaranyam Local. The minimum leaf area (79.29.13 cm^2) was recorded in TE-14 (Kavanur Local). Among the twenty five accessions, the earliest flowering (53.86 days) was observed in TE-4 (Pusa Basanti Gainda). This was followed by TE-13 (55.61 days) and late flowering was registered in TE 12 (76.38 days).

The data on duration of flowering recorded significant variations among the genotypes. Maximum flowering duration (75.31 days) was recorded under the genotype Te-4 (Pusa basanti Gainda) which is followed by TE-13 with 73.91 days (Table.2). However, the lowest flowering duration were noticed under TE-12 with 56.92 days only. Among the twenty five accessions, TE 9 (Pusa Narangi Gainda) gave the maximum number of flowers per plant (53.45) and it was followed by TE-6 with 51. 02 flowers the minimum number of flowers (30.01) was recorded in TE-12. In this study, TE-9 resulted in the maximum flower diameter (7.12 cm) followed by TE-6 (7.03 cm) and the minimum flower head diameter (5.84 cm) was registered in TE-24. Among the twenty five accessions, TE 9 recorded the maximum single flower weight (4.95 g) which is followed TE-6 which recorded 4.90 g. However, the minimum flower weight was recorded under TE-24 with 3.74 g. The genotype TE-9 (Pusa Narangi Gainda) registered for maximum flower yield per plant (222.62 g) which is followed by TE-6 with 213.37 g and the minimum flower yield of 128.28 g per plant was recorded in TE-14.

Among the twenty five accessions, TE 4 gave the maximum xanthophyll content (18.35 kg^{-1} of petal meal (g) and it was followed by TE-13 (17.73 kg^{-1} of petal meal (g) and the minimum xanthophyll content (15.21 kg^{-1} of petal meal (g) was recorded in TE-19. Based on the above results, among the twenty five accessions screened, maximum flower yield was recorded under TE-9 (Pusa Narangi Gainda) and for xanthophyll extraction, maximum xanthophyll content was recorded under TE-4 (Pusa Basanti Gainda) has been identified as the best genotype and are considered for further studies under kalavai condition.

Table 1 : Mean Performance of Genotypes for various vegetative and flowering characters

Genotype	Plant height (cm)	Number of branches	Number of leaves	Leaf area (cm^2)	Days to first flowering	Duration of flowering
TE-1	90.68	13.02	111.92	89.54	69.05	65.32
TE-2	105.48	15.47	103.41	81.43	71.88	64.72
TE-3	117.84	15.80	128.04	120.35	58.92	72.63
TE-4	118.78	15.82	132.53	124.57	53.86	75.31
TE-5	92.19	13.82	113.52	91.95	68.92	66.33
TE-6	121.18	15.99	128.72	118.42	57.02	73.01
TE-7	103.48	15.66	116.56	88.58	67.31	66.85
TE-8	103.18	15.61	125.92	108.28	61.62	71.95
TE-9	123.14	16.38	128.63	108.04	57.01	72.85
TE-10	99.04	14.52	121.75	92.53	66.31	68.73
TE-11	116.11	15.78	123.83	100.30	62.35	70.52
TE-12	92.98	14.01	90.05	81.05	76.38	56.92
TE-13	120.61	15.91	130.03	107.92	55.61	73.91
TE-14	87.48	11.87	95.54	79.29	73.51	59.62
TE-15	94.82	12.83	98.75	82.95	73.89	61.03
TE-16	96.61	14.21	117.57	102.28	67.83	67.14
TE-17	101.82	13.01	108.75	95.70	69.98	65.16
TE-18	95.03	14.47	121.23	113.95	66.18	68.71
TE-19	100.38	14.32	93.42	84.07	74.77	57.03
TE-20	103.92	15.31	122.98	115.60	64.96	69.03
TE-21	94.54	14.29	119.53	111.16	66.13	67.72
TE-22	100.87	15.42	122.53	105.37	66.62	69.01
TE-23	108.92	15.68	127.43	121.05	59.92	72.12
TE-24	101.73	14.82	106.73	94.98	70.61	64.99
TE-25	110.24	15.70	100.91	93.84	72.87	63.01
S.Ed.	2.02	0.22	0.86	0.93	0.65	0.60
CD	2.85	0.45	1.73	1.88	1.32	1.22

Table 2 : Mean Performance of genotypes for various flowering characters

Genotype	Number of flowers per plant	Flower Diameter	Single flower weight (g)	Flower yield per plant (g)	Xanthophyll content kg^{-1} of petal meal (g)
TE-1	36.74	6.67	4.56	142.40	15.92
TE-2	42.78	5.87	3.92	142.54	15.58
TE-3	48.62	6.93	4.87	201.26	16.81
TE-4	49.01	7.01	4.87	202.88	18.35
TE-5	36.92	6.75	4.59	144.04	16.02
TE-6	51.02	7.03	4.92	213.37	17.01
TE-7	45.72	6.76	4.63	179.93	16.04
TE-8	43.65	6.75	4.76	176.61	16.48
TE-9	53.45	7.12	4.90	222.62	16.83
TE-10	40.21	6.24	4.31	147.31	16.27
TE-11	46.90	6.76	4.72	188.16	16.32
TE-12	30.01	6.19	4.27	108.92	14.98
TE-13	49.03	6.91	4.86	202.54	17.73
TE-14	35.01	6.12	4.21	125.28	15.27
TE-15	36.32	6.09	4.12	127.19	15.38
TE-16	37.03	6.78	4.80	151.08	16.11
TE-17	36.37	6.38	4.41	136.33	15.74
TE-18	40.04	6.8	4.82	164.04	16.16
TE-19	38.87	6.02	4.03	133.15	15.21
TE-20	40.66	6.81	4.82	166.58	16.31
TE-21	37.05	6.4	4.43	139.51	16.14
TE-22	42.33	6.83	4.83	173.79	16.30
TE-23	45.98	6.9	4.84	189.16	16.25
TE-24	40.47	5.84	3.74	128.65	15.63
TE-25	46.72	6.33	4.32	171.56	15.52
S.Ed.	0.93	0.04	0.01	1.68	0.22
CD	1.88	0.08	0.03	3.38	0.44

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