MODELLING PLANT–NEMATODE INTERACTIONS TO UNDERSTAND PLANT TOLERANCE

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Root-knot nematodes (RKN) of the *genus Meloidogyne spp.* cause considerable yield losses in numerous crops worldwide. The dynamics and outcomes of crop–pest interactions depend on the ecological conditions, including the phenotypes of the interacting species, their physiology and the abiotic environment. We are particularly interested in understanding the mechanisms that underlie plant tolerance, that is the ability of plants to sustain RKN infestation with limited yield losses. In theoretical ecology, most mathematical models that describe these interactions either focus on plant physiology and do not consider pest dynamics, or conversely are based on the pest life cycle but neglect plant physiology and defense response.

To address the issue of plant tolerance, we built a mechanistic model of plant–RKN interactions that explicitly links plant physiology and pest demography, including both the effect of pests on crop and crop on pests. The model was calibrated on two plant species, tomato and pepper, and used to study the variability of plant response to pest attacks. We analysed the complex interplay between plant physiological traits and nematode biology that affects the infestation dynamics. Understanding the origin of these phenotypic differences is a key challenge to design, improve and assess pest control strategies, including the selection of new tolerant cultivars.