

# THE BIOLOGY OF *PHELIPANCHE* AND *OROBANCHE*

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## Abstract

Members of the *Orobanche* and *Phelipanche* genera, belonging to the broomrape family, are obligate root parasitic weeds. They are devoid of chlorophyll and unable to carry out photosynthesis, and then totally rely on their hosts for their water, mineral, and carbohydrate supplies. Although a fine-tuned molecular dialogue between both partners governed the underlying process of this trophic exploitation, the host unknowingly plays a crucial role. Indeed, three key development stages of the parasite are dependent of the host: 1) to germinate the seeds require the perception of molecules produced by host roots. 2) the development of a specific organ, the *haustorium*, which invades host tissues and establishes a physiological continuum between partners, is induced by host-derived molecules. 3) the establishment of a sink strength required for translocation of host resources seems to be controlled by translocated host hormones.

Given the alarming impact of *Orobanche cumana* on sunflower in countries surrounding the Black Sea, in Southern Europe and in growing area of France, deciphering the physiological and molecular events governing the parasite development and the establishment of the interaction with its host is then a necessary step toward the development of specific control methods. The knowledge of the biology of *O. cumana* will significantly progress in years to come thanks to the availability of transcriptomic and genomic data and the development of a robust system for *Agrobacterium rhizogenes*-mediated transformation and subsequent regeneration of the holoparasitic plant. A new technology called miPEP is in the development stage at the University of Nantes. The objectives of this new project miPEPiTO are to develop new molecular tools to investigate the biology of the parasite, and to develop an innovative and sustainable biocontrol technology for management of this pest.

**Keywords:** broomrape, germination, haustorium, biology, control methods