MOLECULAR BREEDING FOR MAJOR DISEASES OF SUNFLOWER IN INDIA: PRESENT STATUS AND FUTURE NEEDS

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ABSTRACT

Sunflower is an important sources of vegetable oil in the world. The adaptability and versatility of the crop is being demonstrated by its cultivation from subtropical to sub arctic areas. Asia accounts for nearly 20–22% of the global sunflower and contributes to about 18% of the production. The productivity of sunflower in Asia is about 1.0 t/ha which is lower than the world average. India is the second largest grower of sunflower in the Asian continent. The major problems confronting sunflower productivity in India is the vulnerability of the crop to various biotic stresses. Climate change has lead to the evolution of minor diseases into epidemic status in sunflower. The major diseases of sunflower in India include *Alternaria* leaf spot (*Alternaria helianthi*), downy mildew (*Plasmopara halstedii* (Farl.), powdery mildew *(Golovinomyces cichoracaerum*), Sclerotinia rot (*Sclerotinia sclerotiorum*) sunflower necrosis disease (SND) caused by *Tobacco necrosis virus*, rust (*Puccinia helianthi* Schw.) and dry head rot (*Rhizopus* spp). Polygenic inheritance of resistance is reported in case of *Alternaria* leaf spot and powdery mildew. The resistance to *P. halstedii* is known to be controlled by dominant *Pl* genes, grouped in clusters (*Pl*1-*Pl*13 & *Pl*Arg) each conferring resistance to different races. Resistance for *P. helianthi* is reported to be controlled by seven genes *R*1-*R*5, *R*Adv and *Pu*6. Nature of resistance to Sclerotinia is described as partial, quantitative and mostly additive. Promising resistance sources for these fungal diseases have been found in wild sunflowers and exotic germplasm derived through interspecific hybridisation. Fine mapping of these diseases will aid in precision breeding. SND being a virus disease is transmitted by aphid *Myzus persicae* and*Capitphorus elaegni*, breeding for resistance against these vectors is known to reduce incidents of SND. In this review, emphasis is mainly focused on the current status of knowledge related to 'R' genes controlling resistance against major diseases of sunflower in India and their sources as well as markers associated with these genes.

Key Words : sunflower, diseases, breeding, markers