

Weed seed predation by carabids can help to regulate weeds in arable cropping systems



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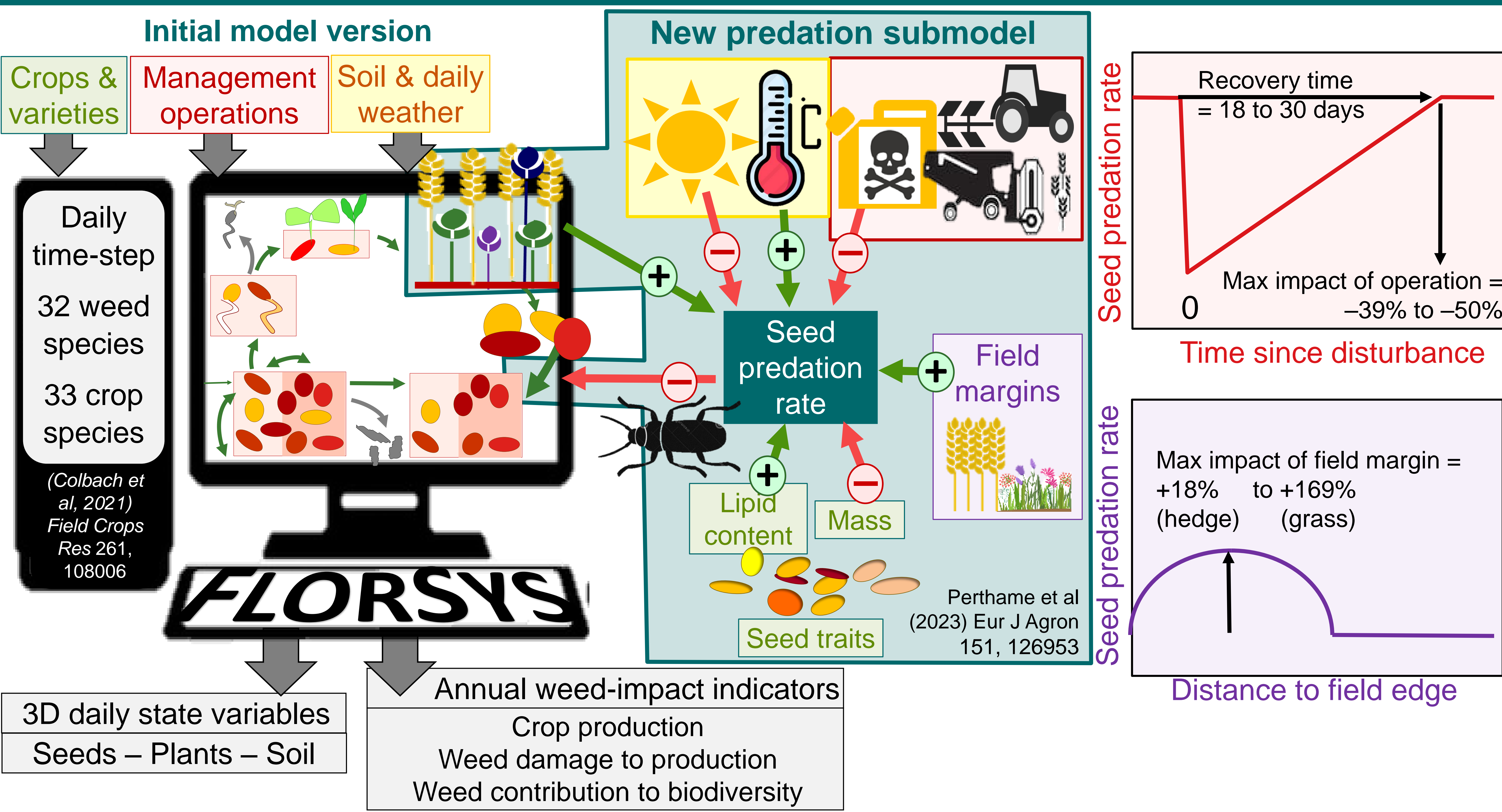
Amara similata © C. Schott

Context Weeds = harmful for crop production & essential for biodiversity

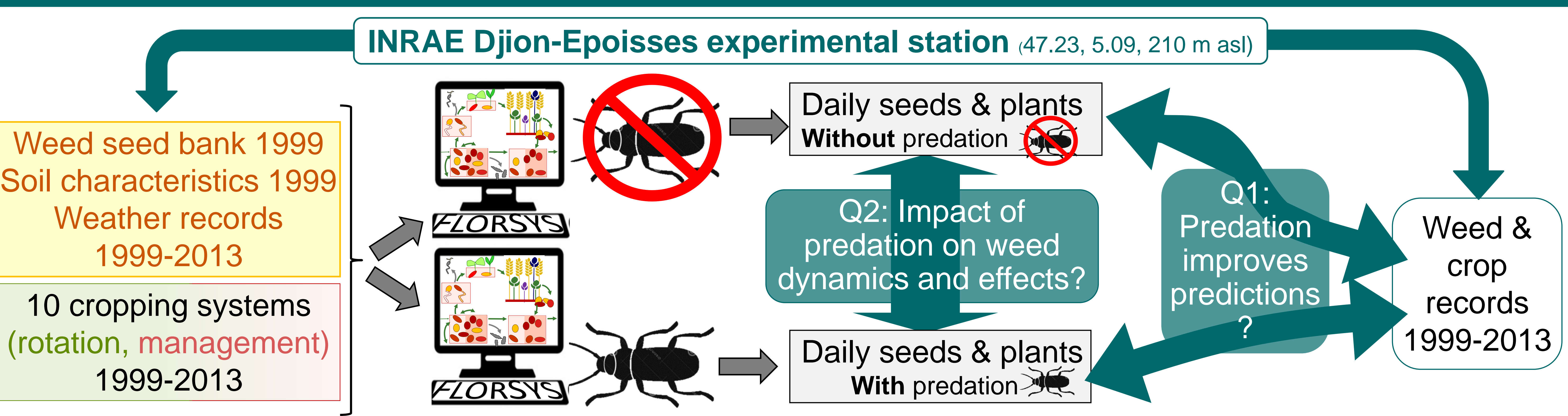
Herbicide use must be reduced because of environmental & health issues

Aim Model & evaluate weed seed predation by carabids in contrasting cropping systems

Step 1: Complete the mechanistic FLORSYS model from experiments & literature



Step 2: Compare simulations with and without predation to independent field observations



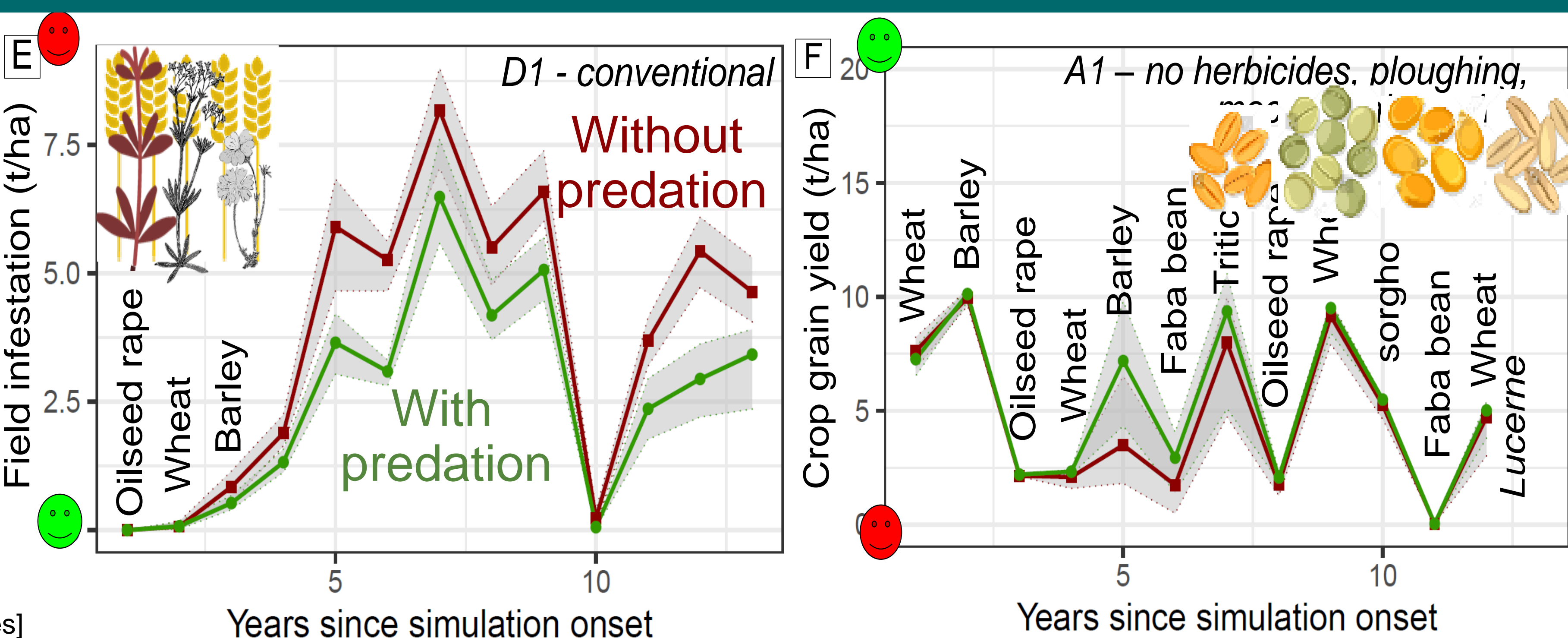
Result 1: Predation reduces overestimation of weed variables

| Variable | | Prediction bias ^{\$} | | Correlation simulated vs observed | Spearman corr. |
|---|-----------------|-------------------------------|----------------|-----------------------------------|----------------|
| | | Without predation | With predation | | |
| Weed density (plants m ⁻²) | Rotation mean | 17% | 12% | 0.60 | ME |
| Weed biomass (g m ⁻²) | Rotation mean | 30% | 16% | 0.69 | |
| Weed seed bank (seeds m ⁻²) | At a given date | 22% | 17% | 0.56 | |
| Crop biomass (g m ⁻²) | At a given date | -1% | -1% | 0.68 | |
| Crop yield (t ha ⁻¹) | At a given date | 7% | 12% | 0.84 | |

^{\$} Relatively to the range of variation of observations 1/2[max+min observed values]
ME = modelling efficiency

But crop yield is now more overestimated
➔ Investigate other processes of biological regulation (e.g., competition for soil resources)

Result 2: Predation can at times reduce weed harmfulness



But effects of crops, management and weather are more influential
➔ Simulate more diverse cropping systems to identify the conditions favouring weed regulation by seed predation