Plan d'action sortie du phosmet

Adaptation of winter oilseed rape to Coleopteran pests in a context of climate change and Phosmet withdrawal.

Focus on the Adaptacol^2 project

Céline Robert, Laurine Brillault, Laurent Ruck, Arnaud Van Boxsom, Michael Geloen

Financed par :

Avec la contribution financière du compte d'affectation spéciale développement agricole et rural CASDAR

MINISTÈRE DE L'AGRICULTURE ET DE LA SOUVERAINETÉ ALIMENTAIRE

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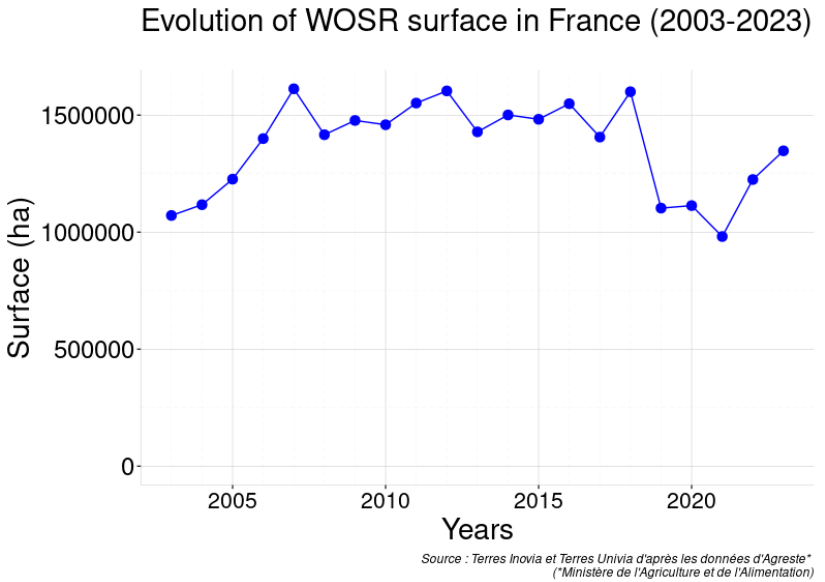
Context in France

- **Dryness at sowing (August)** -> difficulties in the establishement of winter oilseed rape WOSR.
- **Outbreak of some pests**, in particular cabbage stem flea beetle (*Psylliodes chrysocephala*) and rape winter stem weevil (*Ceutorhynchus picitarsis*).

➔ **WOSR is more exposed and susceptible to pests**

Cabbage stem flea beetle

Rape winter stem weevil



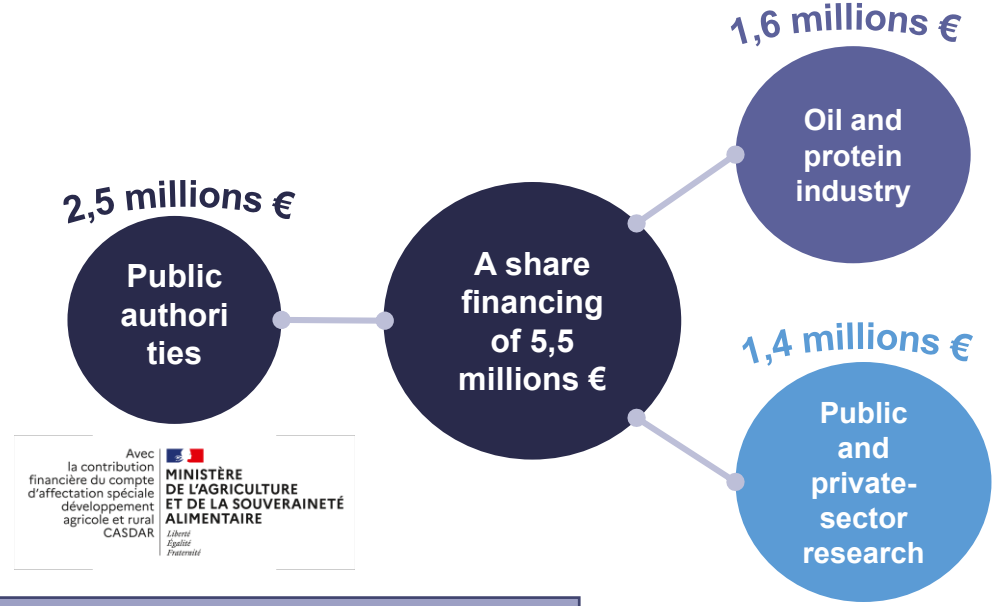
- **Insecticides are not sufficient enough** :

-Development of strong resistance to pyrethroids (*Bothorel et al., 2018*)

-Non-registration of active substances: **no insecticides available for use in autumn in some regions.**

➔ **Heavy losses of oilseed rape yield and surfaces**

➔ **More than ever, pest management requires a combination of agro-ecological levers.**



A massive 3-year (2022-2025) financing plan to find **new operational alternative strategies** to reduce attacks and harmfulness caused by these pests

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8 projects working on 4 axes

Plan d'action sortie du phosmet

Improving knowledge about pests and their natural ennemis

AdaptaCol² (Terres Inovia)
Epidemiology, biology of RWSW and natural ennemies

AltisOr (INRAE)
Characterisation of CSFB olfactory receptors

LEGO (INRAE)
CSFB intensive breeding

Deploying solutions to farmers

AdaptaCol² (Terres Inovia)

- Leading regional committees
- Support for the "Robust Rapeseed" initiative
- Updating decision rules and developing forecasting tools

Plan d'action sortie du phosmet

Identify solutions at field and landscape level

AdaptaCol² (Terres Inovia)
Evaluation of territorial strategies

Ctrl-alt (INRAE)
Development of a Push and Pull strategy using service plants and VOC*

Identify solutions at plant level

Biocontrol

Development

Colzactise (De Sangosse)
Formulation of a deterrent product

Ctrl-alt (INRAE)
Identification of attractive VOC*

Optimisation

Projet (Certis)
Outils technologiques associés à un produit de biocontrôle

VELCO-A (BASF)
Conditions for using an entomopathogenic fungus

AdaptaCol² (Terres Inovia)
Evaluating the effectiveness and conditions of use of new solutions

Genetics

RESALT (INRAE)
Resources for building CSFB-resistant varieties

AdaptaCol² (Terres Inovia)
Varietal classification of tolerance to pests

Agronomy

AdaptaCol² (Terres Inovia)

- Evaluation of levers to promote robustness in WOSR
- Varietal mixtures

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VOC = Volatile Organic Compounds*

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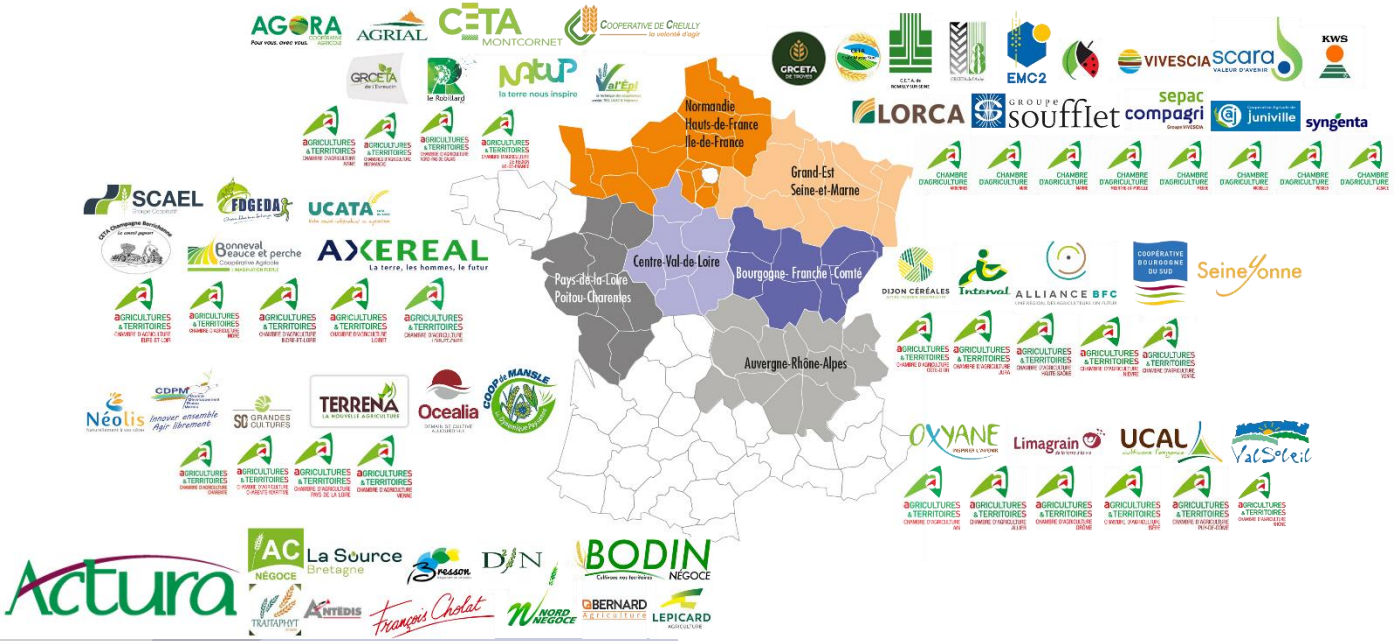
The Adaptacol² approach

Supporting farmers and agricultural technicians to find and adopt **as quickly as possible** new agroecological strategies **at different time and space scales**.

- Acquiring references on alternative levers
- Mobilising research and development stakeholders to provide coordinated support for farmers



With the participation for the equipment needed for experimentation:

- **Seeds** : Brevant, DSV, KWS Maïs France, KWS Momont, LG Semences, LIDEA, Mas Seeds, RAGT Semences, Semences de France
- **Crop protection products and biostimulants** : Syngenta, Corteva, Sumi-Agro, UPL, ViaVegetale, Adama, Gaiago.

Information sharing through regional meetings:

- More than 100 stakeholders involved (distribution, advisers, agricultural education, plant protection and seed companies)
- Presentation of technical results and feedbacks
- Co-construction of:
  - New management strategies
  - Protocols and trial networks
  - Concerted communication actions

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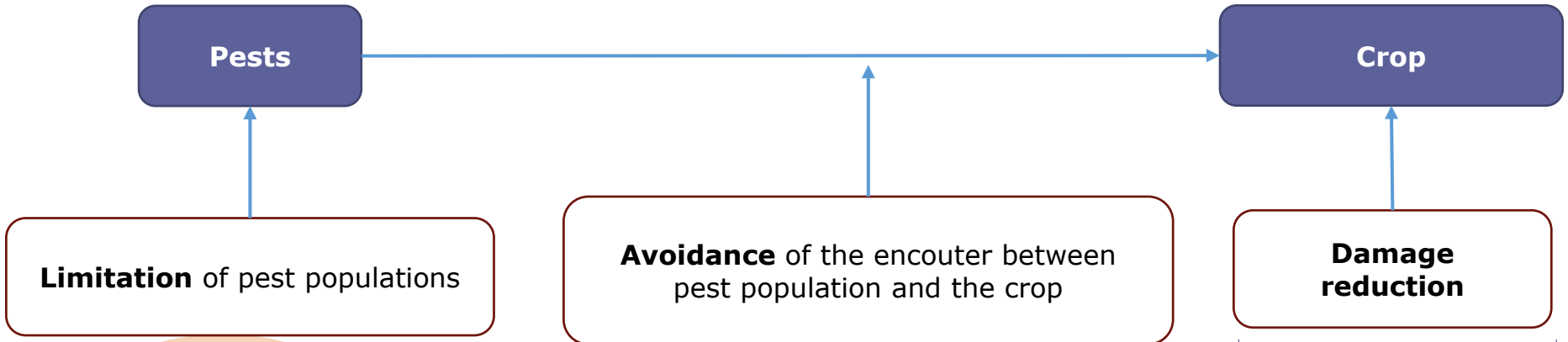
Support for the "Robust Rapeseed" initiative

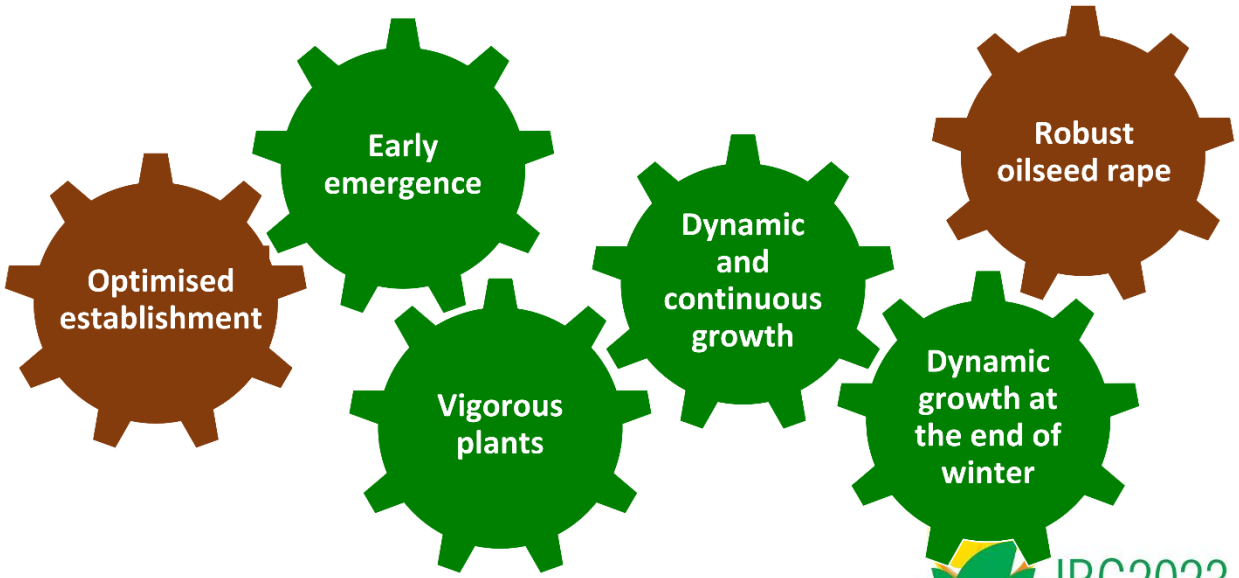


(Attoumani-Ronceux et al., 2010)

A robust oilseed rape

« Robust WOSR » initiative (Sauzet and Cadoux, 2019) :

An approach developed by Terres Inovia to understand and adapt the most favorable practices to the context of the field, based on plot observatories and support tools.



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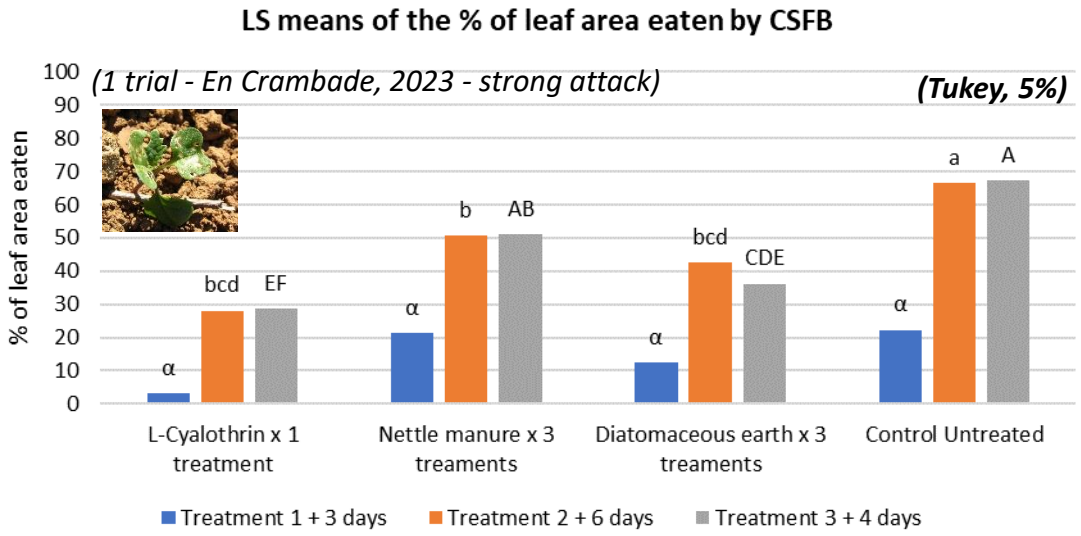
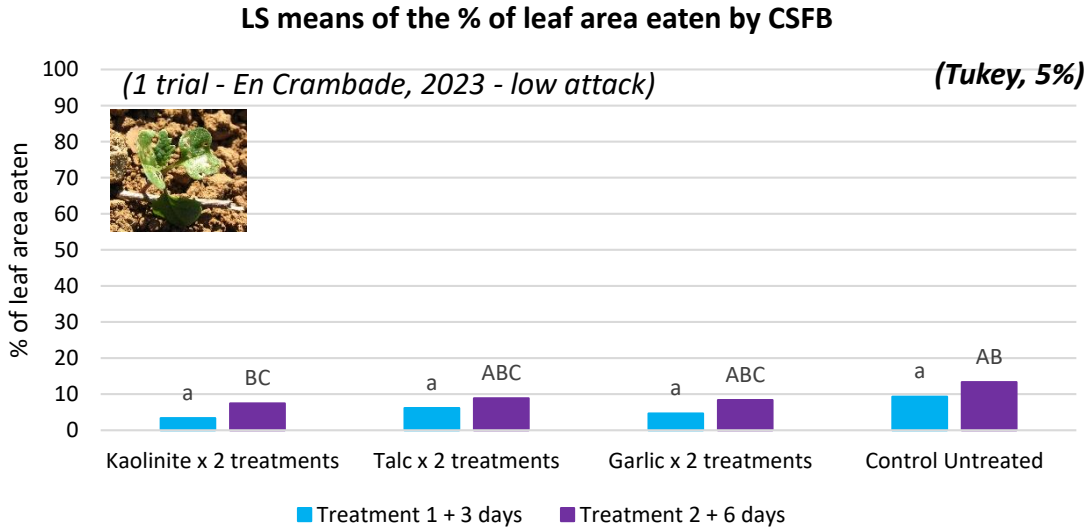
Evaluating the efficacy and conditions of use of new solutions

Since 2017/18, Terres Inovia tested more than 20 alternatives to insecticides against Coleoptera pests : macroorganisms, natural substances, …



Only 1 treatment of Karate Zeon (0.05L/ha). 3 applications for others modalities. Efficacy evaluated after each treatment.

Good efficacy of **diatomaceous earth**, similar to L-Cyalothrin (no strong pyrethroid resistance).



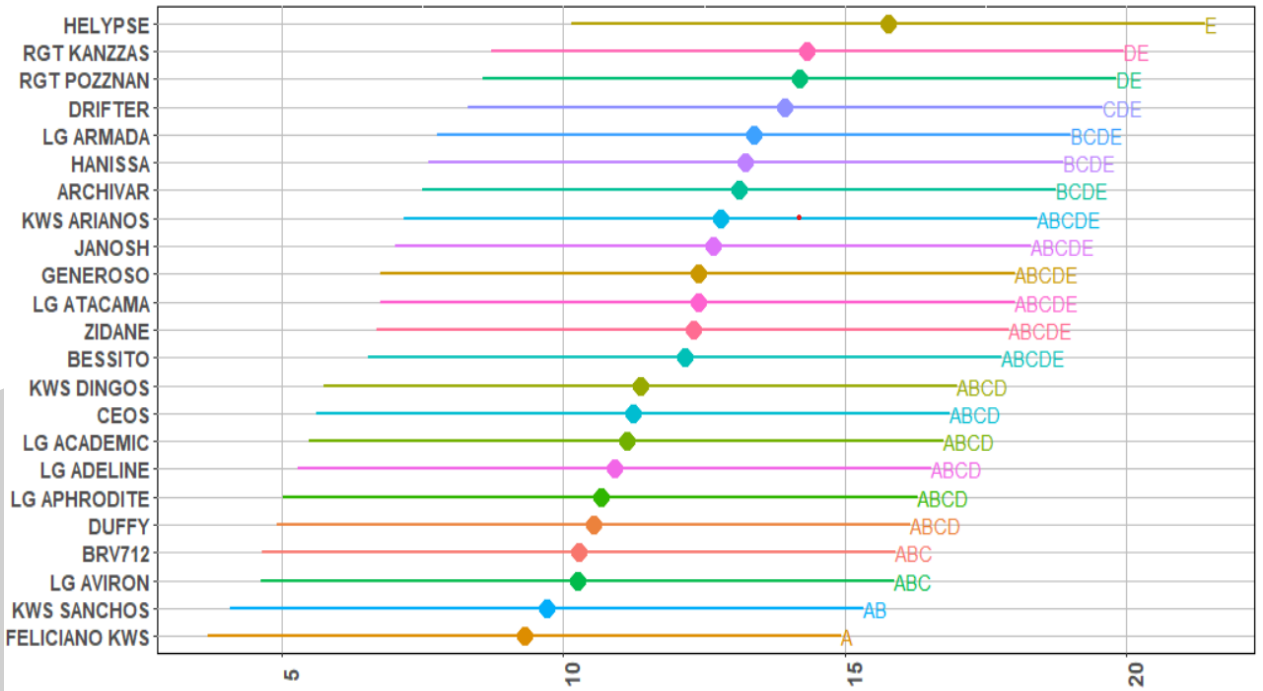
2 applications for each modality. Efficacy evaluated after each treatment.

Good efficacy of **kaolinite** after 1 or 2 applications in a low attack context.

- The efficacy is often limited, and conditions of use need to be defined.
  - Protocols have to be adapted and applications to be repeated.

Varietal classification of tolerance to pests

17 trials, 2023 – Tukey test – α=10%



Number of larvae per plant (adjusted and weighted average)

% of plants with symptoms	Number of larvae per plant					
		1 : low	2	3 : medium	4	5 : high
	1: low	FELICIANO KWS		LG ARMADA	KWS ARIANOS KWS WIKOS	
	2		LG ATLAS	ZIDANE	HANNELI	RGT KANZZAS
	3 : mediu m	KWS SANCHOS LG AVIRON	KWS DINGOS LG ACADEMIC LG AUSTIN RGT OZZONE	BESSITO GENEROSO LG ATACAMA	HANNISSA RGT POZZNAM RGT SWAZZI	HELYPSE
	4	HELIOTT ATTICA	BRV712 CEOS	JANOSH DUFFY HELLEKIS	BRV714 ARCHIVAR	
	5 : high				DRIFTER	LID ULTIMO

Varietal differences highlighted among marketed varieties *(Van Boxsom et Robert, 2022)* **:**

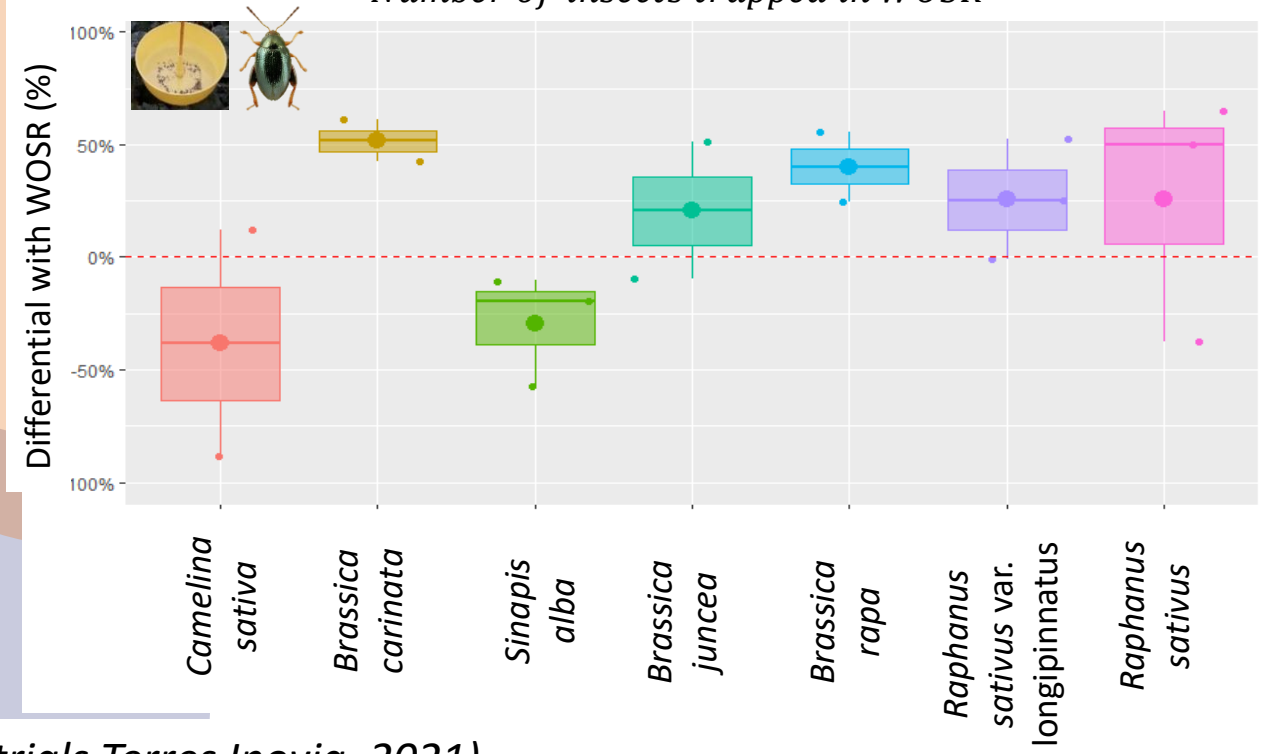
- Vigour
- Presence of CSFB larvae
- Insect damage

Provide an advice adapted to farmers

Evaluation of a territorial strategy

- Several cruciferous species are more attractive than *Brassica napus* for feeding and egg laying (Williams and Cook, 2010)
- Several studies have demonstrated the interest of using cruciferous plants at the field scale (mainly *Brassica rapa*) to manage CSFB (Buechi, 1990; Büchi, 1995; Barari *et al.*, 2005).

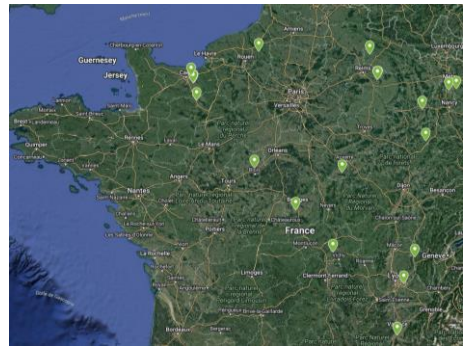
$$\frac{Number\ of\ insect\ trapped\ in\ the\ plot\ -Number\ of\ insects\ trapped\ in\ WOSR}{Number\ of\ insects\ trapped\ in\ WOSR}$$



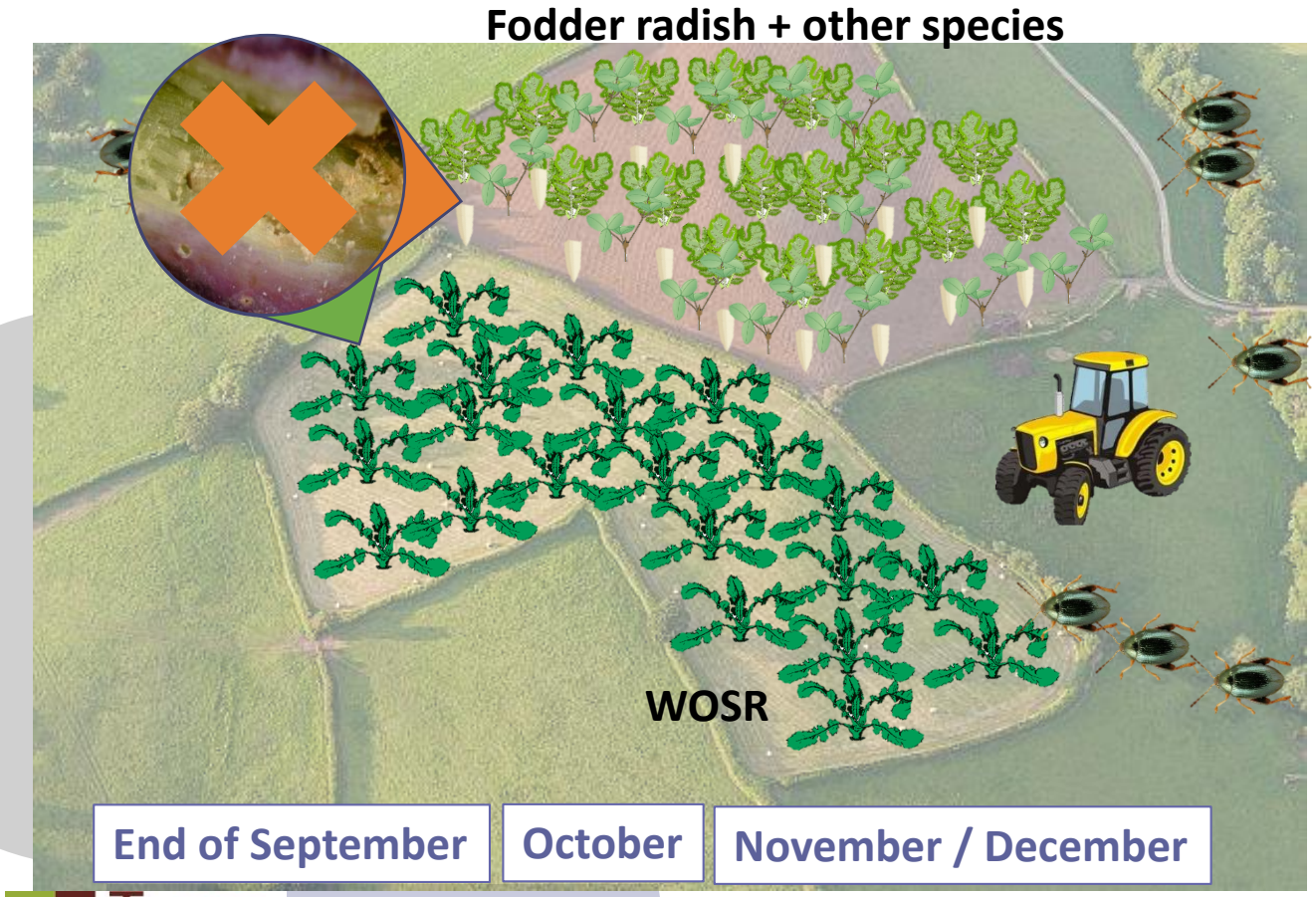
Raphanus sativus var. longipinnatus

(3 field trials Terres Inovia, 2021)

Evaluation of a territorial strategy



Divert CSFB (and RWSW) away from WOSR fields during flight periods by using crucifers that are more attractive than oilseed rape.



A strong mobilisation of stakeholders to test this strategy :

- In 2023 -> at least 17 networks of fields monitored (WOSR + trap crops), including R2D2
- In 2024 -> the evaluation is ongoing.

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Conclusion

- **Le project Adaptacol[2] aims to**:
  - Built with development and research stakeholders agrecological strategies.
  - To support the deployment of solutions so that they can be rapidly adopted by all.
  - Explore as many levers as possible, that can be mobilised as part of an integrated protection strategy, both at the field and regional level.
  - Incorporate the results of the other Plan projects as soon as possible.
- **A very strong mobilisation of partners ... and collaborators of all professions of Terres Inovia. Many thanks to all!**

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Thank you for your attention.

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