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Genetic Variability study in Round Gourd [*Praecitrullus fistulosus* (Stocks) Pangalo] Under Arid Climatic Conditions

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Abstract

A field experiment was conducted tostudy genetic variability in round gourd [*Praecitrullus fistulosus* (Stocks) Pangalo] under arid climatic conditions of western Rajasthan. Twenty different genotypes of round gourd were planted in the field during *Kharif*-2019 in Randomised Block Design with three replications. Significant differences were observed amongst the genotypes for all the 17 characters studied. The high degree of genetic variability along with high heritability and high genetic advance as per cent of mean were recorded formain vine length at harvest, number of marketable fruits per plant, fruit yield per plant, fruit yield per plot,fruit yield hectare, node on which first male flower appeared, fruit diameter, shelf life and rind thickness;which indicates that these characters were under the control of additive gene action and therefore form the basis of selection for round gourd improvement programme. The genotypes which exhibited higher fruit yield in descending order along with other desirable traits were LC-5, Arka Tinda, Tinda Ludhiana, LC-8 and LC-9. These genotypes were also having good quality and desirable traits for cultivation in arid climatic conditions.

Keywords : *Genotypes, round gourd, fruit yield, genetic variability.*

Introduction

Cucurbits belong to the family Cucurbitaceae and form a large group of cultivated vegetables in the India. Round gourd [*Praecitrullus fistulosus* (Stocks) Pangalo] popularly known as*Tinda*in India has 2n (2x) = 24 chromosomes. In India, the family Cucurbitaceae is represented by about 34 genera and 108 species, out of which 38 species are endemic. Tindais the only member in the genus *Praecitrullus* and like other common cucurbits, is a prolific vine grown as an annual. The vines are vigorous, have small thorns similar to the zucchini, productive and begin to bear fruits in 65 to 70 days after planting. The fruit is approximately spherical with 5-8 cm diameter.

It is cultivated as a vegetable in India, Pakistan and Afghanistan. In India, it is mainly grown in summer (February to May) or rainy (June to September) seasons as a popular vegetable in the states of Punjab, Haryana, Rajasthan and Western Uttar Pradesh. The fruit has medicinal value and is considered good for dry cough and blood circulation in the body. Its consumption gives cooling effect to the body, as the fruits have high water content.Presently, the cultivation and yield of round gourd is very low as compared to other cucurbitsin the arid region, due to non-availability of seeds of standard genotypes producing better quality fruits under the climate conditions of north-western India (1). Also, round gourd continuously generates genetic diversity in the population being a cross pollinated crop (2).

Very meagre research work has been done for genetic studies in round gourd.Therefore, the present study was conducted to assess genetic variabilityin 20 round gourd genotypes and association of fruit yield with theyield contributing traits based on 17 important quantitative and qualitative charactersunder arid climatic conditions of Rajasthan to identify promising genotypes for a breeding programme to develop high yielding varieties of round gourd for the arid zone.

Genetic variability is defined as “the occurrence of a high degree of variation differences among individuals due to differences in their genetic composition and of the environment in which they are raised” (3). The basic requirement for genetic improvement of a crop is to utilize the available or created genetic variability. Yield of round gourd fruits is a polygenic character and influenced by a number of characters, so it is worthwhile for opting direct selection, as variability of observed characters is the sum total of hereditable and environment factors. So, it is desirable to use divider walls between heritable and non-heritable components with the help of certain genetic parameters like genotypic coefficient of variation (GCV), phenotypic coefficient of variation (PCV), heritability (H^2) and genetic advance as percent of mean (GAM). The present study was undertaken to estimate genetic variance, heritability and genetic advance as percent of mean of the 20 round gourd genotypes.

Materials and Methods

The present study was carried out during *Kharif*, 2019at College of Agriculture, Agricultural University, Jodhpur. The experimental material consisted of 20 genotypes

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including two check cultivars (Table-1) and was evaluated in randomized block design with three replications under dripirrigation system for 17 different characters *viz.,* number of leaves per plant, leaf area (cm^2), inter nodal length (cm), main vine length at harvest (m), days to anthesis of first female flower, days to anthesis of first male flower, node on which first female flower appeared, node on which first male flower appeared, days taken to 50% female flowering, number of marketable fruits per plant, fruit diameter (cm), fruit weight (g), rind thickness (cm) and shelf life (days),whichwere subjected to genetic variability analysis using standard procedures.

Table-1 : List of round gourd genotypes studied in the present investigation.

S. No.	Genotypes	Source
1.	Arka Tinda	IIHR, Bangalore
2.	Tinda Ludhiana	PAU, Ludhiana
3.	LC 1	Nevra Road, Osian, Jodhpur
4.	LC 2	Nevra , Osian, Jodhpur
5.	LC 3	Baori, Bhopalgarh, Jodhpur
6.	LC 4	Med, Viratnagar, Jaipur
7.	LC 5	Manoharpur, Shahpura, Jaipur
8.	LC 6	Chandwaji, Amber, Jaipur
9.	LC 7	Gathwari, Jamwa Ramgarh, Jaipur
10.	LC 8	KhoralarKhani, Shahpura,Jaipur
11.	LC 9	Rajas, Nawa City, Nagaur
12.	LC 10	Sadulshahar, Sriganganagar
13.	LC 11	Fakirwali, Padampur, Sriganganagar
14.	LC 12	Govindpura, Sriganganagar
15.	LC13	Sawantsar, Padampur, Sriganganagar
16.	LC 14	Roopwas, Uniara, Tonk
17.	LC 15	Mandrella,Chirawa,Jhunjhunu
18.	LC 16	Diplana, Nohar, Hanumangarh
19.	LC 17	KVK, Gudamalani, Barmer

Results and Discussion

The analysis of variance (Table-2) showed significant differences among genotypes for all the 17 characters indicating that the material had adequate genetic variability to support the breedingprogramme for improving the fruit yield of round gourd. The mean performance of genotypes showed a wide range of variability for all the 17 traits. A range of variation was noted for the number of leaves per plant (135.53-182.53), leaf area (61.96-88.38 cm^2), inter nodal length (4.15-7.24 cm), main vine length at harvest (1.63-3.54 m), days to anthesis of first female flower (39.73-47.13 days), days to anthesis of first male flower (29.00-38.46 days), node on which first female flower appeared (6.41-10.10), node on which first male flower appeared (3.14-6.02), days taken to 50% female flowering (41.56-50.10 days), number of marketable fruits per plant (10.26-23.40), fruit diameter (4.02-6.69 cm), fruit weight (56.32- 84.18 g), fruit yield per plant (0.616-1.747 kg), fruit yield per plot (6.16-17.44 kg), fruit yield per hectare (38.06-107.70q), rind thickness (0.44-0.74 cm) and shelf life (3.02-4.82 days).

Genetic variability parameters estimated for different characters of round gourd are given in Table-3. The highest GCV and PCV in round gourd germplasm were observedfor fruit yield per hectare followed by fruit yield per plot and fruit yield per plant, respectively; thereby suggesting a good scope of improvement, creating variability through hybridization followed by selection.The occurrence of moderate GCV and PCV was recorded fornode on which first male flower appeared, main vine length at harvest, fruit diameter, rind thickness, shelf life, node on which first female flower appeared, internodal length and fruit weightwhich suggests that improvement in these characters could be gained to a reasonable extent. These findings are supported by reports of (4) in culinary melon, (5) in watermelon and (6) in muskmelon.

The response of selection depends upon the magnitude of heritable variation present in a population. So, a character with high GCV and high heritability will be more valuable in a selection programme.In the present investigation, high heritability estimates have been observed formain vine length at harvest, number of marketable fruits per plant, fruit yield per plant, fruit yield per hectare, number of leaves per plant, node on which first male flower appeared, fruit diameter, shelf life, internodal length, rind thickness, days to anthesis of first male flower, fruit weight and node on which first female flower appeared. According to (7) such characters are predominantly governed by additive gene action and could be improved through individual plant selection owing to their high heritability values. Similar findings were reported by (8) in sponge gourd and (9) in bottle gourd.

The genetic advance as per cent of mean provides an idea of the amount of progress that can be achieved by selection for the concerned trait. High genetic advance as percentage of mean was estimated forfruit yield per plant followed by fruit yield per hectare, fruit yield per plot, number of marketable fruits per plant, main vine length at harvest, node on which first male flower appeared, fruit diameter, rind thickness and shelf life. However,low values were observed for days to anthesis of first female flower followed by days taken to 50% female flowering.

The heritability values coupled with genetic advance would be more reliable and useful in predicting the gain under selection than the heritability estimates alone.The high estimates of heritability coupled with high genetic advance as percent of mean were recorded formain vine

Table-2 : Analysis of variance for different characters of round gourd.

Character	Mean Sum of Square		
	Replication	Genotype	Error
Degrees of freedom	2	19	38
Number of leaves per plant	85.55	440.19**	28.12
Leaf area (cm^2)	32.22	113.75**	26.85
Internodal length (cm)	0.35	1.34**	0.13
Main vine length at harvest (m)	0.020	0.45**	0.015
Days to anthesis of first femaleflower	4.68	8.61**	2.24
Days to anthesis of first male flower	4.43	14.29**	1.41
Node on which first female flower appeared	0.42	2.77**	0.30
Node on which first male flower appeared	0.13	1.51**	0.11
Days taken to 50% female flowering	5.58	10.86**	2.20
Number of marketable fruits per plant	1.95	27.29**	1.04
Fruit diameter (cm)	0.38	2.37**	0.19
Fruit weight (g)	11.92	177.89**	18.47
Fruit yield per plant (kg)	0.030	0.29**	0.013
Fruit yield per plot (kg)	2.33	28.87**	1.48
Estimated fruit yield per hectare (q)	97.11	1094.15**	56.18
Rind thickness (cm)	0.010	0.02**	0.002
Shelf life (days)	0.12	0.81**	0.078

*Significant at P = 0.05** Highly significant at P = 0.01

Table-3 : Estimates of genetic variability parameters for different characters of round gourd.

Character	Mean	Range		GCV (%)	PCV (%)	h^2 (%)	GAM
		Min.	Max.				
Number of leaves per plant	158.10	135.53	182.53	7.41	8.13	83	13.91
Leaf area (cm^2)	75.035	61.96	88.38	7.17	9.95	51.9	10.64
Inter nodal length (cm)	5.81	4.15	7.24	10.91	12.54	75.6	19.54
Main vine length at harvest (m)	2.26	1.63	3.54	16.82	17.66	90.7	33.02
Days to anthesis of first female flower	42.32	39.73	47.13	3.44	4.93	48.6	4.94
Days to anthesis of first male flower	31.93	29.00	38.46	6.48	7.47	75.2	11.59
Node on which first female flower appeared	8.03	6.41	10.10	11.16	13.12	72.3	19.53
Node on which first male flower appeared	3.89	3.14	6.02	17.58	19.54	80.2	32.58
Days taken to 50% female flowering	44.76	41.56	50.10	3.79	5.04	56.6	5.88
Number of marketable fruits per plant	14.86	10.26	23.40	19.90	21.05	89.3	38.75
Fruit diameter (cm)	5.15	4.023	6.69	16.50	18.59	78.8	30.17
Fruit weight (g)	69.03	56.32	84.18	10.56	12.25	74.2	18.74
Fruit yield per plant (kg)	0.910	0.6167	1.747	33.29	35.51	87.9	64.30
Fruit yield per plot (kg)	9.03	6.16	17.44	33.36	35.96	86.02	63.74
Estimated fruit yield per hectare (q)	55.75	38.06	107.70	33.37	35.97	86.03	63.75
Rind thickness (cm)	0.56	0.45	0.74	13.42	15.46	75.4	24.01
Shelf life (days)	3.69	3.02	4.82	13.39	15.37	75.9	24.02

length at harvest, number of marketable fruits per plant, fruit yield per plant, fruit yield per hectare, fruit yield per plot, node on which first male flower appeared, fruit diameter, rind thickness and shelf life. These traits are governed by additive gene actions, therefore, may be improved through direct selection. Similar findings were reported by (10) in bottle gourd and (11, 12) in pointed gourd.

Conclusion

On the basis of genetic variability study in round gourd [*Praecitrullusfistulosus* (Stocks) Pangalo] under arid climatic conditions of western Rajasthan it could be concluded that out of the 20 genotypes LC-5, ArkaTinda, Tinda Ludhiana, LC-8 and LC-9 genotypes exhibited higher fruit yield along with other desirable traits and were found suitable for cultivation and improvement programmes in arid climatic conditions.

References

1. Samadia, D.K. (2007). Studies on genetic variability and scope of improvement in round melon under hot arid conditions. *Indian J. Hort.,* 64(1): 58-62.
2. Hancock, J.F. (2012). *Plant Evolution and the Origin of Crop Species.* CABI, pp. 492-500.
3. Falconer, D.S. and Mackay, T.F.C. (1996). *Introduction to*

Quantitative Genetics, 4th ed. Benjamin Cummings, London, UK, pp. 122-125.

4. Rakhi, R. and Rajamony, L. (2005). Variability, heritability and genetic advance in landraces of culinary melon (*Cucumismelo* L.). *J. Trop. Agric*., 43(1/2): 79-82.
5. Rolania, S., Fageria, M.S., Dhaka, R.S. and Jat, R.G. (2004). Genetic variability for growth and yield attributes in watermelon [*Citrulluslanatus* (Thunb.) Mansf]. *Agril. Sci.,* 24: 218-220.
6. Janghel, A.K., Trivedi, J., Sharma, D., Lodhi, Y.K. and Kumar, L. (2018). Genetic variability in muskmelon (*Cucumis melo* L.) under protected condition. *Int. J. Curr. Microbiol. App. Sci*., 6: 211-217.
7. Panse, V.G. and Sukhatme, P.V. (1985). *Statistical Methods for Agricultural Workers.* ICAR, New Delhi, p. 357.
8. Kumar, S.J., Pandit, M.K. and Pathy, T.L. (2019). Genetic variability, diversity and character association in sponge gourd [*Luffa cylindrica* (Roem.) L.]. *Int. J. Curr. Microbiol. App. Sci*., 8(3): 278-290.
9. Ahmad, M., Singh, B., Vaishali and Singh, M. K. (2019). Study of genetic variability, heritability and genetic advance among the characters of bottle gourd [*Lagenariasiceraria* (Mol.) Standl.]. *Soc. Recent Dev. Agric.,* 19(1): 217-219.
10. Damor, A.S., Patel, J.N., Parmar, H.K. and Vyas, N.D. (2016). Studies on genetic variability, heritability and genetic advance for yield and quality traits in bottle gourd [*Lagenaria siceraria* (Mol.) Standl.] genotypes. *Int. J. Sci. Env. Tech.,* 4: 2301-2307.
11. Jena, A.K., Suseela, PatroKiran, T.S.K.K. and Sujatha, R.V. (2017). Studies on genetic variability, heritability and genetic advance in pointed gourd (*Trichosanthesdioica* Roxb.). *Int. J. Curr. Microbiol. App. Sci.,* 6(8): 1857-1863.
12. Verma, P., Maurya, S.K., Panchbhaiya, A. and Dhyani, S. (2017). Studies on variability, heritability and genetic advance for yield and yield contributing characters in Pointed Gourd (*Trichosanthesdioica Roxb.). J. Pharmacog. Phytochem.,* 6(3): 734-738.