

Original Research Article

<https://doi.org/10.20546/ijcmas.2018.704.157>

Study on Heritability and Genetic Advance of the Yield Contributing Characters of Different Pumpkin Cultivars under Coastal A.P. Conditions

P. Arun Kumar*, T. Suseela, A.V.D. Dorajerao and R.V. Sujatha

Horticultural College and Research Institute, Venkataramannagudem - 534101, A.P., India

*Corresponding author

ABSTRACT

Keywords

Cucurbita moschata
Duch. ex Poir,
Pumpkin

Article Info

Accepted:
12 March 2018
Available Online:
10 April 2018

Present investigation was carried out at College of Horticulture, Dr. Y.S.R Horticultural University, Venkataramannagudem, West Godavari district of Andhra Pradesh during kharif, 2016-2017. The experimental material comprised of 14 cultivars of (*Cucurbita moschata* Duch. ex Poir) pumpkin collected from different part of India. A wide range of variability was reported in all the characters. Higher magnitude of PCV and GCV were observed for placenta weight per fruit and flesh thickness indicating the existence of wide range of genetic variability in the germplasm for these traits. High heritability (h_b^2) estimates coupled with high estimates of genetic advance as percent of mean were observed for the traits viz., placenta weight, vine length, number of fruits per vine, average fruit weight, fruit diameter, 100-seed weight, flesh thickness, TSS, yield per vine, and yield per hectare.

Introduction

Pumpkin is the most widely grown species of *Cucurbita* genus and this species is cross compatible with *C. maxima*, *C. pepo* and *C. mixta*. In spite of its high carotene content in fruits, its capacity as a potential supplier of carotene has not been exploited till now (Rajan and Markose, 2013). It may contribute to improve the nutritional status of the people, particularly the vulnerable groups with respect to vitamin -A requirement. Great range of variation exists in the plant and yield characters among the cultivars grown all over the country. The present investigation was undertaken to gather information on genetic variability and genetic advance of various agronomic characters with fruit yield in

pumpkin. Among the quantitative characters, yield is a complex character, which is dependent on a number of yield contributing characters.

Materials and Methods

Pumpkin cultivars of 14 number were procured from different sources. Out of 14 cultivars 13 cultivars were procured from NBPGR (National Bureau of Plant Genetic Resources), New Delhi and one cultivar *i.e* check from local region Andhra Pradesh. The experiment was laid out in Randomized Complete Block Design (RCBD) with two replications. The distance between plant to plant was 1 m and row to row was 1.5 m. The experimental bed was 5.18 m x 3.80 m in size.

Manure and fertilizers were applied in the experimental plot for pumpkin cultivation.

Heritability

The heritable portion of phenotypic variance is termed as Heritability. The estimate of heritability helps the plant breeder in selection of elite character by using the formula suggested by Burton and De Vane (1953).

$$h^2(b) = \frac{V_g}{V_p}$$

$h^2(b)$ = heritability broad sense

V_p = phenotypic variance

V_g = genotypic variance

Genetic advance

Genetic advance *i.e.*, the expected genetic gain was worked out by using the formula suggested by Johnson *et al.*, (1955). Heritability estimates along with genetic advance are normally more helpful in predicting the gain under selection than heritability estimates alone.

$$GA = K.h^2.\sigma_p$$

Where,

GA = Genetic advance

K = Selection differential with assumed the value of 2.06 for 5% intensity selection (Lush, 1949).

h^2 =heritability

σ_p = Phenotypic standard deviation.

Further the genetic advance as per cent of mean was computed by using the following formula

GA

$$GA \% \text{ mean} = \frac{\text{GA}}{\text{Grand mean}} \times 100$$

Genetic advance as per cent mean was categorized as given below as suggested by Johnson *et al.*, (1955).

Low - < 10%

Moderate 10-20%

High - > 20%

Results and Discussion

The results of the experiment have been presented and interpreted under the following headings.

Placenta weight per fruit (gm)

This trait exhibited phenotypic variance (5874.97) and genotypic variance (5874.97) with high PCV (26.76), GCV (26.76), high heritability (99) and high GA as per cent mean (70.64) estimates. The PCV and GCV estimates were high for this trait indicating wide variation among the genotypes shown in the table 1. These results confirmed the findings of Lakshmi *et al.*, (2002) in pumpkin.

Flesh thickness (cm)

This character recorded phenotypic and genotypic variances of 0.23 and 0.21 with moderate PCV (19.46) and GCV (18.77) values, high heritability (93), and high GA as percent mean (47.79).

The PCV and GCV values recorded for this trait suggested the presence of moderate genetic variability and considerable influence of environment in the expression of the trait shown in the table 1.

Similar findings were also reported by Dey *et al.*, (2009) in bitter gourd.

Table.1 Estimation of variability, heritability, genetic advance and GA as percent of mean in pumpkin cultivars

S. No.	Characters	PV	GV	PCV	GCV	h^2	Genetic Advance	GAM
1	Vine length (cm)	2014.54	1942.08	16.27	15.98	96	114.23	41.41
2	Average fruit weight (kg)	0.02	0.02	11.46	9.85	74	0.29	22.33
3	Fruit diameter (cm)	4.11	4.09	11.98	11.96	99	5.33	31.51
4	Flesh thickness (cm)	0.23	0.21	19.46	18.77	93	1.18	47.79
5	Placenta weight per fruit (g)	5874.97	5874.97	26.76	26.76	99	202.35	70.64
6	TSS (°)	1.89	1.88	14.91	14.87	98.4	3.61	39.14
7	100-seed weight (g)	0.62	0.62	10.20	10.17	99	2.07	26.79
8	Number of fruits per vine	0.09	0.08	13.15	12.33	88	0.68	30.54
9	Yield per vine (kg)	2.82	2.81	28.39	28.37	99	4.43	74.84
10	Yield/ Hectare (t)	0.71	0.70	27.83	27.73	98	2.21	72.95

Vine length (cm)

Phenotypic and genotypic variances (2014.54 and 1942.08) were recorded for Vine length. The values of PCV (16.27) and GCV (15.98) were in moderate range with high heritability (96) and high GA as percent of mean (41.41) High heritability coupled with high genetic advance as per cent of mean was observed for this trait which indicated the preponderance of additive gene action governing the inheritance of this character and offers the best possibility of improvement of this trait through simple selection procedures shown in the table 1. Similar findings were also reported by Dey *et al.*, (2009) in bitter gourd.

Fruit weight (kg)

Phenotypic variance (0.02) and genotypic variance and (0.02) with moderate PCV (11.46), low GCV (9.85), high heritability (74) and high GA as per cent mean (22.33) estimates were observed for fruit weight. High shown in the table 1. Similar findings were also reported by Dey *et al.*, (2009) in bitter gourd.

Fruit diameter (cm)

Phenotypic variance (4.11) genotypic variance (4.09) with moderate PCV (11.98), GCV (11.96), high heritability (99) and high GA as percent mean (31.51) were recorded for this trait. Moderate PCV and GCV values were observed for this trait shown in the table 1. Similar findings were also reported by Dey *et al.*, (2009) in bitter gourd.

Total soluble solids (⁰)

Phenotypic (1.89) and genotypic (1.88) variances, moderate PCV (14.91), GCV (14.87), high heritability (98.4) and high GA as percent mean (39.14) estimates were recorded for TSS. Estimates of PCV and

GCV were moderate for this trait shown in the table 1. Similar findings were reported by Husna *et al.*, (2011) in bottle gourd

100 Seed weight (gm)

Phenotypic (0.62) and genotypic (0.62) variances, moderate PCV (10.20), GCV (10.17), high heritability (99) and high GA as percent mean (26.79) estimates were recorded for this trait. The estimates of PCV and GCV were moderate for this trait indicating wide genetic variability among the genotypes shown in the table 1. The present results were in accordance with the findings of Husna *et al.*, (2011) in bottle gourd

Number of fruits per vine

This trait exhibited low phenotypic (0.09) and genotypic (0.08) variances, moderate PCV (13.15) and moderate GCV (12.33), high heritability (88) and high GA as percent of mean (30.54) estimates. Moderate PCV and GCV estimates for this trait indicated high influence of environment on the trait shown in the table 1. Similar findings were also reported by Dey *et al.*, (2009) in bitter gourd.

Fruit yield per vine (Kg)

Phenotypic (2.82) and genotypic (2.81) variances were recorded for fruit yield per vine with high PCV (28.39), GCV (28.37), high heritability (99) and high GA as percent mean (74.84) shown in the table 1. Similar findings were also reported by Dey *et al.*, (2009) in bitter gourd.

Fruit yield per hectare (t)

Phenotypic (0.71) and genotypic (0.70) variances were recorded for fruit yield per vine with high PCV (27.83), GCV (27.73), high heritability (98), and high GA as percent mean (72.95) shown in the table 1. Similar

results were also reported by Lakshmi *et al.*, (2002) in pumpkin.

Acknowledgements

The authors are grateful for the completion of research and, Dr. Y.S.R Horticultural University, College of Horticulture Venkataramannagudem West Godavari District, Andhra Pradesh.

References

- Burton, G.W. and Devane, E.H. 1953. Estimating the heritability in tall fescue (*Festuca arundinacea*) from replicated clonal material. *Agronomy Journal*. 45: 478-81.
- Dey, S. S., Behera, T. K., Munshi, A. D. and Bhatia, R. 2009. Genetic variability, genetic advance and heritability in Bitter gourd. *Indian Agriculturist*. 53(1/2): 7-12.
- Husna, A., Mahmud, F., Islam, M. R., Mahmud, M. A. A. and Ratna, M. 2011. Genetic variability, correlation and path co-efficient analysis in bottle gourd. *Advances in Biological Research*. 5 (6): 323-27.
- Johnson, H.W., Robinson, H.F. and Comstock, R.E. 1955. Estimate of genetic and environmental variability in soybean. *Journal of Agronomy*. 47: 211-17.
- Lakshmi, Haribabu, K. and Reddy, G.L.K. 2002. Genetic variability studies in pumpkin (*Cucurbita moschata* Duch. ex. Poir.) *Journal of Research, ANGRAU*. 30 (1): 82-86.
- Lush, J. L. 1949. Heritability of quantitative characters in farm animals. *Proceedings of 8th Congress of Genetics and Hereditas*. 35 (51): 356 -75.

How to cite this article:

Arun Kumar, P., T. Suseela, A.V.D. Dorajeerao and Sujatha, R.V. 2018. Study on Heritability and Genetic Advance of the Yield Contributing Characters of Different Pumpkin Cultivars under Coastal A.P. Conditions. *Int.J.Curr.Microbiol.App.Sci*. 7(04): 1397-1401. doi: <https://doi.org/10.20546/ijcmas.2018.704.157>