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Correlation coefficient and path analysis in black gram [*Vigna mungo* (L.) Hepper]

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Abstract
The present investigation entitled, "Correlation coefficient and path analysis in black gram [*Vigna munga* (L.) Hepper] coefficient were grown during Kharif 2017-2018 in RBD with 3 replications at the Horticulture Research farm, Deptt. Of Genetics and Plant Breeding, Institute of Agricultural Sciences, Bundelkhand University, Jhansi. Observations were recorded on single plant basis. The observations were recorded on the characters *viz*., days to 50% flowering, plant height, number of primary branches per plant, days to 50% maturity, Clusters Per Plant, number of pod Per Clusters, Pod Per Plant, Pod Length (cm), biological yield per plant, Seeds Per 10 Pods test weight, and seed yield per for studying the correlations coefficient and path analysis. The characters *viz*., biological yield per plant, number of pods per plant, number of seeds per plant, number of primary branches per plant, test weight weight, plant height, number of seeds per pod, days to 50% flowering and pod per plant recorded positive correlation coefficient with seed yield both at genotypic and phenotypic level Path coefficient analysis revealed a higher and positive direct effect for days to 50% flowering and test seed weight on yield.

Keywords: Black gram, correlation and path analysis

Introduction
Pulses are the major source of dietary protein. Blackgram (*Vigna mungo* (L.) Hepper), popularly known as urdbean in India, is an important short duration pulse crop and self pollinating diploid (2n=22) with a small genome size estimated to be 0.56pg/1C (574 Mbp) (Gupta *et al*. 2008). Black gram is a protein rich food, containing about 26 percent protein, which is almost three times that of cereals. It ranks fourth among the major pulses cultivated in India. Black gram supplies a major share of protein requirement of vegetarian population of the country. It is consumed in the form of split pulse as well as whole pulse, which is an essential supplement of cereal based diet. According to Vavillov (1926) black gram has originated from Indian subcontinent. Though it is grown in different countries of South and South East Asia, India is the most important producer of blackgram. Black gram is a protein rich food, containing about 26 percent protein, which is almost three times that of cereals. It ranks fourth among the major pulses cultivated in India. Black gram supplies a major share of protein requirement of vegetarian population of the country. It is consumed in the form of split pulse as well as whole pulse, which is an essential supplement of cereal based diet.

India is the largest producer and consumer of blackgram cultivated in an area about million hectares with a production of 1.92 million tonnes (AICRP report, 2016). Besides Gujarat, Andhra Pradesh is one of the major blackgram producing state grown in an area about 4.49 million hectares with a Productivity of 651kg ha-1 (Website http://www.dacnet.nic.in/ean 2017). Among the various pulses, blackgram or urdbean (*Vigna mungo* L. Hepper) is an important grain legume with easily digestable protein and low flatulence contents. It is highly prized pulse, rich in phosphoric acid. Black gram grain contains about 25% protein, 56% carbohydrates, 2% fat, 4% minerals and 0.4% vitamins. Blackgram is extensively used as a nutritious pulse. Its seeds may be eaten raw, roasted, parched or boiled in split form. It is pached and ground to flour for making cakes, biscuits and confectionaries. It is used for making dosa and idli amalgamated with rice, popular breakfast dishes and also used in preparing papad and barian. Sprouting seeds are also eaten as such. It acts as a direct source of protein in vegetarian diet and indirect source of protein in non-vegetarian diet.

It is important to know the association of yield and its components in order to identify a suitable plant type.

At the same time, knowledge about causes of genetic correlation will also give an idea about the extent of possible improvement of the character. The important causes underlined genetic correlations are linkage, pleiotropy, physiological association and heterozygosity. The genetic causes of correlation are chiefly due to pleiotropy. Through linkage is a cause of transient correlation, particularly in population derived from crosses between two species. Plieotropy is simply a property of a gene, which affects two or more character. Therefore if the gene is segregated, it causes simultaneous variations in these traits. Correlated characters are of much interest because the change in one character brought about by selection, can bring simultaneous change in other character. Path coefficient is standardized partial regression coefficient. In biological system, the relationships may exist in a very complex form and the correlation coefficients are only the indications of simple associations between variable. The magnitude of association between two variables is always proved to effect and simultaneous variability in other related characters.

Identification of important yield components and information about the nature and magnitude of their direct and indirect contributions towards the manifestation of grain yield is very essential for devising successful crop breeding strategy in any crop. The correlation and path-coefficient analysis provide information about the relative importance of various yield components in the expression of yield and thus, help in formation of appropriate selection strategy. In agriculture, path analysis has been used by plant breeders to assist in identifying traits that are useful as selection criteria to improve crop yield (Dewey and Lu, 1959).

Materials and Methods

The experimental material includes 25 genotypes (TU-22, PU-10-23, NDUK-16, MU-46, JU05-1, KU14-1, LBG752, TU-94-2, KU96-7, CaB410-06, LBG645, VBG11-031, TU13, DKU98, GBBL, Azad-1, Shikhar-2, ADBG13-004, TBG-645, COBG11-03, IPU10-26, TBG104, KU16-04, KU16-07, Shikhar-1) were grown during Kharif 2017-2018 in RBD with 3 replications at the Horticulture Research farm, Deptt. Of Genetics and Plant Breeding, Institute of Agricultural Sciences, Bundelkhand University, Jhansi. situated at a Latitude: 25°27′31″ N. Longitude: 78°34′47″ E. The latitude level of BU Jhansi is about 285 m above mean sea level. It is characterized by semi-arid and sub-tropical climate. While minimum day temperature is usually recorded in the month of January. Weekly distributions of rainfall, temperature RH, per day of winter season 2017-2018. Jhansi has sub tropical climate with hot days during summer and cold in winter. The mean maximum temperature of 45 °C to 49 °C.

Correlation coefficient amongst different characters: Phenotypic and genotypic correlation coefficient amongst different characters have been presented in Table: 1 Shivade, H.A., Rewale and Patil S.B. 2011.

Days to 50% flowering: At phenotypic level, days to 50% flowering exhibited negative and highly significant correlation coefficient with number of pod per plant(-0.39) At genotypic level, days to 50% flowering showed strong and positive correlation coefficient with pod length cm (0.15).

Plant height: Plant height showed significant and positive correlation with, biological yield per plant (0.30), pod length (0.30), test weight (0.29), Number of primary branch per plant (0.29), Number of cluster per plant (0.21), Days to 50% maturity (0.19), pod per plant(0.16), number of seed per pod (10pods)(0.11) and significant negative association for this character observed Number of pod per cluster (-0.07)

Number of primary branches per plant: At phenotypic level, number of primary branches per plant had positive and significant correlation coefficient with cluster of per plant (0.34), pod per plant (0.32), pod length (0.29), Biological yield per plant (0.17), number of seed per pod (10pods) (0.12), Days to 50% maturity (0.06), number of pod per cluster (0.02). At genotypic level, number of primary branches per plant showed. moderate positive correlation coefficient with pod length (0.92), cluster per plant (0.51) and pod per plant (0.50), Biological yield g(0.35),seed per 10 pod (0.25) and days to 50% maturity,

Days to 50% maturity: At phenotypic level, day to 50% maturity showed positive significant correlation with test weight (0.24), number of seed per pod (10pods) (0.19),pod length(0.09), biological yield per plant (0.05), At genotypic level, days to maturity showed moderate positive correlation coefficient with number of seed per 10 pods (0.37), pod length cm (0.33) and biological yield (0.07).

Number of clusters per plant: At phenotypic level, number of cluster per plant showed positive significant correlation with pod per plant (0.73),biological yield per plant (0.35), pod length (0.27), number of seed per pod (10pods)(0.24), number of pod per cluster (0.23). At genotypic level, number of cluster per plant showed moderate positive correlation coefficient with number of pod per plant (0.85),pod length cm (0.51) number of pod per cluster (0.45),biological yield (0.44) and seed per 10 pods (0.30).

Number of pods per cluster: At phenotypic level, number pods per cluster showed positive significant correlation with pod per plant(0.25), biological yield per plant (0.20), number of seed per pod (10pods) (0.18), pod length (0.10). At genotypic level, number of cluster per plant showed moderate positive correlation coefficient with number of pod per plant (0.37) seed per 10 pod (0.29) and biological yield (0.29).

Number of pods per plant: At phenotypic level, number of pods per plant exhibited high positive and highly significant correlation coefficient with biological yield per plant (0.48), pod length (0.24), number of seed per pod (10pods)(0.15), test weight(0.03). At genotypic level, number of pods per plant showed strong and positive correlation coefficient with biological yield per plant (0.49), pod length cm(0.42) seed per 10 pod (0.17) and test weight (0.0205).

Pod length (cm): At phenotypic level, pod length (cm) showed positive significant correlation with number of seed per pod (10pods)(0.28),biological yield per plant (0.17),test weight (0.08). At genotypic level, pod length (cm) showed moderate positive correlation coefficient with seed per 10 pod (0.51) and biological yield (0.31).

Biological yield per plant: At phenotypic level, biological yield per plant showed positive significant correlation coefficient with number of seed per (10pods)(0.20), test weight (0.01) At genotypic level, biological yield per cluster showed strong and positive correlation coefficient with seed per 10 pod (0.21) and test weight g(0.18). Mahto, A. V. R. N. and Mahto, J. L., 199

Number of seeds per 10 pod (g): At phenotypic level, number of seeds per10 pod showed positive and significant correlation coefficient with, test weight (0.06) At genotypic level, number of seeds per pod showed positive correlation coefficient with test weight.(g) (0.18),

Test weight: At phenotypic level, showed highly significant correlation coefficient with test weight. At genotypic level showed highly positive correlation coefficient with test weight.

Table 1(a): Estimates of genotypic correlation coefficient among yield and its contributing characters of black gram.

Character	DF	PH)	PB	DM	CPP	CPP	PPP	PL	BYPP	SPP	SYPP	TW
DF	1.0000	-0.1716	0.0312	-0.3378	-0.4034	-0.4792	-0.6252	0.1575	-0.4152	-0.3858	-0.2499	0.0077
PH	-0.1716	1.0000	0.3580	0.4824	0.3104	-0.2766	0.2050	0.3839	0.4231	0.1562	0.2940	0.3416
PB	0.0312	0.3580	1.0000	0.1636	0.5170	-0.0578	0.5039	0.9278	0.3351	0.2514	0.3405	-0.5766
DM	-0.3378	0.4824	0.1636	1.0000	-0.1462	-0.3367	-0.2900	0.3383	0.0783	0.3766	0.3793	1.0232
CPP	-0.4034	0.3104	0.5170	-0.1462	1.0000	0.4593	0.8534	0.5144	0.4407	0.3059	0.3805	-0.1420
CPP	-0.4792	-0.2766	-0.0578	-0.3367	0.4593	1.0000	0.3793	-0.0312	0.2918	0.2988	0.0880	-0.5593
PPP	-0.6252	0.2050	0.5039	-0.2900	0.8534	0.3793	1.0000	0.4277	0.4930	0.1775	0.4508	0.0205
PL	0.1575	0.3839	0.9278	0.3383	0.5144	-0.0312	0.4277	1.0000	0.3156	0.5112	0.5213	-0.1600
BYPP	-0.4152	0.4231	0.3351	0.0783	0.4407	0.2918	0.4930	0.3156	1.0000	0.2172	0.6807	0.0737
SPP	-0.3858	0.1562	0.2514	0.3766	0.3059	0.2988	0.1775	0.5112	0.2172	1.0000	0.2990	0.1805
SYPP	-0.2499	0.2940	0.3405	0.3793	0.3805	0.0880	0.4508	0.5213	0.6807	0.2990	1.0000	0.2721
TW	0.0077	0.3416	-0.5766	1.0232	-0.1420	-0.5593	0.0205	-0.1600	0.0737	0.1805	0.2721	1.0000

Table 1(b): Estimates of phenotypic correlation coefficient among yield and its contributing characters of black gram.

Character	DF	PH	PB	DM	CPP	CPP	PPP	PL	BYPP	SPP	SYPP	TW
DF	1.0000	-0.1515	-0.1571	-0.0204	-0.3132	-0.3154	-0.3978	-0.0326	-0.2421	-0.2302	-0.2263	-0.2715
PH	-0.1515	1.0000	0.2942	0.1924	0.2164	-0.0741	0.1621	0.3001	0.3009	0.1178	0.2193	0.2973
PB	-0.1571	0.2942	1.0000	0.0626	0.3424	0.0299	0.3296	0.2903	0.1715	0.1243	0.2292	-0.1316
DM	-0.0204	0.1924	0.0626	1.0000	-0.0462	-0.3016	-0.1408	0.0854	0.0580	0.1935	0.1926	0.2475
CPP	-0.3132	0.2164	0.3424	-0.0462	1.0000	0.2393	0.7354	0.2761	0.3597	0.2451	0.3262	-0.0637
CPP	-0.3154	-0.0741	0.0299	-0.3016	0.2393	1.0000	0.2589	0.1066	0.2007	0.1837	0.0880	-0.0213
PPP	-0.3978	0.1621	0.3296	-0.1408	0.7354	0.2589	1.0000	0.2473	0.4822	0.1590	0.4373	0.0003
PL	-0.0326	0.3001	0.2903	0.0854	0.2761	0.1066	0.2473	1.0000	0.1725	0.2884	0.3059	0.0878
BYPP	-0.2421	0.3009	0.1715	0.0580	0.3597	0.2007	0.4822	0.1725	1.0000	0.2072	0.6425	0.0107
SPP	-0.2302	0.1178	0.1243	0.1935	0.2451	0.1837	0.1590	0.2884	0.2072	1.0000	0.2620	0.0693
SYPP	-0.2263	0.2193	0.2292	0.1926	0.3262	0.0880	0.4373	0.3059	0.6425	0.2620	1.0000	0.2025
TW	-0.2715	0.2973	-0.1316	0.2475	-0.0637	-0.0213	0.0003	0.0878	0.0107	0.0693	0.2025	1.0000

[1] DF- Days to 50% Flowering
[2] PH-Plant Height (cm)
[3] PB- Primary Branches Per Plant
[4] DM- Days to 50% Maturity
[5] CPP- Clusters Per Plant
[6] CPP- Clusters Per Pod
[7] PPP- Pod a Per Plant
[8] PL- Pod Length (cm
[9] BYPP- Biological Yield Per Plant (g)
[10] SPP- Seeds Per 10 Pod
[11] TW- Test Weight (g)
[12] SYPP- Seed Yield Per Plant (g)

Path Analysis

The estimate of path coefficient has been furnished in the Table 2 (phenotypic path) and Table 2 (genotypic path). In general the genotypic direct effects as well as indirect effect were slightly higher in magnitude as compared to corresponding phenotypic direct and indirect effects. The measurement of the direct and indirect effects were characterize as negligible (0.00 to 0.09), low (0.10 to 0.19), moderate (0.20 to 0.29), high (0.30 to 0.99) and very high (> 1.00) as suggested by Lenka and Mishra (1983). Parameswarappa, S.G and Kumar, D.L. 2005.

(a) Direct effects

Phenotypic path analysis (Table 2) showed that of seeds yield per plant (0.64) and biological yield per plant (0.56) registered high and positive direct effects on yield, registered the moderate direct effect and the rest of characters *viz*., test weight (0.21), number of pods per plant, pod lenght, days to 50%maturity, number of primary branches per plant, and days to 50% flowering showed negligible direct effects on seed yield per plant. Study of genotypic path analysis (Table-2) revealed that a Seeds yield per plant (0.68) and biological yield per plant (0.54) test weight (0.40) number of primary branch per plant (0.38), pod per plant (0.36), pod per cluster (0.32), days to 50%flowering (o.30), registered very high, positive direct effects on seed yield. However registered the moderate direct effect and the rest of characters *viz*. days to 50% maturity (0.24), plant height cm (-0.17) registered very high negative direct effect on seed yield. Whereas, number of cluster per plant (-0.23), pod length cm (-0.02), seeds per 10 pod (-0.01) and plant height (-0.17) showed high negative direct effects on seed yield, registered moderate positive direct effect on seed yield per plant.

(b) Indirect effect

Days to 50% flowering: At phenotypic level, days to 50% flowering, indirect effects *via* characters namely, days to flowering, plant height (cm), number of primary branches per plant, days to 50% maturity, number of cluster per plant, number of pods per cluster, number of pod per plant, pod length (cm) biological yield per plant, and seeds per 10 pods, test weight, seed yield per plant. At genotypic level, days to 50% flowering recorded very high positive indirect effect of 0.3004 *via* Days to 50% flowering, pod length(0.04), Number of primary branch per plant(0.94),test weight(0.23) whereas, high negative indirect effect of -0.62 *via* number of pods per plant on seed yield. However, whereas, moderate negative indirect effect of -0.12 via biological yield, (-0.12), via number of cluster per plant, number of seed per 10 pod (-0.11), Days to 50% maturity(-0.10), plant height (-0.05) on seed yield, whereas, low positive indirect effect of seed yield per plant.

Plant height (cm): At phenotypic level, plant height recorded negligible indirect effects *via* characters namely (cm) biological yield per plant, and seeds per 10 pods, test weight, seed yield per plan, days to flowering, plant height (cm), number of primary branches per plant, days to 50% maturity, number of cluster per plant, number of pods per cluster, number of pod per plant, pod length t. At genotypic level, plant height recorded high positive indirect effect of 0.04 *via* number of pod per cluster on seed yield, whereas, high negative indirect effect of *via* plant height (cm), days to 50% maturity.

Number of primary branches per plant: At phenotypic level, low indirect effect was exerted through seeds yield per plant (0.22) and primary branches per plant (0.10) on seed yield per, days to 50% maturity, number of cluster per plant, number of pods per cluster, number of pod per plant, pod length (cm) biological yield per plant, and seeds per 10 pods Whereas, negligible indirect effect through test weight. At genotypic level, this trait recorded very high positive indirect effect. Through number of primary branch(0.38), on seed yield. Whereas, high negative indirect effect of (-0.01) *via test weigh* yield per plant on seed yield. However, moderate indirect effect *via*), pod length (0.35) No. of cluster per plant (0.19), No. of pod per plant (0.19).

Days to 50% maturity: At phenotypic level, days to maturity recorded negligible indirect effects through characters namely, days to flowering, plant height (cm), number of primary branches per plant, days to 50% maturity, number of cluster per plant, number of pods per cluster, number of pod per plant, pod length (cm) biological yield per plant, and seeds per 10 pods, test weight, seed yield per plant.

Number of clusters per plant: At phenotypic level, number of cluster per plant recorded negligible indirect effects through characters namely, days to flowering, plant height (cm), number of primary branches per plant, days to 50% maturity, number of cluster per plant, number of pods per cluster, number of pod per plant, pod length (cm) biological yield per plant, and seeds per 10 pods, test weight, seed yield per plant. At genotypic level, number of cluster per plant, recorded very high positive indirect effect of (0.38) *via* seeds yield per plant on seed yield per plant., Days to 50% flowering(0.09), However, high negative indirect effect of (-0.23) *via* number of cluster per plant, (-0.19) via No. of pod per plant on seed yield per plant.

Number of pods per cluster: At phenotypic level, number of pod per cluster recorded negligible indirect effects through characters namely, days to flowering, plant height (cm), number of primary branches per plant, days to 50% maturity, number of cluster per plant, number of pods per cluster, number of pod per plant, pod length (cm) biological yield per plant, and seeds per 10 pods, test weight, seed yield per plant. At genotypic level, number of pod per cluster, recorded very high positive indirect effect of 0.3269 *via* number of pods per cluster on seed yield per plant.) No. of cluster per plant (0.15), No. of pod per plant (0.12), No of seed per pod (10pods) (0.09). However, high negative indirect effect of -0.1828 *via* test weight and -(0.15) via Days to 50% flowering on seed yield per plant.

Number of pods per plant: At phenotypic level, this trait recorded low indirect effect for Seeds yield per plant (0.43) and pod per plant (01.5) and biological yield per plant (0.07) on seed yield per plant. Whereas, the negligible indirect effect exerted through number of primary branches per plant, test weight, number of seeds per pod, plant height, days to maturity, days to 50% flowering, days to maturity, and on seed yield per plant. At genotypic level, high indirect effect of (0.36) was exerted *via* number of pod per plant). No of cluster per plant (0.31), No. of primary branch per plant (0.18), Biological yield per plant (0.17) on seed yield. However, high negative indirect effect of (-0.22) *via* day to 50%flowering on seed yield. Whereas, moderate negative indirect effect of (-0.10) *via* day to maturity on seed yield per plant.

Length of pod (cm): At phenotypic level, number of cluster per plant recorded negligible indirect effects through characters namely, days to flowering, plant height (cm), number of primary branches per plant, days to 50% maturity, number of cluster per plant, number of pods per cluster, number of pod per plant, pod length (cm) biological yield per plant, and seeds per 10 pods, test weight, seed yield per plant. At genotypic level, length of pod (cm) recorded very high positive indirect effect of (0.34), *via* test weight and number of pod per cluster (0.07) on seed yield However, high negative indirect effect of (-0.02) *via* pod length and number of primary branch (-0.01).

Biological yield per plant (g): At phenotypic level, high indirect effect of (0.64) was exerted *via* Seeds yield per plant on seed yield per plant, while negligible indirect effect through days to, days to 50% flowering, days to maturity, plant height, number of pods per plant, number of seeds per pod, test weight, and number of primary branches per plant on seed yield per plant. At genotypic level, biological yield per plant recorded high positive indirect effect of (0.68) through seeds yield per plant and biological yield (0.54)on seed yield. However, very high negative indirect effect of (-0.22) was recorded through. Days to 50% flowering on seed yield, whereas, moderate positive indirect effect of pod per plant (0.26), No. of cluster per plant (0.2384) plant height(0.22) the on seed yield per plant.

Number of seeds per 10 pod: At phenotypic level, moderate indirect effect was exerted through number of seeds per 10 pod plant (0.26) on seed yield per plant, whereas negligible indirect effect was excreted through days to flowering, plant height (cm), number of primary branches per plant, days to 50% maturity, number of cluster per plant, number of pods per cluster, number of pod per plant, pod length (cm) biological yield per plant, and seeds per 10 pods, test weight. At genotypic level, number of seeds per pod recorded very high positive indirect effect *via* number of seeds per10 pod (0.29) on seed yield. However, high negative indirect effect was recorded through No. of seed per 10 pods (-0.01) on seed yield, whereas, however, low positive indirect effect was recorded through day to 50% flowering (0.67) on seed yield per plant.

Test weight: At phenotypic level, this trait recorded moderate indirect effect for harvest index (0.21) test weight, whereas negligible indirect effect was exerted through number of seeds per plant, number of seeds per pod, number of pods per plant, biological yield per plant, plant height, days to maturity, days to 50% flowering, number of primary branches per plant and cluster per plant number of pod per cluster, on seed yield per plant. At genotypic level, positive indirect effect of (0.41) *via* day 50% maturity and test weight(0.40) plant height (0.13) on seed yield was recorded, whereas, negative indirect effect of (-0.23) *via* number of primary branch per plant and (-0.22) *via*. of pod per cluster on seed yield per plant.

Table 2: Estimates of phenotypic path coefficient among yield and its contributing characters of black gram.

Character	DF	PH	PB	DM	CPP	CPP	PPP	PL	BYPP	SPP	TW
DF	0.0248	-0.0038	-0.0039	-0.0005	-0.0078	-0.0078	-0.0099	-0.0008	-0.0060	-0.0057	-0.0067
PH	0.0212	-0.1396	-0.0411	-0.0269	-0.0302	0.0104	-0.0226	-0.0419	-0.0420	-0.0165	-0.0415
PB	-0.0161	0.0302	0.1026	0.0064	0.0351	0.0031	0.0338	0.0298	0.0176	0.0127	-0.0135
DM	-0.0022	0.0204	0.0067	0.1063	-0.0049	-0.0321	-0.0150	0.0091	0.0062	0.0206	0.0263
CPP	0.0043	-0.0030	-0.0047	0.0006	-0.0137	-0.0033	-0.0101	-0.0038	-0.0049	-0.0034	0.0009
CPP	0.0188	0.0044	-0.0018	0.0180	-0.0143	-0.0597	-0.0155	-0.0064	-0.0120	-0.0110	0.0013
PPP	-0.0623	0.0254	0.0516	-0.0220	0.1151	0.0405	0.1565	0.0387	0.0755	0.0249	0.0000
PL	-0.0047	0.0437	0.0423	0.0124	0.0402	0.0155	0.0360	0.1456	0.0251	0.0420	0.0128
BYPP	-0.1373	0.1706	0.0973	0.0329	0.2040	0.1138	0.2734	0.0978	0.5671	0.1175	0.0061
SPP	-0.0152	0.0078	0.0082	0.0128	0.0162	0.0121	0.0105	0.0191	0.0137	0.0661	0.0046
TW	-0.0577	0.0631	-0.0279	0.0526	-0.0135	-0.0045	0.0001	0.0186	0.0023	0.0147	0.2123
SYPP	-0.2263	0.2193	0.2292	0.1926	0.3262	0.0880	0.4373	0.3059	0.6425	0.2620	0.2025
Partial R^2	-0.0056	-0.0306	0.0235	0.0205	-0.0045	-0.0053	0.0684	0.0445	0.3643	0.0173	0.0430

Conclusion

Path coefficient analysis revealed a higher and positive direct effect for days to 50% flowering and test seed weight on yield. Thus on the basis of above findings pertaining to correlation and path analysis, the two traits *viz*. days to 50% flowering and test seed weight were undisputedly most important components for further yield improvement in black gram. Moreover, the importance of number of primary branches per plant and days to maturity on the basis of correlation studies should not be under estimated.

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