Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; 7(2): 1378-1380
Received: 03-01-2018
Accepted: 04-02-2018

Ipsita Panigrahi
Department of Vegetable Science, College of Agriculture, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana, India

DS Duhan
Department of Vegetable Science, College of Agriculture, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana, India

VPS Panghal
Department of Vegetable Science, College of Agriculture, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana, India

SK Tehlan
Department of Vegetable Science, College of Agriculture, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana, India

AC Yadav
Department of Vegetable Science, College of Agriculture, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana, India

Correspondence
Ipsita Panigrahi
Department of Vegetable Science, College of Agriculture, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana, India

Correlation coefficient analysis between yield defining traits of cultivated genotypes of bottle gourd (*Lagenaria siceraria* (Mol.) Stdl.)

Ipsita Panigrahi, DS Duhan, VPS Panghal, SK Tehlan and AC Yadav

Abstract
A field experiment was conducted to assess the relationship between different morphological traits of bottle gourd genotypes. The research work was held on Research Farm of the Department of Vegetable Science, CCS Haryana Agricultural University, Hisar during summer by using 37 genotypes. The genotypes were planted in randomized block design with three replications. The data recorded were subjected to statistical analysis. Considerable amount of variability was noticed for the 16 quantitative traits as indicated by the analysis of variance.The fruit yield per vine and per hectare had positive and highly significant correlation with most of the characters *viz.*, number of primary branches, vine length, number of fruits per vine and length of fruit. Fruit yield per vine and yield per hectare were also positively correlated with each other at both genotypic and phenotypic level.

Keywords: bottle gourd and correlation coefficient

Introduction
Bottle gourd (*Lagenaria siceraria* (Mol.) Standl.) belongs to family cucurbitaceae having chromosome number 2n=2x=24. The genus has six species which are well distributed over Africa, Madagascar, Indo-malaya and neo tropical regions. Among the six species only one species is monoecious which is found only in India and the rest are dioecious in nature and are distributed in Africa. The monoecious vine bears chalky white coloured male and female flower separately in the same plant due to which cross pollination is the only mode of reproduction. Honey bees act as the chief pollinator. Male flowers generally appear at 8th or 9th node in case of early varieties. Good quality bottle gourd based blend juice could be prepared without adding any chemical preservative in it with minimal thermal processing since during thermal processing, the minimum and maximum loss of ascorbic acid blend juice have been recorded 22.97% at 80ºC for 5 minutes and 47.70% at 95ºC for 30 minutes, respectively (Gajera and Joshi, 2014) [1]. The seeds are triangular or rectangular shaped with grey to whitish coloured, having higher essential amino acids and micronutrients (Joshi and Gaur, 1971) [2]. But still its development is in infancy stage so breeders now show keen interest for improvement of this crop by utilizing its different yield affecting traits. The knowledge of correlation between yield and different morphological characters are basic and foremost importance to find out interrelationship between two characters which provides a guideline for plant selection. The existing relationships between traits are generally determined by the genotypic and phenotypic correlations. The phenotypic correlation measures the degree of association between two variables and is determined by the interaction between genetic and environmental factors. The genotypic correlation coefficient can be taken as the correlation of breeding value. The genotypic correlation which represents the genetic portion of phenotypic correlation is of inheritable in nature; therefore it is used in orientation of breeding programme.

Materials and Methods
A study on correlation coefficient analysis of 37 genotypes of bottle gourd was carried out at at Research Farm of the Department of Vegetable Science, CCS Haryana Agricultural University, Hisar during summer. On the basis of qualitative analysis best genotypes were found out. The genotypes have good marketable attributes were studied for different parameters affecting yield (quantitative character). Statistical analysis was carried out on 16 quantitative characters by using ANOVA as per the standard procedure suggested by (Panse and Sukhatme, 1978) [3]. Least significance difference (5%) was used to separate the different means. The correlation coefficients among all possible character combinations at phenotypic

(rp) and genotypic (rg) level were estimated by employing the formulae given by (Al-Jibouri *et al.*, 1958) [4]. The significance of correlation was tested by comparing estimated 'r' values with tabulated value at 5 and 1% level of significance.

Germplasm lines and standard released varieties included under study

The seeds of bottle gourd genotypes GH-39, GH-40, GH-41, GH-42, GH-43, GH-44, GH-45, GH-46, GH-47, GH-48, GH-49, GH-50, GH-51, GH-52, GH-53, GH-54, GH-55, GH-56, GH-57, GH-58, GH-59, Hisar Seletion were procured from vegetable science department, Hisar, Punjab Komal, Punjab Long from PAU, Punjab, Pusa Naveen, Pusa Samridhi, Pusa Santhusti, Pusa Sandesh, P.S.P.L. from ICAR-IARI, New Delhi, NDBG-15, NDBG-104, NDBG-10 from NDUAT, Faizabad, Arka Bahar from ICAR-IIHR, Banglore, Rajendra Chamtkar from RAU, Bihar, Pant Lauki 3 from GBPUA & T, Uttarakhand and other local varieties such as Dudhi Long, KBG-16 and RS-1 were taken for observation.

Results and Discussion

Days to 50% germination was significantly positive and highly correlated with length of fruit (0.146, 0.420) diameter of fruit (0.098, 0.784), number of fruits per vine (0.255, 0.277) and leaf width (0.233, 0.306) at both phenotypic and genotypic levels. It was significantly and negatively correlated at both genotypic and phenotypic level with days to first fruit harvest (-0.084, -0.387) nodes to first male flower (-0.205, -0.582) nodes to first female flower (-0.005, -0.548) fruit yield per vine (-0.149, -0.523), leaf length (-0.023, -0.117), days to first male flower opening (-0.97, -0.117) and days to first female flower opening (-0.158, - 0.731). The number of primary branches exhibited positive and highly significant correlation with number of fruits per vine (0.423, 0.456), nodes to first male flower (0.014, 0.153), nodes to first female flower (0.002, 0.272), days to 50% germination (0.135, 0.548) and length of fruit (0.107, 0.123). Days to first male flower opening shown significant and highly positive correlation with most of the characters under study at both phenotypic and genotypic level with days to first female flower opening (0.371, 0.903), nodes to first male flower (0.119, 0.372), nodes to first female flower (0.110, 0.596), days to first fruit harvest (0.461, 0.868), and fruit yield per plant (0.037, 0.929). These results are in same with the findings of (Rastogi and Aryadeep, 1990) [5] who observed that the number of primary branches per plant had significant effect on total fruit yield of cucumber. Days to first female flower opening had highly significant and positive association with nodes to male flower (0.388, 0.495), days to first fruit harvest (0.416, 0.953), days to first male flower opening (0.371, 0.903) and vine length at final fruit harvest (0.137, 0.596) at both genotypic and phenotypic level. The number of nodes to first male flower was found highly significant and positively correlated with nodes to first female flower (0.571, 0.574), vine length (0.021, 0.840), days to first fruit harvest (0.334, 0.396) and days to first female flower opening (0.388, 0.495). However, highly significant negative association was found with length of fruit (-0.119, -0.192), diameter of fruit (-0.113, -0.463) at both genotypic and phenotypic level for all characters under study. These results are in agreement with the findings of (Kumaran *et al.*, 1998) [6]. Nodes to first female flower showed positive and significant correlation with nodes to first male flower (0.574, 0.571), vine length (0.127, 0.427) and weight of seeds (0.165, 0.956) at genotypic level and phenotypic level. The character leaf length showed positive significant correlation with leaf width (0.241, 0.522), nodes to first male flower opening (0.345, 0.465) and diameter of fruit (0.170, 0.274) at both genotypic and phenotypic level. Similar results were noticed by (Singh *et al*., 1996) [7] and (Ahmed *et al*., 2005) [8]. The character leaf width showed positive significant association with days to 50% germination (0.306, 0.233), nodes to first male flower opening (0.242, 0.351) and negatively correlated with nodes to first female flower opening (-0.206, -0.513) at phenotypic and genotypic level. The character days to first fruit harvest was observed to have highly significant positive association with days to first male flower opening (0.461, 0.868), days to first female flower opening (0.416, 0.953), nodes to first male flower (0.334, 0.396), while highly significant negative association with length of fruit (-0.112,-0.132) diameter of fruit (-0.281, - 0.393) leaf length (-0.117, -0.123) and leaf width (-0.233, -0.307). These results are similar with the findings of (Singh and Prasad, 1997) [9] in pointed gourd, (Rolania *et al*., 2003) [10] in watermelon and (Ahmed *et al*., 2005) [8] in bottle gourd. Length of fruit exhibited positive and significant correlation with number of fruits per vine (0.107, 0.123), fruit yield per vine (0.250, 0.265), leaf length (0.160, 0.263), yield per hectare (0.168, 0.270) and significantly negative association with diameter of fruit (-0.400, - 0.489), days to first male flower opening (-0.197, -0.489) and days to first female flower opening (-0.104, -0.543) at both phenotypic and genotypic level. Diameter of fruit had highly significant and negative correlation with most of the characters under study at both genotypic and phenotypic levels with length of fruit (-0.400, -0.489), vine length (-0.343, -0.484), days to first fruit harvest (-0.281, -0.393) and fruit yield per vine (-0.207, -0.230). These findings also same with the findings of (Doijode and Sulladmath, 1986) [11] in pumpkin, (Raju *et al*., 1998) [12] in summer squash, (Rolania *et al*., 2003) [10] in watermelon and (Ahmed *et al*., 2005) [8] in bottle gourd Vine length had highly significant positive correlation with number of fruits per vine (0.303, 0.480) fruit yield per vine (0.255, 0.369), days to first fruit harvest (0.468, 0.606) and yield per hectare (0.241, 0.450) at both phenotypic and genotypic level. The above findings are in agreement with the findings of (Kennard and Havey, 1995) [13] and (Singh *et al*., 1996) [7] in bottle gourd, (Badade *et al*., 2001) [14] in bottle gourd and (Rolania *et al*., 2003) [10] in watermelon. Weight of 100 seeds recorded highly significant positive association with number of fruits per vine (0.426, 0.483), fruit yield per vine (0.205, 0.303) and days to first fruit harvest (0.296, 0.668) at both phenotypic and genotypic level. The number of fruits per vine was found highly significant and positively correlated with fruit length (0.118, 0.318), number of primary branches (0.423, 0.456) and yield per hectare (0.345, 0.876). The fruit yield per vine and per hectare had highly significant positive correlation with most of the characters viz., number of primary branches (0.207, 0.287), length of fruit (0.118, 0.265), days to first male flower opening (0.437, 0.929), days to first fruit harvest (0.121, 0.400),vine length (0.255, 0.369) and number of fruits per vine (0.416, 0.496). Fruit yield per vine and yield per hectare were also positively correlated with each other. Similar findings were noticed by (Tikka *et al*., 1974) [15] in water melon, (Lawande and Patil, 1989) [16] in bitter gourd, (Rao *et al*., 1999) [17] in ridge gourd. All the above given value are presented in Table No. 1.

Conclusion

The results from above experiment revealed that there was significant positive correaltion between different traits, which

affects yield of the plant. The fruit yield per vine and per hectare had highly significant positive correlation with most of the characters *viz*., number of primary branches, number of fruits per vine, length of fruit, fruit yield per plant and vine length. Fruit yield per vine and yield per hectare were also positively correlated with each other. The best genotypes were found out on the basis of yield and it should be commercialized in national level.

Table 1: Genotypic (below digonal) & Phenotypic (above digonal) Correlation Coefficient analysis of Various Characters in Bottle gourd

TRAITS	DFG	DFH	DF	DFF	DMF	FYP	LL	LW	LF	NOP	NFV	NFM	NFF	VL	WS	FY
DFG	1.0000	-0.084*	0.098*	-0.158	-0.110	-0.529	-0.023	0.306*	0.146	0.135*	0.277*	-0.205	-0.005	-0.161	-0.009	-0.397
DFH	-0.387	1.0000	-0.281	0.953*	0.868	0.121	-0.117	-0.233*	-0.132	-0.343*	-0.520*	0.396	0.061	0.468*	0.296	0.053
DF	0.784*	-0.393*	1.0000	-0.380*	-0.371	-0.207	0.274*	0.001	-0.400	0.315*	0.258*	-0.113	-0.085	-0.343	0.093	-0.002
DFF	-0.731	0.416*	0.964*	1.0000	0.903	0.001	-0.197	-0.255*	-0.104	-0.450	-0.621	0.388	0.110	0.137	-0.070	-0.068
DMF	-0.097	0.461*	0.334*	0.371*	1.0000	0.437	-0.151	-0.104	-0.197	-0.279	-0.465	0.372*	0.146*	-0.011	-0.067*	-0.043
FYP	-0.149	0.400*	-0.230	0.289*	0.929*	1.0000	0.259	0.241	0.250	0.207	0.416*	0.219	0.123*	0.255*	0.205	0.876
LL	-0.117*	-0.123*	0.170	-0.151*	-0.171	0.259*	1.0000	0.522	0.160*	0.344*	0.246*	0.345	0.351	0.230*	-0.053	0.207
LW	0.233*	-0.307*	0.170*	-0.104*	-0.255	0.522*	0.241*	1.0000	0.183	0.594	0.157	0.242	-0.206	0.257	-0.229*	0.316
LF	0.420*	-0.112	-0.489*	-0.543*	-0.489*	0.265*	0.263*	-0.493*	1.0000	0.107	0.318	-0.119*	-0.047*	0.162	0.087*	0.168
NOP	0.548*	-0.133*	0.559*	0.460*	-0.114*	0.287*	0.344	0.594*	0.123	1.0000	0.423	0.014	0.002	-0.038*	-0.116	0.525
NFV	0.255	0.871*	-0.299	-0.335*	-0.626*	0.496*	0.385*	0.007	0.118	0.456*	1.0000	-0.167	-0.113	0.303*	0.426*	0.319*
NFM	-0.582*	0.334*	-0.463	0.495*	0.119	0.064	0.465*	0.351*	-0.192	0.153*	-0.167	1.0000	0.574*	0.021	0.165	0.017
NFF	-0.548	0.892	-0.588	-0.646*	-0.596*	-0.454*	-0.369*	-0.513*	0.252*	0.272*	-0.113	0.571	1.0000	0.127*	0.017	-0.086
VL	-0.421*	0.606*	-0.484*	0.596*	-0.454*	0.369*	-0.513*	0.252*	-0.272*	0.561*	0.480*	0.840*	0.427*	1.0000	-0.101	0.241*
WS	-0.431*	0.668*	-0.456*	-0.540*	-0.434*	0.303*	-0.494*	-0.261*	-0.300*	-0.604*	0.483*	0.904*	0.956*	-0.101	1.0000	0.021
FY	0.270	0.143	0.456	0.321	0.023	0.132	0.298	0.465	0.234	-0.345	-0.876	-0.567	0.023	0.450	0.324	1.0000

*Significant at 5% level **Significant at 1% level

DFG: Days to 50% germination; DFH: Days to first fruit harvest; DF: Diameter of fruit (cm); DFF: Days to first female flower opening ; DMF: Days to first male flower opening; FYP: Fruit yield per plant; LL :leaf length (cm); LW: leaf width (cm) ; LF: Length of fruit (cm) ; NOP: Number of primary branches; NFV: Number of fruits per vine; NFM: Nodes to first male flower; NFF: Nodes to first female flower harvest; VL: Vine length at the time of final harvest (m); WS: Weight of 100 seeds (g); FY: Fruit yield per hectare (t)

References

1. Gajera RR, Joshi DC. Processing and storage stability of bottle gourd [*Lagenaria siceraria* (Mol.) Standl.] base blend juice. Agri. Eng. Internat. 2014; 16(2):103-107.
2. Joshi DP, Gaur SKS. Floral biological studies of bottle gourd [*Lagenaria siceraria* (Mol.) Standl.]. J Res. Punjab Agril. Univ. 1971; 8:420-426.
3. Panse VG, Sukhatme PV. Stat. Meth. Agril. Workers. ICAR Publications, New Delhi, India. 1978, 68-75.
4. Al-Jibouri HA, Miller PA, Robison HF. Genotype and environmental variances and covariances in an upland cotton cross of inter-specific origin. Agron. J. 1958; 50:633-636.
5. Rastogi KB, Aryadeep K. A note on interrelationship between yield and important plant characters of cucumber. Veg. Sci. 1990; 17(1):102-104.
6. Kumaran SS, Natarajan S, Thamburaj S. Correlation and path analysis studies in pumpkin. South Ind. Hort. 1998; 46:138-142.
7. Singh SP, Singh NK, Maurya IB. Genetic variability and correlation studies in bottle gourd [*Lagenaria siceraria* (Mol.) Standl.]. PKV. Res. J. 1996; 20(1):88-89.
8. Ahmed N, Hakeema ZA, Afroza B, Rajnarayan, Fahema. Variability studies in bottle gourd. Haryana J. Horti. Sci. 2005; 34(3-4):336-337.
9. Singh DP, Prasad, VSR. Genetic divergence in parwal (*Trichosanthes dioica* R. Oxb.). Indian J Plant Genetic Res. 1997; 10:91-96.
10. Rolania S, Fageria MS, Dhaka RS, Jat RG. Correlation and path coefficient analysis in watermelon [*Citrullus lanatus* (Thunb.) Mansf.]. Haryana J Horti. Sci. 2003; 32(1-2):113-116.
11. Doijode SD, Sulladmath UV. Genetic variability and correlation studies in pumpkin (*Cucurbita moschata* Dutch. Ex. Poir.) Mysore J Agric. Sci. 1986; 29:59-61.
12. Raju AMK, Rana MK, Dahiya MS. Genetic variability studies in summer squash (*Cucurbita pepo* L.) Veg Sci. 1998; 25(1):68-71.
13. Kennard WC, Havey MJ. Quantitative traits analysis of fruit quality in cucumber; QTL detection, confirmation, and comparison with mating-design variation. Theoretical Appl. Gen. 1995; 91:53-61.
14. Badade DS, Waradi SD, Gaikwad SK. Genetic variability and divergence in bottle gourd. J Maharashtra Agril. Univ. 2001; 6(2):137-139.
15. Tikka SBS, Bachan SCP, Jainini SN, Bhudayal. Path coefficient analysis of yield components in watermelon. Indian J Heredity. 1974; 6(1-2):77-80.
16. Lawande KE, Patil AV. Correlation studies in bitter gourd. J Maharashtra Agril. Univ. 1989; 14(1):77-79.
17. Rao BN, Rao PV, Reddy TB. Correlation and path coefficient studies in ridge gourd [*Luffa acutangula* (L.) Roxb.]. Int J Trop Agri. 1999; 17(1-4):119-124.