# Genetic variability studies in yellow seeded linseed


## ABSTRACT:-

The experimental materials consisted of 40 yellow seeded genotypes of linseed taken from "AICRP on linseed, Department of Genetics and Plant Breeding, IGKV, Raipur", Chhattisgarh, India along with one check variety Surabhi ©.Seed yield is an important trait and the cumulative result of a number of component traits controlled by polygenes and influenced greatly by the environmental factors. Hence, yield alone would not be effective for selection of superior genotypes. In order to make the selection effective one has to give emphasis on the yield attributing traits. According to analysis of variance, "significant differences exist for all the parameters investigated from yellow seededlinseed genotypes."It demonstrates that the yellow seededgenotypes of linseed have sufficient variability in seed yield and contributing characteristics. 1000 Seed weight (7.7g) and seed yield (15g) were the highest in the YLS-31 and YLS-23 genotypes. The highest GCV was found in number of secondary branches per plant (39.5%) followed by seed yield (32.1%), harvest index (21.6%), and number of primary branches per plant (24.3%). The highest PCV was found in the number of primary branches per plant (47%). Number of secondary branches per plant (43.2%), 1000 seed weight (37.9%), number of capsules per plant (33.9%) and harvest index (22.8%) were the next most important factor.



**Keywords:-Additive gene, Harvest Index, Heritable, Replications.**


## INTRODUCTION:-

Linseed (*Linumusitatissimum* L.),commonly known as alsi, flax, or flaxseed, is a seed that comes from the *Linum usitatissimum*L. plant. It **belongs to the genus name Linum and is self-**pollinating. Linum is a Latin term that means "very beneficial" and comes from the word lin, which meaning "thread." It belongs to the Linaceae family. It flourishes in deep damp sand, silt, and clay soils. The species is endemic to the eastern Mediterranean, Western Asia, the Middle East, and India. It's a multipurpose oilseed crop that has been farmed for fiber (flax) and oil since ancient times (yellow seed linseed). Linseed has two origins, based on plant diversity, namely South West Asia, mainly in India (Vavilov, 1935; Richharia, 1962) and the

Mediterranean region of Europe (Darlington,1963) and the United States.

The flowers are bisexual, have erect, long pedicels, a superior ovary, or hypogynous state, and are made up of five sepals, five petals in various colors such as blue, violet and white. five stamens and five carpels that combine to form a complex pistil, each of which is divided by a false septum. The fruit comes in the form of globular capsules with eight to ten seeds. The oval, lenticular seeds has a smooth, glossy surface, is 46 mm in length, and is colored from brown to golden seeds with a protein level of 20-25% and an oil content of 35-45% (Diederichsen and Ulrich, 2009). In general the harvest index varies from 0.19 to 0.31. The test weight or 1000 seeds weight is nearly 4.5 per 1000 seeds. It is a significant oilseed crop grown on 2.09 lakh hectares in India, with yields of 1.40 lakh tones and 669 kg/ha, respectively. 10.92 thousand hectares of linseed with a productivity of 316 kg/ha were planted in Chhattisgarh in 2021–2022 (Source: Director's Report AICRP Linseed and Safflower 2022-23). It is grown on 41.42 lakh hectares worldwide, producing 33.39 lakh tons, and has a productivity of 952 kg/ha.(Source-FAOSTAT 2020–21). After China, Kazakhstan, the Russian Federation, Canada, and the United States of America, India came in sixth place in terms of output (FAO STAT 2021). India ranks sixth globally in terms of the two acreage and production contributed by linseed, at 13% and 5.5%, respectively.

## OBJECTIVES:-

Recognizing the benefit and desire for **"Genetic variability studies in yellow seeded linseed *(Linum usitatissimum* L.),"** the following objectives were managed at Research-Cum-Instructional-Farm, Department of Genetics and Plant Breeding, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh during the 2020-21 *Rabi* season:-

1. **Estimation of Genetic Variability in yellow seeded linseed (*Linum usitatissimum*L.).**
2. **Estimation of Heritability and Genetic Advance in yellow seeded linseed (*Linum usitatissimum*L.).**

## MATERIALS AND METHODS:-

The research work "**Genetic variability studies in yellow seeded linseed (*Linum usitatissimum* L.)"** was carried out at the Research-cum-Instructional Farm of the Department of Genetics and Plant Breeding, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh.India during Rabi 2020-2021 to evaluate the genetic variability among genotypes of yellow seeded linseed.

| S.N. | GENOTYPES | S.N. | GENOTYPES |
|---|---|---|---|
| 1. | YLS-1 | 21. | YLS-21 |
| 2. | YLS-2 | 22. | YLS-22 |
| 3. | YLS-3 | 23. | YLS-23 |
| 4. | YLS-4 | 24. | YLS-24 |
| 5. | YLS-5 | 25. | YLS-25 |
| 6. | YLS-6 | 26. | YLS-26 |
| 7. | YLS-7 | 27. | YLS-27 |
| 8. | YLS-8 | 28. | YLS-28 |
| 9. | YLS-9 | 29. | YLS-29 |
| 10. | Surabhi© | 30. | YLS-30 |
| 11. | YLS-11 | 31. | YLS-31 |
| 12. | YLS-12 | 32. | YLS-32 |
| 13. | YLS-13 | 33. | YLS-33 |
| 14. | YLS-14 | 34. | YLS-34 |
| 15. | YLS-15 | 35. | YLS-35 |
| 16. | YLS-16 | 36. | YLS-36 |
| 17. | YLS-17 | 37. | YLS-37 |
| 18. | YLS-18 | 38. | YLS-38 |
| 19. | YLS-19 | 39. | YLS-39 |
| 20. | YLS-20 | 40. | YLS-40 |

## RESULTS AND DISCUSSION:-

Analysis of variance for seed yield and its contributing traits” in the present set of yellow seeded genotypes of linseed are as follows-:

| Analysis of variance for seed yield and its contributing traits in yellow seeded linseed during 2020- |
|---|

| **2021 at Raipur(C.G):-** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S. N.** | **Source of variation** | **DF** | **PH (cm)** | **DTF** | **DM** | **PB** | **SB** | **C** | **SW (g)** | **OC (%)** | **HI (%)** | **SY (g)** |
| 1 | Replication | 2 | 24.9* | 11.0 | 1.81 | 68.5** | 167.5 | 195.6 | 0.02 | 5.2 | 0.3 | 40.5** |
| 2 | Treatment | 39 | 177.4** | 89.8** | 70.3** | 12.9** | 170.0** | 802.4** | 3.25** | 26.9** | 133.6** | 30.8** |
| 3 | Error | 78 | 7.6 | 3.8 | 11.0 | 6.1 | 10.4 | 33.0 | 0.03 | 1.3 | 4.9 | 3.6 |
| 4 | Total | 119 | | | | | | | | | | |

**TABLE- 1.1**

**Significant at 5 % level-(*), Significant at 1 % level-(**)**

| | |
|---|---|
| **PH- Plant height (cm)** | **DM- Days to maturity** |
| **DTF- Days to 50% flowering** | **PB- Primary branches per plant** |
| **DM- Days to maturity** | **SB- Secondary branches per plant** |
| **PB- Primary branches per plant** | **C- Number of capsules per plant** |
| **SB- Secondary branches per plant** | **SW- 1000 Seed weight (g)** |
| **OC- Oil content (%)** | **SY- Seed yield (g)** |
| **HI-Harvest index (%)** | **DTF- Days to 50% flowering** |

Oil content ranges from 31.1% (YLS-36) to 41.9% (YLS-20) with a mean value 35.6%. YLS-20 has recorded high oil content (41.9%) when compared to the best performing check variety Surabhi ©(31.5%).

The seed yield of the yellow seeded genotypes of linseed varied from (3.97g) to (13.9g). YLS-40 was best genotype in terms of seed yield per plant as compared to all other genotypes which showed (13.9g) seed yield. Harvest index ranges from 13.4% (YLS-3) to 40.6% (YLS-4) with amean value of 30.2 %. YLS-4 was recorded highest harvest index when compared to the check variety Surabhi © (28.9%).

The maximum variation in genotypic coefficient was found for no of secondary branches per plant (39.5%) followed by seed yield (32.14%), and no of capsules per plant (31.0%).

While, high variation in phenotypic coefficient was found for no of primary branches per plant (47.03%) followed by no of secondary branches per plant shows the existence of considerable amount of variability for those characters among the genotypes. The highest heritability was observed in 1000 seed weight whereas highest genetic advance was observed in plant height followed by no of secondary branches per plant.

YLS-36 (70.4 cm) has highest plant height, which shows high performance than check variety Surabhi © (64.60cm) with a mean value of 53.4cm.

Earliest days to 50% flowering was recorded in YLS-4(48.6 days).Whereas best performing check variety was recorded 64.3 days i.e. Surabhi ©.

YLS-12 have more number of primary branches per plant.

YLS-33 has low Days to maturity. plant (11.8)when compared to the best performing check variety Surabhi © (6.6).

YLS-20 havemore number of secondary branches per plant (29.0)when compared to the best performing check variety Surabhi © (15.8)

YLS-2(92.6) have more capsules when compared to the best performing check variety Surabhi © (52.2).

1000-seed weight of YLS-31 have highest mean value(7.71g) when compared with the best performing check variety Surabhi © (4.83g).

YLS-20 has recorded high oil content(41.9%) when compared to the best performing check variety Surabhi © (31.5%).

YLS-4 (40.6%)was recorded highest harvest index when compared to the check variety Surabhi © (28.9%).

Highest seed yield was recorded for YLS-23 (15.0g) with a mean value of 9.3g. The minimum value was found in YLS-2(3.8g)Whereas check variety Surabhi © was recorded 5.7

**Fig-1.2(a):Graphical representation of comparison of PCV (Phenotypic coefficient of variation) and GCV (Genotypic coefficient of variation) of seed yield and its contributing traits in yellow seeded linseed during 2020-21 at Raipur (C.G.):-**

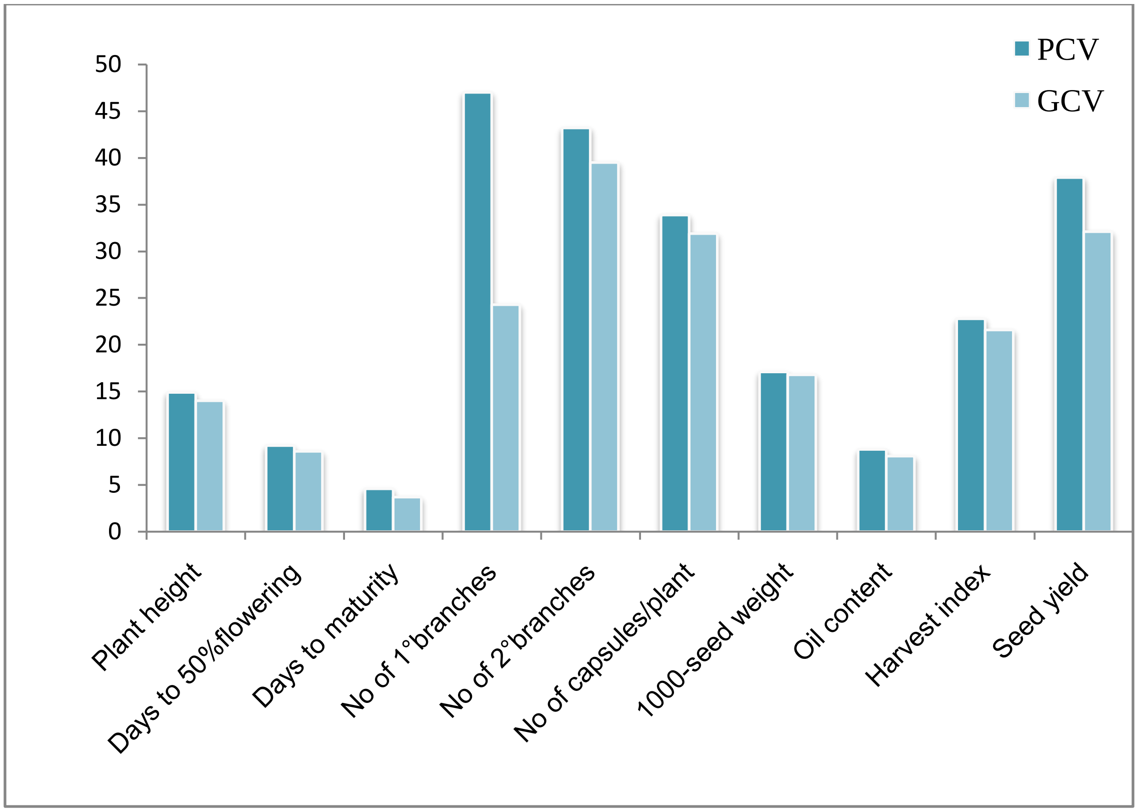


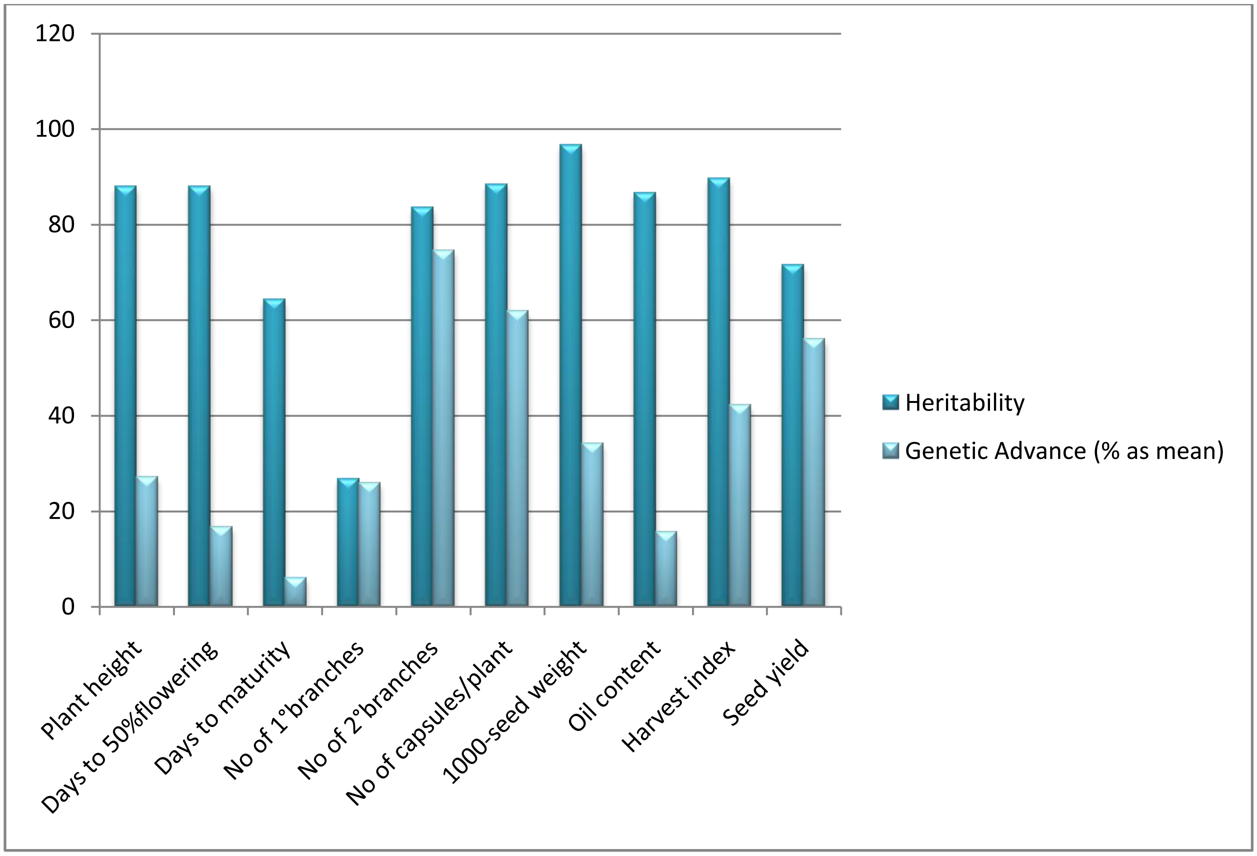

**Table-1.2**

**Genetic parameter of variation for seed yield and its contributing traits of yellow seeded linseed during 2020-2021 at Raipur(C.G):-**

| S. N. | Characters | Mean | Range | | Critical differences (5%) | Coefficient of Variation (%) | | $h^2_{(bs)}$ | GA | GA % (mean) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Max. | Min. | | PCV | GCV | | | |
| 1 | Plant height (cm) | 53.4 | 70.4 | 41.6 | 4.5 | 14.9 | 14.0 | 88.0 | 14.5 | 27.1 |
| 2 | Days to 50% flowering | 61.8 | 70.7 | 48.6 | 3.2 | 9.2 | 8.6 | 88.1 | 10.3 | 16.7 |
| 3 | Days to maturity | 119.4 | 126.8 | 111.2 | 4.4 | 4.6 | 3.7 | 64.2 | 7.3 | 6.1 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 4 | No. of 1°branches/plant | 6.1 | 11.8 | 2.2 | 4.0 | 47.0 | 24.3 | 26.8 | 1.6 | 26.0 |
| 5 | No. of 2°branches/plant | 18.4 | 29.0 | 4.0 | 7.2 | 43.2 | 39.5 | 83.6 | 13.7 | 74.5 |
| 6 | No. of capsules/plant | 50.4 | 92.6 | 16.0 | 8.3 | 33.9 | 31.9 | 88.5 | 31.0 | 61.9 |
| 7 | 1000 -seed weight(g) | 6.1 | 7.71 | 4.0 | 0.3 | 17.1 | 16.8 | 96.7 | 2.0 | 34.1 |
| 8 | Oil content (%) | 35.6 | 41.9 | 31.1 | 1.8 | 8.8 | 8.1 | 86.6 | 5.6 | 15.7 |
| 9 | Harvest index (%) | 30.2 | 40.6 | 13.4 | 3.6 | 22.8 | 21.6 | 89.6 | 12.7 | 42.2 |
| 10 | Seed yield | 9.3 | 15.0 | 3.8 | 2.7 | 37.9 | 32.1 | 71.6 | 5.2 | 56.0 |

**Fig-1.2.(b):Graphical representation ofHeritability and genetic advance as mean percent for seed yield and its contributing characters in yellow seeded linseed 2020-21 at Raipur**




## Conclusion:-

Analysis of variance for seed yield and its contributing traits in the present set of 40 yellow seeded genotypes of linseed disclosed significant differences for all the character.

Under studied considerable range of variation was recorded for all the traits showed enough scope for enhancement in desirable direction. In general phenotypic coefficient of variation was high when compared to genotypic coefficient of variation.

High heritability accompanied with high genetic advance enhanced the selection intensity in yellow seeded genotypes of linseed over the base population. "Significant amount of genetic variability" was recorded for quantitative characters which is an essential breeding material for selection in linseed for Chhattisgarh.

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