AUTOMATIC PHENOTYPING OF SUNFLOWER FOR THEIR RESISTANCE TO *OROBANCHE CUMANA* AT EARLY STAGES OF THE INTERACTION

Mireille CHABAUD[1*], Guillaume IBARCQ[1], Aurélie BAUSSART[2],
Marie-Claude BONIFACE[1], Nicolas POUILLY[1],
Nicolas LANGLADE[1], Stéphane MUNOS[1]

[1]*LIPM, Université de Toulouse, INRA, CNRS, Castanet-Tolosan, France*
[2]*Maïsadour Semences, Haut-Mauco, France*
[*]*Corresponding author: mireille.chabaud@inra.fr*

Abstract

Orobanche cumana (the sunflower broomrape) is a parasitic plant that specifically infects sunflower and is one of the main constraint of sunflower crop in Europe. Quick and high throughput phenotyping of sunflowers for their resistance to broomrape is a challenge for breeding varieties with new resistances. Various biological mechanisms, such as the fixation of *O.cumana* on sunflower roots before emerging overground as a flower shoot and the fact that *O. cumana* populations differ by their virulence and aggressiveness depending on their geographical locations make high throughput phenotyping difficult in field. Therefore, developing new phenotyping tools in controlled conditions is a good alternative to better characterize the physiological effect of the infection on sunflower development and to screen for resistant sunflowers at various stages. A collaborative project between Maïsadour Semences and INRA (LIPM-Toulouse) has been set up with the objective to develop a mini-rhizotron-based phenotyping system to access to sunflower roots infected by the parasitic plant at early stages. We will present biological and technical optimization of this growth culture system such as the nutritive solution, the pre-conditioning of the *O. cumana* seeds before inoculation and the type of solid substrate used in the rhizotron. With the goal of a high through put system, we are developing an automatic image analysis tool to accelerate sunflower genotype screening for resistance at early stages.

Keywords: screening, rhizotron, image analysis