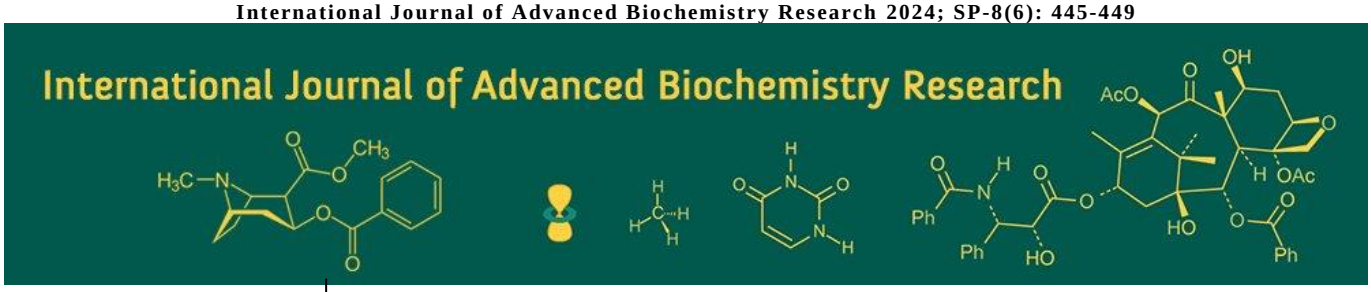

ISSN Print: 2617-4693
ISSN Online: 2617-4707
IJABR 2024; SP-8(6): 445-449
www.biochemjournal.com
Received: 21-03-2024
Accepted: 26-04-2024

Sherly J
Pandit Jawaharlal Nehru College of Agriculture and Research Institute, UT of Pondicherry, Puducherry, India

Sumithra S
Pandit Jawaharlal Nehru College of Agriculture and Research Institute, UT of Pondicherry, Puducherry, India

Kanthaswamy V
Pandit Jawaharlal Nehru College of Agriculture and Research Institute, UT of Pondicherry, Puducherry, India

K Manojkumar
Pandit Jawaharlal Nehru College of Agriculture and Research Institute, UT of Pondicherry, Puducherry, India

Corresponding Author:
Sherly J
Pandit Jawaharlal Nehru College of Agriculture and Research Institute, UT of Pondicherry, Puducherry, India

Correlation and path coefficient analysis for yield and its attributing traits in Yardlong bean (*Vigna unguiculata* sub sp. *sesquipedalis*) genotypes

Sherly J, Sumithra S, Kanthaswamy V and K Manojkumar

DOI: https://doi.org/10.33545/26174693.2024.v8.i6Sf.1333

Abstract
Inter relationship among the yield and its attributes in yardlong bean can be studied through correlation and path analysis. In the current study, 29 yardlong bean genotypes including varieties were evaluated based on thirteen quantitative characters to study the association between yield and its contributing traits. The yield plant^{-1} was found to be significant and positively correlated with pod weight, 100 seed weight and pods plant^{-1} at both genotypic and phenotypic level. Individual pod girth showed positive significant association with fruit yield plant^{-1} at genotypic level. peduncle length, individual pod length and pod set showed positive significant association with yield plant^{-1} at phenotypic level. Path analysis revealed that the selection based on the characters *viz*., individual pod weight, followed by days to 50 percent flowering, individual pod length, peduncle length, vine length and number of primary branches plant^{-1} might be considered as the most important traits in the determination of yield since these traits had positive direct effect towards yield.

Keywords: Path coefficient, yield, attributing traits, Yardlong bean, *Vigna unguiculata* sub sp. *sesquipedalis*

Introduction
Yardlong bean (*Vigna unguiculata* sub sp. *sesquipedalis*) is a self-pollinated crop with 2n=2X=22 chromosomes and belongs to the family of Fabaceae. As Yardlong are rich in Vitamin C, it also lowers the risk of gout which is painful condition that afflicts big toe. It is caused due to the high uric acid that forms crystals in joints. In the study, those who intake 1000-1499 mg of Vitamin C, their chances of gout were decreased by 31%. Vitamin C is an antioxidant that prevents the damage of free radicals, pollutants and toxic chemicals.

In spite of the importance of this crop in agricultural production, productivity of this crop is very low in India due to lack of suitable high yielding varieties, rainfed cultivation, improper time of sowing, pests and diseases incidence, inadequate fertilization and improper agronomic practices. Therefore, there is an urgent need to design breeding programmes that can enhance productivity and stabilize the yield.

Yield, being a complex trait, is composed of several components some of which affect the yield directly while, others affect indirectly. Hence knowledge of association between yield and its components is necessary. Correlation studies would provide estimates of degree of association between seed yield and its components and also among the components. While path co-efficient analysis further elucidates the intrinsic nature of association of component traits by determining direct or indirect contribution of these traits to yield.

Materials and Methods
A field experiment was conducted at PAJANCOA and RI, college farm, Department of Horticulture, Karaikal during 2021. Yardlong bean germplasm comprising of 29 genotypes (Table 1) were collected from different geographical regions were evaluated in a randomized block design (RBD) with two replications. Each plot consisted of 12 plants spaced at 1 m between row and 0.6 m between plants in a row. Uniform recommended package of practices was adopted to raise a good crop. Observations were recorded on five randomly selected plants in each from each replication.

Genotypic and phenotypic correlation coefficient was calculated by using the method given by Johnson *et al*., (1955) [7]. The genotypic and phenotypic correlation coefficients were used in finding out their direct and indirect contribution towards yield per plot. The path coefficient analysis was carried out by the method suggested by Dewey and Lu (1959) [3] to partition the genotypic correlation coefficients into measures of direct and indirect effects.

Results and Discussion Correlation

The genotypic and phenotypic correlation coefficients among 23 yield and it's contributing traits are shown in Table 2 & Table 3. The genotypic correlations were higher than the phenotypic correlation coefficients for all the traits suggesting the association of between traits is primarily due to genetic effects. Notably, the traits individual pod weight (rg = 0.829), (rp = 0.828), 100 seed weight (rg = 0.643), (rp = 0.411) and number of pods plant^{-1} (rg = 0.488), (rp = 0.471) were significant at both genotypic and phenotypic level, which implied that these characters are strongly influence the yield plant^{-1} and hence selection for these traits would be considered important in selection of genotypes for yield. A similar kind of positive association was reported by Chattopadhyay *et al.* (2014) [2] in vegetable cowpea, Ullah *et al.* (2011) [12], Bhagavathi *et al.* (2018) [1] in yardlong bean, Ghosh *et al.* (2019) [4] in Mungbean.

Path coefficient analysis

The study of path coefficient analysis for yield and its attributing characters in 29 yardlong bean genotypes revealed the presence of very high direct positive effect (Table 4) of individual pod weight on yield plant^{-1}. In the present investigation, the characters *viz.,* days to 50 percent flowering (1.466), individual pod length (0.669), peduncle length (0.426), vine length (0.295) and number of primary branches plant^{-1} (0.273) were found to register positive direct effect on yield. Similar results were also observed by Bhagavathi *et al.* (2018) [1] for number of primary branches plant^{-1} and days to 50 percent flowering, Gowd *et al*. (2020) [5] for fresh pod length, number of clusters per plant and number of number of pods plant^{-1} and Mishra *et al.* (2020) [10] for number of number of pods plant^{-1} in cluster bean. The direct selections for these characters are likely to bring about an overall improvement in fruit yield plant^{-1}.

Characters *viz.,* Individual pod girth (-1.478), followed by 100 seed weight (-1.241), number of seeds pod^{-1}(-1.062), pod set (-0.395), days to first flowering (-0.163) and number of pods plant^{-1} (-0.012) had registered negative direct effect on yield plant^{-1}. This result is in line with the findings of Lal *et al*. (2014) [9] for plant height and days to first flower in cowpea, Panda *et al*. (2016) [11] for days to 50 percent flowering and Lad *et al.* (2017) [8] for protein content in French bean. Residual effect of the path analysis was medium (0.337711) suggesting the characters considered in the study was sample and defensible which accounted that 66.30 percent of variability has been explained by the 13 traits included in the study.

Table 1: Details of yardlong bean genotypes used in the study

Sl. No.	Genotypes	SOURCE
1	VS – 17	KAU, COA, Vellayani, Kerala.
2	VS – 27	Aripra – Mallappuram: KAU, COA, Vellayani, Kerala
3	VS – 28	KAU, COA, Vellayani, Kerala.
4	VS – 35	Periya – Kasargode: KAU, COA, Vellayani, Kerala.
5	VS – 37	Kanjhangad – Kasargode: KAU, COA, Vellayani, Kerala.
6	VS – 38	KAU, COA, Vellayani, Kerala.
7	VS – 40	KAU, COA, Vellayani, Kerala.
8	VS – 43	Ettumanoor- Kottayam: KAU, COA, Vellayani, Kerala.
9	VS – 44	Kanakkary – Kottayam: KAU, COA, Vellayani, Kerala.
10	VS – 53	KAU, COA, Vellayani, Kerala.
11	VS – 54	KAU, COA, Vellayani, Kerala.
12	VS – 55	Palakkad - KAU, COA, Vellayani, Kerala.
13	VS – 56	Palakkad - KAU, COA, Vellayani, Kerala.
14	VS – 57	Palakkad - KAU, COA, Vellayani, Kerala.
15	Kanjikuzi payar local	Mannuthi – Thrissur, Kerala.
16	Kilichundan payar local	Mannuthi – Thrissur, Kerala.
17	Palakkad local	Palakkad - Kerala.
18	Mannuthi local	Mannuthi – Thrissur, Kerala.
19	Kollam local	Kollam - Kerala.
20	Arka Mangala	IIHR – Bangalore.
21	Lola	KAU – Thrissur, Kerala.
22	Vyjayanthi	KAU – Thrissur, Kerala.
23	Deepika	KAU – Thrissur, Kerala.
24	Sumanth	Tanindo Seed Private Limited, Bangalore.
25	Rocket	Tanindo Seed Private Limited, Bangalore.
26	YLB – 7	Dharani agro technologies – Udumalpet, Tamilnadu.
27	YLB – Red	Dharani agro technologies – Udumalpet, Tamilnadu.
28	YLB -Green long	Dharani agro technologies – Udumalpet, Tamilnadu.
29	NS 621	Namdhari Seeds Pvt.Ltd, Karnataka.

Table 2: Genotypic correlation coefficient in yardlong bean genotypes

Characters	Vine length	Number of primary branches vine^{-1}	Days to first flowering	Days to 50 percent flowering	Peduncle length	Pod set	Individual pod length	Individual pod girth	Individual pod weight	100 seed weight	Number of pods plant^{-1}	Number of seeds pod^{-1}	Yield plant^{-1}
Vine length	1**	-0.151	0.254	0.395*	0.318	0.122	0.044	-0.103	0.123	0.331	0.258	-0.603	0.245
Number of primary branches vine^{-1}		1**	0.225	0.187	-0.01	0.207	-0.179	0.066	-0.200	-0.109	-0.055	-0.156	-0.257
Days to first flowering			1**	0.485**	0.231	0.431*	-0.228	-0.093	-0.274	0.103	0.232	0.004	-0.064
Days to 50 percent flowering				1**	0.023	0.291	-0.245	-0.171	-0.226	0.403*	0.378*	-0.514	0.044
Peduncle length					1**	0.376*	0.112	0.351	0.291	0.453*	0.004	0.358	0.308
Pod set						1**	0.083	0.056	0.076	0.278	0.393*	0.299	0.303
Individual pod length							1**	0.632**	0.459*	0.162	-0.175	0.213	0.318
Individual pod girth								1**	0.750**	-0.309	-0.168	-0.134	0.535**
Individual pod weight									1**	0.676**	-0.063	0.683	0.829**
100 seed weight										1**	0.002	-0.686	0.643**
Number of pods plant^{-1}											1**	0.065	0.488**
Number of seeds pod^{-1}												1**	0.523
Yield plant^{-1}													1**

*, ** significant at 0.05% and 0.01% level of significance, respectively.

Table 3: Phenotypic correlation coefficient in yardlong bean genotypes

Characters	Vine length	Number of primary branches vine^{-1}	Days to first flowering	Days to 50 percent flowering	Peduncle length	Pod set	Individual pod length	Individual pod girth	Individual pod weight	100 seed weight	Number of pods plant^{-1}	Number of seeds pod^{-1}	Yield plant^{-1}
Vine length	1**	-0.085	0.256	0.382**	0.303*	0.141	0.031	0.054	0.103	0.331*	0.252	-0.034	0.223
Number of primary branches vine^{-1}		1**	0.236	0.193	-0.014	0.219	-0.182	0.03	-0.196	0.073	-0.048	0.15	-0.239
Days to first flowering			1**	0.438**	0.222	0.418**	-0.235	-0.018	-0.266*	0.172	0.219	0.08	-0.068
Days to 50 percent flowering				1**	0.039	0.294*	-0.234	-0.066	-0.209	0.261*	0.369**	-0.162	0.053
Peduncle length					1**	0.368**	0.089	0.138	0.271*	0.286*	0.009	0.122	0.296*
Pod set						1**	0.071	-0.013	0.057	0.238	0.382**	0.147	0.271*
Individual pod length							1**	0.221	0.451**	0.095	-0.171	0.073	0.309*
Individual pod girth								1**	0.255	0.043	-0.056	0.182	0.196
Individual pod weight									1**	0.427**	-0.061	0.267*	0.828**
100 seed weight										1**	0.008	0.388**	0.411**
Number of pods plant^{-1}											1**	0.042	0.471**
Number of seeds pod^{-1}												1**	0.236
Yield plant^{-1}													1**

*, ** significant at 0.05% and 0.01% level of significance, respectively

Table 4: Path coefficient analysis showing direct and indirect effect of yield components on yield plant-1 in yardlong bean genotypes

Characters	Vine length	Number of primary branches vine^{-1}	Days to first flowering	Days to 50 percent flowering	Peduncle length	Pod set	Individual pod length	Individual pod girth	Individual pod weight	100 seed weight	Number of pods plant^{-1}	Number of seeds pod^{-1}	Yield plant^{-1}
Vine length	0.295	-0.041	-0.041	0.579	0.135	-0.048	0.030	0.152	0.240	-0.411	-0.003	-0.641	0.245
Number of primary branches vine^{-1}	-0.045	0.273	-0.037	0.275	-0.004	-0.082	-0.120	-0.097	-0.391	0.135	0.001	-0.165	-0.257
Days to first flowering	0.075	0.061	-0.163	0.711	0.098	-0.170	-0.152	0.138	-0.535	-0.128	-0.003	0.004	-0.064
Days to 50 percent flowering	0.117	0.051	-0.079	1.466	0.010	-0.115	-0.164	0.253	-0.442	-0.500	-0.005	-0.547	0.044
Peduncle length	0.094	-0.003	-0.038	0.034	0.426	-0.149	0.075	-0.518	0.569	-0.562	0.000	0.380	0.308
Pod set	0.036	0.056	-0.070	0.427	0.160	-0.395	0.056	-0.083	0.149	-0.345	-0.005	0.317	0.304
Individual pod length	0.013	-0.049	0.037	-0.359	0.048	-0.033	0.669	-0.933	0.899	-0.201	0.002	0.226	0.318
Individual pod girth	-0.030	0.018	0.015	-0.251	0.149	-0.022	0.423	-1.478	1.466	0.384	0.002	-0.143	0.535**
Individual pod weight	0.036	-0.055	0.045	-0.332	0.124	-0.030	0.308	-1.109	1.954	-0.839	0.001	0.726	0.829**
100 seed weight	0.098	-0.030	-0.017	0.591	0.193	-0.110	0.108	0.457	1.322	-1.241	0.000	-0.729	0.643**
Number of pods plant^{-1}	0.076	-0.015	-0.038	0.554	0.002	-0.155	-0.117	0.249	-0.122	-0.003	-0.012	0.069	0.488**
Number of seeds pod^{-1}	-0.178	-0.042	-0.001	-0.754	0.152	-0.118	0.142	0.198	1.335	0.851	-0.001	-1.062	0.523

Residual effect – 0.337711

Conclusion

Correlation and path analysis reports that, the character individual pod weight had played important role in variability studies followed by 100 seed weight, individual pod girth and number of pods plant^{-1}. Hence, top priority may be given to selection based on these traits for yield improvement and could be considered while formulating selection indices in yardlong bean.

The correlation and path coefficient analyses conducted in this study shed light on the complex interplay between yield and its contributing traits in yardlong bean genotypes. Key findings highlight individual pod weight as a critical determinant of yield per plant, with a significant positive direct effect, emphasizing the importance of selecting genotypes with higher pod weights to boost overall yield. Moreover, traits such as days to 50 percent flowering, individual pod length, peduncle length, vine length, and number of primary branches per plant exhibit positive direct effects on yield, underscoring their role in enhancing yield potential. Conversely, traits like individual pod girth, 100 seed weight, number of seeds per pod, pod set, and days to first flowering demonstrate negative direct effects on yield per plant. While these traits may not directly contribute to yield enhancement, their indirect effects through other correlated traits warrant consideration in breeding programs. In conclusion, the study advocates for prioritizing the selection of genotypes with superior individual pod weight while also acknowledging the importance of other positively associated traits for yield improvement in yardlong bean. These insights offer valuable guidance for breeders and researchers aiming to develop strategies for enhancing productivity and stability in yardlong bean cultivation.

Reference

1. Bhagavathi PP, Patro TK, Prasad NV, Lakshmi M, Reddy N, Emmanuel N, *et al*. Path analysis for growth, quality, yield and yield components in yardlong bean [*Vigna unguiculata* (L.) Walp. ssp. sesquipedalis verdc]. J Pharmacogn Phytochem. 2018;7(6):2015-2017.
2. Chattopadhyay A, Rana NP, Seth T, Das S, Chatterjee S, Dutta S. Identification of selection indices and choosing of parents for vegetable cowpea (*Vigna unguiculata* cv-gr. sesquipedalis) breeding programme. Legume Res. 2014;37(1):19-25.
3. Dewey DR, Lu KH. A correlation and path coefficient analysis of components of crested wheat grass seed production. Agron J. 1959;51:515-518.
4. Ghosh S, Roy A, Kundagrami S. Diversity analysis of mungbean [*Vigna radiata* (L.) Wilczek] genotypes for bruchid resistance. Indian J Agric Res. 2019;53(3):309-314.
5. Gowd TYM, Reddy PSS, Priya BT, Kiran YD, Reddy AR. Correlation and path coefficient analysis for yield and yield attributes in cluster bean [*Cyamopsis tetragonoloba* (L.) Taub.] genotypes. Int J Curr Microbiol App Sci. 2020;9(9):155-164.
6. Huque AKM, Hossain MK, Alam N, Hasanuzzaman M, Biswas BK, Arifuzzaman M. Genetic variability, correlation and path analysis for yield and its component characters in string bean [*Vigna unguiculata* ssp. sesquipedalis (L.) Verdc.]. J Biol Sci. 2012;1(1):1-10.
7. Johnson HW, Robinson HF, Comstock RE. Estimation of genetic and environmental variability in soyabeans. Agron J. 1955;47:314-318.
8. Lad DB, Longmei N, Borle UM. Studies on genetic variability, association of characters and path analysis in French bean (*Phaseolus vulgaris* L.). Int J Pure App Biosci. 2017;5(6):1065-1069.
9. Lal H, Bhardwa DR, Nath RSV. Character association and genetic divergence studies in cowpea [*Vigna*

unguiculata (L.) Walp.]. Ann Plant Soil Res. 2014;16(3):186-191.
10. Mishra S, Aghora TS. Genetic variability, character association and path analysis for quantitative traits to breed vegetable type cluster bean (*Cyamopsis tetragonoloba*). Indian J Agric Sci. 2020;90(3):537-540.
11. Panda A, Paul A, Mohapatra P. A study on variability, character association and path analysis for pod yield in French bean (*Phaseolus vulgaris* L.). Int J Biores Stress Manag. 2016;7(1):33-39.
12. Ullah MZ, Hasan MJ, Rahman AHMA, Saki AI. Genetic variability, character association and path analysis in yard long bean. SAARC J Agric. 2011;9(2):9-16.