Research Article

Assessment of Concrete and Absolute Recovery from Different Farmers Landraces of Marigold (*Tagetes Species*) For Industrial and Breeding Programme

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Abstract
Marigold concrete and absolute was obtained from the flowers collected from farmers field of Western Uttar Pradesh. The maximum concrete and absolute (0.900 and 0.527%) was obtained from MGV-8 cultivar followed by (0.847 and 0.413%) in Chotta Jafari, (0.743 and 0.320%) in Medium Jafari, (0.547 and 0.303%) in MGV-6, (0.543 and 0.237%) in MGV-5 and minimum concrete and absolute (0.333 and 0.143%) obtained from the cultivar MGV-4.The results indicate that the cultivar MGV-8, Chota Jafari and Medium Jafari was found superior in terms of concrete and absolute quantity among the studied genotypes and these cultivars may be used for breeding programme in marigold as well as commercial points of view of farmers.

Keywords: Marigold, *Tagetes species*, concrete, absolute, essential oil

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Introduction

Marigold (*Tagetes spp*.) was introduced in India by Portuguese in 16th century. It has been adapted to different agro-climatic regions of India in such a way that it now appears to be a native of this country. However, it is a native of Central and South America. In India, it ranks first in area and production among loose flowers crops and its occupies an area of 55,890 hectares with production of 5,11,310 metric tonnes loose flower [1]. It is extensively grown in Karnataka, Gujarat, Maharashtra, Haryana, Andhra Pradesh, Uttar Pradesh, Chhattisgarh, Odisha, Jammu & Kashmir, Puducherry, Andaman & Nicobar Islands, Arunachal Pradesh, West Bengal, Tamil Nadu, *etc*. and exported to several countries. It is cultivated as a floriculture crop and capitula are sold loose or used in garlands for social and religious purposes [2]. The genus Tagetes comprises of 57 species world over of which, *Tagetes erecta*, *Tagetes patula*, *Tagetes minuta* and *Tagetes tenuifolia* are the most common in cultivation. Among them, 56 species have been reported to be used in traditional medicine in America, Africa and Asian countries [3]. Among them, two species, namely, *T. erecta* (African marigold) and *T. patula* (French marigold) are most popular as loose flower crops [4]. The petals of marigold are rich in the orange-yellow lutein pigments and as such extracts of marigold are used as a food colour. Besides, lutein, the other important carotenoid fractions are carotenes, mono-hydroxy pigments, di-hydroxy pigments etc. that imparts yellow, orange and red colour for use in food, beverage and textile industries. The aerial parts of marigold are rich source of essential oil. The ornamental plant is well known for its decorative flowers and a wide range of biological activities [5]. It is also being used in the traditional medicine to treat gastric ulcers, conjunctivitis, bronchitis, fever and intestinal and stomach diseases. The flowers of *T. erecta* are sold in some markets of our country instead the well known medicinal plant Calendula officinalis. It is an annual flower belonging to family Asteraceae and genus Tagetes. Keeping in view the importance of concrete and absolute obtained from marigold, present investigation was carried out at Department of Chemistry, CSSS (PG) College, Machhra, Meerut, UP, India

Materials and Methods

The experimental material comprised of 11 marigold (*Tagetes spp*) genotypes, namely, Chota Jafari, Medium Jafari, Pusa Narangi, MGV-1, MGV-2, MGV-3, MGV-4, MGV-5, MGV-6, MGV-7, MGV-8. To conduct the experiment, Completely Randomized Block Design (CRBD) was used with three replications. Fresh flowers were collected from the farmers field (**Table 1**) and brought to the laboratory where the flowers were sorted and the calyces were removed from the flower petals. The marigold capitula (Petals) were weighed and taken in to a 5 L round

bottomed flask. Sufficient amount of water was added into the flask in such a way that the capitula/petals dipped into the water. This was then hydrodistilled using clevenger apparatus on a heating mantle for about 5 h. The light yellow colored concrete was collected and dried in desiccator over calcium chloride. To get the absolute from concrete, addition of 20 ml of methanol to the residue, warming to 50^0 C for 5 min to get a homogeneous mixture followed by refrigeration 12 hrs at -50^0 C, precipitated most of the waxes. Filtration through a sintered funnel followed by evaporation of methanol below 40^0 afforded a light yellow partially dewaxed absolute with a pleasant odour reminiscent of fresh capitula. The experimental data generated from present investigations were subjected to the statistical analysis in accordance with the procedure outlined by [6]. The interpretations of the results were based on "F- test" at 0.05 level.

Table 1 Concrete and absolute recovery in different genotypes of Marigold (*Tagetes species*)

S.N	Name of genotype	Flower characteristics	Concrete	Absolute
1	Chota Jafari	Small flowers with red colour	0.847	0.413
2.	Medium Jafari	Orange colour flower with medium size	0.743	0.320
3	Pusa Narangi	Orange colour flower	0.433	0.270
4	MGV-1	Big size golden orange colour flower	0.407	0.193
5	MGV-2	Big size yellow orange colour flower	0.420	0.197
6	MGV-3	Big size dark orange colour flower	0.390	0.200
7.	MGV-4	Big size lemon colour flower	0.333	0.143
8.	MGV-5	Small size flower with dark orange colour	0.543	0.237
9.	MGV-6	Small flower with yellow orange colour	0.547	0.303
10.	MGV-7	Small orange flower	0.520	0.247
11.	MGV-8	Big size plant with yellowish colour flower	0.900	0.527
	Mean B	-	0.553	0.277
	Factors	-	SE(m)	C.D.
	Variety	-	0.016	0.045
	Conc	-	0.007	0.019
	VxC	-	0.022	0.064

Figure 1 Collection site of flowers

Results and Discussion

The present study showed significant variation in concrete and absolute contents among different genotypes (Table 1).The maximum concrete and absolute (0.900 and 0.527%) was obtained from MGV-8 cultivar followed by (0.847 and 0.413%) in Chotta Jafari, (0.743 and 0.320%) in medium Jafari, (0.547 and 0.303%) in MGV-6, (0.543 and 0.237%) in MGV-5 and minimum concrete and absolute (0.333 and 0.143%) was recordrd in the cultivar MGV-4. Igolen (1936) had studied chemistry of *T. Patula* oil in first time, the yield of essential oil was obtained 0.3% by steam distillation. Similar variations in essential oil contents among the marigold genotypes have also been observed by [7]. Earlier, [8] have obtained the essential oil (0.09%) from capitula while, [9] had isolated 0.056% essential oil. [10] reported 0.18% volatile crop oil and [11] found that aerial parts yielded 0.17% oil. The results regarding essential oil are comparable with the previous study where *R. damascena* produced 0.14% of absolute oil followed by, 0.11% of absolute oil from *R. centifolia* while *Rosa* 'Gruss an Teplitz' produced the lowest absolute oil content [12]. The oil content i.e, (concrete and absolute) in the present study ranged from MGV-8 (0.900 and 0.527%) to MGV-5 (0.333 and 0.143%) while [9] reported concrete and absolute (0.56% and 0.32%), respectively in marigold and [7] reported the essential oils yield ranged from (0.02 to 0.09%) in marigold on fresh weight basis of flowers. The variation in concrete and absolute concentration might be due to genetic variation among the the examined genotypes.

In this study, the analysis of variance (**Table 2**) revealed significant differences (p = 0.05) for concrete (A) and absolute (B). The existence of genetic variation in yield attributing characters is the primary base for breeding programs. Therefore, genetic variation may be the one of the reason for the variation in essential oil contents in the examined germplasm. This variation could be the positive indication for the proper selection for oil content [13]. So the landraces with high concrete and absolute might be selected for the breeding and industrial purposes and also may be benefited to the farmers on economic point of view. The present analysis of variance is close conformity with the other researchers [14-21] who had also found significant mean squares among landraces for yield attributing traits. The significant interactions were observed between in concrete and absolute during the course of study.

Table 2 Analysis of variance of the studied traits

Source of Variation	DF	Sum of Squares	Mean Squares	F-Calculated
Replication	2	0.009		
Factor A	10	1.349	0.135	90.465*
Factor B	1	1.255	1.255	841.566*
Intraction A X B	10	0.138	0.014	9.27*
Error	42	0.063	0.001	
Total	65	2.813		

*= significant (P < 0.05)

Conclusion

On the basis of present study, it may be concluded that the cultivar MGV-8, Chota Jafari and Medium Jafari was found superior in terms of concrete and absolute quantity and these cultivars may be used for breeding programme as well as commercial points of view of farmers.

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