E-ISSN: 2618-0618
P-ISSN: 2618-060X

www.agronomyjournals.com
2025; SP-8(2): 527-531
Received: 15-10-2024
Accepted: 21-11-2024

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Study of association between the yield attributing triats in Mungbean under high temperature

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DOI: https://doi.org/10.33545/2618060X.2025.v8.i1Sh.2490

Abstract
Association studies for Yield Attributes in Mungbean (*Vigna radiata* L. Wilczek) were conducted on 15 Mung bean genotypes during *Kharif* 2021. The study was set up in a Randomized Block Design with three replications and focused on 16 morpho-physiological character variability. The analysis of variance revealed extremely significant variations across accessions for all characteristics. Grain yield per plant exhibited significant & positive correlation with plant height, number of secondary branches per plant, relative water content, biological yield and harvest Index. This provides an opportunity to select those characters for further breeding program which will contributes towards the yield.

Keywords: Anti-nutritional, high temperature, mungbean, correlation, yield.

Introduction: *Vigna radiata*, commonly known as mung beans, is a small green legume extensively cultivated across Asia and other regions with warm climates. Renowned for its versatility, mung beans have been used for both culinary and medicinal purposes for centuries and are integral to the traditional cuisines of countries like India, China, and Southeast Asia. This nutritious legume is widely incorporated into various dishes, whether consumed in its dried form or as sprouts. Mung beans are small, oval-shaped legumes with a delicate, creamy interior and a green outer skin. Closely related to other legumes like lentils and chickpeas, they are typically consumed either as whole or sprouted beans. In Asian cuisine, dried mung beans are often split, creating "split mung beans" or "mung dal." These beans are highly nutrient-dense, offering an excellent source of plant-based protein, dietary fibre, vitamins (such as folate, vitamin B6, and vitamin C), and minerals (like potassium, magnesium, and iron). They are also rich in antioxidants, which help protect the body from oxidative stress and inflammation.
The correlation coefficient analysis measures the relationships between various plant traits and identifies key component traits that can be targeted to enhance yield. A strong positive correlation between traits can accelerate genetic improvement, whereas a strong negative correlation may hinder progress in breeding programs. However, the relationships between traits may vary in strength and direction, potentially affecting the influence of component traits on dependent traits. By analysing the correlation of different traits with seed yield, the current study established links between plant, pod, and seed characteristics and their contributions to economic yield.

Material and Methods: The field study for the investigation titled “Genetic Variation in Mungbean Yield-Related Characteristics under High Temperatures” was conducted during *Kharif* 2022. The experiment followed a Randomized Block Design (RBD) with three replications, utilizing plot sizes of 5 x 2 meters. Spacing between plants was maintained at 30 cm, and between rows at 10 cm. The study involved 15 Mungbean genotypes procured from CCSHAU, Hisar, and Haryana.
Observations on days to 50% flowering, days to physiological maturity, and grain yield per plot were recorded on a plot basis. For all other traits, data were collected from five randomly selected plants per genotype in each replication,

excluding the first two border rows on all four sides to minimize sampling errors. Observations were recorded with averages computed per replication. The mean data were used for statistical analysis of 16 traits.

The phenotypic, genotypic and environmental correlation coefficients were worked out as per AI-jibouri *et al.* (1958) [1].

Result and Discussion

Phenotypic Correlation Analysis

Grain yield per plant exhibited significant & positive correlation with plant height (0.38*), No of secondary branches per plant (0.57*), Relative water content (0.83*), Biological yield (0.90*) and Harvest Index (0.70*). Whereas non-significant and positively associated with days to 50% flowering (0.13), no of primary branches per plant (0.08), no of pods) 0.24), no of seeds per pod (0.13, Root length (0.24) and root dry weight (0.21). Days to first flower open exhibited (- 0.42*) significant negative correlation with. Whereas days to cessation of flowering (- 0.07) and pod length (-0.01) showed non-significant and negative correlation with grain yield per plant.

Genotypic Correlation Analysis

Significant and positive correlation of grain yield per plant was exhibited by plant height (0.40*),no of secondary branches (0.58*) per plant, Relative water content (0.95*),Biological yield (0.99)*,Harvest Index (0.95*).Whereas non-significant positive correlations was exhibited by days to 50% flowering (0.13).no of secondary branches per plant (0.08),no of pods (0.25), No of seeds per pod (0.15), Root length (0.25),Root dry weight (0.22) with grain yield per plant. Days to cessation of flowering (-0.17), Pod length (-0.02) & test weight (-0.01) showed negative Correlation with grain yield per plant

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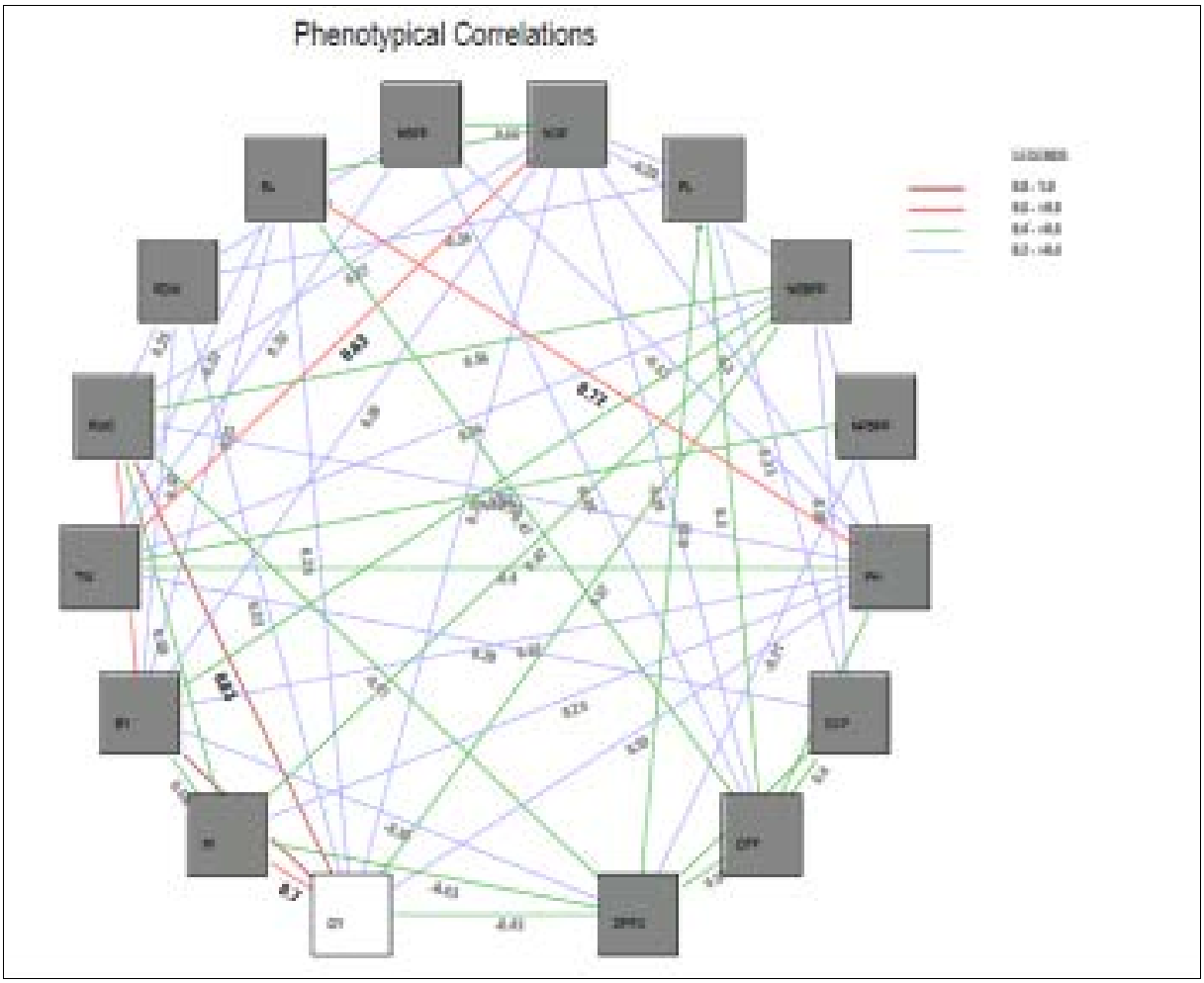
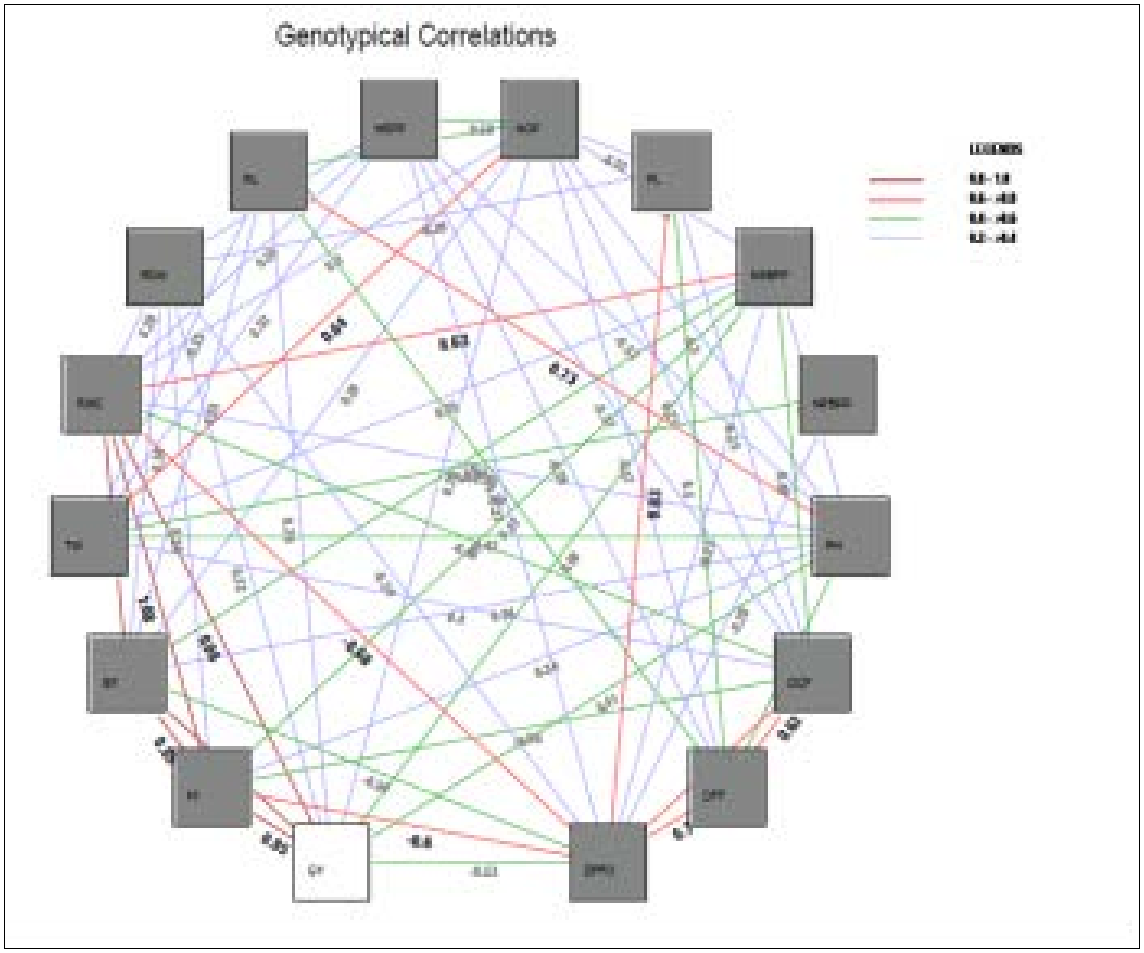
Table 1: Genotypic Correlation coefficients among fifteen characters in Mung bean

Characters	DFFO	DFF	DCF	PH	NPBPP	NSBPP	PL	NOP	NSPP	RL	RDW	RWC	TW	BY	HI
DFFO	1														
DFF	0.712***	1													
DCF	0.787***	0.624***	1												
PH	-0.042	0.481***	0.0203	1											
NPBPP	-0.279	-0.132	-0.050	-0.185	1										
NSBPP	-0.229	0.131	0.486***	0.371*	0.015	1									
PL	0.633***	0.501***	0.247	-0.079	0.122	-0.035	1								
NOP	-0.198	-0.369*	0.206	-0.302*	-0.053	0.348*	-0.321*	1							
NSPP	-0.269	-0.389**	-0.367*		-0.014	-0.144	-0.005	0.583***	1						
RL	-0.083	0.559***	-0.060	0.725***	0.036	0.044	0.062	-0.499***	-0.189	1					
RDW	-0.238	-0.086	-0.058	0.109	-0.131	0.192	-0.391**	0.036	-0.341*	-0.182	1				
RWC	-0.681***	-0.126	-0.460***	0.356*	0.016	0.630***	-0.055	0.302*	0.248	0.109	0.279	1			
TW	0.005	-0.148	0.395**	-0.418***	0.553***	0.245	-0.068	0.64***	0.324*	-0.326*	-0.096	-0.021	1		
BY	-0.541***	0.194	-0.057	0.342*	-0.012	0.576***	-0.130	0.291*	0.119	0.229	0.343*	0.891***	0.010	1	
HI	-0.604***	-0.004	-0.557***	0.342*	0.039	0.572***	-0.026	0.162	0.115	0.064	0.254	1.078***	-0.181	0.850***	1
GY	-0.528***	0.137	-0.179	0.406**	0.088	0.589***	-0.029	0.256	0.150	0.257	0.224	0.956***	-0.011	0.990***	0.951***

Table 2: Phenotypic Correlation coefficients among fifteen characters in Mung bean

	DFFO	DFF	DCF	PH	NPBPP	NSBPP	PL	NOP	NSPP	RL	RDW	RWC	TW	BY	HI
DFFO	1														
DFF	0.531***	1													
DCF	0.411**	0.405**	1												
PH	0.027	0.437**	0.042	1											
NPBPP	-0.211	-0.103	-0.039	-0.183	1										
NSBPP	-0.167	0.114	0.355*	0.367*	0.016	1									
PL	0.526***	0.503***	0.231	-0.046	0.108	-0.014	1								
NOP	-0.145	-0.289	0.151	-0.296*	-0.052	0.348*	-0.281	1							
NSPP	-0.117	-0.280	-0.198	-0.308*	-0.017	-0.129	0.062	0.554***	1						
RL	-0.045	0.471**	-0.020	0.720***	0.037	0.045	0.075	-0.491***	-0.183	1					
RDW	-0.185	-0.069	-0.033	0.106	-0.131	0.192	-0.353*	0.037	-0.332*	-0.179	1				
RWC	-0.407**	-0.011	-0.166	0.331*	0.014	0.556***	0.006	0.269	0.199	0.108	0.254	1			
TW	0.038	-0.114	0.290	-0.405**	0.546***	0.245	-0.045	0.633***	0.323*	-0.322*	-0.097	-0.009	1		
BY	-0.351*	0.158	-0.013	0.324*	-0.011	0.546***	-0.115	0.279	0.106	0.229	0.331*	0.754***	0.004	1	
HI	-0.425**	-0.044	-0.119	0.253	0.021	0.422**	-0.003	0.120	0.052	0.053	0.185	0.593***	-0.140	0.584***	1
GY	-0.426***	0.137	-0.076	0.387**	0.088	0.573***	-0.012	0.246	0.139	0.242	0.219	0.831***	-0.004	0.904***	0.704***





Conclusion

Grain yield per plant exhibited significant & positive correlation with plant height, number of secondary branches per plant, relative water content, biological yield and harvest Index. This indicates that traits such as plant height, number of secondary branches per plant, relative water content, biological yield, and harvest index are key contributors to grain yield per plant. Selecting and improving these traits through breeding programs could enhance overall grain production under changing climatic scenario.

Acknowledgement

The authors extend their gratitude to CCSHAU, Hisar, Haryana, for supplying the research materials and to the Faculty of Agricultural Sciences, Department of Genetics & Plant Breeding, Shree Guru Gobind Singh Tricentenary University, Gurugram for providing resources and unwavering support, which greatly contributed to the successful completion of this research.

Conflict of interest: The authors declare that they have no conflict of interest.

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