

**miPEPiTO PROJECT: A NEW STRATEGY TO STUDY
AND CONTROL THE SUNFLOWER – *OROBANCHE CUMANA* INTERACTION**

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Abstract

The broomrape species *Orobancha cumana* causes important losses to the production of sunflower in countries surrounding the Black Sea, in Southern Europe and in growing area of France. Unfortunately, no sustainable or efficient methods to control these root parasitic weed are presently available. The objectives of the miPEP project 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 Orobanchaceae pest.

One partner of the project has recently discovered a new class of regulatory peptides, the miPEPs, which are encoded by primary transcripts of miRNAs. Each miPEP stimulates the transcription of its own encoding transcript, leading to the production of higher amount of the corresponding miRNA and consequently to a downregulation of specific target genes. This natural molecular regulation of gene expression can be obtained with synthetic miPEPs, so that specific stages of plant development can be perturbed temporally by exogenous treatment with appropriate miPEPs.

The project will consist in two main tasks:

- 1) to identify *O. cumana* miPEPs potentially involved in the regulation of seed germination/haustorium formation, to identify sunflower miPEPs most likely involved in regulating sunflower immunity, to produce the corresponding synthetic candidate peptides and to assess the activity of *O. cumana* synthetic miPEPs on seed germination and haustorium differentiation.
- 2) to select the synthetic *O. cumana* and sunflower miPEP candidates and evaluate their capacity to negatively affect parasitism by either decreasing broomrape growth and infection or improving sunflower resistance.

The expected results of the first task are to increase our knowledge on key molecular mechanisms underlying a complex parasitic interaction. The expected results of the second task, to be exploited by MicroPEP Technologies, will be to provide a new phytosanitary method to control broomrape parasitism with highly specific and biodegradable natural substances.

Keywords: miPEP, miRNA, germination, haustorium, resistance