The Pharma Innovation Journal 2022; 11(2): 1630-1632

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(2): 1630-1632

www.thepharmajournal.com
Received: 08-11-2021
Accepted: 19-01-2022

Anoj Yadav
Research Scholar, Department of Vegetable Science, College of Horticulture and Forestry, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

GC Yadav
Associate Professor, Department of Vegetable Science, College of Horticulture and Forestry, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

Corresponding Author:
Anoj Yadav
Research Scholar, Department of Vegetable Science, College of Horticulture and Forestry, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

Studies on heritability and genetic advance for the quantitative traits in bottle gourd [*Lagenaria siceraria* (Mol.) Standl.] over seasons under salt affected soil

Anoj Yadav and GC Yadav

Abstract
Present investigations were carried out in bottle gourd to assess the heritability and genetic advance for yield and quality traits. Twenty seven bottle gourd hybrids generated by crossing 9 lines with 3 testers cross, along with their twelve parents evaluated in a randomized complete block design with three replication at the Main Experiment Station (which is salt affected), Department of Vegetable Science, ANDUA&T, Kumarganj, Ayodhya, during the of *Zaid* seasons of year 2020 and 2021. High heritability coupled with moderate genetic advance as per cent of mean was observed for primary branches per plant, fruit length, days to first female flower anthesis, days to first harvest, dry matter, days to first male flower anthesis, number of node per vine and internodal length and moderate estimate of genetic advance in per cent of mean (10-20%) was observed for number of node per vine, The results indicated that these characters had additive gene effect and therefore, these are more reliable for effective selection for their further improvement.

Keywords: Heritability (narrow sense), genetic advance, bottle gourd

Introduction
Bottle gourd [*Lagenaria siceraria* (Mol.) Standl.] is one of the popular cucurbit vegetable crop with 2n = 2x = 22. It is an important cultivated annual cucurbitaceous crop grown throughout the country. Being warm season vegetable crop it thrives well in warm and humid climate but at present it's off season cultivation has progressively stretched throughout the year in northern Indian plains. It is mainly grown for its fruits for culinary purposes and seeds which are good source of oil and protein. This delicious vegetable is also known by other names such as *bottle squash, calabash gourd, white flowered gourd, doodhi* and *lowki*. It is highly cross pollinated crop due to its monoecious and andromonoecious nature. Bottle gourd is the largest produced cucurbitaceous vegetables in the world preferred in both urban and rural population. In India, the total area covered under bottle gourd is 0.117 million ha with production of 2.18 million tonnes and its productivity is 18.6 tonnes per ha. (Anonymous, 2018) [2].
Among cucurbits, bottle gourd is considered as one of the most important vegetables mainly due to its prolific bearing habit, low cost of cultivation and utility as a cooked vegetable. It is grown as a summer and rainy season crop in north India. The juice of bottle gourd is very helpful in urinary disorder, excessive thrust and insomnia. The fruit is also known to be a good source of essential amino acids as leucine, phenyl alanine, threonine, cystine, valine, aspartic acid and proline, along with a good source of vitamin B, especially thiamine, riboflavin and niacin. The mineral matter reported to be present in fair amount which includes calcium, phosphorus, iron, potassium, sodium and iodine.
Heritability and genetic advance are important parameters in predicting the genetic gain under selection. These estimates help the breeder in selection of genotypes from diverse genetic populations. Keeping in view above facts the present experiments were executed to estimate the heritability in narrow sense and genetic advance over seasons to predict the methods of crop improvement in bottle gourd.

Materials and Methods
The present research work was conducted during *Zaid* seasons of 2019-20 (Y_1) and 2020-21 (Y_2) to study the heritability and genetic advance using line × tester mating design at the Main Experiment Station (MES) of the Department of Vegetable Science, Acharya Narendra Deva University of Agriculture and Technology, Narendra Nagar, Kumarganj, Ayodhya (U.P.) India.

The soil of this farm have more than 8 pH and alkaline in nature. The observations were recorded on twenty five characters.

The experimental materials for the present investigation comprised of nine promising and diverse inbred lines/varieties with three testers of bottle gourd selected on the basis of genetic variability from the germplasm stock maintained in the Department of Vegetable Science, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya (U.P.) India. The selected parental lines *i.e.*; NDBG-28 (L_1), NDBG-13 (L_2), NDBG-15 (L_3), Narendra Pooja (L_4), NDBG-104 (L_5), NDBG-Sel-1 (L_6), Narendra Kamna (L_7), NDBG-21(L_8), NDBG-22 (L_9) were crossed with three testers *viz.* Pusa Naveen (T_1), Narendra Prabha (T_2), Narendra Rashmi (T_3) to get 27 F_1 seed. Parental lines (9 lines and 3 testers) were also selfed/sibbed to get the true to type seeds. The present experiments were conducted in RBD with three replications to appraise the performance of 27 F_1 hybrids and their 12 parents (9 lines and 3 testers) for the study heritability and genetic advance for twenty three fruit yield and quality attributing traits. The crop was sown in rows spaced at 3 meters apart with a plant to plant spacing of 0.50 meter. Sowing was done on 20 March, 2019-20 and 19 March, 2020-21. All the recommended agronomic package of practices and protection measures were followed to raise good crops. Observations were recorded on days to first male flower anthesis, days to first female flower anthesis, node number to first male flower appearance, node number to first female flower appearance, length of pedicel of male flower (cm), length of pedicel of female flower (cm), days to first harvest, primary branches per plant, vine length (m), number of node per vine, internodal length (cm), picking duration, peduncle length (cm), fruit length (cm), average fruit circumference (cm), average fruit weight (kg), number of fruit per plant, fruit yield per plant (kg), total soluble solids (%), reducing sugars (%), non- reducing sugar (%), total sugars (%) and dry matter (g/100g). Heritability in narrow-sense was estimated as per the procedure presented by Amangoua (2018) [1]. The estimates of heritability in narrow-sense (h^2_{ns}) have been classified by Kempthorne and Curnow (1961) [6] into three categories *viz*., high (> 30%), medium (10-30%) and low (<10%). The Genetic advance as per cent of mean was categorized as low, moderate and high by following Johnson *et al*. (1955) [5]. (0-10%): low, (10-20%): moderate and (above 20%) high respectively.

Result and Discussion

The estimates of heritability (narrow sense) and genetic advance in percent of mean is presented in table-1. In first year (Y_1), moderate estimate of heritability in narrow sense was observed for total sugars, length of pedicel of male flower, length of pedicel of male flower, fruit yield per plant, non reducing sugar, vine length, number of fruits per plant, average fruit circumference, average fruit weight, reducing sugars, total soluble solids, peduncle length, node number to first female flower appearance, picking duration and node number to first female flower appearance whereas, no any characters showed low estimate of heritability in narrow-sense (h^2_{ns}). In the year (Y_2), moderate estimate of heritability in narrow sense was observed for total sugars, node number to first female flower appearance, average fruit weight, non reducing sugar, reducing sugars, peduncle length, node number to first female flower appearance, picking duration and number of fruits per plant, whereas, only one trait *viz*., total soluble solids showed low estimate of heritability in narrow-sense (h^2_{ns}). In case of pooled, moderate estimate of heritability in narrow sense was observed for non reducing sugar, vine length, fruit yield per plant, average fruit circumference, reducing sugars, total soluble solids, peduncle length, picking duration, node number to first female flower appearance, node number to first female flower appearance and number of fruits per plant whereas, only two trait *viz*., average fruit weight and total sugars showed low estimate of heritability in narrow-sense (h^2_{ns}). In Y_1, low estimate of genetic advance in per cent of mean (<10%) was observed for primary branches per plant followed by fruit length, days to first female flower anthesis, days to first male flower anthesis, average fruit circumference, picking duration, internodal length, peduncle length, length of pedicel of male flower, node number to first female flower appearance, length of pedicel of female flower, node number to first male flower appearance, vine length, fruit yield per plant, dry matter, number of `1fruit per plant, total sugars, reducing sugars, non reducing sugar, average fruit weight and total soluble solids except number of node per vine where moderate estimate of genetic advance in per cent of mean was observed. In Y_2 moderate estimate of genetic advance in per cent of mean (10-20%) was observed for number of node per vine (10.49%) while, remaining characters showed low estimate of genetic advance in per cent of mean. In pooled, moderate estimate of genetic advance in per cent of mean (10-20%) was observed for number of node per vine (10.68%) while, remaining characters showed low estimate of genetic advance in per cent of mean.

Perusal of table-1 revealed that high estimates of heritability (> 30) in narrow-sense was recorded for primary branches per plant, fruit length, days to first female flower anthesis, days to first harvest, dry matter, days to first male flower anthesis, number of node per vine and internodal length in both the years and pooled while, length of pedicel of male flower, length of pedicel of female flower, in Y_2 and pooled and fruit yield per plant, average fruit circumference and vine length in Y_2. Similar finding for high estimate of narrow sense heritability for different bottle gourd traits have been also reported by Deepthi *et al*. (2016) [4], Damor *et al.* (2016) [3], Rashid *et al*. (2020) [8], Rehan *et al.* (2020) [9], Singh *et al.* (2021) [10] and Lal *et al*. (2021) [7].

Table 1: Estimates of heritability in narrow sense and genetic advance in per cent of mean for twenty three characters in bottle gourd over two years and pooled

S. No.	Parameters/Characters	Heritability (h^2ns %)			Genetic advance in per cent of mean		
		Y_1	Y_2	Pooled	Y_1	Y_2	Pooled
1	Days to first male flower anthesis	45.21	50.63	44.15	3.12	4.35	3.53
2	Days to first female flower anthesis	48.49	44.75	44.41	3.47	3.61	3.49
3	Node number to first male flower appearance	13.68	14.39	14.46	0.58	0.69	0.65
4	Node number to first female flower appearance	15.79	28.56	12.99	0.72	1.47	0.71

5	Length of pedicel of male flower (cm)	27.58	32.49	35.01	1.29	1.38	1.49
6	Length of pedicel of female flower (cm)	27.47	30.11	33.31	0.78	0.93	0.93
7	Days to first harvest	48.32	41.70	41.73	3.14	2.96	2.97
8	Primary branches per plant	52.75	54.58	54.91	6.54	6.76	6.76
9	Vine length (m)	25.99	32.93	27.18	0.55	0.92	0.69
10	Number of node per vine	32.73	31.89	34.51	10.05	10.49	10.68
11	Internodal length (cm)	32.26	31.55	32.87	1.47	1.22	1.37
12	Picking duration	15.06	13.59	15.12	1.60	1.54	1.64
13	Peduncle length (cm)	17.19	17.25	17.69	1.41	1.44	1.45
14	Fruit length (cm)	52.36	56.78	59.49	5.18	7.73	6.63
15	Average fruit circumference (cm)	23.33	36.02	26.10	1.66	1.62	1.45
16	Average fruit weight (kg)	19.62	28.22	4.23	0.07	0.17	0.03
17	Number of fruit per plant	23.91	13.67	11.93	0.39	0.42	0.32
18	Fruit yield per plant (kg)	27.24	40.56	27.15	0.52	0.94	0.60
19	Total soluble solids (%)	18.12	0.39	19.54	0.05	0.00	0.05
20	Reducing sugars (%)	19.13	19.16	21.93	0.09	0.09	0.09
21	Non- reducing sugar (%)	26.59	27.48	27.29	0.08	0.08	0.08
22	Total sugars (%)	28.95	29.55	2.25	0.14	0.07	0.01
23	Dry matter (g/100g)	46.38	49.03	51.61	0.47	0.48	0.49

Conclusion

Estimates of moderate heritability coupled with low genetic advance indicated preponderance of now additive gene action fruit yield per plant. Hence heterosis breeding approach will be more rewarding than selection for improvement of bottle gourd.

References

1. Amangoua NF, Koffi KK, Baudoin JP, Zoro BIA. Heritability and number of genes controlling seed yield in bottle gourd. Afr. Crop Sci. J. 2018;26(2):245-258.
2. Anonymous, 2018. http:/www.agriculturalproductsindia.com/vegetables/vegetables-bottle- gourd-html.
3. Damor AS, Patel JN, Parmar HK, Vyas ND. Studies on genetic variability, heritability and Genetic advance for yield and quality traits in Bottle gourd [*Lagenaria siceraria* (Mol.) Standl.] Genotypes. Int. J. Sci. Environ. Tech. 2016;5(4):2301-2307.
4. Deepthi B, Reddy PSS, Satyaraj Kumar AS, Reddy AR. Studies on pcv, gcv, heritability and genetic advance in Bottle gourd genotypes for yield and yield components. Plant Archives. 2016;16(2):597-601.
5. Johnson HW, Robinson HF. Comstock RE. Estimates of genetic and environmental variability in soybean. Agron. J. 1955;47:314-318.
6. Kempthorne O, Curnow RN. The partial diallel cross. Biometrics. 1961;17:229-250.
7. Lal M, Ram CN, Yadav GC, Rao OP. Studies on heritability and genetic advance for the quantitative traits in Bottle gourd [*Lagenaria siceraria* L. (Mol.) Standl.]. The Pharma Innovation Journal. 2021;10(7):1582-1584.
8. Rashid M, Wani KP, Hussain KP, Dar ZA, Singh PK, Khalil A, *et al*. Studies on genetic variability, heritability and genetic advance in bottle gourd [*Lagenaria siceraria* (Mol.) Standl.] genotypes. Inl. J. of Chem. Stud. 2020;8(3):455-458
9. Rehan, Singh MK, Kumar M, Kumar V, Malik S, Singh A. Assessment of the genetic diversity in bottle gourd [*Lagenaria siceraria* (mol.) standl.]. Int. J. Curr. Microbiol. App. Sci. 2020;9(10):1003-1010.l
10. Singh R, Singh B, Prakash S, Kumar M, Kumar V, Chand P, *et al*. Genetic variability, heritability and genetic advance in bottle gourd (*lagenaria siceraria* (Mol.) Standl). Annals of Horticulture. 2021;14(1):72-78.