Himachal Journal of Agricultural Research 34(2):107-108, 2008

Short Note

Reaction of linseed genotypes and their cross combinations to powdery mildew (*Oidium lini*) over environments

S. Bhateria and Shailesh P. Sood
Department of Plant Breeding and Genetics
CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur-176 062, India.

Abstract

KL-224 was moderately susceptible, still its cross combinations with Janaki and KL-187 were found to be resistant. The dominant resistant genes possessed by Janaki, Surbhi and Flak-1 parents produced resistant progeny yet the crosses of resistant (with disease score 0-2) and susceptible parents (disease score of 3-5) produced the susceptible crosses which may be due to genotypic differences and lack of proper environment for full expression.

Linseed/Flax is one of the most important oilseed crops, cultivated both for seed and fibre. The oil content in seed generally varies from 33 to 45 per cent (Gopalan *et al.*,2005) and the fibre is used for the manufacture of linen. Powdery mildew caused by *Oidium lini* is one of the important diseases and causes considerable losses in yield (Singh, 2004).The relative humidity and temperature during March-April at CSK HPKV,Palampur ranges from 35 to 51 per cent and 11 to 31.3° C and these are conducive parameters for the development of this disease. The present study was undertaken in two different environments under natural epiphytotic conditions to identify the resistant genotypes and crosses for their further exploitation in breeding programme.

The experimental material consisted of 19 linseed genotypes and 70 cross combinations which were developed in line x tester (14 x 5) design. The experiment was laid out in a randomized block design with three replications in two environments, timely (26th October) and late (17th November) sown condition at CSKHPKV, Palampur. Each entry was raised in three rows, 2.5m long with row-to-row and plant-to-plant spacing of 30cm and 5cm, respectively. All the recommended package of practices for raising the crop were followed. Disease reaction was recorded on ten randomly tagged plants in each entry and in each replication. The 0-5 scale devised by All India Coordinated Project on Linseed (Annonymous, 1991) was applied for scoring the data on powdery mildew. The disease score 0 refers to highly resistant condition. The disease score of 1 and 2 represents resistant and moderately resistant conditions. However, disease score of 3, 4 and 5 represents the moderately susceptible, susceptible and highly susceptible condition.

The perusal of results (Table1) over both the environments revealed that none of the parent was highly resistant to powdery mildew but in all only seven cross combinations (Surbhi x KL-233, KL-224 x KL-233, KL-224 x LCK-9816, Flak-1 x LC-2232, Flak-1 x KL-178 & KL-221 x KL-233), in which two crosses each using KL-224, Flak-1 and KL-221 as one of the parent and Surbhi x KL-233, were highly resistant. Out of nineteen genotypes, Janaki, Surbhi and Flak-1 were resistant to powdery mildew over environments having the minimum disease score (1). Out of 70 cross combinations, twelve crosses, nine crosses each using Surbhi, Flak-1 and KL-221 as one of the parent, two crosses with KL-224 and one with kangra local parent, were recorded as resistant. Eight parents and 26 crosses were observed to be moderately resistant with disease score of 2. Fifteen crosses and four parents (disease score3) were moderately susceptible to powdery mildew. Only one cross KL-221 x LCK-9816 was found to be susceptible and hybrid KL-168 x Kangra local was highly susceptible (disease score5).

The cross combinations of KL-178, KL-168 and LCK-9816 with Surbhi, Parvati and Janaki and KL-168 with Flak-1 were found resistant indicating that disease resistance in Surbhi and Flak-1 is conditioned by the dominant gene. This finding is in accordance with that of Pathania (1999) who reported Flak-1 resistant to powdery mildew but contrary to the results of Salej Sood (2006) who had reported recessive gene control of this disease in Flak-1. Although KL-224 was moderately susceptible, still its cross combinations with Janaki and KL-187 were found to be resistant.

It evidences the presence of dominance nature of resistance in Janaki. The resistant nature of cross combination of Janaki with Kangra local-the highly susceptible genotype, further confirms the dominance gene action of resistance imparted by Janaki. KL-221 is moderately resistant but its crosses with moderately resistant parent (KL-178) and resistant parent Janaki are resistant showing the additive effect of resistance genes in these genotypes but its cross with moderately susceptible genotype - Parvati may be due to favourable combination of the desirable resistance imparting genes, but it needs further confirmation to establish the nature of resistance. However, the dominant resistant genes possessed by Janaki, Surbhi and Flak-1 parents produced resistant progeny yet the crosses of resistant (with disease score 0-2) and susceptible parents (disease score of 3-5) produced the susceptible crosses which may be due to genotypic differences and lack of proper environment for full expression.

Table 1. Reaction of Parents and their cross combinations in linseed to powdery mildew in combined over environments

Disease score	Parents	Cross combinations involving parents				
		Surbhi	KL-224	Kangra local	Flak-1	KL-221
0	-	KL-223	KL-233, LCK-9816	-	LC-2232, KL-178	KL-233, KL-187
1	Janaki, Surbhi, Flak-1	KL-178, KL-168, LCK-9816	Janaki, KL-187	Janaki	Parvati, Janaki, KL-168	KL-178, Parvati, Janaki
2	KL-221,KL-223, KL-233, KL-168, KL-178, LC-2232, LCK-9826, Binwa	KL-233, Parvati, Himalini, KL-187	KL-223, Binwa, KL-168 LC-2232	KL-223, Chambal, Nagarkot, Binwa, KL-178, KL-187 Parvati, Himalini	KL-233, Nagarkot, LCK-9816, LCK-9826	Chambal, Nagarkot, Himalini, Janaki, LCK-9826, KL-168
3	KL-224,LCK-9816, Parvati, Himalini	Chambal, Nagarkot, Binwa, LC-2232	Chambal, Nagarkot, KL-178, LCK-9826, Himalini	LC-2232, LCK-9816, LCK-9826	Himalini,KL-187	KL-223
4	Chambal, Nagarkot	-	-	-	-	LCK-9816
5	Kangra local , KL-187	-	-	KL-168	-	-

References

Anonymous 1991. Annual Progress Report. All India Co-ordinated Research Project on Safflower and Linseed ICAR, Directorate of Oilseed Research, Hyderabad, pp 1-6.

Gopalan C, Ramasastri BV and Balasubramanian SC 2005. Nutritive value of Indian foods. ICMR, Hyderabad. (A.P).

Pathania A 1999. Genetic analysis involving exotic and indigenous linseed (*Linum usitatissimum* L.) genotypes. M Sc Thesis, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur (unpublished).

Singh J 2004. Field evaluation of linseed, *Linum usitatissimum* L. germplasm for resistance to Alternaria blight and powdery mildew diseases. J Oil. Res. 21:208-09.

Sood S, Kalia NR, Bhateria S and Kumar S 2006. Natural epiphytotic reaction of linseed/flax cultivars and their cross combinations to powdery mildew (*Oidium lini*) in diverse environments. Him. J. Agric. Res. 32:146-48.