How to pit weeds against parasitic plants? A simulation study with *Phelipanche ramosa*

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Branched broomrape (*Phelipanche ramosa* L.) is a parasitic plant that infects crop and weed species in more than 20 families (*Solanaceae, Brassicaceae*, *Asterasceae…*). It is a major pest of oilseed rape in France causing up to 90% of yield losses. No curative method is available. The parasite can only be controlled by combining cropping techniques. Simulation models are essential to design such complex management strategies.

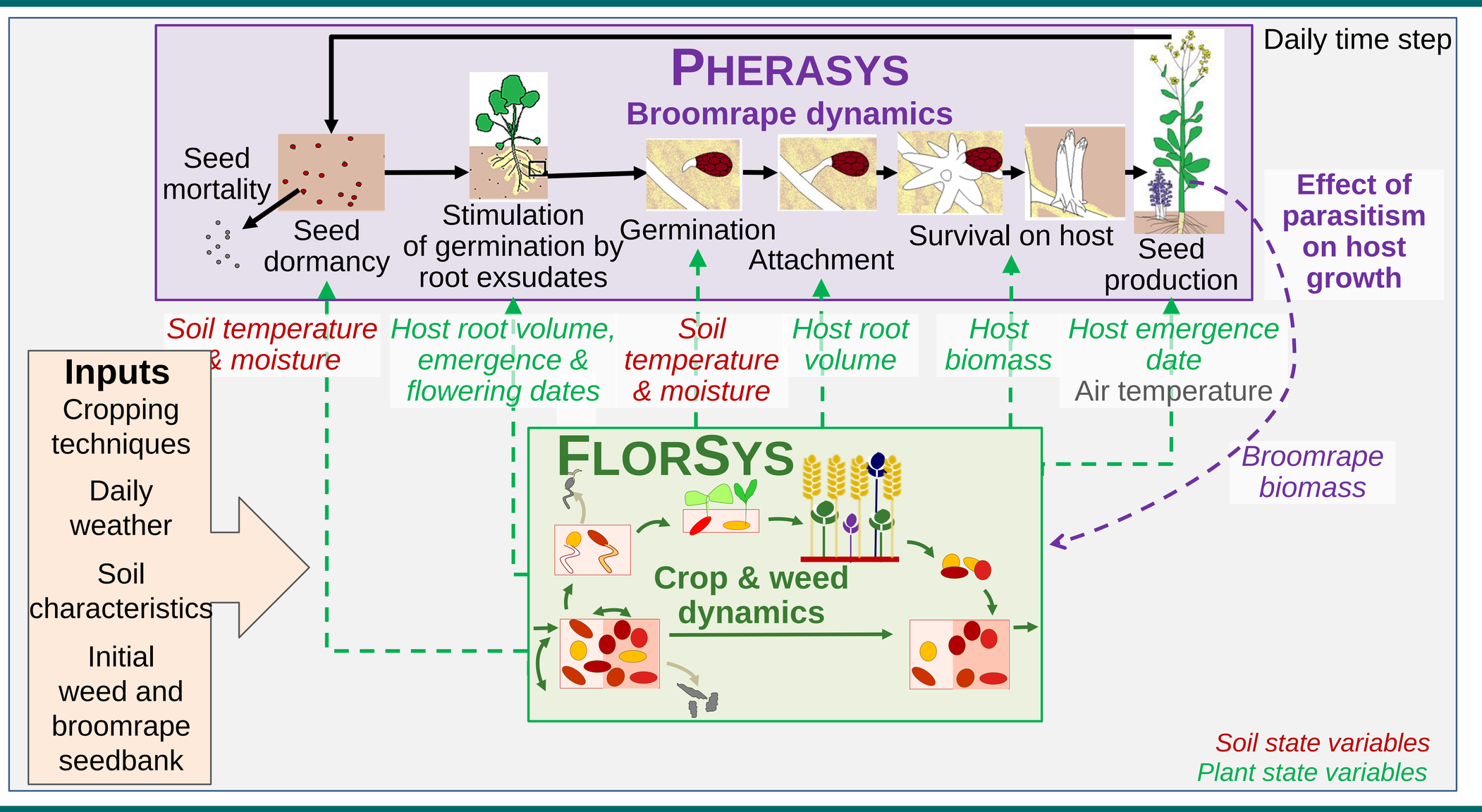
Aim Develop a simulation model & use it to design strategies to manage broomrape

Step 1: Synthesize knowledge on broomrape dynamics & effects in a 3D individual-based model

1. Experiments → fit functions & estimate parameters

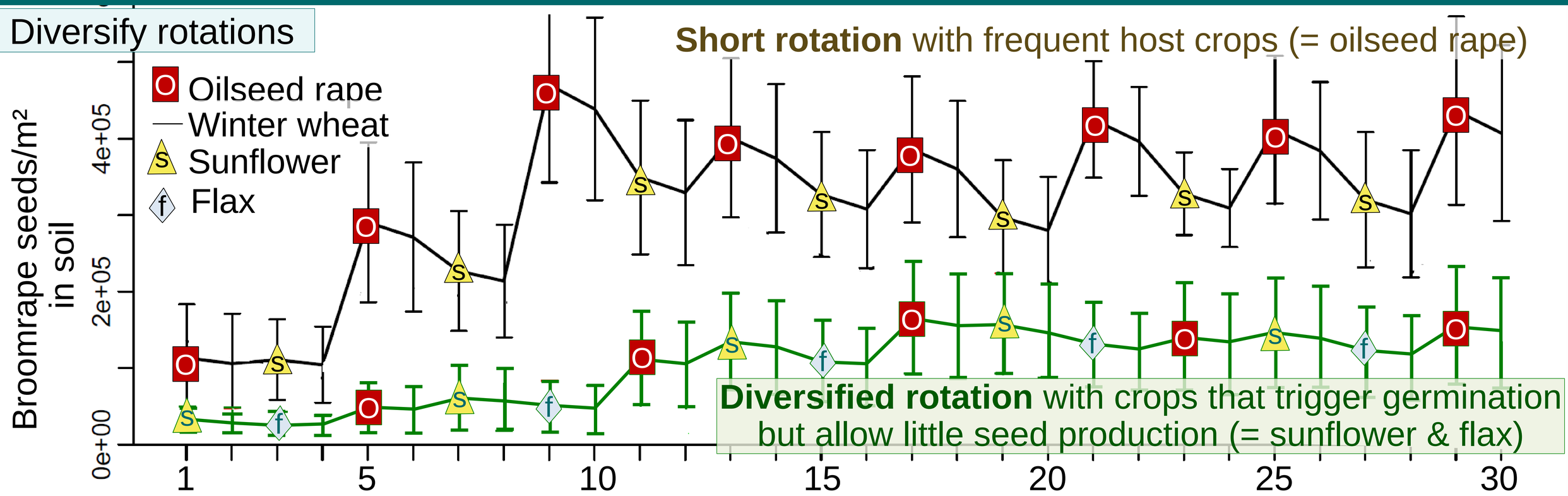
2. Build the PHERASYS submodel → simulate borromrape dynamics

3. Connect PHERASYS to the FLORSYS model → simulate crop & weed dynamics

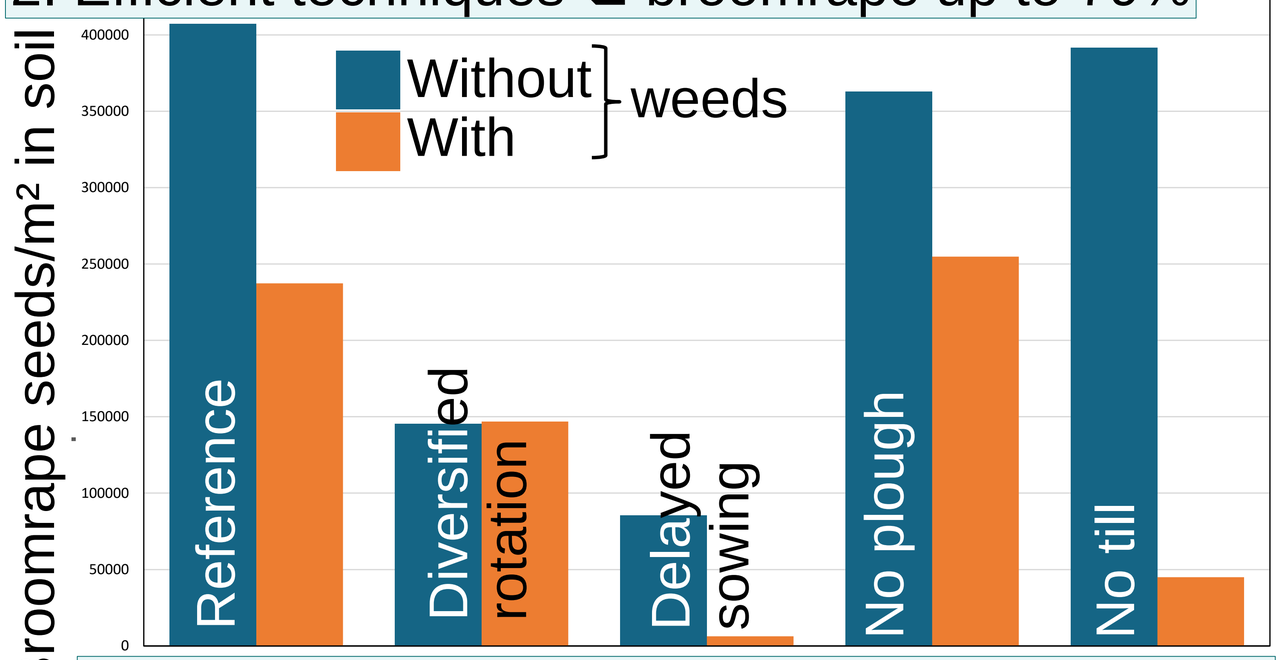


Step 2: Simulate cropping systems over 30 years x 10 weather series, with and without weeds

1. Diversify rotations



2. Efficient techniques ↘ broomrape up to 79%



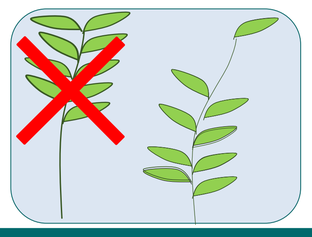
3. Non-parasitic weeds↘ broomrape up to 93%

4. Weed ideotypes to ↘ broomrape seed bank

Trigger broomrape germination

Allow broomrape attachment

Spring/ summer annual



Conclusion

Efficient strategies to control broomrape exist

Adapt strategies to local conditions

Broomrape regulation by weeds only works if broomrape cycle is long on weeds

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