



Modelling crop-weed canopies as a tool to optimise crop diversification in agroecological cropping systems

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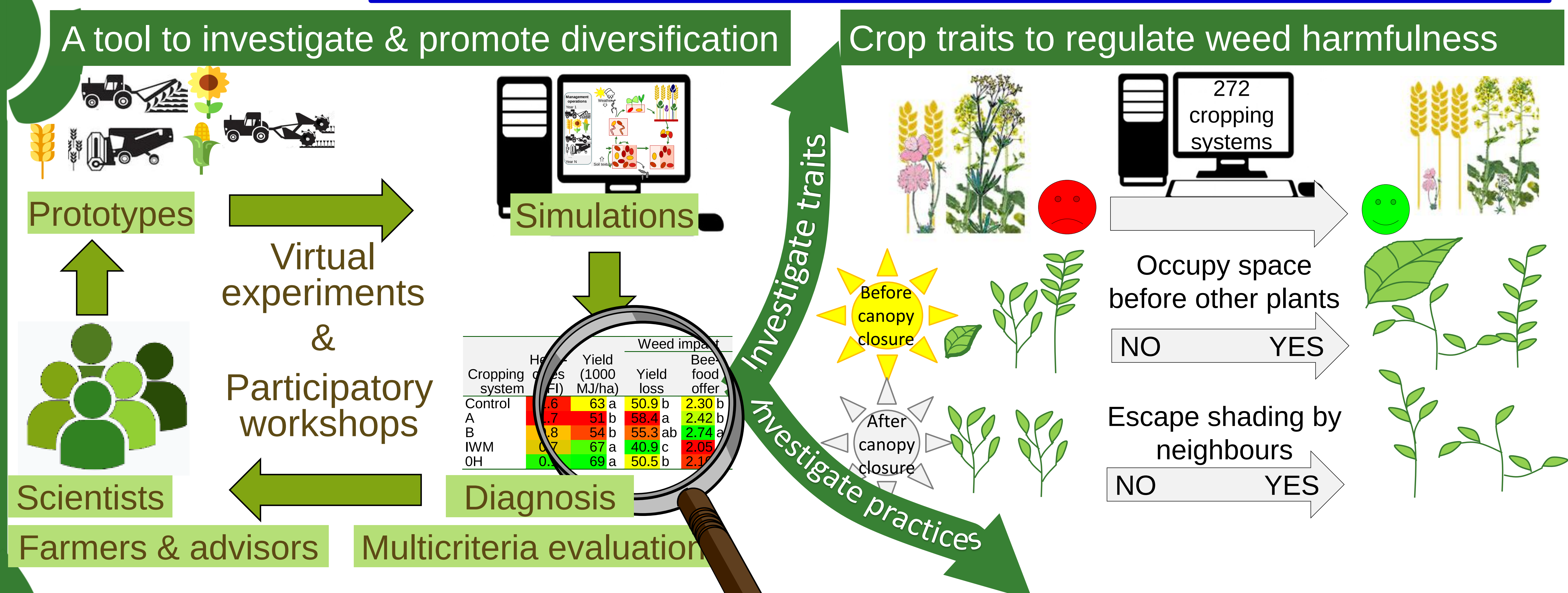
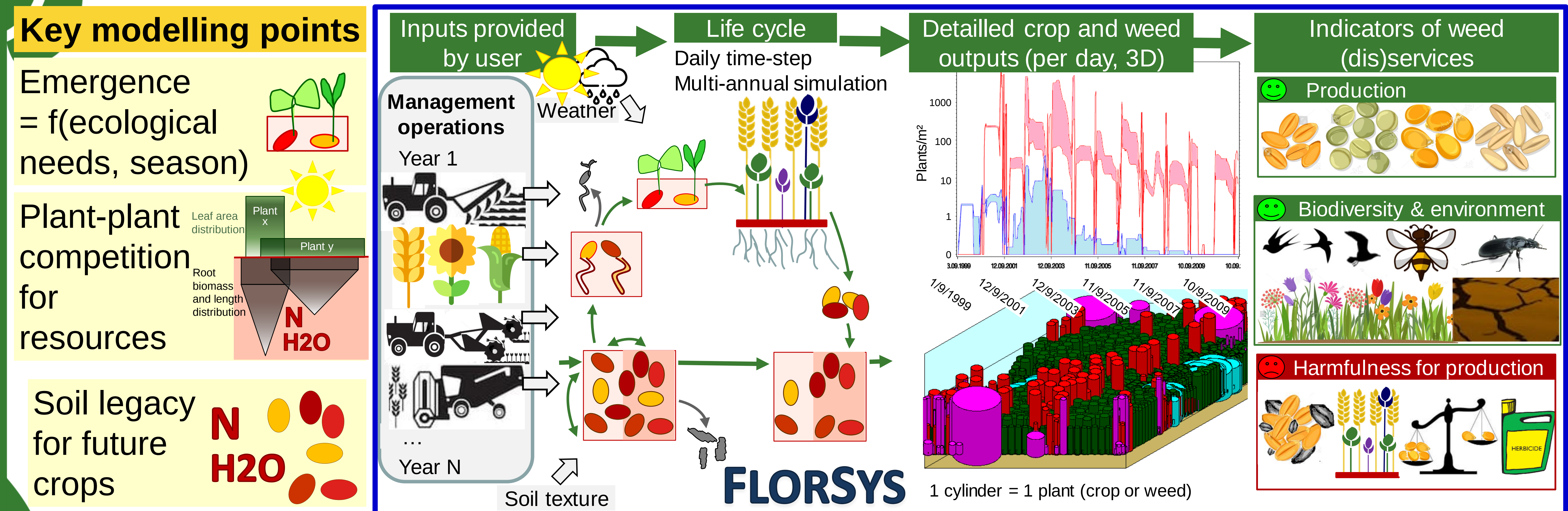
Agroécologie, AgroSup Dijon, INRAE, Univ. Bourgogne, Univ. Bourgogne Franche-Comté, Dijon

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Aim Evaluate crop diversification and promote agroecological weed management

Method Mechanistic modelling to synthesize knowledge and simulate plant-plant interactions in agroecosystems

Synthesize knowledge on the effects of crop diversification in a 3D individual-based model



Diversifying crops allows to reduce herbicide use intensity

Cropping system	Crop diversity			Plough	Mecha-nical weeding	Herbi-cides (TFI)	Yield (1000 MJ/ha)	Weed impact	
	Species & varieties / 12 years	Winter crops	Cover crop (%)					Yield loss	Bee-food offer
Conventional	4	100%	8%	Yes	No	1.6	63 a	50.9 b	2.30 b
IWM simplified	18	77%	39%	No	No	1.7	51 b	58.4 a	2.42 b
IWM medium	10	63%	8%	Yes	No	0.8	54 b	55.3 ab	2.74 a
IWM complete	8	55%	0%	Yes	Yes	0.7	67 a	40.9 c	2.05 c
IWM ~ 0 herbicide	12	63%	16%	Yes	Yes	0.1	69 a	50.5 b	2.10 c

😊 Systems with the highest crop diversification = highest yield and lowest herbicide use

⚠️ Diversifying crops is not enough to promote weed-based biodiversity (e.g. bee food)

⚠️ Diversifying crops is not enough to control weeds and ensure crop production

What next...

Ergonomic tools

Colas et al 2020 EJA

→ Participatory workshops
→ Easier use by farmers & advisors

ReMIX
Species mixtures for redesigning European cropping systems

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