PRIMA

Title of Proposal

Innovative sustainable solutions for broomrapes: prevention and integrated pest management approaches to overcome parasitism in Mediterranean cropping systems

Acronym: ZeroParasitic

ZeroParasitic is a three-year project, aiming to deliver innovative sustainable solutions to overcome broomrape plant parasitism in key Mediterranean cropping systems. Genetic and molecular approaches will be used at three critical levels to gain new insights on potential regulatory targets of the infection: the broomrapes per se, the host plants and their interaction (host-parasite). Research will target two of the most important crops in the Mediterranean. i.e. industrial tomato and faba beans. Surveillance tools utilizing remote and satellite images will be employed for monitoring parasitism and for large-scale documentation. Innovation tools will consist of molecular approaches for screening and identification of tolerant/resistant hosts and hormone host-parasite interactions. Deciphering the molecular basis for resistance utilizing pattern recognition receptors (PRRs) and other defense-triggering molecules aiming to support breeding of resistant host plants. Solutions will be integrated in an integrated pest management (IPM) context targeting several innovations such as prevention, biological/non-chemical approaches, and other IPM strategies. Agronomic practices will be scientifically supported by a validated model for prediction of parasitism emergenceacross various Mediterranean locations and farming systems. Solutions will be socioeconomically evaluated, implemented and disseminated in a participatory way. The dissemination of the Project outputs will be based on a systems-thinking approach and the solutions that will be proposed will be highly accessible via an innovative web platform designed to satisfy requirements of a wide range of end-users.

Objectives

The main goal of ZeroParasitic is to integrate innovative solutions into a realistic framework through a trans-disciplinary, multi-actor effort targeting broomrapes, which is one of the most critical disease/weed in Mediterranean countries, posing a significant threat to various key cropping systems in the region.

The specific objectives are as follows:

Objective 1. Identify new genetic variability in different species for broomrape tolerance/resistance

Objective 2. Identify molecular genetic markers in mapping populations and in contrasting genotypes at different phases of parasite-plant interaction

Objective 3. Identify new hormones and metabolites involved in broomrape germination, haustorial development and plant infection during host-plant interaction

Objective 4. Identify the molecular basis of resistance based on pattern recognition receptors (PRRs) to enhance capabilities for targeted breeding of resistance

Objective 5. Provide IPM solutions that are supported by innovative tools such as modelling of emergence of parasitism, validated under different Med cropping systems

Objective 6. Provide surveillance tools for local, regional and national scale monitoring of the parasitism

Objective 7. Disseminate the results among stakeholders, engaging with them in the co-creation of innovative solutions and provide training to farmers to facilitate prevention of broomrape expansion