Original Research Article

Genetic variability studies in yellow seeded linseed

ABSTRACT:-

Forty yellow-seeded linseeds were used in a Randomized Complete Block Design experiment with three replications. Analysis of variance indicates that "significant differences exist for all the parameters investigated from genotypes of yellow-seeded linseed." It shows that there is enough variation in seed output and contributing traits among the yellow-seeded genotypes of linseed.In the YLS-31 and YLS-23 genotypes, the highest weights were SW (7.7g) and SY (15g). SB had the highest GCV (39.5%), followed by HI (21.6%), SY (32.1%), and PB (24.3%).PB had the greatest PCV (47%) of any area. The next most significant variables were HI(22.8%), C(33.9%), SW(37.9%), and SB (43.2%). "The most heritable groups were SW (96.7%), HI (89.6%), PH (88%), C (88.5%), DTF (50%)(88.1%), OC (86.6%), SB (83.6%), and SY (71.6%). The groups with the highest mean genetic progress percentage were SB (74.5%), C (61.9%), SY (56%), HI (42.2%), SW (34.1%), PH (27.1%), and PB (26%). The most heritable group was TH (93.8%), while TH (7.5%) had the most genetic advance, with PH (7%), following closely behind. This indicates that certain traits are influenced by additive gene activity and that improving these traits will benefit selection.

Keywords:-

Additive gene, Harvest Index, Heritable, Replications.

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INTRODUCTION:-

Linseed (*Linum usitatissimum* 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 globuler 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 tonnes 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 (*Linumusitatissimum*L.).**
2. **Estimation of Heritability and Genetic Advance in yellow seeded linseed (*Linum usitatissimum*L.).**

MATERIALS AND METHODS-

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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.

List 1 : 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 :

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The main objective to study the variation present among the yellow seeded linseed. For that, an experiment was conducted in Randomized Complete Block Design with 3 replications in 40 yellow seeded linseedThere were 40 yellow seeded linseed genotypes as well as checks (Surabhi©)The experiment was set up at RCBD with three replications.

Observations for numerous agro-morphological features were conducted based on the linseed descriptor were PH(cm), DTF(50%), DTM, PB, SB,C, SW(g), OC(%), HI(%), SY(g)

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 Secondary Branches (39.5%) followed by Seed Yield (32.1%), HI(21.6%), and Primary Branches(24.3%). The highest PCV was found in the Primary Branches (47%). Secondary Branches (43.2%), Seed Weight (37.9%), No of Capsules (33.9%) and Harvest Index(22.8%) were the next most important factors.

TABLE- .1

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										

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**

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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**

Results of genetic variability revealed that under study for all the traits phenotypic coefficient of variation was higher than genotypic coefficient of variation which indicates that environment having masking effect on the expression of genetic variability (Table 2). This range of variation was found for all the traits indicated enough scope to study considerable range of variation was reported for all the traits. The evaluation of PCV and GCV were categorized as high (>20%), moderate (10-20%) and low (<10%) according to Sivasubramanian and Madhavamenon (1973).

The highest magnitude of genotypic coefficient of variation was noticed for number of secondary branches per plant (39.5%) which is followed by seed yield (32.1%) harvest index (21.6%) and number of primary branches per plant (24.3%).

The moderate magnitude for plant height (14.06%) which is followed by 1000 seed weight (16.8%), total number of branches per plant (14.4%) and seed yield per plant (10.7%).

The low magnitude of genotypic coefficient of variation was noticed in Days to 50%flowering (8.6%) followed by oil content (8.1%), days to maturity (3.7%).

The highest magnitude of phenotypic coefficient of variation was noticed for number of primary branches per plant (47%) followed by number of secondary branches per plant (43.2%), seed yield (37.9%) ,number of capsules per plant (33.9%) and harvest index (22.8%).

Fig-1.(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.):-

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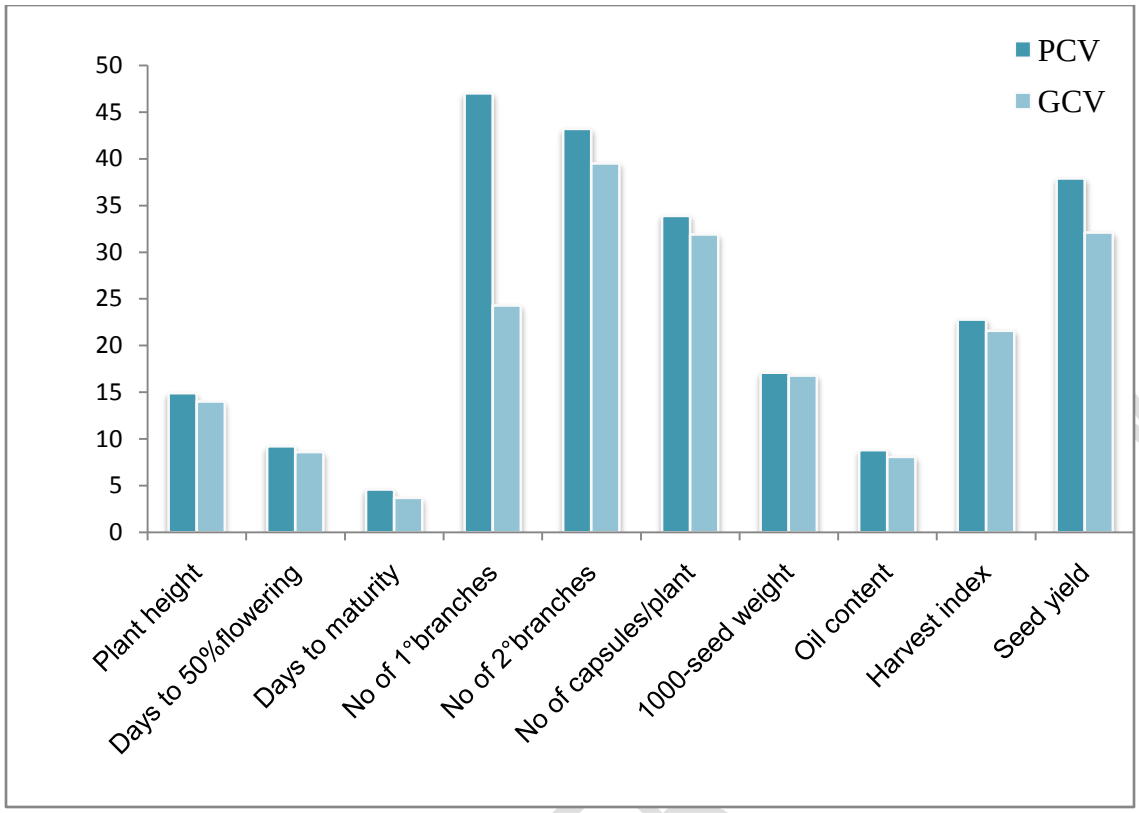

Table-2

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

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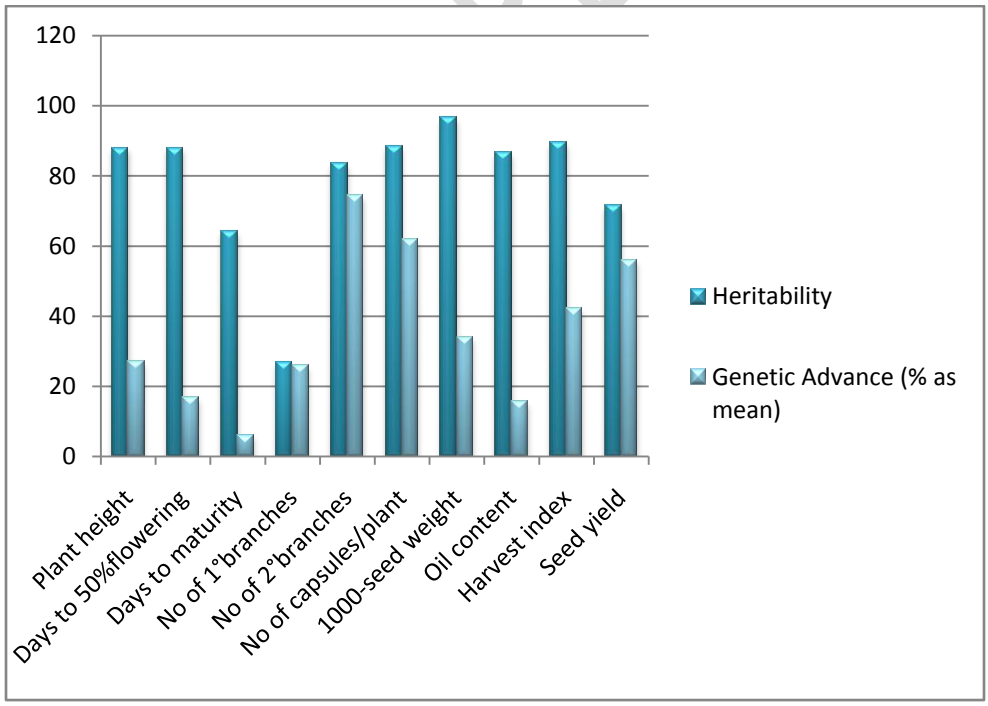
4	No. of 1°branches/plant	6.1	11.8	2.2	4.0	47.0	24.3	26.8	1.6	26.0
5	No. of 2°branches/plant	18.4	29.0	4.0	7.2	43.2	39.5	83.6	13.7	74.5
6	No. of capsules/plant	50.4	92.6	16.0	8.3	33.9	31.9	88.5	31.0	61.9
7	1000 - seed weight(g)	6.1	7.71	4.0	0.3	17.1	16.8	96.7	2.0	34.1
8	Oil content (%)	35.6	41.9	31.1	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-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



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