

RESISTANCE MECHANISMS TO *OROBANCHE CUMANA* WALLR. IN SUNFLOWER

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Abstract

Breeding for resistance is regarded as the most effective, feasible, and environmentally friendly solution to control sunflower broomrape. However, breeding for resistance is challenging as new races have evolved and the existing sources of genetic resistance are defeated. The use of resistant hybrids, of monogenic nature in many cases, is followed by the appearance of new more virulent races of the parasite that overcome the existing resistance genes. Because of this frequent development of more virulent races, it would be desirable to pay more attention to quantitative resistances and to accumulate different mechanism of resistances in a single sunflower hybrid, resulting in a resistance more likely to be durable. Hence, a detailed knowledge of sunflower–broomrape interaction and the mechanisms underlying resistance is mandatory to reach this goal. The *Orobanche cumana* biological cycle comprises welldefined steps, separated both spatially and temporally, that are potential targets for host defence strategies. Upon germination, stimulated by host root-exuded chemical signals, broomrape seed develops a small seedling that attaches to the host root and differentiates in the attachment organ (appressorium). After host tissue penetration and connection to the vascular system through the haustorium, the parasite becomes a major sink for plant photosynthates, gradually forming a tubercle from which a shoot arises to emerge from the soil to flower and produce seeds. A review of the different mechanism of resistance described so far in the different steps of the biological cycle will be presented. They can operate at the pre-attachment, pre-haustorial or post-haustorial stage of the host-parasite interaction. Practical examples about the combination of pre-haustorial and post-haustorial resistance in a single cultivar will be described as way to provide durable and sustainable genetic resistance.

Keywords: broomrape, genetic resistance, race, sunflower