



GENETICS OF RESISTANCE TO POWDERY MILDEW DISEASE IN LINSEED *LINUM USITATISSIMUM* L.

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Abstract

On the basis of segregating ratio obtained in F_2 and back crosses of three crosses, a single dominant gene have been identified for resistance to powdery mildew in LCK- 9406, Palf-5 and NDL-2004-05.

Key words : *Linum usitatissimum* L., powdery mildew disease, susceptible cultivars, dominant gene.

Introduction

Globally linseed *Linum usitatissimum* is an important crop both for fiber and technical grade oil. Recent advances in medicinal result have found linseed as best herbal source Omega 3 and Omega 6 fatty acid which have immense nutritional and medicinal effect on human body systems . India ranks first in area in the world but is at fifth place in term of production after Canada, China, USA and Ethopia. In terms of productivity, India (408 kg/ha) is below to UK (1636 kg/ha.), USA (1484 kg/ha), Canada (1179 kg/ha) and China (1029 kg/ha) (Anonymus, 2016). The major impediments for the lower national productivity is the growing of linseed under marginal land, input starved situation coupled with biotic and abiotic factor. Powdery mildew (*Oidium lini* Skorje) is a common disease of flax growing area of the world (Gill 1987, Turner1987). Yield losses from powdery mildew in experimental plot were proportional to the disease severity, 12-38% (Pandey and Mishra1992) as high as 18% in United Kingdom (Beale 1991). The information regarding inheritance of powdery mildew disease resistance in the crop will be useful for developing linseed resistance varieties against powdery mildew disease . Keeping this objective in view the present study was undertaken.

Materials and Methods

The experimental material for present investigation

comprised of 7 diverse line viz. LCK-9406, Polf-5, NDL-2004-5, NDL-2004-05, PKDL-52, Surbhi, Polf-19 and Shekhar in half diallele fashion design five genotypes Polf-5, NDL-2004-05 and LCK-9406 were resistant and PKDL- 52 genotype was susceptible to powdery mildew disease. During *rabi* 2010-11 crosses were made between resistant and susceptible genotypes at Genetics and Plant Breeding farm, N.D. University of Agriculture and Technology, Kumarganj, Faizabad. (U.P.). During 2010-11 F_1 seeds were grown for generation advanced. On few f_1 plants back crosses were made from both the parents to get BC-1, BC-2 cross seeds . During this year fress crosses similar to *rabi* 2010 were also made. During *rabi* 2012-13 F_1 s and F_2 S and back crosses were grown in compact family block design in 3 replication. In this experiment one row of parent ulternatively with F_1 10-12 rows of BC-1, BC-2 and F_2 of every cross wee grown at crop research station Masodha of N.D. University of Agriculture and Technology, Kumarganj, Faizabad. In second weak of nov. 2012-13. Row length was kept on 3 mt. and spaced 30 cm. apart. Recommended Agronomic practices were adopted to raise a good crop PKDL-52, was use to plant to single spreader row after every 7 rows of test materials and also 2 non experimental cum spreader rows surrounded the intire block. The powdery mildew attacks the crop every year feb. to mid april in mild to severe farm. In order to facilitate uniform incidence epiphytotic condition was created by inoculating with spray of uniform spore suspension culture of whole plant population in evening after sun shade. The inoculated

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spore were procured from crop research centre of CSAUA & T, Kanpur, Mauraniur Jhansi (U.P). First spray dusting was given 45 DAS, IInd 55 DAS and IIIrd spray 70 DAS. After each spray crop was irrigated immediately to maintain the humidity in field the disease observation was recorded when disease severity was stabilized following 0 to 5 scale:

Scale	Symptom
0	No disease
1.	1 to 10 % of leaf area infected (resistant)
2.	10.1 to 25 % of leaf area infected (moderately resistant)
3.	25.1 to 50 % of leaf area infected (moderately susceptible)
4.	50.1 to 75 % of leaf area infected (susceptible)
5.	More than 75 % of leaf area infected (highly susceptible)

*the goodness of the model was tested using chi square value

Reaction of parents to powdery mildew showed that the resistant parent *viz.* LCK-9406, Polf-5 and NDL-2004-05 expressed powdery mildew reaction for 0 to 10 percent (Resistant) while susceptible genotypes *viz.* PKDL-52 suffered from heavily with 75 to 100 percent infection. The experimental result of six genetic populations (P_1 , P_2 , F_1 , BC_1 , BC_2 and F_2) to disease reaction of resistant and susceptible crosses are presented in table-1. Disease reaction in F_{15} of resistant x susceptible crosses (3) revealed that all the crosses showed no powdery mildew infection like their resistant parent. These findings confirmed the dominance of resistance over susceptibility as also reported by Sorya *et al.* (1989) and Singh *et al.* (1989). In BC_1 generations also all the parents were resistant where as BC_2 plant progenies segregated in 1 resistant:1 susceptible plants. In F_2 generation of all the crosses plant progenies segregated in 3 resistant:1 susceptible plants. This supporting the hypothesis of a single dominant gene

conferring resistant in the parents. The similar findings have been reported Rashid and Duguid and Young *et al.* (2008). Hence the genotypes LCK-9406, Polf-5 and NDL-2004-05 may be used as donor for transferring resistance in susceptible cultivars through large back cross breeding methods.

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