Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2020; 9(1): 1398-1400
Received: 04-11-2019
Accepted: 06-12-2019

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Assessment of genetic variability in tuberose (*Polianthes tuberosa* L.) cultivars

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Abstract
An experiment was carried out in the Experimental Farm, Department of Horticulture, Assam Agricultural University, Jorhat during 2016-17 and 2017-18, to study the variability in genetic parameters. The experiment was laid out with eighteen tuberose cultivars in Randomized Block Design (RBD) with three replications. Observations were recorded for growth, flower and physiological characters. The estimates of PCV and GCV were very close for yield of floret per spike, yield of floret per m^2, floret weight, moisture content, fresh weight of spike, diameter of rachis, vase life of spike, vase life of floret, weight of clump, size of bulb, days to spike emergence, days to opening of first pair of floret, which were also reflected in their respective high heritability estimates. That means there is considerably high genetic variation and environment effect is less for these characters. Yield of florets per spike, yield of florets per m^2 and floret weight exhibited high heritability and high genetic advance. So these characters are predominantly controlled by additive gene.

Keywords: Tuberose, genotypic coefficient of variation, phenotypic coefficient of variation, heritability, genetic advance

Introduction
Tuberose (*Polianthes tuberosa* L) is a bulbous fragrant ornamental plant, native to Mexico. In India, tuberose occupies a prime position in the floriculture industry. The major portion of tuberose flowers consumption is in the form of loose flowers and cut flowers. The loose flowers of tuberose have high demand in the market for making garlands and other floral arrangements. The tuberose flowers are valued more because they impart sweet and lingering pleasant fragrance. For a sound breeding programme, critical assessments of the nature and extent of genetic variability in the germplasm and assessment of the heritability and genetic advance of the important yield contributing characters in a crop are essential (Ranchana *et al.* 2013) [6]. Overall variation is required to be partitioned into heritable and non- heritable components for the estimation of genetic parameters such as genotypic and phenotypic coefficients of variation, heritability and expected genetic advance (Ariyo, 1987) [1]. As a result, the cultivars for use, as parents in any hybridization programme can be chosen from different groups representing distinct variability.

Materials and Methods
The present investigation included 18 genotypes of the species conducted in the Experimental Farm, Department of Horticulture, Assam Agricultural University, Jorhat in two seasons during 2016-17 and 2017-18. The genotypes taken were Arka Nirantara, Vaibhav, Subhasini, Mexican Double, Mexican Single, Prajwal, Jorhat Collection, Guwahati Single, Hajo Locale, Calcutta Single I, Calcutta Single II, Calcutta Double, Sikkim Selection, Bidhan Rajani I, Bidhan Rajani II, Shringar and Phule Rajani. The experiment was laid out in randomized block design with three replications. The soil was brought to a fine tilth by giving deep ploughings. The field was divided into plots for allotment of various treatments. Fifty four plots were laid out to accommodate all the 18 treatments replicated three times. The gross size of an individual plot was 2.5 x 1.5 m in each replication. Medium sized bulbs of 3.0-3.5 cm diameter weighing about 25 grams were selected and treated with Bavistin 1.5g/l water for half an hour. The treated bulbs were planted in rows at 30 x 25 cm spacing accommodating 28 plants per plot. All the growth, flower and bulb characters were recorded in five sampled plants in each treatment from each replication. The phenotypic coefficient of variation (PCV) and genotypic coefficient of variation (GCV) were calculated as suggested by Burton and De Vane (1953) [2]. The heritability (h^2) in broad sense in percent and the genetic advance as percent mean were calculated as suggested by Johnson, Robinson and Comstock (1956).

Results and Discussion

The estimates of genotypic coefficient of variation (GCV) and phenotypic coefficient of variation (PCV) of yield and yield attributing characters for both single and double cultivar are presented in Table 1. Genotypic coefficient of variation (GCV) and phenotypic coefficient of variation (PCV) were highest for yield of florets per spike (80.00 and 80.21 respectively) followed by yield of florets per m^2 (79.82 and 80.03 respectively) and weight of floret (74.48 and 74.60 respectively) suggesting that these characters are under genetic control. Hence, these characters can be considered for further improvement. The phenotypic coefficient of variation (PCV) was higher than genotypic coefficient of variation (GCV) for all the characters under study, indicating the role of environment in expression of cultivar. Similar results were also reported by Ranchana *et al.* (2013) [6], Vanlalruati *et al.* (2013) [8] and Gaidhani (2016) [3] in Tuberose cultivars. The lowest GCV and PCV were observed for days to spike emergence (2.66 and 2.73 respectively) followed by chlorophyll content (3.41 and 3.38 respectively). This indicated that low variation existed among the cultivars with respect to these characters.

High heritability coupled with high genetic advance was observed for yield of florets per spike (99.49,164.39), yield of florets per m^2 (99.48, 164.01), weight of florets (99.66, 153.17), chlorophyll content (99.12, 66.20), fresh weight of spike (97.13, 67.85), no of shoots per bulb planted (89.82,68.15), moisture content (98.39, 52.80), vase life of floret (91.75, 59.39) and bulb weight (87.05,60.59) (Table1). This indicated the lesser influence of environment in expression of these characters and prevalence of additive gene action in their inheritance. Hence, these traits are found suitable for selection. High heritability with moderate genetic advance was recorded for weight of clump (92.88,49.31), size of bulb (93.90,29.30), vase life of spike (95.46,45.98), days to opening of first pair of florets (91.76,28.72), length of spike (89.74, 26.08), length of rachis (89.74,42.34), self-life of spike (89.13, 35.09), length of florets (87.94, 18.06), self-life of florets (86.74,34.50), diameter of stalk (86.97,24.58) and no of economic bulb produced per bulb planted (84.60,26.79) suggesting the presence of both additive and non-additive gene actions, and simple selection offers best possibility of improvement of this trait. The estimate of heritability was high with low genetic advance as percentage of mean for diameter of rachis (91.31, 14.85) and days to spike emergence (94.72, 5.34) which indicated that high heritability were due to non-additive gene effects and influence of environment. Hence, there is a limited scope for selection. Gurav *et al.* (2005) [4], Vijayalaxmi *et al.* (2010) [9], Vanlalruati *et al.* (2013) [8], Ranchana *et al.* (2013) [6] and Gaidhani (2016) [3] reported similar kind of results in tuberose.

Table 1: Estimates of variability parameters for different characters in tuberose cultivars

Parameters	GCV	PCV	Heritability (%)	GA(%of mean)
1) Plant height	11.40	12.48	83.56	21.48
2) No of leaves	19.13	22.00	75.64	34.28
3) Leaf length	9.88	11.48	74.04	17.51
4) Leaf breadth	18.53	21.79	72.35	32.48
5)Leaf area index	33.87	42.23	64.30	55.95
6) No of shoots per bulb planted	34.91	36.83	89.82	68.15
7) Days to bulb sprouting	9.61	11.59	68.74	16.42
8) Days to spike emergence	2.66	2.73	94.72	5.34
9) Days to opening of first pair of floret	14.55	15.19	91.76	28.72
10) Length of spike	13.36	14.10	89.74	26.08
11) Length of rachis	21.69	22.90	89.74	42.34
12)Number of florets per spike	12.34	13.66	81.56	22.96
13) Length of florets	9.34	9.97	87.94	18.06
14) Diameter of stalk	12.79	13.72	86.97	24.58
15) No of economic bulbs produced per bulb planted	14.13	15.37	84.60	26.79
16) Bulb weight	31.42	33.56	87.05	60.59
17) Weight of clump	24.83	25.77	92.88	49.31
18) Size of bulb	14.67	15.14	93.90	29.30
19) Weight of floret	74.48	74.60	99.66	153.17
20) Chlorophyll content	3.38	3.41	99.12	66.20
21) Vase life of spike	23.08	24.18	95.46	45.98
22) Vase life of floret	30.10	31.42	91.75	59.39
23) Moisture content	25.84	26.05	98.39	52.80
24) Fresh weight of spike	33.42	33.91	97.13	67.85
25) Diameter of rachis	7.54	7.89	91.31	14.85
26) Self-life of the spike	18.04	19.11	89.13	35.09
27) Self-life of the floret	17.98	19.31	86.74	34.50
28) No of spikes per bulb planted	19.94	23.44	72.40	34.96
29) Yield of floret per spike	80.00	80.21	99.49	164.39
30) Yield of florets per m^2	79.82	80.03	99.48	164.01

GCV: Genotypic coefficient of variation, PCV: Phenotypic coefficient of variation, GA: Genetic advance

References

1. Ariyo OJ. Multivariate analysis and choice of parents for hybridization in Okra [*Abelmoschus esculentus* (L)] Moench. Theor. Appld. Gen. 1987; 74:361-363.
2. Burton GW, De Vane EH. Estimating heritability in tall fescue (*Festuca arundinacea*) from replicated clonal material. Agron. J. 1953; 45:478-485.
3. Gaidhani A, Badge S, Patil S, Ingole M, Ganorkar AA. Genetic and correlation studies in tuberose for assessing

the genetic variability. Journal of Crop and Weed. 2016; 12(1):52-55.
4. Gurav SB, Katwate MS, Singh RB, Kahade SD, Dhane VA, Sabale NR. Quantitative genetic studies in tuberose. J Ornam. Hort. 2005; 8(2):124-127.
5. Johnson HW, Robinson HF, Comstock RE. Estimation of genetic and environmental variability in soybeans. Agron J. 1995; 47:314-318.
6. Ranchana P, Kannan M, Jawaharlal M. The Assessment of Genetic Parameters: Yield, Quality Traits and Performance of Single Genotypes, of Tuberose (Polianthes Tuberose). Adv Crop Sci Tech, 2013, 1(3).
7. Ranchana P, Kannan M, Jawaharlal M. Genetic divergence analysis in double type of tuberose (*Polianthes tuberose*). The Asian J Hort. 2014; 9(2):507-509.
8. Vanlalruati. Correlation and path coefficient analysis in tuberose. J Crop. Weed. 2013; 9(2):44-99.
9. Vijayalaxmi MA, Rao M, Padmavatamma SA, Siva SA. Evaluation and variability studies in tuberose (*Polianthes tuberose* L.) single cultivars. J Ornam Hort. 2010; 13(4):251-256.