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Assessment of yield-associated traits in soybean (*Glycine max* (L.) Merrill) using correlation and path coefficient analysis

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Abstract
Soybean is a major oil crop. Soybean (*Glycine max* (L.) Merrill) is a globally significant legume known for its high protein and oil content. To increase yield and identify superior genotypes, the current study examined seven soybean genotypes and one check variety using a randomized block design with three replications during the Kharif season of 2024 at G.H. Raisoni Agricultural Experimental Field, School of Agriculture Science, G.H. Raisoni University, Saikheda, dis-Pandhurna, Madhya Pradesh. Morphological and yield-related parameters were assessed, including seed yield per plant, plant height, branching traits, and pod characteristics etc. The correlation study found strong and very significant positive relationships between seed yield and variables such as plant height, number of primary and secondary branches, pods per plant, pod length, 100-seed weight, and grains per pod. Path coefficient analysis revealed that the number of major branches, pods per plant, 100-seed weight, grains per pod, and number of nodes per plant all had significant direct influence on yield, whereas plant height, days to maturity, and secondary branches contributed indirectly. These findings are consistent with prior research and emphasize the need of incorporating both direct and supporting qualities into breeding methods to increase soybean productivity.

Keywords: Correlation, path analysis, genotype, morphology, soybean

Introduction
Soybean (*Glycine max* (L.) Merrill, 2n = 2x = 40) is a legume indigenous to East Asia that is grown worldwide for its seeds, which are high in protein, oil, and important nutrients. It is one of the world's most economically and nutritionally significant crops, with several uses in both the food and non-food industries. Soy products such as tofu, soy milk, and textured vegetable protein are important in human nutrition, particularly for vegetarians and vegans, because soybean is one of the few plant-based sources that contains all nine essential amino acids, making it a complete protein source (Kuswantoro, 2022) [10]. Aside from its nutritional value, soybean is widely utilized in animal feed and as a raw ingredient in companies that manufacture biodiesel, lubricants, bioplastics, and printing inks. Soybean is a nitrogen-fixing crop that enhances soil fertility through a symbiotic association with Bradyrhizobium species, making it an important component in crop rotation systems (Chandel *et al*., 2017) [4]. As worldwide demand for soybeans rises, big producers such as the United States, Brazil, and Argentina dominate the international market. However, the rapid and sometimes unregulated growth of soybean into environmentally vulnerable areas, such as the Amazon rainforest, has caused major environmental issues, including deforestation and biodiversity loss. Addressing these environmental concerns while meeting expanding global demand necessitates improving soybean production potential and sustainability. A fundamental technique for achieving this goal is to measure genetic diversity among soybean genotypes, which will serve as the foundation for selection and breeding. Evaluating variability in yield and associated attributes allows for the selection of superior genotypes with good agronomic qualities. Correlation analysis helps us understand the strength and direction of links between features, but it does not show causality. To solve this restriction, path coefficient analysis divides correlation coefficients into direct and indirect effects, offering more information about the causal linkages between features (Ghiday *et al*., 2017) [8].

Furthermore, creating selection indices that incorporate numerous features into a single score improves the efficiency of genotype selection. This integrated approach strengthens the accuracy of selection by accounting for the combined influence of several traits rather than relying on a single parameter.

These tools, which include genetic variability evaluation, correlation analysis, path coefficient analysis, and selection indices, work together to provide a complete framework for identifying and developing high-performing soybean genotypes. This study intends to apply these approaches to enhance soybean breeding efforts aimed at increasing yield and critical components.

Materials and Methods

The present study consists of seven soybean genotypes with one check variety. The plant material was procured from School of Agriculture Science, G.H. Raisoni University, Saikheda, dis-Pandhurna. Local seed market. The experiment was conducted in Randomized Block Design (RBD) with three replications during kharif of 2024. Each genotype was arranged across three replications, with each replication comprising 8 plots. Each plot consist of four rows maintaining a row-to-row spacing of 30 cm and a plant-to-plant spacing of 5 cm. The total area for the experiment was 92.16 m2. All the necessary agricultural practices have been followed to cultivate a high-quality and healthy crop. The observations recorded during the work were seed yield per plant, days to flower initiation, days to 50% flowering, days to maturity, plant height, number of primary branches per plant, number of secondary branches per plant, days to 50% pod setting, number of nodes per plant, number of pods per plant, pod length, number of pods per cluster, 100-seed weight, and number of grains per pod etc. The observations were recorded from five randomly tagged plants from each plot.

Statistical Analysis

To better understand the relationships among the traits, correlation coefficients were calculated using the method proposed by Searle (1961) [12]. Additionally, path coefficient analysis, based on the approach of Dewey and Lu (1959) [6], was carried out to separate the direct and indirect effects of various traits on seed yield, using the morphological data recorded from field observations. The data analysis is done using RStudio software.

Results and Discussion

Correlation analysis

The genotypic and phenotypic correlation coefficients between numerous morphological and yield-related variables in soybean revealed multiple extremely significant positive associations, emphasizing the interrelated nature of these traits in determining total productivity (Table.1).

50% flowering and days to maturity showed a substantial positive connection with flower start, indicating that genotypes with earlier floral initiation had synchronized reproductive development. Days to 50% flowering and days to maturity were positively and strongly correlated, suggesting that early-flowering genotypes typically finish their life cycle sooner.

The consistency between the blooming and maturation phases was reflected in the substantial positive correlation between days to maturity and 50% flowering. The number of major and secondary branches, pods per plant, pods per cluster, pod length, 100-seed weight, grains per pod, and seed yield per plant all showed strong and statistically significant positive associations with plant height. These results demonstrate how plant height may be used as an integrative characteristic to improve yield and canopy architecture. Plant height, number of secondary branches, pods per cluster, pod length, test weight, and seed yield per plant all showed positive correlations with the number of primary branches per plant, indicating that more branching significantly influences pod growth and ultimate production. Plant height, pods per plant, pods per cluster, pod length, 100-seed weight, grains per pod, and seed yield per plant all showed highly significant positive associations with the number of secondary branches, suggesting that it plays a critical role in increasing pod load and seed production .As a dependable feature for selection in high-yielding genotypes, the number of nodes per plant was found to be highly and positively correlated with plant height, branch number, pods per plant, pods per cluster, pod length, 100-seed weight, grains per pod, and seed production. Reiterating its pivotal role in determining reproductive success and final output, pods per plant showed highly significant positive connections with plant height, branches, pods per cluster, 100-seed weight, grains per pod, pod length, and seed yield per plant.

Plant height, branches, pods per plant, pods per cluster, 100-seed weight, grains per pod, and seed yield all showed positive correlations with pod length, indicating that longer pods are linked to better seed set and weight. Its usefulness as a yield-contributing feature was further supported by the substantial positive correlations that were found between pods per cluster and plant height, branches, pods per plant, pod length, 100-seed weight, grains per pod, and seed production per plant. Its impact on productivity and seed quality was demonstrated by the positive and substantial correlation between 100-seed weight and plant height, branches, pods per plant, pods per cluster, grains per pod, pod length, and seed yield per plant. A crucial characteristic in determining yield, grains per pod showed significantly significant positive connections with plant height, branches, pods per plant, pods per cluster, pod length, 100-seed weight, and seed output per plant. Lastly, almost every key yield component, including plant height, number of primary and secondary branches, pods per plant, pods per cluster, pod length, 100-seed weight, and grains per pod, showed a positive and substantial correlation with seed output per plant. According to these findings, soybean production potential can be significantly increased by enhancing these related features.

The current results correspond with previous findings from a number of academics. Belay *et al*. (2023) [1], Nasir *et al*. (2023) [11], Bijarania *et al*. (2021) [3], and Karyawati and Puspitaningrum (2021) [9] also found significant positive relationships of seed yield with plants' height, number of branches, pods per plant, 100-seed weight, and grains per pod. In a similar way, Kuswantoro (2022) [10] highlighted the significance of seed weight and pod-related features in yield enhancement. The usefulness of these qualities as trustworthy selection criteria in soybean breeding programs is confirmed by the consistent findings across research.

Path Coefficient Analysis

To better understand how different traits influence seed yield in soybean, path coefficient analysis was carried out. This method allowed us to break down the total correlation into direct and indirect effects, helping to identify which traits contribute most to yield improvement. Here, we focus only on the traits that showed positive contributions. Fifty percent flowering had a negative direct effect on yield, but interestingly, it contributed positively through other traits like days to maturity, number of secondary branches, and seeds per capsule. This means that while early flowering is ideal, its influence can still be beneficial when combined with other supportive traits. Days to maturity showed a small but positive direct impact on seed yield, both genetically and in actual field conditions. It also helped indirectly through traits such as number of secondary branches and fifty percent flowering, suggesting that maturity can play a helpful role when balanced with the right growth pattern. Plant height had a positive effect on yield at the genetic level. Although its direct contribution in the field was slightly negative, it helped improve yield indirectly through traits like maturity, primary branches, and flowering time, showing its importance when considered as part of the overall plant structure. Number of primary branches stood out with a strong and consistent positive impact on seed yield. It also supported yield indirectly by boosting traits like plant height and early flowering, confirming it as a key trait for yield improvement.

Number of secondary branches showed a small negative direct effect, but made up for it by contributing positively through primary branches, plant height, and flowering time. This suggests that while it might not independently boost yield, it plays a supportive role when combined with other traits. Pods per plant was one of the most impactful traits, showing a strong direct effect on seed yield. It also helped indirectly through secondary branches and maturity, making it an essential trait for selection. Pod length had a moderate direct effect on yield and also supported it indirectly through plant height, branching, and early flowering, showing that pod size matters both individually and in combination with other traits. Pods per cluster contributed positively to yield, both directly and through indirect links with primary branches, plant height, and flowering, making it another reliable trait for improving productivity. Hundred-seed weight showed a significant direct effect on yield and also helped through branching, height, and early flowering. This confirms its importance in producing bigger, better seeds. Grains per pod had a clear positive influence on yield, not just directly, but also through strong relationships with primary branches, plant height, and flowering time, reinforcing its role in yield improvement. Number of nodes per plant also showed a strong direct effect on yield. It further contributed indirectly through traits like plant height, primary branches, and flowering, underlining its structural importance in yield formation. Overall, traits such as primary branches, pods per plant, hundred-seed weight, grains per pod, and nodes per plant were found to have the most direct impact on yield. Meanwhile, traits like plant height, flowering, and maturity supported yield indirectly. Focusing on these traits in breeding programs can help significantly boost soybean productivity, shown in table.2.

Table 1: Genotypic and phenotypic correlation coefficient between different characters in Soybean genotypes

		FI	**5f**	**dm**	**ph**	**npb**	**nsb**	**50ps**	**npp**	**ppp**	**pl**	**ppc**	**100sw**	**GPP**	**sypp**
FI	P	1.000**													
	G	1.000**													
50%F	P	0.925**	1.000**												
	G	0.903**	1.000**												
DM	P	0.489*	0.520**	1.000**											
	G	0.407*	0.465*	1.000**											
PH	P	-0.580**	-0.606**	-0.832**	1.000**										
	G	-0.516**	-0.586**	-0.816**	1.000**										
NPB	P	-0.689**	-0.587**	-0.455*	0.594**	1.000**									
	G	-0.678**	-0.514*	-0.446*	0.576**	1.000**									
NSB	P	-0.566**	-0.529**	-0.498*	0.729**	0.678**	1.000**								
	G	-0.505*	-0.454*	-0.473*	0.733**	0.611**	1.000**								
50PS	P	0.687**	0.732**	0.728**	-0.768**	-0.539**	-0.480*	1.000**							
	G	0.682**	0.735**	0.752**	-0.821**	-0.539**	-0.489*	1.000**							
NPP	P	-0.603**	-0.673**	-0.529**	0.525**	0.750**	0.583**	-0.579**	1.000**						
	G	-0.569**	-0.581**	-0.561**	0.621**	0.752**	0.609**	-0.658**	1.000**						
PPP	P	-0.613**	-0.691**	-0.624**	0.685**	0.777**	0.685**	-0.677**	0.936**	1.000**					
	G	-0.616**	-0.652**	-0.623**	0.687**	0.784**	0.645**	-0.680**	0.957**	1.000**					
PL	P	-0.456*	-0.545**	-0.789**	0.706**	0.386^{NS}	0.408*	-0.642**	0.566**	0.615**	1.000**				
	G	-0.416*	-0.523**	-0.831**	0.754**	0.432*	0.480*	-0.665**	0.593**	0.636**	1.000**				
PPC	P	-0.642**	-0.693**	-0.613**	0.727**	0.689**	0.672**	-0.685**	0.788**	0.898**	0.583**	1.000**			
	G	-0.672**	-0.668**	-0.622**	0.797**	0.725**	0.722**	-0.720**	0.803**	0.854**	0.549**	1.000**			
100SW	P	-0.703**	-0.775**	-0.515*	0.594**	0.670**	0.589**	-0.728**	0.779**	0.851**	0.506*	0.853**	1.000**		
	G	-0.695**	-0.762**	-0.517**	0.660**	0.639**	0.588**	-0.746**	0.812**	0.820**	0.534**	0.826**	1.000**		
GPP	P	-0.700**	-0.726**	-0.555**	0.749**	0.587**	0.814**	-0.729**	0.622**	0.736**	0.501*	0.730**	0.674**	1.000**	
	G	-0.672**	-0.679**	-0.575**	0.780**	0.564**	0.850**	-0.724**	0.671**	0.700**	0.505*	0.770**	0.673**	1.000**	
SYPP	P	-0.497*	-0.493*	-0.513*	0.653**	0.673**	0.572**	-0.655**	0.655**	0.751**	0.606**	0.697**	0.718**	0.653**	1.000**
	G	-0.534**	-0.589**	-0.490*	0.708**	0.610**	0.520**	-0.734**	0.695**	0.685**	0.618**	0.618**	0.659**	0.662**	1.000**

Note: Fi: flower initiation, 50%F: days to 50% flowering, DM: Days to maturity, PH: Plant height, NPB: no. of primary branches, NSB: no. of secondary branches, 50PS: 50% pod setting, NPP: node per plant, PPP: pods per plant, PL: pod length, PPC: Pod per cluster, 100sW: 100seed weight, GPP: Grain per pod, SYPP: Seed yield per plant.

Table 2: Direct (diagonal) and indirect effects of yield components on seed yield per plant at genotypic level in soybean genotypes

		FI	5f	dm	ph	npb	nsb	50ps	npp	ppp	pl	ppc	100sw	GPP
FI	P	-0.44308	0.08001	0.13884	-0.31155	0.17561	0.20611	0.25558	-0.43354	-0.00612	-0.21306	0.12582	-0.70591	-0.35042
	G	-0.49708	0.98634	-0.18204	-0.4059	0.12008	0.69762	-0.65027	-0.46344	-0.07048	0.7509	3.46135	-0.38483	0.79167
5f	P	-0.41508	0.15287	0.13871	-0.32569	0.15366	0.19534	0.27422	-0.44074	-0.00642	-0.24199	0.13129	-0.73769	-0.36698
	G	-0.54829	0.88755	-0.17735	-0.34481	0.28388	0.70986	-0.64487	-0.62544	-0.17934	0.74677	0.58205	-0.42615	0.7982
dm	P	-0.23652	0.61482	0.26007	-0.46006	0.13016	0.19423	0.28232	-0.31958	-0.00554	-0.34488	0.11605	-0.47399	-0.29538
	G	-0.11779	0.10043	-0.2438	-0.97979	0.64679	0.5615	-0.67041	-0.07018	-0.71392	0.8531	0.35819	-0.03933	0.67223
ph	P	0.2557	-0.69552	-0.22165	0.53985	-0.15439	-0.26968	-0.28677	0.35055	0.00641	0.31405	-0.13832	0.57103	0.37823
	G	0.13311	-0.13003	0.22855	0.17871	-0.9111	-0.76902	0.6131	0.3853	0.9523	-0.77672	-0.3637	0.08824	-0.83862
npb	P	0.29806	-0.67858	-0.12968	0.31927	-0.26108	-0.25452	-0.19425	0.53403	0.00771	0.18619	-0.13817	0.67664	0.29618
	G	0.5443	-0.20876	0.19535	0.95575	-0.05525	-0.8881	0.80987	0.57683	0.44355	-0.6533	-0.09918	0.53425	-0.21013
nsb	P	0.25357	-0.62532	-0.14027	0.40424	-0.18449	-0.36004	-0.19536	0.3936	0.00656	0.17487	-0.12098	0.5823	0.4052
	G	0.22501	-0.40423	0.16057	0.86726	-0.14094	-0.85256	0.53088	0.96004	0.11091	-0.48691	-0.37972	0.10634	-0.94742
50ps	P	-0.30502	0.85151	0.19778	-0.41698	0.13658	0.18951	0.37127	-0.40549	-0.00657	-0.30157	0.13975	-0.71653	-0.38134
	G	-0.35743	0.59646	-0.22791	-0.71745	0.32092	0.6311	-0.71717	-0.40373	-0.34354	0.86106	0.97187	-0.42046	0.83638
npp	P	0.31503	-0.83329	-0.13632	0.31036	-0.22863	-0.23248	-0.2469	0.60976	0.00839	0.2441	-0.1479	0.72856	0.34491
	G	0.4345	-0.89627	0.13964	0.09769	-0.03382	-0.69818	0.67534	0.61452	0.33875	-0.57404	-0.72561	0.48142	-0.95539
ppp	P	0.30289	-0.82741	-0.16102	0.38675	-0.22477	-0.26388	-0.27259	0.57171	0.00895	0.26506	-0.16747	0.79203	0.39174
	G	0.26972	-0.57778	0.17117	0.54208	-0.05721	-0.7372	0.68847	0.46279	0.44124	-0.69156	-0.93275	0.40655	-0.98184
pl	P	0.21928	-0.64803	-0.20836	0.39382	-0.11291	-0.14629	-0.26008	0.34574	0.00551	0.42995	-0.10353	0.47194	0.25566
	G	0.24319	-0.38468	0.23001	0.73042	-0.48488	-0.45908	0.68292	0.29461	0.86703	-0.90425	-0.62281	0.23117	-0.61916
ppc	P	0.30767	-0.83537	-0.16659	0.41212	-0.19908	-0.24047	-0.28636	0.49775	0.00827	0.24599	-0.18117	0.81795	0.37088
	G	0.32613	-0.64702	0.20953	0.7363	-0.15604	-0.73739	0.72897	0.44623	0.45698	-0.83836	-0.90755	0.38733	-0.9803
100sw	P	0.33554	-0.91238	-0.13226	0.33071	-0.1895	-0.22499	-0.2854	0.47659	0.00761	0.21796	-0.15899	0.93232	0.35367
	G	0.46871	-0.91735	0.17951	0.45059	-0.23386	-0.6682	0.72168	0.79337	0.43254	-0.78868	-0.84042	0.41158	-0.96743
GPP	P	0.31033	-0.84563	-0.15356	0.40813	-0.15454	-0.29168	-0.28299	0.42037	0.00701	0.21999	-0.13431	0.65893	0.49926
	G	0.26359	-0.45731	0.17473	0.84205	-0.65165	-0.86116	0.63951	0.68172	0.55546	-0.59691	-0.08398	0.45593	-0.93796
sypp	P	-0.497*	-0.493*	-0.513*	0.653**	0.673**	0.572**	-0.655**	0.655**	0.751**	0.606**	0.697**	0.718**	0.653**
	G	-0.534**	-0.589**	-0.490*	0.708**	0.610**	0.520**	-0.734**	0.695**	0.685**	0.618**	0.618**	0.659**	0.662**

Note: Fi: flower initiation, 50%F: days to 50% flowering, DM: Days to maturity, PH: Plant height, NPB: no. of primary branches, NSB: no. of secondary branches, 50PS: 50% pod setting, NPP: node per plant, PPP: pods per plant, PL: pod length, PPC: Pod per cluster, 100sW: 100seed weight, GPP: Grain per pod, SYPP: Seed yield per plant.

According to the several findings, a number of important characteristics have a direct and significant positive impact on seed yield, including the number of primary branches, pods per plant, 100-seed weight, grains per pod, and number of nodes per plant. Berhanu *et al*. (2021) [2], Bijarania *et al*. (2021) [3], and Deshmukh *et al*. (2016) [5] found similar results, emphasizing the significance of seed weight, branching features, and pod number in enhancing production. Despite having few direct effects, factors including plant height, days to maturity, and number of secondary branches indirectly affected yield by being associated with pod features and primary branches. Karyawati and Puspitaningrum (2021) [9], Faot *et al*. (2019) [7], Chandel *et al*. (2017) [4], Sulistyo *et al*. (2018) [13], and Ghiday *et al*. (2017) [8] also highlighted the importance of supporting features in raising soybean productivity, and these findings are consistent with their findings.

Conclusion

The current study emphasizes the necessity of understanding the direct and indirect effects of different morphological features on soybean seed yield. Correlation and path coefficient analysis found that variables such as number of primary branches, pods per plant, 100-seed weight, grains per pod, and number of nodes per plant all have a significant positive and direct impact on yield. Furthermore, variables such as plant height, days to maturity, and number of secondary branches, while indirectly contributing, play an important role in supporting yield-related characteristics. These findings suggest that soybean breeding efforts should prioritize a mix of yield-enhancing and supporting characteristics. Effective selection based on these essential qualities can boost yield potential and assist in the development of high-performing soybean genotypes for future cultivation.

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References

1. Belay T, Tesfaye A, Alamerew S. Correlation and path analysis in black and brown seeded soybean (*Glycine max* (L.) Merr.) genotypes at Melko and Modio, South-Western Ethiopia. International Journal of Agricultural Research, Innovation and Technology. 2023;13(1):67-71.
2. Berhanu H, Obsa BT, Dagnachew L. Correlation and path coefficient analysis for seed yield and yield-related traits in soybean (*Glycine max* (L.)) genotypes. Plant. 2021.
3. Bijarania S, Pandey A, Kumar A, Shahani M, Singh D, Rojaria V. Assessment of correlation and path analyses for yield and its component traits in soybean (*Glycine max* (L.) Merrill). International Journal of Environment and Climate Change. 2021;11(12):44-51.
4. Chandel KK, Patel NB, Sharma LK, Gali S. Genetic variability, correlation coefficient and path analysis for yield and yield attributing characters in soybean

(*Glycine max* L. Merrill). Green Farming. 2017;8(3):547-551.
5. Deshmukh MP, Chavan BH, Dahat DV, Rajput HJ, Diwane SL. Correlation and path analysis in soybean. International Research Journal of Multidisciplinary Studies. 2016;2(9):1-2.
6. Dewey DR, Lu KH. A correlation and path coefficient analysis of components of crested wheatgrass seed production. Agronomy Journal. 1959;51:515-518.
7. Faot MM, Zubaidah S, Kuswantoro H. Genetic correlation and path analysis of agronomical traits of soybean (*Glycine max*) lines infected by CpMMV. Biodiversitas. 2019;20(6):1496-1503.
8. Ghiday T, Amogne A, Tefera G, Malede M. Heritability, genetic advance and path coefficient analysis for grain yield and its component characters in soybean (*Glycine max* L. Merrill). International Journal of Research Studies in Agricultural Sciences. 2017;3(5):1-11.
9. Karyawati AS, Puspitaningrum ESV. Correlation and path analysis for agronomic traits contributing to yield in 30 genotypes of soybean. Biodiversitas. 2021;22(3):1146-1151.
10. Kuswantoro H. Correlation and path analysis on yield and yield components in segregating populations. IOP Conference Series: Earth and Environmental Science. 2022;1114:012037.
11. Nasir B, Razzaq H, Sadaqat HA, Wahid MA, Imtiaz M. Correlation and path coefficient analysis in soybean under various levels of water and temperature at maturity stage. Pakistan Journal of Agricultural Sciences. 2023;60(1):107-115.
12. Searle SR. Phenotypic, genotypic, and environmental correlations. Biometrics. 1961;17(3):474-480.
13. Sulistyo A, Purwantoro, Sari KP. Correlation, path analysis and heritability estimation for agronomic traits contributing to yield on soybean. IOP Conference Series: Earth and Environmental Science. 2018;102:012034.