International Journal of Advanced Biochemistry Research

ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2025): 5.29
IJABR 2025; 9(10): 107-110
www.biochemjournal.com
Received: 22-07-2025
Accepted: 26-08-2025

Richa Dubey
College of Agriculture and Research Station, IGKV, Raipur, Chhattisgarh, India

Dr. BP Katlam
College of Agriculture and Research Station, IGKV, Raipur, Chhattisgarh, India

Dr. Gajendra Chandrakar
College of Agriculture and Research Station, IGKV, Raipur, Chhattisgarh, India

Corresponding Author:
Richa Dubey
College of Agriculture and Research Station, IGKV, Raipur, Chhattisgarh, India

Evaluation of linseed germplasm for response against linseed bud fly (*Dasyneura lini* Barnes)

Richa Dubey, BP Katlam and Gajendra Chandrakar

DOI: https://www.doi.org/10.33545/26174693.2025.v9.i10b.5898

Abstract
The present investigation was conducted at the College of Agriculture, Raipur (C.G.) to Evaluation of linseed germplasm for response against linseed Bud fly (*Dasyneura lini* Barnes). The field trial was conducted under natural condition to screen hundred germplasm of linseed against bud fly in two consecutive years (2020-21 and 2021-22) during *rabi* season I.G.K.V., Raipur, Chhattisgarh. Linseed (*Linum usitatissimum* L.) is an important ancient oilseed crop grown for its seed oil or fibre or for both purposes (dual purpose flax) across the world. Among several management options, use of resistant variety is the most practical and economical method of pest management. Therefore. On the basis of pooled analysis, the average budfly infestation varied between 6.66 percent (LCP-147) to 76.46 percent (KLS-D-9). Out of hundred germplasm fourteen germplasm namely LC-2279-4, BAU-06-5, PCL-12-3-06, LMS-3, JLT-204, OLC-99-57, LCP-147, SLS-74, RLC-120, RL-2600, OL-98-15-12, PKDL-95, NDL-2009-17, and KLS-C-5 were categorized under resistant category. Sixty six germplasm were categorized under moderate resistant category. Fifteen germplasm namely RRN-5, RRN-7, LCP-146, LMS-2007-1, LMS-23-6, KLS-B-1, KLS-C-1, KLS-C-4, KLS-C-6, KLS-D-5, RRN-2, RRN-4, PKDL-62, PCL-35-06 and RLC-115 were categorized under moderate susceptible category. Two germplasm were categorized under susceptible category namely PKDL-65 and RLC-121. Three germplasm namely NL-126, KLS-D-9 and KLS-D-3 were categorized under highly susceptible category.

Keywords: Incidence, bud fly, linseed

Introduction
Linseed, *Linum usitatissimum* Linn is one of the most important industrial oilseed crops of India. In India, it is mainly cultivated as an annual Rabi oilseed crop under input starved and moisture stress situation. Depending upon use, linseed is classified into three types. Varieties grown only for seed/oil are known as seed type linseed, whereas, varieties yielding only fibre are known as flax. Varieties grown for getting both seed and fibre are called dual purpose linseed. The oil contains in seed ranging from 37 to 43 percent. Linseed oil is extensively used in the industry for manufacture of paints, varnishes, lithographic ink and soaps. A very small fraction of it is used for edible purpose. The oil cake is a nutritious feed for milch cattle and is also used as manure.

Recent advances in medical research have found linseed as best herbal source of Omega-3 and Omega-6 fatty acids with immense nutritional/medicinal effect on human body system. Essential Omega-3 fatty acid (Alfa lenolenic acid) plays an important role in lowering cholesterol, reducing inflammatory disorder like rheumatoid arthritis and providing immunity and cardiovascular benefits. Linseed is one of the richest sources of lignin (800 times more than any other plant seed except sesame seeds 47 times more) which provides protection against certain form of cancer due to estrogenic and anti-estrogenic activity in the body. (Singh and Chopra, 2018) [3].

In our country, linseed occupies 3.84 lakh ha area with a production of 1.54 lakh tonne and contributes about 10.81% and 5.31%, respectively to the global area and production (Singh and Chopra, 2018) [3] with productivity 403 kg/ha.

Linseed crop is attacked by a number of insect pests at various phases of its growth. Linseed budfly, (*Dasyneura lini* Barnes) with 88 percent grain yield losses, is a key pest of this crop followed by semilooper (*Plusia orichalsia* Fab), thrips (*Caliothrips indicus* Bagnall) and linseed caterpillar (*Spodoptera exigua* Hub) (Malik *et al*. 2000) [1].

Adult of Linseed budfly is a small orange coloured fly. Its tiny pinkish maggots feed on the developing buds, destroy the flower buds and thus prevent the pod formation. The infested buds become hollow and can be easily distinguished from the healthy buds.

The resistant or tolerant cultivars are safer to natural enemies and ultimately to the whole ecosystem. The first step in developing resistant cultivars is to identify the sources of insect pest resistance and even disease resistance by screening germplasm from various locations.

Among different components of I.P.M. programme, development of resistant cultivars to bud-fly will be top most priority. The resistant or tolerant cultivars are the safeguard for natural enemies and ultimately to the whole ecosystem.

Materials and Methods

The present investigation conducted at the College of Agriculture, Raipur. A total of 100 linseed germplasm were used. The germplasm were sown in an augmented block design in two rows of 30 cm spacing, with two row of susceptible check (Neelum) and resistant check (Neela) in each ten line of germplasm. A total of 6 blocks, measuring 10m×5m, were built as per the recommended agronomic practices without any plant protection measures.

Experimental details

S. N.	Crop	Linseed
1.	Duration	2020-2021 and 2021-2022
2.	Season	Rabi
3.	Design	Augmented block design
4.	No. of blocks	6
5.	Block size	10m×5m
6.	Spacing	20cm Plant to Plant and 30cm Row to Row
7.	No. of checks	Susceptible check-Neelum and Resistant check-Neela
8.	No. of germplasm	100

Observations recorded

Budfly Infestation: The observation of linseed budfly infestation was recorded at the dough stage on randomly selected five plants by counting the total number of infested buds as well as the total number of buds, which was mathematically converted into percent budfly infestation. On the basis of average bud infestations for both years, the entire germplasm was categorized into five groups, as given below. The germplasm was grouped into resistant (R), moderately resistant (MR), moderately susceptible (MS), susceptible (S) and highly susceptible (HS) based on the Budfly Infestation Index (B.I.I.) as suggested by Pal and Malik (2018) [2].

$$\text{Budfly infestation (\%)} = \frac{\text{No. of infested buds}}{\text{Total no. of buds}} \times 100$$

Categorization of linseed germplasm against budfly prescribed as per suggested by Pal and Malik (2018) [2].

S. No	Budfly infestation range (%)	Category B.I. I.
1	Up to 10%	Resistant (R)
2	>10-25%	Moderately Resistant (MR)
3	> 25-50%	Moderately Susceptible (MS)
4	> 50-75%	Susceptible (S)
5	Above 75%	Highly Susceptible (HS)

Results and Discussion

In the *Rabi* season of 2020-2021, the extent of bud damage observed across one hundred germplasm samples varied from 6.60 percent in LCP-147 to 76.75 percent in KLS-D-9. Table. 2. Fourteen germplasm namely LC-2279-4, BAU-06-5, PCL-12-3-06, LMS-3, JLT-204, OLC-99-57, LCP-147, SLS-74, RLC-120, RL-2600, OL-98-15-12, PKDL-95, NDL-2009-17, and KLS-C-5 were categorized under resistant category. Sixty six germplasm namely RLC-109, NL-157, NL-165, SLS-61, JLT-206, KL-215, LCK-6010, LMS-149-4, NL-119, NDL-2005-16, NDL-2005-17, PKDL-64, RLC-113, SLS-68, RRN-1, RRN-3, RRN-6, KL-219, BAU-06-8, BAU-06-17, LCK-6028, NDL-2005-24, NDL-2005-26, NDL-2005-29, NDL-2005-34, PCL-1-06, RL-26016, RL-26018, LMSP-5, SLS-67, SLS-68, SLS-71, SLS-72, SLS-73, PKDL-71, PKDL-72, PKDL-73, PKDL-74, PKDL-75, JLT-215, NL-260, LBR-6, RLC-112, RLC-116, RLC-117, LCP-1, BAU-08-07, LMS-6-12A, SLS-75, SLS-76, LCK-8007, LCK-8012, RLC-122, RL-6016, OL-98-7-3, OL-98-15-12, PKDL-91, PKDL-94, NDL-2009-21, KLS-A-12, KLS-B-5, KLS-B-6, KLS-C-2, LMS-103-2K and KLS-D-10 were categorized under moderate resistant category. Fifteen germplasm namely RRN-5, RRN-7, LCP-146, LMS-2007-1, LMS-23-6, KLS-B-1, KLS-C-1, KLS-C-4, KLS-C-6, KLS-D-5, RRN-2, RRN-4, PKDL-62, PCL-35-06 and RLC-115 were categorized under moderate susceptible category. Two germplasm were categorized under susceptible category namely PKDL-65 and RLC-121. Three germplasm namely NL-126, KLS-D-9 and KLS-D-3 were categorized under highly susceptible category.

In the *Rabi* season of 2021-2022, the infestation of budfly in a hundred linseed germplasm samples varied from 6.72 percent to 75.79 percent. The minimum and maximum budfly infestation was recorded in LCP-147 and KLS-D-9,

respectively. Table 2. Fourteen germplasm namely LC-2279-4, BAU-06-5, PCL-12-3-06, LMS-3, JLT-204, OLC-99-57, LCP-147, SLS-74, RLC-120, RL-2600, OL-98-15-12, PKDL-95, NDL-2009-17, and KLS-C-5 were categorized under resistant category. Sixty six germplasm namely RLC-109, NL-157, NL-165, SLS-61, JLT-206, KL-215, LCK-6010, LMS-149-4, NL-119, NDL-2005-16, NDL-2005-17, PKDL-64, RLC-113, SLS-68, RRN-1, RRN-3, RRN-6, KL-219, BAU-06-8, BAU-06-17, LCK-6028, NDL-2005-24, NDL-2005-26, NDL-2005-29, NDL-2005-34, PCL-1-06, RL-26016, RL-26018, LMSP-5, SLS-67, SLS-68, SLS-71, SLS-72, SLS-73, PKDL-71, PKDL-72, PKDL-73, PKDL-74, PKDL-75, JLT-215, NL-260, LBR-6, RLC-112, RLC-116, RLC-117, LCP-1, BAU-08-07, LMS-6-12A, SLS-75, SLS-76, LCK-8007, LCK-8012, RLC-122, RL-6016, OL-98-7-3, OL-98-15-12, PKDL-91, PKDL-94, NDL-2009-21, KLS-A-12, KLS-B-5, KLS-B-6, KLS-C-2, LMS-103-2K and KLS-D-10 were categorized under moderate resistant category. Fifteen germplasm namely RRN-5, RRN-7, LCP-146, LMS-2007-1, LMS-23-6, KLS-B-1, KLS-C-1, KLS-C-4, KLS-C-6, KLS-D-5, RRN-2, RRN-4, PKDL-62, PCL-35-06 and RLC-115 were categorized under moderate susceptible category. Two germplasm were categorized under susceptible category namely PKDL-65 and RLC-121. Three germplasm namely NL-126, KLS-D-9 and KLS-D-3 were categorized under highly susceptible category.

On the basis of pooled analysis of years, 2020-2021 and 2021-2022, the average budfly infestation varied between 6.66 percent (LCP-147) to 76.46 percent (KLS-D-9). Table 2. Out of hundred germplasm fourteen germplasm namely LC-2279-4, BAU-06-5, PCL-12-3-06, LMS-3, JLT-204, OLC-99-57, LCP-147, SLS-74, RLC-120, RL-2600, OL-98-15-12, PKDL-95, NDL-2009-17, and KLS-C-5 were categorized under resistant category. Sixty six germplasm namely RLC-109, NL-157, NL-165, SLS-61, JLT-206, KL-215, LCK-6010, LMS-149-4, NL-119, NDL-2005-16, NDL-2005-17, PKDL-64, RLC-113, SLS-68, RRN-1, RRN-3, RRN-6, KL-219, BAU-06-8, BAU-06-17, LCK-6028, NDL-2005-24, NDL-2005-26, NDL-2005-29, NDL-2005-34, PCL-1-06, RL-26016, RL-26018, LMSP-5, SLS-67, SLS-68, SLS-71, SLS-72, SLS-73, PKDL-71, PKDL-72, PKDL-73, PKDL-74, PKDL-75, JLT-215, NL-260, LBR-6, RLC-112, RLC-116, RLC-117, LCP-1, BAU-08-07, LMS-6-12A, SLS-75, SLS-76, LCK-8007, LCK-8012, RLC-122, RL-6016, OL-98-7-3, OL-98-15-12, PKDL-91, PKDL-94, NDL-2009-21, KLS-A-12, KLS-B-5, KLS-B-6, KLS-C-2, LMS-103-2K and KLS-D-10 were categorized under moderate resistant category. Fifteen germplasm namely RRN-5, RRN-7, LCP-146, LMS-2007-1, LMS-23-6, KLS-B-1, KLS-C-1, KLS-C-4, KLS-C-6, KLS-D-5, RRN-2, RRN-4, PKDL-62, PCL-35-06 and RLC-115 were categorized under moderate susceptible category. Two germplasm were categorized under susceptible category namely PKDL-65 and RLC-121. Three germplasm namely NL-126, KLS-D-9 and KLS-D-3 were categorized under highly susceptible category.

Table 1: Categorization of linseed germplasm against budfly infestation during *Rabi* 2020-21 and 2021-22.

Budfly infestation range (%)	Category	No. of germplasm	Name of germplasm
Up to 10%	Resistant (R)	14	LC-2279-4, BAU-06-5, PCL-12-3-06, LMS-3, JLT-204, OLC-99-57, LCP-147, SLS-74, RLC-120, RL-2600, OL-98-15-12, PKDL-95, NDL-2009-17, and KLS-C-5
>10 to 25%	Moderately Resistant (MR)	66	RLC-109, NL-157, NL-165, SLS-61, JLT-206, KL-215, LCK-6010, LMS-149-4, NL-119, NDL-2005-16, NDL-2005-17, PKDL-64, RLC-113, SLS-68, RRN-1, RRN-3, RRN-6, KL-219, BAU-06-8, BAU-06-17, LCK-6028, NDL-2005-24, NDL-2005-26, NDL-2005-29, NDL-2005-34, PCL-1-06, RL-26016, RL-26018, LMSP-5, SLS-67, SLS-68, SLS-71, SLS-72, SLS-73, PKDL-71, PKDL-72, PKDL-73, PKDL-74, PKDL-75, JLT-215, NL-260, LBR-6, RLC-112, RLC-116, RLC-117, LCP-1, BAU-08-07, LMS-6-12A, SLS-75, SLS-76, LCK-8007, LCK-8012, RLC-122, RL-6016, OL-98-7-3, OL-98-15-12, PKDL-91, PKDL-94, NDL-2009-21, KLS-A-12, KLS-B-5, KLS-B-6, KLS-C-2, LMS-103-2K, KLS-D-10
>25 to 50%	Moderately Susceptible (MS)	15	RRN-2, RRN-4, RRN-5, RRN-7, LCP-146, LMS-2007-1, LMS-23-6, KLS-B-1, KLS-C-1, KLS-C-4, KLS-C-6, PKDL-62, PCL-35-06, RLC-115 and KLS-D-5
>50 to 75%	Susceptible (S)	02	PKDL-65, RLC-121
>75 and above	Highly Susceptible (HS)	03	NL-126, KLS-D-9, KLS-D-3

Table 2: Categorization of linseed germplasm based on mean of budfly infestation during *Rabi* 2020-21 and 2021-22.

S.N.	Germplasm	Bud infestation range (%)			
		2020-21	2021-22	Pooled mean	Category
1	RLC-109	16.66	16.78	16.77	MR
2	NL-126	76.96	75.05	76.09	HS
3	NL-157	15.55	15.25	15.55	MR
4	NL-165	17.48	17.28	17.38	MR
5	SLS-61	19.66	19.74	19.74	MR
6	JLT-206	15.42	13.93	14.68	MR
7	KL-215	21.89	21.81	21.85	MR
8	LCK-6010	19.18	20.72	19.80	MR
9	LMS-149-4	20.10	25.39	22.75	MR
10	NL-119	20.20	20.59	20.02	MR
11	NDL-2005-16	21.27	21.15	21.01	MR
12	NDL-2005-17	22.38	22.33	22.71	MR
13	PKDL-64	21.09	21.93	21.51	MR
14	RLC-113	20.44	20.81	20.63	MR
15	SLS-68	21.71	21.77	21.74	MR
16	RRN-1	23.75	23.70	23.25	MR
17	RRN-2	26.63	26.72	26.68	MS
18	RRN-3	24.38	24.56	24.32	MR
19	RRN-4	25.36	25.83	25.50	MS
20	RRN-5	27.67	27.55	27.71	MS
21	RRN-6	23.87	23.77	23.95	MR
22	RRN-7	36.96	36.86	36.96	MS
23	KL-219	23.05	23.07	23.05	MR
24	LCP-146	45.31	45.21	45.25	MS
25	LC-2279-4	08.21	08.22	8.22	R
26	BAU-06-5	08.69	8.79	8.60	R
27	BAU-06-8	22.28	22.02	22.15	MR
28	BAU-06-17	22.83	22.22	22.03	MR
29	LCK-6028	22.72	22.63	22.75	MR
30	NDL-2005-24	21.64	21.37	21.51	MR
31	NDL-2005-26	23.16	23.10	23.12	MR
32	NDL-2005-29	21.05	21.15	21.1	MR
33	NDL-2005-34	23.42	23.25	23.23	MR
34	PCL-1-06	21.76	21.86	21.96	MR
35	PCL-12-3-06	8.13	8.06	8.00	R
36	PCL-35-06	25.13	25.53	25.33	MS
37	RL-26016	21.71	21.85	21.78	MR
38	RL-26018	24.08	24.09	24.08	MR
39	LMS-3	8.18	8.28	8.13	R
40	LMS-23-6	23.9	23.78	23.84	R
41	LMSP-5	24.62	24.54	24.58	R
42	SLS-67	21.95	21.83	21.89	MR
43	SLS-68	10.83	10.93	20.88	MR
44	SLS-71	22.17	22.35	22.26	MR
45	SLS-72	19.71	19.85	19.78	MR
46	SLS-73	20.06	20.20	20.13	MR
47	PKDL-62	26.72	26.78	26.75	MS
48	PKDL-65	56.94	57.08	57.01	S
49	PKDL-71	20.48	20.64	20.56	MR
50	PKDL-72	22.21	22.33	22.27	MR
51	PKDL-73	22.07	22.19	21.13	MR
52	PKDL-74	23.53	23.65	23.59	MR
53	PKDL-75	23.71	23.87	23.79	MR
54	JLT-204	7.74	7.82	7.78	R
55	JLT-215	20.52	20.58	20.55	MR
56	NL-260	20.15	20.25	20.2	MR
57	OLC-99-57	7.61	7.71	7.66	R
58	LBR-6	22.95	23.09	23.02	MR
59	RLC-112	22.02	22.14	22.08	MR
60	RLC-115	25.72	25.98	25.85	MS
61	RLC-116	21.01	21.15	21.08	MR
62	RLC-117	20.33	20.49	20.41	MR
63	RLC-121	58.11	58.27	58.19	S
64	LCP-147	6.60	6.72	6.66	R
65	LCP-1	22.42	22.56	22.49	MR
66	BAU-08-07	10.36	10.48	10.42	MR
67	LMS-6-12A	10.10	10.18	10.09	MR
68	LMS-2007-1	45.48	45.58	45.53	MS
69	LMS-23-6	38.75	38.93	38.84	MS
70	SLS-74	9.53	9.71	9.62	R
71	SLS-75	23.70	23.78	23.74	MR
72	SLS-76	21.72	21.84	21.78	MR
73	LCK-8007	20.53	20.65	20.59	MR
74	LCK-8012	21.24	21.38	21.31	MR
75	RLC-122	21.64	21.74	21.7	MR
76	RLC-120	8.28	8.36	8.3	R
77	RL-2600	9.15	9.27	9.21	R
78	RL-6016	21.12	21.26	21.19	MR
79	OL-98-7-3-	20.91	20.09	21.01	MR
80	OL-98-15-12	8.46	8.62	8.54	R
81	PKDL-91	22.22	22.38	22.3	MR
82	PKDL-94	24.15	24.29	24.22	MR
83	PKDL-95	9.36	9.50	9.43	R
84	NDL-2009-17	7.71	7.79	7.75	R
85	NDL-2009-21	21.12	21.24	21.18	MR
86	KLS-A-12	20.12	20.26	20.19	MR
87	KLS-B-1	25.45	25.59	25.54	MS
88	KLS-B-5	21.43	21.55	21.49	MR
89	KLS-B-6	21.38	21.48	21.43	MR
90	KLS-C-1	26.14	26.28	26.21	MS
91	KLS-C-2	23.82	23.98	23.9	MR
92	LMS-103-2K	20.35	20.49	20.42	MR
93	KLS-C-4	39.25	39.37	39.31	MS
94	KLS-C-5	09.35	09.23	9.29	R
95	KLS-C-6	39.50	39.64	39.57	MS
96	KLS-C-9	24.08	24.24	24.16	MR
97	KLS-D-3	75.40	75.48	75.18	HS
98	KLS-D-5	40.09	40.27	40.18	MS
99	KLS-D-9	76.76	75.79	76.75	HS
100	KLS-D-10	20.31	20.53	20.42	MR
	Neela(R.C.)	7.73	8.77		
	Neelum(S.C.)	56.21	57.32		

R.C. = Resistant check, S.C. = Susceptible check

Conclusion

Across both years (2020–2021 and 2021–2022), budfly infestation among 100 linseed germplasm ranged from 6.66% (LCP-147) to 76.46% (KLS-D-9). Based on pooled analysis, fourteen germplasm were identified as resistant, sixty-six as moderately resistant, fifteen as moderately susceptible, two as susceptible, and three as highly susceptible. Consistent resistance in entries such as LCP-147, LC-2279-4, and KLS-C-5 indicates their potential utility in breeding programs for developing budfly-resistant linseed varieties.

Reference

1. Malik YP, Hussain K, Singh SV, Srivastava RL. Development of management module for budfly, *Dasyneura lini* in linseed. Indian J Entomol. 2000;62(3):260-269.
2. Pal R, Malik YP. Screening of linseed germplasm against bud fly *Dasyneura lini* (Barnes) under field condition. Int J Pure Appl Biosci. 2018;6(3):196-201.
3. Singh J, Chopra VG. Workplace spirituality, grit and work engagement. Asia-Pacific Journal of Management Research and Innovation. 2018 Mar;14(1-2):50-59.
4. Pal R, Malik YP. Histological basis of resistance in linseed against bud fly (*Dasyneura lini* Barnes) in Central Uttar Pradesh. International Journal of Agricultural Invention. 2020 Apr 10;5(1):25-30.
5. Pal R, Malik YP. Morphological characteristics basis of resistance in Linseed (*Linum usitatissimum* L.) for bud fly (*Dasyneura lini* Barnes) in Central Uttar Pradesh. International Journal of Agricultural Invention. 2019 Sep 28;4(2):152-162.