

# Correlation and Route Analysis of Linseed Under Uterine Conditions (*Linum Usitatissimum* L.)

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**Abstract-** This study was carried out to assess the correlation and the paths of flax genotypes in the uterus. Eighteen gear genotypes were assessed in a complete randomized block with three rehearsals during Rabi 2021-22 in Muzaffarnagar. Analysis of variance revealed significant differences among genotypes for all traits, indicating the presence of a significant amount of genetic diversity. Phenotypic correlations showed that grain yield was significantly and positively related to number of primary branches per plant, number of bolls per plant, number of seeds per boll, and weight of 1000 seeds. Path coefficient analysis showed that the number of primary branches per plant had the largest positive direct phenotypic effect on seed yield per plant, followed by the number of capsules per plant and the number of seeds per capsule.

**Index Terms-**Genotype, Phenotypic, Genetic Diversity, Traits, Capsules.

## I. INTRODUCTION

Linseed (*Linum usitatissimum* L.) is the oilseed crops raised during rabi. Every part of the linseed plant is utilized commercially, either directly or after processing. This is the most abundant source of alphanolenic acid. (Payasi, 2024). The lineage also has large medicinal values such as anti-hyper cholesterol and anti-caosinogenic effect, which is also useful for the development of brain tissues and retina (Wyllie, R., 2020). Oil cake is a feed suitable for dairy cows and birds (36 %) because of its abundant protein content. Flaxy fibers are used for raw materials for fibers and paper industries (Chandrasekaran, M., 2012). Linseed is a self-pollinating rabi oilseed crop and is grown under three cultivation conditions namely rainfed, irrigated and brood crop. Under brood crop conditions, linseed is sprayed on the standing rice plants one week before harvesting. The harvest is growing well on the residual humidity and the fertilizers of the previous harvest.

The improvement of the genetic architecture of harvest depends on the nature and the degree of genetic variability, which is a prerequisite for selection (Gupta, S. K. 2012). A good knowledge of the interrelationships between different traits would provide more reliable selection criteria for obtaining high seed yield (Aruah, B. C. 2012). However, selection for yield with highly correlated traits becomes easier once the contributions of different traits to yield are quantified using path coefficient analysis (Rasel, M. D., 2018). Keeping this in mind, the present study aimed to investigate the association and causal relationship between seed yield and yield related traits of flax genotypes under utero conditions (Jasienska, G. 2012).

## II. MATERIALS AND METHODS

The present study was carried out at Shri Ram College Muzaffarnagar Uttar Pradesh in the Rabi season 2008-2009. Materials comprising 18 flax genotypes, namely NL 119, PKDL 75, BAU-06-17, NDL 2005-34, RLC 121, LMSP 5, PCL -1-06, LCK 7034, NL 260, PKDL 74, BAU-06-08, KL 219, SLS 71, EC 552, EC 534, Shekhar, Garima and T 397 were evaluated in a completely randomized design with three replications during Rabi 2021-22. Each accession was grown in two rows of four to five inches with 25 cm between rows and 0.5 cm between plants per row. Recommended agronomic practices were followed to ensure good harvest.

Data were recorded as number of primary branches per plant, number of capsules per plant, number of seeds per capsule and grain yield per plant on ten randomly selected plants from each site of each replicate. Days to 50 percent flowering and days to 50 percent maturity were recorded on a plot basis, and 1,000 kernel weight and oil content were determined from the total seed weight from each plot for each replicate. Seed oil content was measured by NMR.

The average values of the replication symbol were subjected to a statistical analysis using Indostat software. The correlation coefficient between different symbols has been developed in accordance with the method suggested by Johnson et al., (1955). Correlation coefficients were separated into direct and indirect effects using path coefficient analysis following the method developed by Wright (1921) and refined by Dewey and Lu (1959).

### III. RESULTS AND DISCUSSION

An analysis of variance (Table 1) was performed for the eight quantitative traits under utero conditions. Genotype-specific mean squares were highly significant for all traits studied, suggesting large differences in the average performance of genotypes for all traits. Several signs of gene correlation coefficients (Table 2) Some signs of flax genes of uterine symptoms indicate that there was a coefficient of gene correlation. The corresponding values of phenotypic correlation coefficients with higher amplitudes have the same direction. Phenotypic correlations showed that grain yield per unit was significantly and positively related to the number of primary branches per plant, number of capsules per plant, number of seeds per capsule, and weight of 1000 seeds. The number of primary branches per plant also had a significant and positive correlation with the number of capsules per plant, while the number of capsules per plant had a significant and positive correlation with the number of seeds per capsule. (Rabindra et al., 2009, Tadesse et al., 2009,)

According to Wright (1921), path analysis is a standardized partial regression analysis by which correlation coefficients can be divided into measures of direct and indirect effects in order to understand the cause-effect relationship between related effects.

Path coefficient analysis (Table 3) revealed that the number of main branches per plant had the largest positive direct phenotypic effect on seed yield per plant, followed by the number of capsules per plant and the number of seeds per capsule, whereas the number of seeds per capsule had the largest positive indirect effect on grain yield per plant. Several researchers have also confirmed the results for most traits (Adugna and Labuschagne 2003; Akbar et al., 2003).

Table-1: Analysis of variances for eight quantitative characters under utera conditions in linseed.

Source of variation	Mean sum of squares	
	D.F.	
Days to 50% flowering		
Days to 50% maturity		
Number of primary branches per plant		
Number of capsules per plant		
Number of seeds per capsule		
1000-seed weight		
Oil content		
Grain yield per plant		

Error	Genotypes	Replicatio n
34	17	2
4.15	84.76**	3.68
29.38	61.62**	6.12
0.16	2.14**	1.07
16.64	184.74**	107.24
0.18	3.78**	0.52
0.05	5.35**	0.19
0.10	87.45**	0.02
0.02	0.24**	0.27

Table-2: Phenotypic and genotypic correlation coefficient between pairs of quantitative characters under utera condition in linseed.

Character	Days to maturity	Number of primary branches per plant	Number of capsules per plant	Number of seeds per capsule	1000-seeds weight	Oil content	Grain yield per plant
Days to maturity	0.440 (0.723)						
Number of primary branches per plant	-0.186 (-0.289)	0.068 (-0.098)					
Number of capsules per plant	-0.196 (-0.272)	0.025 (0.285)	0.678** (0.983)				
Number of seeds per capsule	0.064 (0.093)	0.253 (0.498)	0.436 (0.584)	0.685** (0.740)			
1000-seeds weight	-0.425 (-0.468)	0.238 (0.398)	0.438 (0.542)	0.432 (0.469)	0.235 (0.295)		
Oil content	-0.068 (-0.089)	0.265 (0.395)	-0.078 (-0.068)	0.285 (0.366)	0.343 (0.386)	0.285 (0.366)	
Grain yield per plant	-0.098 (-0.125)	0.235 (0.354)	0.678* * (0.856)	0.786* * (0.872)	0.678** (0.848)	0.678** (0.848)	0.678** (0.848)



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