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## Modelling cropping system effects on branched broomrape dynamics in interaction with weeds

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Branched broomrape (*Phelipanche ramosa* (L.) Pomel) is a parasitic plant that infects many crop and weed species. It is a major pest of winter oilseed rape in France.

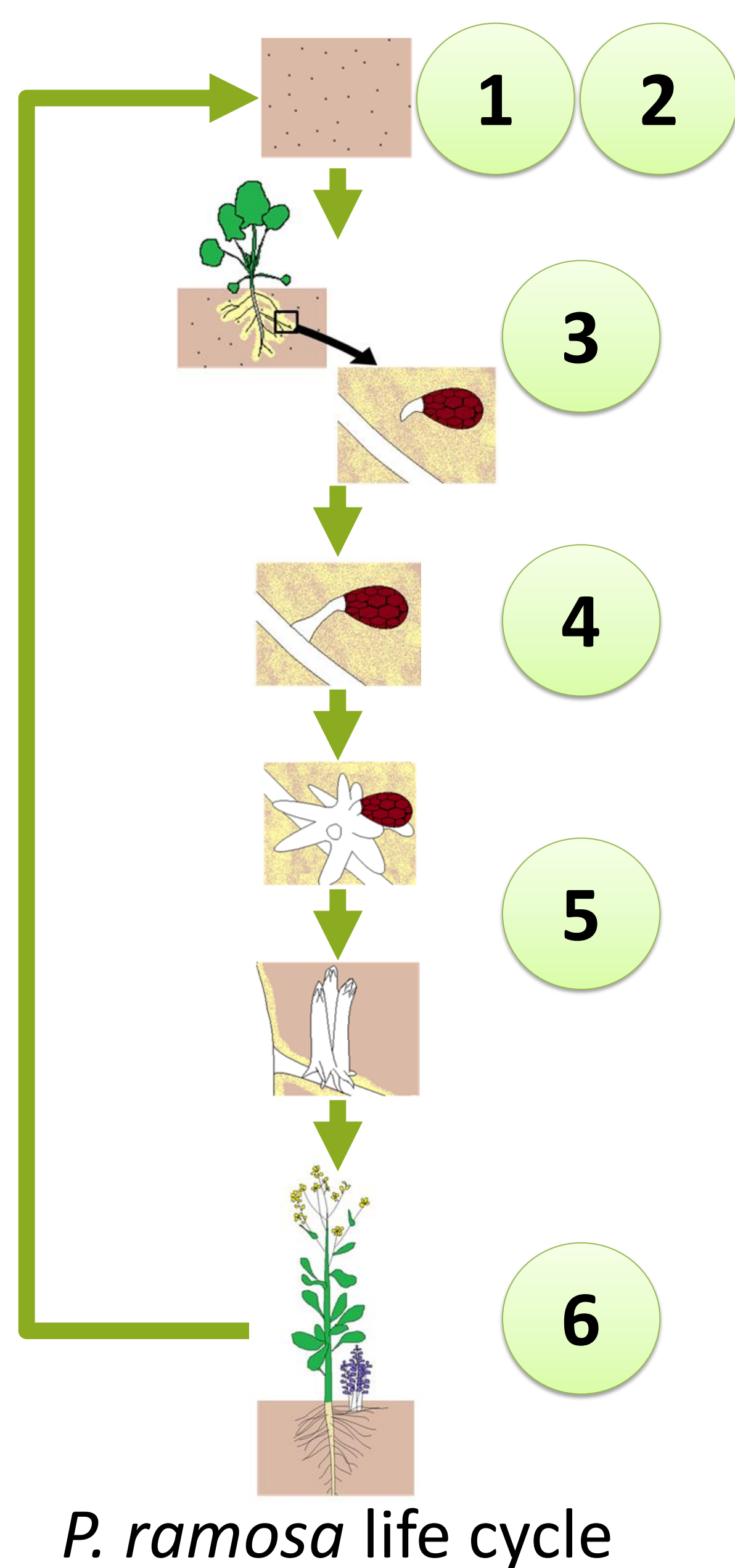
➔ **Objectives** : To model the effects of cropping systems on *P. ramosa* dynamics in interaction with weeds and crops in order to design efficient pest management strategies.

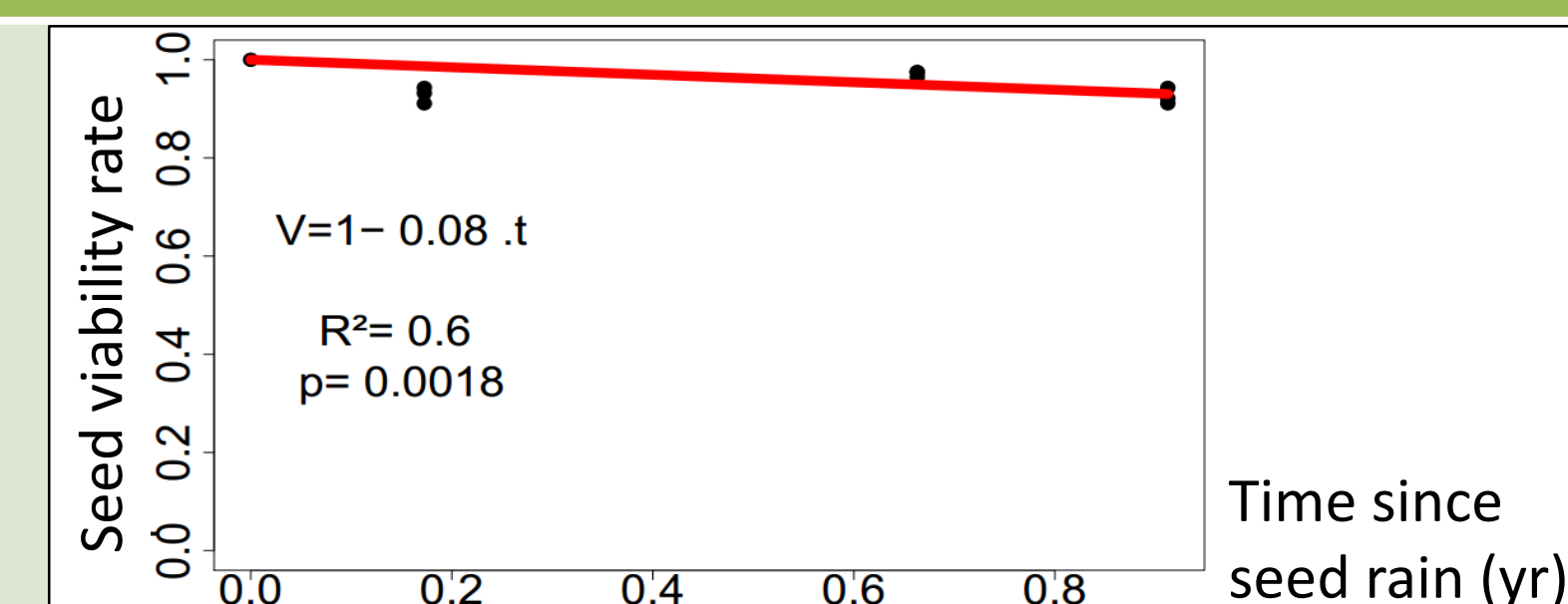
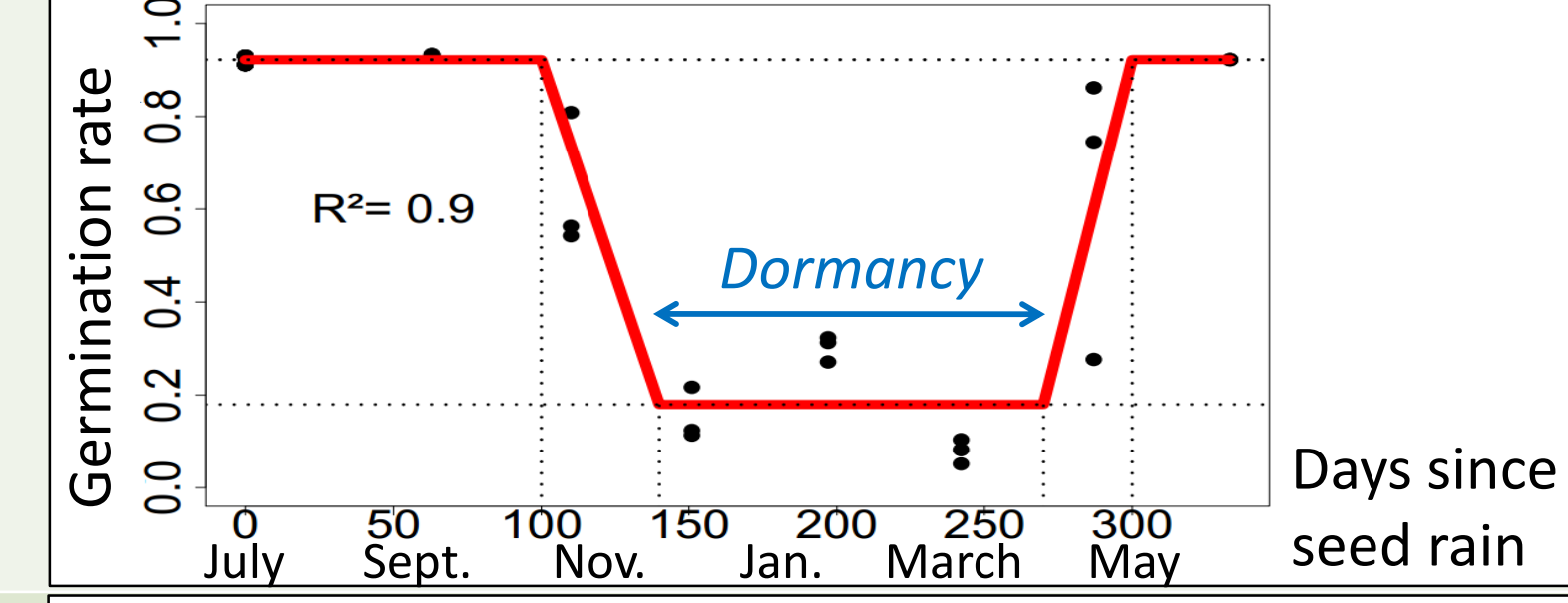
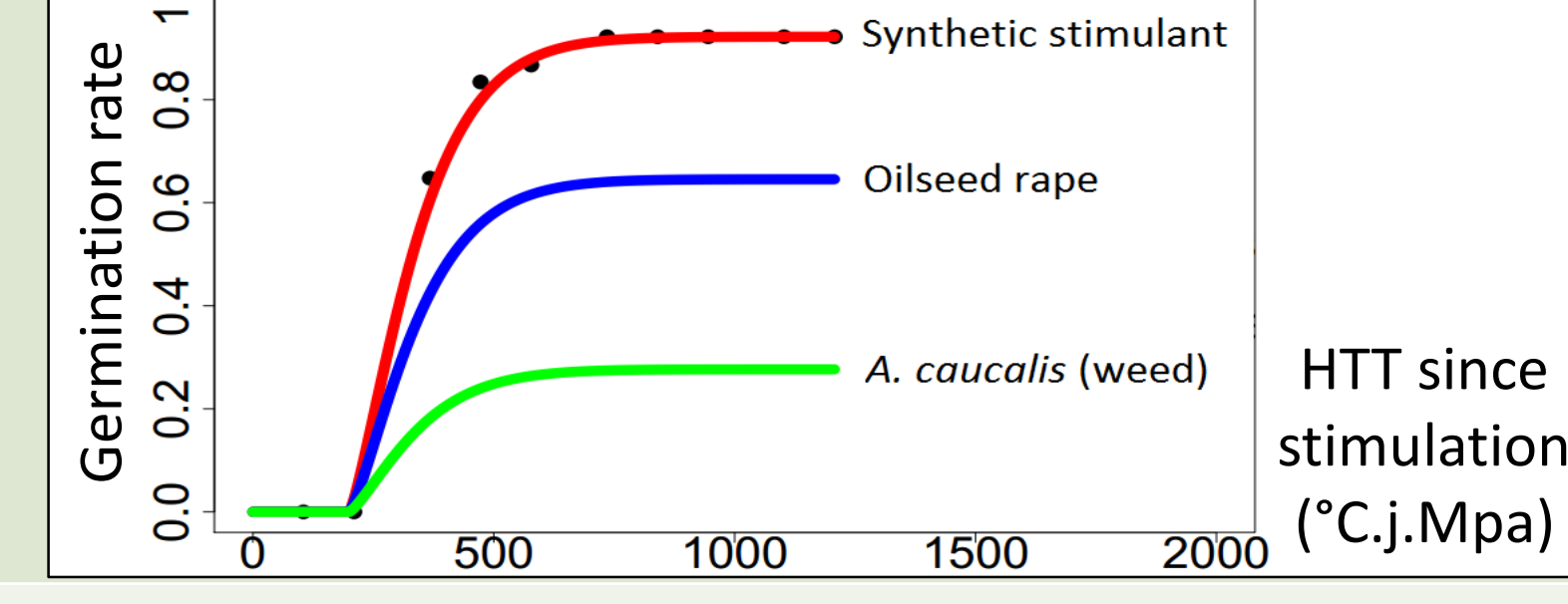
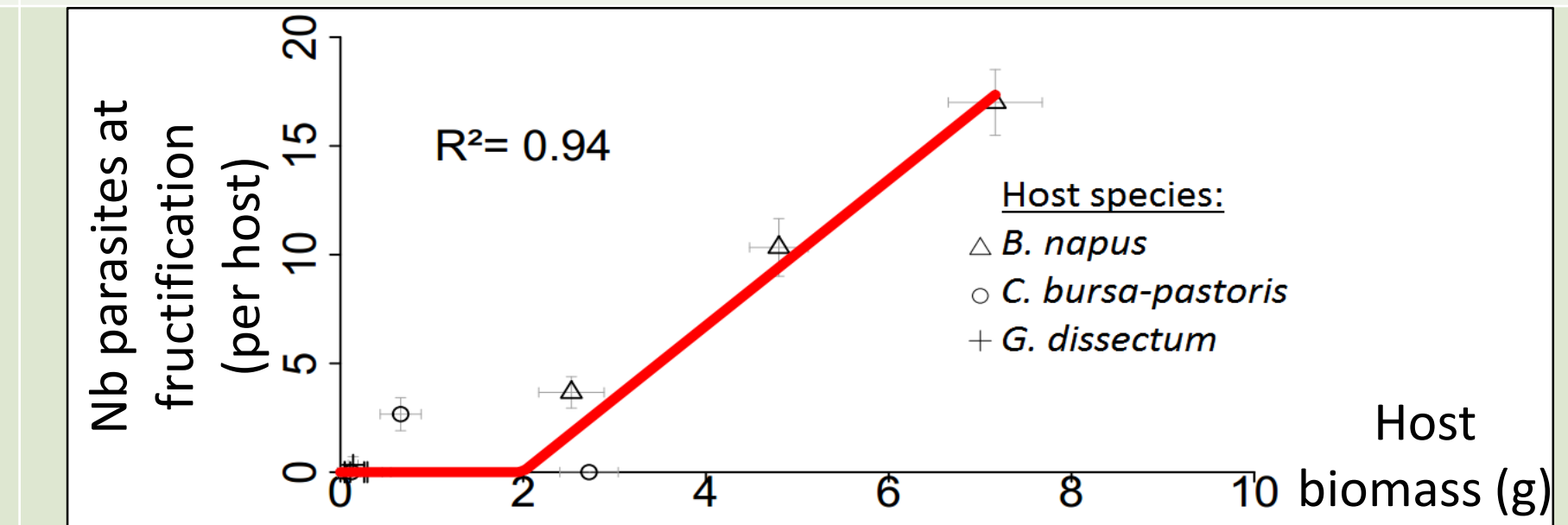
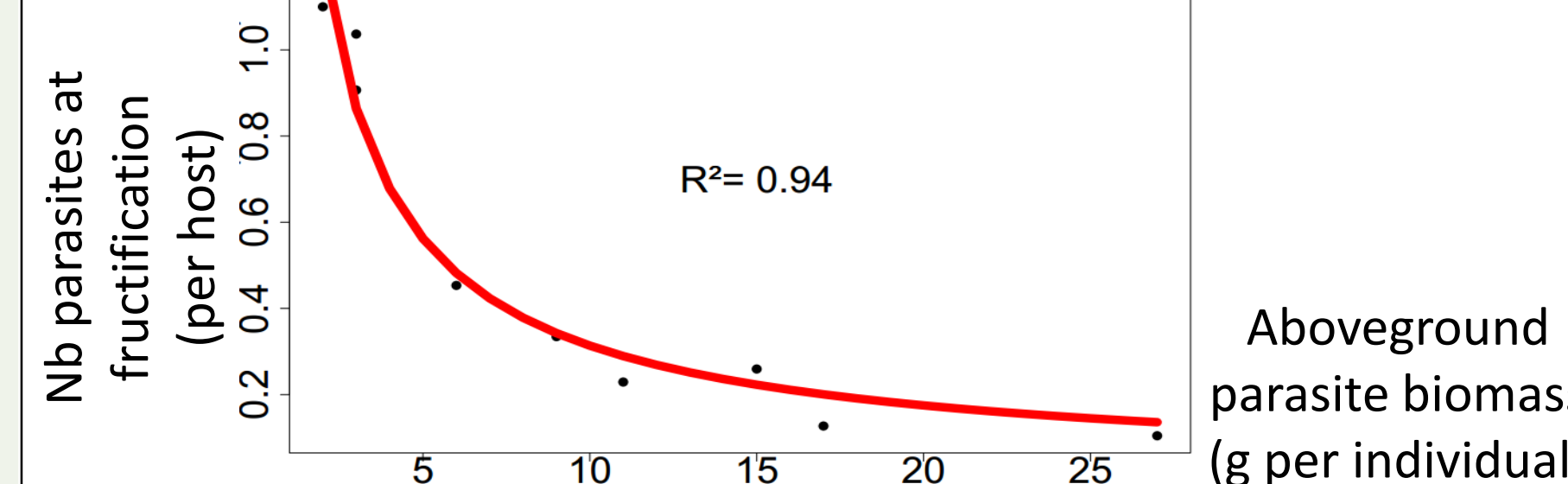
## Materials & Methods

- Process-based modelling of *P. ramosa* dynamics as a succession of processes of its life-cycle
- Daily time-step
- Functions and parameters based on literature and experiments

## Results

PHERASYS = model of *PHElipanche RAMosa* dynamics in cropping SYStems in interaction with weeds



Process	Modelled as a function of	Example
<b>1 In situ seed mortality</b>	<ul style="list-style-type: none"> <li>• Time since seed rain</li> <li>• Seed age</li> </ul>	
<b>2 Seed dormancy</b>	<ul style="list-style-type: none"> <li>• Days since seed rain</li> <li>• Soil temperature and water potential</li> </ul>	
<b>3 Germination (stimulated by host root exudates)</b>	<ul style="list-style-type: none"> <li>• Stimulating species</li> <li>• Distance from host root</li> <li>• Hydrothermal time (HTT) since stimulation</li> </ul>	
<b>4 Attachment on host root</b>	<ul style="list-style-type: none"> <li>• Distance from host root</li> </ul>	
<b>5 Survival on the host to fructification</b>	<ul style="list-style-type: none"> <li>• Nb. of parasites attached on the host</li> <li>• Host biomass</li> </ul>	
<b>6 Seed production and release</b>	<ul style="list-style-type: none"> <li>• Parasite biomass</li> <li>• Seed/total biomass ratio</li> </ul>	

## Discussion

- PHERASYS points to potential management improvements:
  - *P. ramosa* seeds display dormancy during winter ➔ delayed crop sowing could reduce infestation
  - Very low annual seed mortality (6-8%) ➔ burying seeds by soil tillage does not deplete seed bank
- Perspectives: to validate the model with field data and to predict parasite effect on crop yield

## References

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