Screening of pea germplasm and cultivars for powdery mildew resistance in different climatic conditions in India

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Abstract

Pisum sativum (Family: Fabaceae), known as green pea or garden pea, has long been a valuable pulse due to its content of fiber, protein, starch, trace elements, and many phytochemical substances and is globally cultivated as vegetable and fodder crop. However, its quality and productivity potential is affected by several biotic and abiotic factors which includes, the powdery mildew disease caused by the fungal pathogen, *Erysiphe pisi.* It is a major concern in pea-growing regions worldwide. It is an obligate biotrophic ascomycetes fungus which requires a living host for its survival and its infection results in crop yield losses of 25-50%, affecting the quality of the produce and rendering it unfit for consumption both as food or fodder for cattle. So far only three genes have been identified which confer resistance. Among these genes, two are recessive *er1* and *er2* and identified from *Pisum sativum* genetic background, while *Er3*, a dominant gene was identified from *Pisum fulvum*. Most of the commercial cultivars are found to be moderately susceptible to highly susceptible, thereby necessitating the identification of resistant donors to transfer the resistance through crop breeding program. Eighty four pea germplasm lines were tested in the field conditions in different climatic conditions for resistance and susceptibility to check for its consistency by disease phenotyping and genotyping with sequence characterized amplified regions (SCAR) markers specific to *er1*, *er2*, and *Er3* genes. The presence of the resistant genes in the control pea genotypes; JI2302 for *the er1* gene, JI2480 for *the er2* gene, P660-4 for *Er3* were confirmed through their respective gene-specific markers. The pea genotype, Arkel served as a negative control. The present study revealed seven genotypes as highly resistant, twenty three genotypes as resistant while eighteen genotypes were moderately resistant, thirty three genotypes were moderately susceptible, and nine genotypes were susceptible.

Keywords: *Erysiphe pisi*, powdery mildew resistance, garden pea, germplasm, SCAR markers