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Combining literature review, tracking farmers' innovative practices, and design workshops to design pesticide-free management methods against *Bruchus* on lentil and fababean

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Bruchus : a threat for grain legume production

- **Legume crops** are being more and more infested and damaged by *Bruchus sp.*, whose larva develop in growing seeds, thus strongly limiting both yields and grain quality for human consumption.
- The **lack of *Bruchus* efficient control** is particularly threatening **lentil** and **fababean** production intended to the food market.



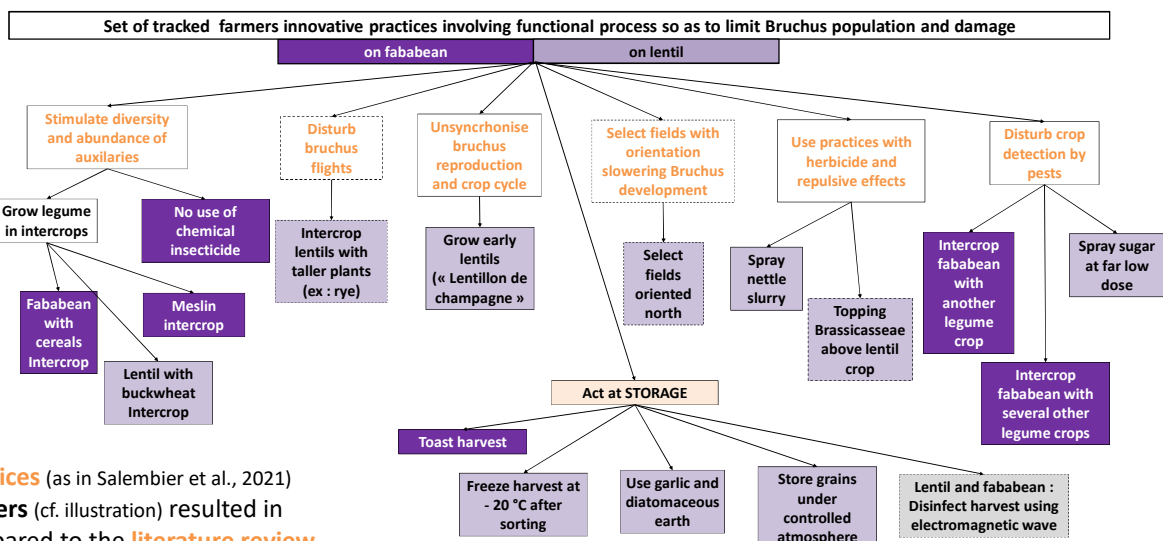
- **Bruchus infestation is likely to increase** in European current cropping systems, due to several factors such as climate change, the expansion of legumes cultivated area, higher return frequency in crop rotation, pesticide issues (inefficiency due to insect resistance, health risks ...).

→ As no efficient alternative practices have been identified so far, our **objective** was to design **pesticide-free alternatives** to manage *Bruchus sp.* in lentil and fababean.

Literature review

& Tracking farmers' innovative practices allowing to manage *Bruchus sp.*

Gathered knowledge on all the phases of *Bruchus* life cycle using both literature review and entomologists' expertise, allowed us to identify **key ecological process** that could be modified to reduce *Bruchus* populations and their impacts (not shown).

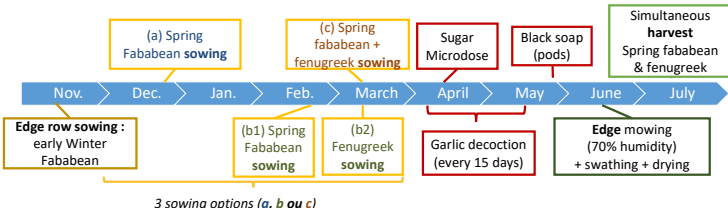
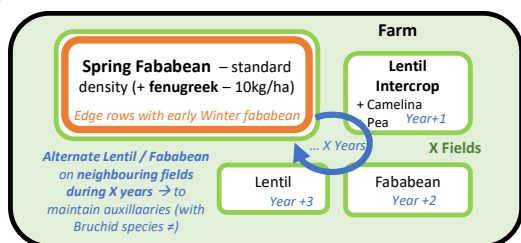


Tracking crop management practices (as in Salembier et al., 2021) implemented by **innovative farmers** (cf. illustration) resulted in complementary knowledge, compared to the literature review.

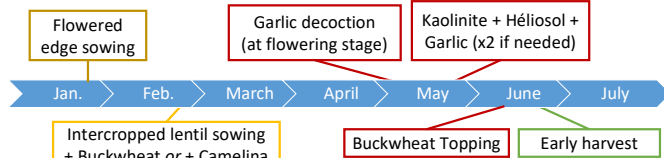
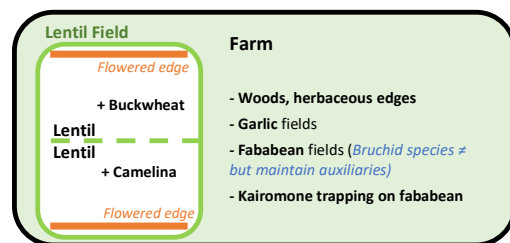
Co-designed prototypes of systems aiming at controlling Bruchids in fababean or lentil

All this knowledge was used in three **co-design workshops** to enhance the exploration of management options, involving a diversity of stakeholders, scientists from different disciplines (agronomists, entomologists, geneticists, ...), as well as farmers and agribusiness (agronomists, collectors). These workshops took place in **three different agricultural regions**, in order to consider specific and local contexts in the designed solutions.

Example of Co-designed system in the region of Grignon (78, France)



Example of Co-designed system in the region of Giscaro (32, France)



→ **Sharing biological processes, expert knowledge and innovative concepts enhanced creativity, thus resulting in the design of various prototypes, some of them being implemented in farmers' fields.**