Bud structure of linseed (*Linum usitatissimum* L.) in relation to incidence of bud fly (*Dasyneura lini* Barnes) in Central Uttar Pradesh

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**ABSTRACT**

A field experiment conducted for screened 288 elite gen pool of linseed against bud fly infestation at Kanpur, India during *rabi* 2012-13 to study the bud structure of resistance of linseed against bud fly. The results indicated that the bud length and width showed significant positive correlation coefficient relationship (r=0.1559 and 0.0761) bud infestation. The resistant germplasm line minimum (GS-234) minimum bud length and width (7.93 ×3.26 mm) had relative minimum bud infestation (6.88%) and was statically at par other resistant germplasm lines viz. A-95B, CI-1385, EC-1392, EC-1424, GS-234, IC-15888 and JRF-5. While susceptible germplasm line (Arny) exhibited maximum bud length and width (8.25 ×3.23 mm) maximum bud infestation (65.11%) which was statically at par with other susceptible lines viz. Ajgan-3-1, Ajgan-20M, Alipur (Hamirpur), Anand, GS-148, GS-440, Gunawal Local, NP(RR)193, RAULD-7810, RLC-28(PM), MS-14, SJKO-2, SJKO-45.

**KEYWORDS**

Linseed, Bud Length, Bud Width, Sepal Thickness, *Dasyneura lini*, Bud Fly Infestation, Germplasm, Resistance

Linseed/ Flaxseed (*Linum usitatissimum* L.) is being grown since the beginning of civilization and people all over the world have realized its usefulness throughout the ages. The crop has been cultivated for fiber and its seed containing 33-47 % oil content. World over, linseed is an important crop grown over 27.29 lakh ha with production of 25.2 lakh tons with average productivity of 923 kg/ ha, while national production of 1.525 lakh tons is from 3.226 lakh ha with low productivity of 473 kg/ha. However, the remarkable increase in productivity of Rajasthan (1066 kg/ha), Bihar (865 kg/ha) and Nagaland (807 kg/ha) is almost surpassing the productivity of Asia being 524 kg/ha (AICRP, 2013). More than 36 insect-pests are associated with linseed/ flaxseed throughout the world, but only a small number of the major cosmopolitan insect-pests cause economic yield loss to this crop (Malik, 1998). However, yield losses due to bud fly (*D. lini*) have been reported ranging between 17-49% with an average of 40 % at national level (Malik, 2006). Such heavy losses in seed yield due to bud fly incidence can be reduced upto some extent by manipulations in agronomic practices (Singh et al., 1991, Malik et al., 1996, Malik et al., 1999, Malik et al., 2000, Malik et al., 2008) but the successful management of this pest by the use of systemic insecticides is quite easy, encouraging and cost effective especially in late sown crop (Jahkmo et al., 1973, Sood and Pathak, 1984, Malik, 1998, Malik et al., 2012).
The resistant varieties are one of the fundamental, widely accepted and eco-friendly tools of integrated pest management (IPM) according to (Painter, 1951, Panda and Khush, 1995). Each plant species possessed unique defense mechanism involving various histological traits which have deep effect on the reproduction and survival of insect pests on a plant species. Therefore, present study was undertaken for various detailed studies to pinpoint the resistance mechanism involved in resistant lines with bud structure basis. These resistant or tolerant lines may prove safer to natural enemies and ultimately to the whole ecosystem.

Materials and Methods

A set of 288 elite germplasm of linseed was obtained from Project Coordinating and Germplasm Management Unit (Linseed) of this university and evaluated for elite germplasm of linseed was sown paired rows of test entries of 3 m length at 30 cm row distance their reaction to bud fly (D. lini) under natural field conditions were carried out at Oilseed Research Farm Kalyanpur, C. S. A. University of Agriculture and Technology, Kanpur during rabi 2012-13. This trial was executed in Augmented Block Design consisting 18 blocks of 16 test entries in each block. Two checks i.e. Neela (Resistant check) and Neelum (SC) were also planted in each block. The crop was sown in the mid of November. The length and width of flower bud were measured by digital instruments.

The bud infestation (%) was observed at green bud stage on twenty five buds and the maggot populations were counted. The bud fly infestation was recorded at dough stage on five plants per entry by counting total number of floral buds as well as bud fly infested buds, which was statistically converted into per cent bud infestation. The germplasm were grouped into resistant, moderately resistant, moderately susceptible, susceptible and highly susceptible on the basis of Bud fly Infestation Index (B.I.I.) as suggested by (Malik, 2005).

Results and Discussion

The shape of flower buds of different genotypes of linseed was found having different dimensions. The length of the buds varied from 6.22 mm (A-449) to 9.52 mm (EC-1424), whereas the width ranged between 2.00 mm (EC-312953) to 4.60 mm (EC-399582).

Flower buds depending upon their length and width were categorized into three groups i.e. (i) Buds having <7.5 mm length with <3.00 mm width, (ii) Buds with >7.5-8.5 mm length and >3.00-4.00 mm width, and (iii) buds having >8.5 mm length and >4.00 mm width, which were designated as slender, normal and thick flower buds.


The thick flower buds (>8.5 mm length and >4.00 mm width) were measured on 3/1, 5/47-2-1-10/10, 12×15, 333-6, A-4-3-1-13, A-12-1-2, A-95, A-95B, A-100, BR-5, BS-1, BS-30, C-5-82, CC-1-2, EC-1917, EC-99080, L-40, and SJKO-43 genotype of linseed during 2012-13. A total number of 16, 118 and 18 genotypes of linseed were grouped into slender, normal and thick flower buds bearing lines, respectively. As far as the bud shape is concerned, the parent studies revealed that the longer flower buds (6.20 to 9.52 mm) were measured with more width (2.00 to 4.60).

These type of flower buds conceived higher number of maggots of bud fly by providing them sufficient space. Katiyar et al. (1992) revealed that the increased bud structure (length and width) was favorable for maggots population and extent of buds damage (%) at green bud stage. Katiyar et al. (1984) reported that variety R-552 was having minimum (16.7%) infestation while, LMH-235 received maximum (76.7%) infestation at green bud stage.
Fig 1. Bud length and bud fly infestation linseed germplasm during 2012-13

Fig 2. Bud width and bud fly infestation linseed germplasm during 2012-13

Genotypes like Jabalpur-1986, 333-6, A-44, EC-1424, EC-99090, EC-41618, IC-15888 and RL-2600 were having 7.98 to 9.52 mm length and 3.42 to 4.08 mm width, which showed thicker sepal measuring 0.30 to 0.48 mm. This character of flower buds was found as desirable traits, as such germplasm lines were least infested by the bud fly. It is worth explaining that the resistant genotypes viz, A-95B, Cl-1385, EC-1392, EC-1424, GS-234, IC-15888, JRF-4 and JRF-5 exhibited up to 10% bud infestation due to bud fly *D. lini* were having shorter flowering period (12.94 to 18.44 days) with 6.46 to 9.52 mm bud length and 2.66 to 4.08 mm bud width. The flower buds of these entries consisted thinner sepals showing 0.35 to 0.49 mm thickness.

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Summary and Conclusion

Two hundred eighty and eight germplasm/ varieties of linseed genotypes during 2012-13 were screened on the basis bud structure against bud fly infestation. As far as the bud shape is concerned, the parent studies revealed that the longer flower buds (6.20 to 9.52 mm) were measured with more width (2.00 to 4.60). These type of flower buds conceited higher number of maggots of bud fly by providing...
them sufficient space. The increased bud structure (length and width) suffered maximum bud infestation as compared to those small bud structures. So increased bud structure (length and width) was favorable for maggots population and extent of buds damage (%) at green bud stage.

References


