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# Genetic variability [Mean, range, general mean, standard error, coefficient of variability (PCV & GCV) in linseed (*Linum usitatissimum* L.]

**Ravindra Kumar Kasana, PK Singh, Amit Tomar, Shiva Mohan and Sonu Kumar**

**Abstract**
The present experiment was conducted using 151 genotypes/varieties of diverse origin were tested in randomized block design with two replications at Nawabganj, Research form of the Chandra Shekhar Azad University of Agriculture and Technology, Kanpur during rabi 2014-15. Observations were recorded on eleven character namely, days to 50% flowering, size of corolla, number of primary branches per plant, plant height, capsule size, days to maturity, number of capsules per plant, number of seeds per capsule, 1000-seed weight, oil content and grain yield per plant. The maximum value of genotypic coefficient of variability, phenotypic coefficient of variability, heritability and genetic advance were found for number of capsules per plant.

**Keywords:** genetic variability, standard error, linseed, variability

## Introduction
Linseed (*Linum usitatissimum* L.) is one of the oldest crop cultivated for its seeds and fibres. Almost every part of the linseed plant is utilized commercially either directly or after processing. Linseed oil and meal are the two products provided by the seeds on account of its quick drying properties. Linseed oil is extensively used in industry for the manufacturing of high quality paints and varnishes. The oil content of the seed generally varies from 33 to 45 per cent. About 20 per cent of the total linseed oil is used for edible and domestic purposes and 80 per cent goes for industrial utilization. The oil is also utilized for manufacturing paints, varnishes, oilcloth, linoleum, pad-ink, printers ink, soap etc.
Germplasm utility depends on the information generated by evaluation. It covers the whole range of activities starting from the receipt of the material by the curator and its growing out for seed increase, characterization and preliminary evaluation, and also further evaluation, documentation, utilization and maintenance. The use of proper descriptors, characterization, preliminary evaluation and further evaluation is stressed. Emphasis is laid on linseed germplasm maintenance, population size, experimental design, rejuvenation, and information management and documentation of data. The value of core collection and pre-breeding concept is pointed out. The coordinated role of NBPGR in evaluation activities has been highlighted.

## Materials & Methods
The experiment consisting of one hundred fifty one strains/genotypes of linseed was conducted at Oilseed Research Farm, Nawabganj, Kanpur is a Randomized Block Design (RBD) with two replications during rabi 2014-2015. The experiment was sown on 30$^{th}$ October, 2014. Each strain/genotype was sown in a plot of 5.0 m long and 2 m wide. Within the plot, plant x plant (P x P) and row x row (R x R) distances were kept 5 cm and 25 cm, respectively. Recommended agronomical practices and plant protection measures were adopted to raise the good crop. Ten plants were taken randomly from each plot for recording the observations. Observations were recorded for eleven characters namely; days to 50% flowering, size of corolla (cm), number of primary branches per plant, plant height (cm), capsule size (cm), days to maturity, number of capsules per plant, number of seeds per capsule, 1000-seed weight (g), oil content (%) and seed yield per plant (g).

## Results & Discussion
The analysis of variance was done separately for all the characters studied in order to find out the difference among the treatments for days to 50% flowering, size of corolla, number of

primary branches per plant, plant height, capsule size, days to maturity, number of capsules per plant, number of seeds per capsule, 1000-seed weight, oil content, seed yield per plant. 'F' test was done for testing the significance difference among the treatments. The mean sums of squares for all the eleven characters are presented in Table-1. The 'F' test indicated that there were highly significant differences among the treatments for all the eleven characters indicating high magnitude of genetic variability. These results are similar to Verma & Singh (2006) [17] and Tiwari *et al.* (2012) [16].

The mean performance of the strains for all the eleven characters is presented in Table-2. The results showed that days to 50% flowering ranged from 47.50 to 69.50, the minimum days to flowering have been observed in varieties A-10-2-2 & A-404 (47.50) and maximum in variety A-180 (69.50). Size of corolla ranged from 16.13 to 25.97, the minimum size of corolla was in variety ICI-14577 (16.13) and maximum in variety 1541 (25.97). The number of primary branches per plant ranged from 3.00 to 5.50, minimum numbers of primary branches per plant have been recorded in varieties BR-1, BENGAL-62, BENGAL-70, BEHAMPUR, BUAPUR LOCAL, CI-1554, EC-569, EC-1389, EC-15298, EC-16398, EC-41733, LCK-152 & NO.55 (3.00) and maximum number of primary branches was found in variety EX-131-10 (5.50). Plant height ranged from 43.08 to 75.43, the minimum plant height was in variety CI-1972(43.08) and maximum plant height was found in variety NP-89 (75.47). Capsule size ranged from 4.44 to 6.40, the minimum number of capsule size are in variety HANAMAN SAGAR (4.44) and maximum number of capsule size in variety LS-1 (6.40). Days to maturity ranged from 125.50 to 143, minimum days to maturity in variety EC-9832 (125.50) and maximum days to maturity were found in variety GS-206 (143). The number of capsules per plant ranged from 23 to 121, number of capsules isminimum in variety GS-206 (23) and the maximum number of capsules per plant in variety EX-6-3 (121). The number of seeds per capsule ranged from 7.14 to 8.45, minimum seeds per capsule are in variety EC-1389 (7.14) and maximum in variety EX-6-3(8.45). The range of 1000-seed weight varied from 4.51 to 6.11, the variety EX-6-3 has maximum 1000-seed weight while variety A-449 has minimum 1000-seed weight. The range of Oil content varied from 31.09 to 41.79, the minimum oil content percentage have in variety BUAPUR LOCAL and minimum oil content variety GUNAWAL LOCAL. The range of seed yield per plant varied from 9.56 to 13.68, the maximum yield per plant is in variety Hyb-603-2 (13.68) while variety L-21 has the minimum seed yield per plant (9.56). Similar findings were also observed by Awasthi and Rao (2005) [5], Ram Jeet *et al.* (2010) [12], Tiwari *et al.* (2012) [16] and Ahmed *et al.* (2014) [3].

Estimation of variability (GCV & PCV) for all the eleven characters has been presented in Table -3. The maximum value of genotypic coefficient of variability has been observed for number of capsules per plant (32.30), followed by plant height (10.95), days to flowering (9.97), size of corolla (8.77), number of primary branches per plant (8.50), followed by seed yield per plant (7.00), capsule size (5.36), oil content (4.90), 1000-seed weight (4.55) and days to maturity (2.66). The minimum value of genotypic coefficient of variation was observed for number of seeds per capsules (2.19). These results were also similar to Ram and Kerketta (2007) [13], Rama kant *et al.* (2008) [14], Ram Jeet *et al.* (2010) [12] and Savita *et al.* (2011) [15].

The maximum phenotypic coefficient of variation has been recorded for number of capsules per plant (34.42), followed by number of primary branches per plant (17.62), plant height (12.20), days to flowering (11.20), size of corolla (10.00), capsule size (9.33), seed yield per plant (8.68), oil content (6.31), 1000-seed weight (5.54), number of seeds per capsule (8.66) and days to maturity (3.47). The minimum value of phenotypic coefficient of variation was observed for seeds per capsules (3.34). Similar results were also observed by Adugna *et al.* (2003) [1], Ahmed and Hussanein (2003) [2], Akbar *et al.* (2003) [4], Awasthi and Rao (2005) [5], Dandigadasar (2011) [8], Gauraha *et al.* (2011) [10] and Bibi *et al.* (2013) [7].

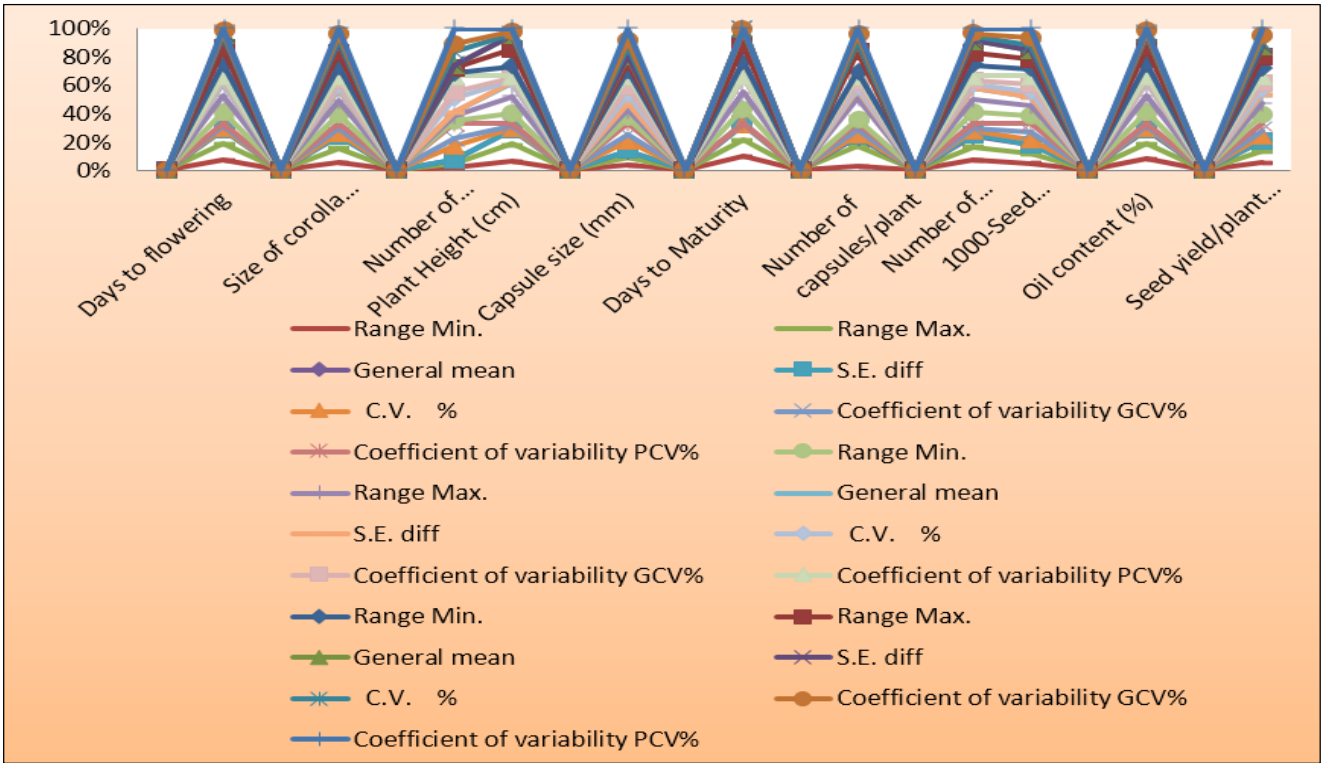


**Fig 1:** Graphical representation of range, general mean, S.E., coefficient of variability for 11 characters in linseed

**Table 1:** Anova for eleven characters in linseed-(mean sum of square).

| Source of variation | D.F | Days to 50% flowering | Size of corolla (mm) | Number of primary branches per plant | Plant height (cm) | Capsule size (mm) | Days to maturity | No. of capsules per plant | No. of seeds per capsule | 1000-seeds weight (g) | Oil content (%) | Seed yield per plant (g) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Replication | 1 | 3.605 | 0.028 | 0.000 | 0.376 | 0.128 | 0.847 | 0.162 | 0.0004 | 0.006 | 0.0006 | 0.972 |
| Treatment | 150 | 75.587** | 8.499** | 0.560** | 98.069** | 0.324** | 34.973** | 606.627** | 0.095** | 0.155** | 8.615** | 1.662** |
| Error | 150 | 8.765 | 1.107 | 0.351 | 10.526 | 0.163 | 9.114 | 38.515 | 0.038 | 0.030 | 2.136 | 0.352 |

*, **Significant at 5% and 1% levels, respectively.

**Table 2:** Mean performance of 151 genotypes for 11 characters in linseed.

| S. No. | Genotypes | Days to 50% flowering | Size of corolla (mm) | No. of Primary branches | Plant height (cm) | Capsule size (mm) | Days to maturity | No. of capsules Per plant | No. of seeds Per Capsule | 1000-Seed Weight (g) | Oil content (%) | Grain yield (g) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 9 x 12 | 52.50 | 24.03 | 3.50 | 68.52 | 6.14 | 131.50 | 77.50 | 7.91 | 5.15 | 37.56 | 10.46 |
| 2 | 68-IC-32676 | 52.50 | 22.58 | 3.50 | 60.38 | 6.13 | 130.00 | 74.00 | 7.78 | 5.29 | 39.36 | 10.90 |
| 3 | 164/1 | 61.50 | 19.98 | 4.00 | 61.35 | 4.99 | 127.50 | 69.00 | 7.51 | 5.27 | 36.51 | 11.02 |
| 4 | 191 x RR-9/2 | 52.50 | 19.23 | 4.00 | 58.28 | 5.51 | 139.50 | 52.50 | 7.82 | 5.25 | 37.54 | 11.21 |
| 5 | 1541 | 61.00 | 25.97 | 3.50 | 65.94 | 5.05 | 129.50 | 47.00 | 7.92 | 5.26 | 38.88 | 11.10 |
| 6 | 5620 A | 68.00 | 18.63 | 3.50 | 63.48 | 4.84 | 142.00 | 45.00 | 7.54 | 5.92 | 34.55 | 11.34 |
| 7 | 50125 | 57.50 | 17.93 | 4.00 | 61.88 | 5.16 | 137.50 | 47.50 | 7.55 | 5.83 | 34.16 | 12.05 |
| 8 | A-10-2-2 | 47.50 | 22.24 | 4.00 | 63.50 | 6.15 | 139.50 | 51.00 | 7.57 | 5.62 | 35.31 | 12.27 |
| 9 | A-23-1-1 | 51.00 | 22.18 | 4.00 | 51.64 | 5.13 | 130.00 | 59.00 | 7.85 | 5.22 | 34.25 | 10.55 |
| 10 | A-49 | 55.00 | 17.48 | 4.00 | 62.38 | 6.31 | 128.50 | 67.50 | 7.63 | 5.34 | 34.71 | 12.03 |
| 11 | A-170 | 60.50 | 22.73 | 3.50 | 66.89 | 5.71 | 138.00 | 43.50 | 7.28 | 5.36 | 34.35 | 12.51 |
| 12 | A-180 | 69.50 | 21.77 | 3.50 | 58.56 | 5.73 | 139.50 | 49.50 | 7.69 | 5.21 | 33.50 | 12.69 |
| 13 | A-198 | 50.50 | 23.68 | 4.00 | 60.64 | 5.26 | 131.00 | 57.50 | 7.84 | 5.62 | 32.50 | 12.64 |
| 14 | A-210 | 50.50 | 22.59 | 3.50 | 60.35 | 5.37 | 136.50 | 51.00 | 7.81 | 5.90 | 32.19 | 11.17 |
| 15 | A-375 | 52.00 | 21.20 | 3.50 | 53.34 | 5.04 | 130.00 | 42.50 | 7.66 | 5.42 | 33.52 | 11.28 |
| 16 | A-385 | 58.00 | 21.37 | 4.50 | 60.91 | 5.36 | 130.00 | 87.50 | 7.70 | 4.87 | 33.71 | 12.52 |
| 17 | A-388 | 63.50 | 23.55 | 4.00 | 58.89 | 5.48 | 140.50 | 67.50 | 7.87 | 5.41 | 34.66 | 12.28 |
| 18 | A-396A | 62.00 | 20.89 | 3.50 | 61.12 | 5.17 | 133.50 | 60.00 | 7.60 | 5.62 | 32.57 | 11.81 |
| 19 | A-404 | 47.50 | 20.53 | 4.50 | 49.70 | 5.50 | 134.50 | 52.00 | 7.32 | 5.97 | 33.38 | 11.71 |
| 20 | A-117 | 50.50 | 20.26 | 3.50 | 49.40 | 5.07 | 125.50 | 39.00 | 7.90 | 5.52 | 34.37 | 11.87 |
| 21 | A-434 | 48.50 | 22.17 | 3.50 | 47.01 | 4.92 | 130.00 | 39.50 | 7.65 | 5.59 | 36.36 | 12.65 |
| 22 | A-449 | 61.50 | 19.07 | 4.00 | 45.28 | 4.49 | 138.00 | 33.50 | 7.75 | 6.11 | 39.50 | 12.75 |
| 23 | A-459 | 60.00 | 24.36 | 3.50 | 60.10 | 5.05 | 137.00 | 53.50 | 7.57 | 5.78 | 36.78 | 12.88 |
| 24 | A-495 | 60.00 | 22.22 | 4.00 | 50.19 | 5.07 | 135.00 | 38.50 | 7.77 | 5.54 | 38.33 | 12.09 |
| 25 | ARNY | 50.00 | 22.79 | 3.50 | 59.00 | 5.05 | 134.50 | 42.00 | 7.90 | 5.56 | 36.36 | 12.22 |
| 26 | BAU-111-1 | 62.50 | 22.29 | 3.50 | 57.14 | 5.18 | 129.00 | 47.50 | 7.43 | 5.52 | 36.27 | 11.32 |
| 27 | BAULK | 57.00 | 21.54 | 3.50 | 51.18 | 5.25 | 138.50 | 35.00 | 7.75 | 5.61 | 35.38 | 11.16 |
| 28 | BR-1 | 51.00 | 25.50 | 3.00 | 47.75 | 4.97 | 140.00 | 33.00 | 7.87 | 5.65 | 35.51 | 11.36 |
| 29 | BR-14 | 63.00 | 23.70 | 4.00 | 56.67 | 4.93 | 137.50 | 30.00 | 7.61 | 5.42 | 34.81 | 10.73 |
| 30 | B2-3-62 | 58.50 | 23.08 | 3.50 | 49.80 | 5.07 | 138.00 | 33.00 | 7.37 | 6.00 | 33.45 | 10.92 |
| 31 | BS-2 | 66.50 | 25.04 | 5.00 | 51.38 | 5.05 | 138.50 | 34.00 | 7.50 | 5.67 | 35.56 | 11.83 |
| 32 | Bengal-23 | 51.00 | 23.78 | 4.50 | 45.52 | 4.48 | 135.00 | 41.00 | 7.78 | 5.43 | 34.91 | 11.90 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 33 | Bengal-62 | 66.50 | 19.09 | 3.00 | 43.49 | 4.76 | 130.50 | 39.50 | 7.52 | 5.60 | 33.51 | 12.13 |
| 34 | Bengal-70 | 61.50 | 23.90 | 3.00 | 49.41 | 5.01 | 140.00 | 29.50 | 7.86 | 5.30 | 35.38 | 10.81 |
| 35 | Behampur | 60.50 | 19.10 | 3.00 | 47.15 | 4.85 | 140.50 | 37.50 | 7.89 | 6.00 | 34.47 | 10.58 |
| 36 | Buapur Local | 68.50 | 19.25 | 3.00 | 46.35 | 4.91 | 141.50 | 43.00 | 7.66 | 5.71 | 31.09 | 10.28 |
| 37 | Buapur Local | 66.50 | 25.87 | 3.00 | 54.03 | 5.53 | 134.50 | 42.50 | 7.78 | 5.27 | 34.25 | 9.90 |
| 38 | Bilaspur | 59.50 | 22.14 | 4.00 | 49.68 | 4.91 | 138.00 | 32.50 | 7.99 | 5.45 | 35.33 | 10.28 |
| 39 | C-429-3 | 49.00 | 24.59 | 3.50 | 59.24 | 5.11 | 139.00 | 38.00 | 7.51 | 5.47 | 35.64 | 10.48 |
| 40 | CC-12 | 58.00 | 19.75 | 4.50 | 50.11 | 5.01 | 134.00 | 44.00 | 7.92 | 5.69 | 36.54 | 10.56 |
| 41 | CI-540 | 56.50 | 21.89 | 4.00 | 43.86 | 4.52 | 140.00 | 45.50 | 7.67 | 5.85 | 37.76 | 10.68 |
| 42 | CI-765 | 59.00 | 25.00 | 4.00 | 59.37 | 5.03 | 139.50 | 40.00 | 7.77 | 5.20 | 37.85 | 10.29 |
| 43 | RL-975 | 61.50 | 23.35 | 4.50 | 60.71 | 5.30 | 135.50 | 47.50 | 7.42 | 5.39 | 31.99 | 13.21 |
| 44 | CI-1427 | 60.50 | 22.09 | 3.50 | 60.39 | 5.07 | 135.00 | 51.00 | 7.82 | 5.76 | 35.55 | 13.63 |
| 45 | CI-15-B | 54.00 | 19.86 | 3.50 | 51.16 | 5.08 | 141.50 | 58.00 | 7.97 | 5.85 | 37.38 | 12.83 |
| 46 | CI-1554 | 62.00 | 24.60 | 3.00 | 60.89 | 5.29 | 137.50 | 61.50 | 7.98 | 5.24 | 39.03 | 11.64 |
| 47 | CI-1597 | 57.50 | 21.69 | 4.50 | 62.58 | 5.69 | 137.50 | 43.50 | 7.53 | 5.55 | 38.31 | 11.46 |
| 48 | CI-1968 | 68.00 | 25.03 | 3.50 | 67.03 | 6.24 | 135.00 | 52.00 | 7.82 | 5.43 | 38.84 | 12.18 |
| 49 | CI-1972 | 67.00 | 20.66 | 3.00 | 43.08 | 5.67 | 129.50 | 48.50 | 7.68 | 5.61 | 41.08 | 13.36 |
| 50 | CI-2010 | 54.50 | 21.00 | 3.00 | 64.36 | 5.14 | 126.50 | 38.50 | 7.64 | 5.64 | 37.45 | 12.02 |
| 51 | CI-2056 | 55.50 | 18.87 | 3.50 | 67.34 | 5.60 | 135.00 | 36.50 | 7.76 | 5.58 | 36.84 | 10.59 |
| 52 | CI-2067 | 61.50 | 19.50 | 4.00 | 62.28 | 5.76 | 128.50 | 33.00 | 7.75 | 5.53 | 36.28 | 9.87 |
| 53 | CI-J-5635 | 58.00 | 21.75 | 4.00 | 63.42 | 5.65 | 140.00 | 50.00 | 7.69 | 5.53 | 35.59 | 11.45 |
| 54 | CR-M-6 x 22-9 | 67.50 | 21.72 | 3.00 | 63.22 | 5.62 | 141.00 | 40.00 | 7.65 | 5.40 | 36.46 | 10.53 |
| 55 | Bignoahi | 50.50 | 19.24 | 3.00 | 64.80 | 5.70 | 135.50 | 58.00 | 7.72 | 5.23 | 34.61 | 12.10 |
| 56 | BC-523B | 49.50 | 18.90 | 4.50 | 65.78 | 5.04 | 133.50 | 45.00 | 7.92 | 5.65 | 37.57 | 12.66 |
| 57 | EC-561 | 52.50 | 20.72 | 4.00 | 59.35 | 5.20 | 135.00 | 48.00 | 7.55 | 5.46 | 36.78 | 12.09 |
| 58 | EC-564 | 50.50 | 19.95 | 4.00 | 69.36 | 6.05 | 132.00 | 56.00 | 7.58 | 5.74 | 37.74 | 12.60 |
| 59 | EC-569 | 51.00 | 19.66 | 3.00 | 62.31 | 4.79 | 130.00 | 45.00 | 7.66 | 5.32 | 33.64 | 9.80 |
| 60 | EC-589 | 61.00 | 23.07 | 3.50 | 57.04 | 5.10 | 140.00 | 48.00 | 7.55 | 5.10 | 35.65 | 10.27 |
| 61 | EC-1187 | 69.00 | 22.00 | 3.50 | 64.93 | 4.97 | 134.50 | 42.50 | 7.78 | 5.92 | 38.47 | 10.71 |
| 62 | EC-1389 | 61.00 | 18.42 | 3.00 | 61.61 | 4.86 | 137.50 | 38.00 | 7.14 | 5.91 | 36.65 | 11.51 |
| 63 | EC-1410 | 59.00 | 23.00 | 3.50 | 72.40 | 5.17 | 130.50 | 48.00 | 7.68 | 5.48 | 36.74 | 10.03 |
| 64 | EC-1433 | 69.00 | 25.79 | 4.00 | 67.29 | 6.04 | 138.50 | 59.00 | 7.84 | 5.37 | 38.29 | 11.21 |
| 65 | EC-1434 | 58.00 | 23.14 | 3.50 | 60.08 | 5.44 | 135.50 | 40.50 | 7.52 | 5.29 | 36.51 | 12.81 |
| 66 | EC-1529B | 51.00 | 25.68 | 3.00 | 59.36 | 5.01 | 135.50 | 37.50 | 7.64 | 5.70 | 36.31 | 12.31 |
| 67 | EC-9832 | 66.50 | 19.35 | 3.50 | 61.44 | 5.01 | 125.50 | 42.00 | 7.41 | 5.12 | 37.01 | 12.48 |
| 68 | EC-99080 | 69.00 | 22.16 | 4.50 | 49.26 | 5.08 | 136.00 | 58.50 | 7.72 | 5.58 | 36.57 | 12.30 |
| 69 | EC-12077B | 66.00 | 21.84 | 3.50 | 66.58 | 4.90 | 130.00 | 54.00 | 7.70 | 5.55 | 38.34 | 11.01 |
| 70 | EC-1639B | 62.50 | 20.93 | 3.00 | 64.25 | 4.90 | 134.50 | 53.00 | 7.57 | 5.56 | 39.65 | 13.12 |
| 71 | EC-22583 | 53.00 | 23.59 | 3.50 | 62.40 | 5.21 | 138.00 | 47.00 | 7.67 | 5.61 | 37.93 | 12.02 |
| 72 | EC-22684 | 56.00 | 21.72 | 4.50 | 63.38 | 5.11 | 139.00 | 52.00 | 7.44 | 5.53 | 38.08 | 11.73 |
| 73 | EC-22848 | 61.50 | 24.55 | 4.00 | 63.22 | 5.40 | 138.00 | 50.50 | 7.44 | 5.58 | 37.74 | 12.04 |
| 74 | EC-22850 | 59.50 | 23.81 | 3.50 | 66.11 | 5.91 | 139.00 | 57.50 | 7.46 | 5.52 | 37.33 | 11.81 |
| 75 | EC-23592 | 59.00 | 24.46 | 3.50 | 67.21 | 5.57 | 129.50 | 54.50 | 7.45 | 5.69 | 39.60 | 12.37 |
| 76 | EC-41561 | 62.00 | 18.80 | 4.50 | 61.20 | 5.67 | 135.50 | 48.00 | 7.43 | 5.65 | 35.55 | 11.83 |
| 77 | EC-41577 | 68.50 | 20.01 | 3.50 | 63.00 | 5.32 | 140.50 | 42.50 | 7.66 | 5.36 | 38.35 | 10.29 |
| 78 | EC-41627 | 51.00 | 23.69 | 3.00 | 62.75 | 5.49 | 138.00 | 58.00 | 7.34 | 4.98 | 37.75 | 11.78 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 79 | EC-41656 | 58.00 | 19.64 | 4.50 | 60.06 | 5.12 | 135.50 | 47.50 | 7.68 | 5.57 | 38.34 | 12.43 |
| 80 | EC-41704 | 52.50 | 20.52 | 3.50 | 56.71 | 4.90 | 135.00 | 43.00 | 7.41 | 5.62 | 36.74 | 12.45 |
| 81 | EC-41733 | 59.50 | 24.00 | 3.00 | 64.55 | 6.25 | 129.00 | 58.50 | 7.72 | 5.38 | 38.43 | 12.51 |
| 82 | EC-99007 | 60.50 | 18.38 | 3.50 | 58.91 | 4.97 | 129.50 | 52.00 | 7.44 | 5.22 | 35.80 | 10.86 |
| 83 | EC-99009 | 66.50 | 24.43 | 4.00 | 60.15 | 5.17 | 129.50 | 54.50 | 7.58 | 5.37 | 38.27 | 11.04 |
| 84 | EC-99025 | 64.00 | 24.78 | 4.00 | 57.14 | 6.10 | 140.00 | 55.00 | 8.08 | 5.13 | 39.53 | 10.46 |
| 85 | EC-99029 | 57.50 | 22.04 | 3.50 | 45.18 | 5.24 | 139.00 | 41.00 | 7.78 | 5.63 | 35.53 | 10.82 |
| 86 | EC-115178 | 54.50 | 19.31 | 3.50 | 55.85 | 4.87 | 135.00 | 48.00 | 7.68 | 5.59 | 36.61 | 11.48 |
| 87 | ES-1534 | 49.50 | 17.45 | 4.00 | 49.96 | 5.52 | 138.50 | 47.00 | 7.17 | 5.40 | 40.00 | 12.06 |
| 88 | ES-16381 | 53.00 | 19.13 | 3.50 | 48.64 | 5.18 | 138.00 | 45.00 | 7.79 | 5.48 | 39.93 | 11.20 |
| 89 | E x -6-3 | 48.50 | 21.59 | 4.50 | 65.99 | 5.78 | 130.00 | 121.00 | 8.45 | 4.51 | 37.49 | 10.66 |
| 90 | E x -131-10 | 55.00 | 22.58 | 5.50 | 68.81 | 5.46 | 132.50 | 32.50 | 7.62 | 5.47 | 38.40 | 12.09 |
| 91 | PB-3-NO3 | 54.50 | 23.04 | 3.50 | 61.50 | 5.02 | 140.00 | 27.50 | 7.60 | 5.62 | 37.33 | 10.90 |
| 92 | FR-11 | 65.50 | 24.25 | 4.00 | 63.11 | 5.88 | 141.50 | 42.00 | 8.16 | 5.69 | 34.51 | 10.55 |
| 93 | GLC-1-2 | 67.50 | 21.25 | 3.50 | 62.64 | 5.51 | 134.00 | 30.00 | 7.74 | 6.03 | 33.55 | 13.15 |
| 94 | GS-121 | 58.00 | 21.25 | 3.00 | 63.31 | 5.19 | 135.50 | 33.00 | 7.62 | 5.32 | 33.26 | 11.42 |
| 95 | GS-134 | 57.50 | 21.60 | 5.00 | 62.59 | 5.85 | 133.50 | 28.00 | 7.98 | 5.86 | 36.37 | 11.30 |
| 96 | GS-178 | 55.00 | 20.24 | 5.00 | 60.40 | 5.32 | 133.50 | 76.00 | 8.03 | 5.29 | 36.29 | 11.84 |
| 97 | GS-183 | 52.00 | 20.54 | 4.50 | 70.45 | 5.16 | 127.50 | 53.00 | 7.82 | 5.47 | 35.49 | 12.51 |
| 98 | GS-194 | 62.00 | 19.61 | 4.50 | 71.07 | 5.35 | 132.00 | 43.00 | 7.91 | 5.57 | 38.37 | 12.61 |
| 99 | GS-204 | 63.00 | 22.37 | 4.50 | 63.58 | 5.06 | 137.50 | 51.00 | 7.57 | 5.80 | 38.37 | 12.37 |
| 100 | GS-206 | 59.00 | 23.29 | 5.00 | 67.85 | 4.74 | 143.00 | 23.00 | 7.71 | 5.72 | 39.34 | 9.88 |
| 101 | GS-219 | 54.50 | 22.16 | 4.50 | 62.92 | 4.74 | 141.00 | 81.50 | 7.93 | 4.85 | 38.45 | 9.68 |
| 102 | GS-280 | 53.50 | 24.50 | 4.00 | 70.91 | 4.61 | 137.50 | 41.00 | 8.03 | 5.22 | 32.91 | 9.66 |
| 103 | GS-337 | 50.00 | 19.16 | 3.50 | 70.39 | 5.03 | 133.50 | 49.00 | 7.43 | 5.30 | 38.29 | 10.48 |
| 104 | GS-401 | 49.50 | 23.57 | 4.00 | 66.85 | 5.11 | 136.00 | 98.50 | 7.99 | 4.88 | 38.71 | 10.61 |
| 105 | Gunawal Local | 53.00 | 20.70 | 3.50 | 63.89 | 5.41 | 130.00 | 33.00 | 7.75 | 5.76 | 41.79 | 11.66 |
| 106 | Gangroochi | 59.50 | 19.39 | 4.00 | 66.14 | 5.69 | 128.50 | 53.50 | 7.82 | 5.84 | 39.50 | 11.07 |
| 107 | H-8 | 61.00 | 22.14 | 3.50 | 66.65 | 5.39 | 133.50 | 79.00 | 7.55 | 5.31 | 39.15 | 11.74 |
| 108 | EC-384154 | 56.00 | 24.97 | 4.50 | 68.21 | 5.50 | 136.00 | 67.50 | 7.88 | 5.18 | 34.61 | 10.83 |
| 109 | H-11 | 60.00 | 23.13 | 4.00 | 69.98 | 5.03 | 137.00 | 61.50 | 8.23 | 5.52 | 31.89 | 10.80 |
| 110 | AYOGI | 61.50 | 24.43 | 4.50 | 67.18 | 4.93 | 128.50 | 42.50 | 7.66 | 5.81 | 33.30 | 10.69 |
| 111 | H-25 | 68.50 | 22.46 | 3.50 | 55.55 | 4.94 | 140.50 | 33.00 | 8.00 | 5.64 | 35.74 | 10.53 |
| 112 | Hyb-603-2 | 68.00 | 21.96 | 3.50 | 51.93 | 4.96 | 138.00 | 25.50 | 7.47 | 5.81 | 37.07 | 13.68 |
| 113 | Hanaman Sagar | 57.50 | 20.18 | 3.50 | 51.44 | 4.44 | 137.00 | 27.00 | 7.72 | 5.60 | 36.37 | 11.56 |
| 114 | IC/6387 | 49.50 | 24.98 | 3.50 | 59.71 | 5.17 | 126.50 | 24.50 | 7.96 | 5.97 | 38.34 | 12.02 |
| 115 | IC-15888 | 68.50 | 22.19 | 4.50 | 52.59 | 5.04 | 136.00 | 48.00 | 7.68 | 5.52 | 37.12 | 10.91 |
| 116 | ICI-14577 | 64.00 | 16.13 | 4.00 | 54.01 | 4.89 | 138.50 | 43.00 | 7.91 | 5.79 | 33.38 | 11.05 |
| 117 | ILS-150 | 54.50 | 20.00 | 3.50 | 52.30 | 5.00 | 133.50 | 41.00 | 8.15 | 5.79 | 36.32 | 10.57 |
| 118 | ILS-153 | 54.00 | 21.82 | 4.00 | 53.95 | 5.26 | 129.50 | 45.00 | 7.79 | 5.93 | 37.87 | 11.59 |
| 119 | Jabalpur-367 | 52.00 | 21.61 | 3.50 | 56.69 | 5.02 | 138.00 | 45.50 | 8.05 | 5.80 | 37.32 | 11.51 |
| 120 | KL-169 | 63.00 | 21.34 | 4.00 | 61.23 | 5.16 | 141.50 | 52.50 | 7.82 | 5.70 | 37.35 | 11.87 |
| 121 | Kanpur Local | 52.50 | 21.89 | 3.50 | 65.75 | 5.48 | 137.50 | 78.00 | 7.92 | 5.76 | 36.86 | 12.08 |
| 122 | Karam Banda | 67.00 | 22.78 | 4.50 | 67.21 | 5.17 | 140.50 | 57.50 | 7.71 | 5.23 | 37.82 | 11.15 |
| 123 | L-4 | 57.00 | 21.63 | 3.50 | 64.81 | 5.61 | 135.50 | 39.00 | 7.90 | 5.53 | 39.67 | 12.00 |
| 124 | L-14 | 52.00 | 18.83 | 3.50 | 66.27 | 5.40 | 130.50 | 51.00 | 7.94 | 5.52 | 39.13 | 11.76 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 125 | L-18 | 67.00 | 22.97 | 3.50 | 56.59 | 4.89 | 138.00 | 32.50 | 7.74 | 5.74 | 38.34 | 11.29 |
| 126 | L-21 | 49.50 | 22.88 | 3.50 | 59.92 | 5.27 | 135.00 | 37.50 | 7.76 | 5.32 | 37.55 | 9.56 |
| 127 | L-43 | 53.00 | 20.33 | 4.00 | 60.73 | 4.63 | 129.00 | 69.00 | 7.63 | 5.28 | 38.53 | 11.10 |
| 128 | L-48 | 55.50 | 23.77 | 4.50 | 62.02 | 4.95 | 137.50 | 75.00 | 7.78 | 5.18 | 39.15 | 11.01 |
| 129 | L-53 | 67.50 | 24.45 | 3.50 | 60.58 | 5.58 | 131.00 | 88.00 | 8.33 | 5.22 | 39.99 | 11.73 |
| 130 | L-108 | 49.50 | 23.00 | 4.50 | 62.21 | 5.93 | 130.50 | 96.50 | 8.11 | 4.94 | 39.05 | 12.36 |
| 131 | LC-1044 | 50.00 | 20.35 | 3.50 | 64.60 | 5.37 | 140.00 | 75.00 | 7.78 | 5.47 | 36.44 | 12.51 |
| 132 | LCK-152 | 48.50 | 24.35 | 3.00 | 72.28 | 5.76 | 137.50 | 78.50 | 7.67 | 5.21 | 37.76 | 11.82 |
| 133 | LCK-254 | 53.00 | 21.10 | 3.50 | 56.35 | 5.40 | 135.50 | 40.00 | 7.90 | 5.59 | 37.99 | 11.09 |
| 134 | LCK-3532 | 55.50 | 23.29 | 3.50 | 69.31 | 4.83 | 139.00 | 47.50 | 7.80 | 5.25 | 37.19 | 10.52 |
| 135 | LCK-87312 | 51.00 | 23.89 | 4.00 | 70.24 | 5.35 | 138.50 | 81.00 | 7.80 | 5.17 | 37.63 | 12.09 |
| 136 | LCK-88311 | 63.00 | 23.22 | 4.50 | 70.34 | 5.91 | 132.00 | 87.50 | 7.58 | 5.38 | 36.54 | 12.98 |
| 137 | LMH-379 | 68.50 | 21.09 | 4.50 | 70.13 | 5.12 | 138.00 | 79.00 | 8.04 | 5.15 | 36.11 | 11.10 |
| 138 | LS-1 | 65.00 | 18.73 | 4.00 | 57.81 | 6.40 | 138.00 | 47.50 | 8.17 | 5.12 | 35.09 | 11.55 |
| 139 | NO-3 | 53.00 | 21.90 | 4.50 | 63.19 | 5.22 | 140.50 | 53.50 | 7.83 | 5.63 | 39.10 | 12.26 |
| 140 | NO-11 | 53.00 | 22.80 | 3.50 | 65.19 | 5.21 | 138.50 | 83.50 | 7.81 | 5.66 | 37.39 | 13.06 |
| 141 | NO.18 x RR-9 | 59.50 | 23.94 | 4.00 | 61.58 | 5.47 | 135.00 | 86.00 | 7.82 | 5.20 | 37.59 | 12.44 |
| 142 | NO.55 | 50.50 | 22.79 | 3.00 | 68.96 | 5.74 | 134.00 | 72.00 | 7.89 | 5.87 | 34.26 | 13.31 |
| 143 | NO.335 | 50.00 | 22.53 | 4.50 | 54.30 | 5.21 | 133.50 | 37.50 | 7.64 | 5.76 | 36.30 | 12.33 |
| 144 | NO.356 | 53.00 | 22.92 | 3.50 | 67.40 | 5.34 | 129.00 | 67.50 | 7.87 | 5.65 | 39.45 | 13.33 |
| 145 | NP.8 | 57.00 | 22.87 | 4.00 | 65.26 | 5.67 | 139.50 | 66.50 | 7.75 | 5.61 | 37.27 | 11.83 |
| 146 | NP23K | 62.00 | 21.37 | 4.50 | 62.25 | 5.72 | 133.00 | 63.50 | 7.99 | 5.32 | 36.51 | 11.34 |
| 147 | NP.25RRSK | 66.00 | 25.96 | 3.50 | 67.44 | 5.24 | 132.00 | 71.50 | 7.52 | 5.16 | 39.94 | 11.01 |
| 148 | NP-48 | 64.00 | 20.20 | 4.00 | 66.12 | 5.16 | 139.50 | 77.00 | 8.29 | 5.60 | 36.59 | 10.62 |
| 149 | NP-59 | 56.00 | 22.71 | 4.00 | 61.49 | 6.08 | 137.50 | 80.00 | 8.05 | 5.51 | 39.46 | 11.41 |
| 150 | NP-88 | 52.00 | 19.95 | 4.00 | 57.54 | 5.93 | 134.50 | 78.50 | 7.79 | 4.87 | 37.40 | 10.40 |
| 151 | NP-89 | 58.00 | 20.00 | 4.50 | 75.47 | 5.61 | 128.00 | 102.50 | 7.88 | 4.76 | 37.19 | 11.23 |

**Table 3:** Range, General mean, S.E. Coefficient of variability for 11 characters in Linseed.

| Character | Range | | General mean | S.E. diff | C.V. % | Coefficient of variability | |
|---|---|---|---|---|---|---|---|
| | Min. | Max. | | | | GCV% | PCV% |
| Days to flowering | 47.50 | 69.50 | 57.96 | 2.09 | 5.10 | 9.97 | 11.20 |
| Size of corolla (mm) | 16.13 | 25.97 | 21.90 | 0.74 | 4.80 | 8.77 | 10.00 |
| Number of primary branches/Plant | 3.00 | 5.50 | 3.80 | 0.41 | 15.60 | 8.50 | 17.76 |
| Plant Height (cm) | 43.08 | 75.47 | 60.37 | 2.29 | 5.37 | 10.95 | 12.20 |
| Capsule size (mm) | 4.44 | 6.40 | 5.29 | 0.28 | 7.63 | 5.36 | 9.33 |
| Days to Maturity | 125.50 | 143.00 | 135.19 | 2.13 | 2.23 | 2.66 | 3.47 |
| Number of capsules/plant | 23.00 | 121.00 | 52.17 | 4.38 | 11.89 | 32.30 | 34.42 |
| Number of seeds/Capsule | 7.14 | 8.45 | 7.74 | 0.13 | 2.52 | 2.19 | 3.34 |
| 1000-Seed weight (g) | 4.51 | 6.11 | 5.49 | 0.12 | 3.15 | 4.55 | 5.54 |
| Oil content (%) | 31.09 | 41.79 | 36.71 | 1.03 | 3.98 | 4.90 | 6.31 |
| Seed yield/plant (g) | 9.56 | 13.68 | 11.55 | 0.41 | 5.13 | 7.00 | 8.68 |

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