



Combining agronomy and conservation biological control at a territory scale for pest management

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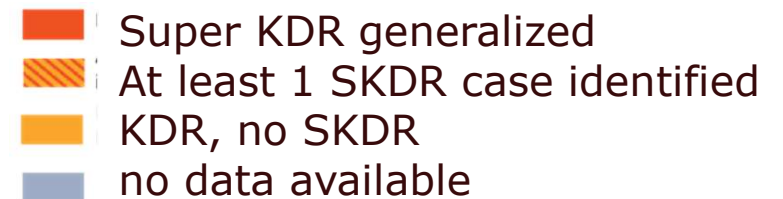
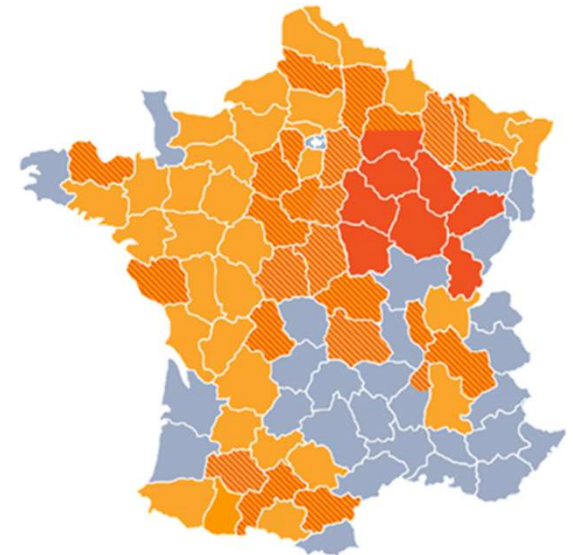
R2D2, an innovative territorial approach

R2D2 respond to several issues :

- Pest outbreaks in WOSR
- Reduction in the number of insecticide molecules available
- Major development of insect resistance to pyrethroids
- Climate change
- Environmental issues

→ **Adaptative management approach to increase crop system resilience and face hazards while reducing insecticide applications**

Cabbage stem flea beetle
pyrethroid resistance
situation in 2022



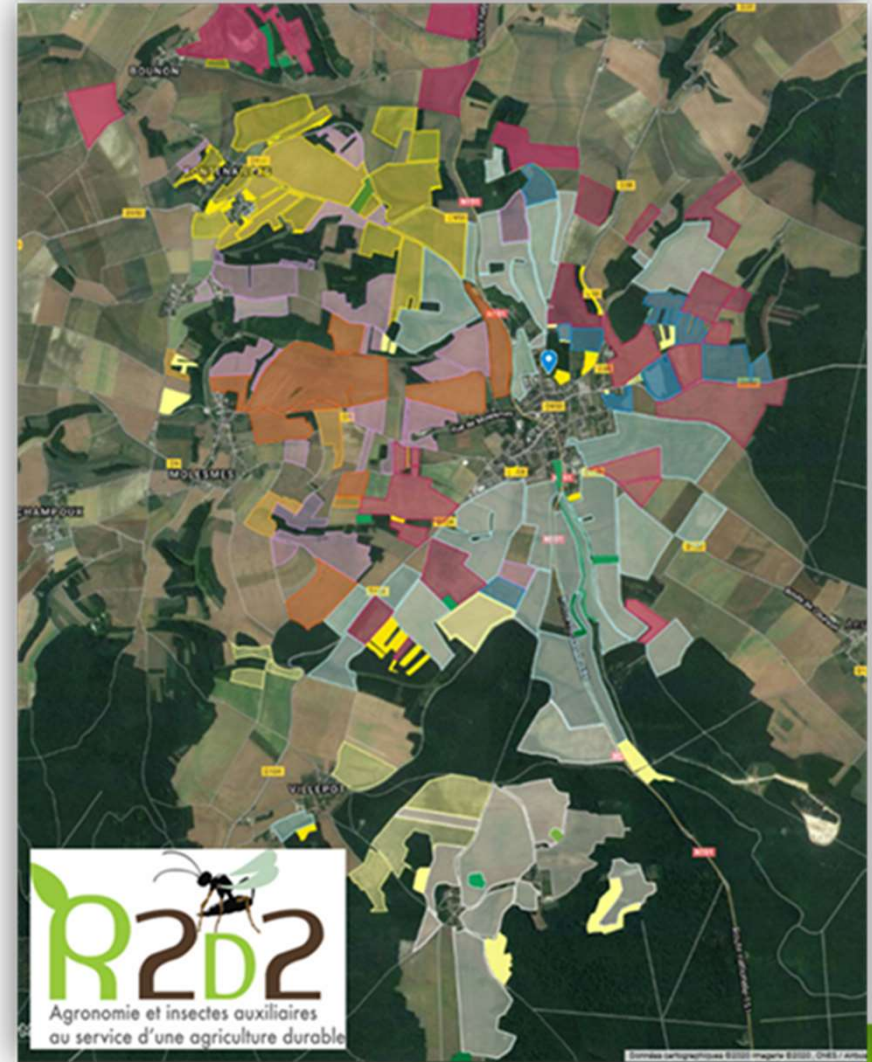
R2D2 Project Goals

- Duration : 6 years
- 1330 ha of field crops
- 10 famers involved
- +5 farms outside territory

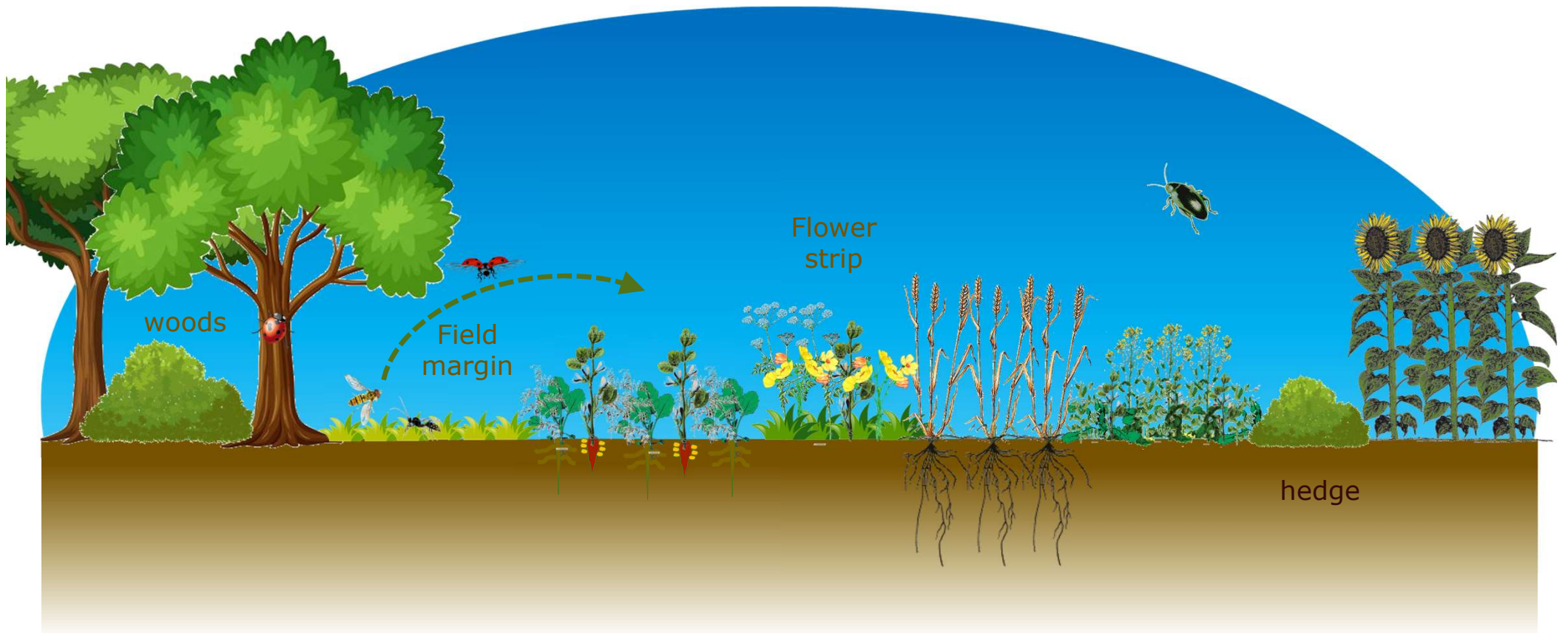
OBJECTIVES :

-**Help farmers** to manage pests with low insecticides input

-**Study** outbreaks, biological control, natural enemies' biology, crop damage, yields...



Working areas on R2D2 project territory



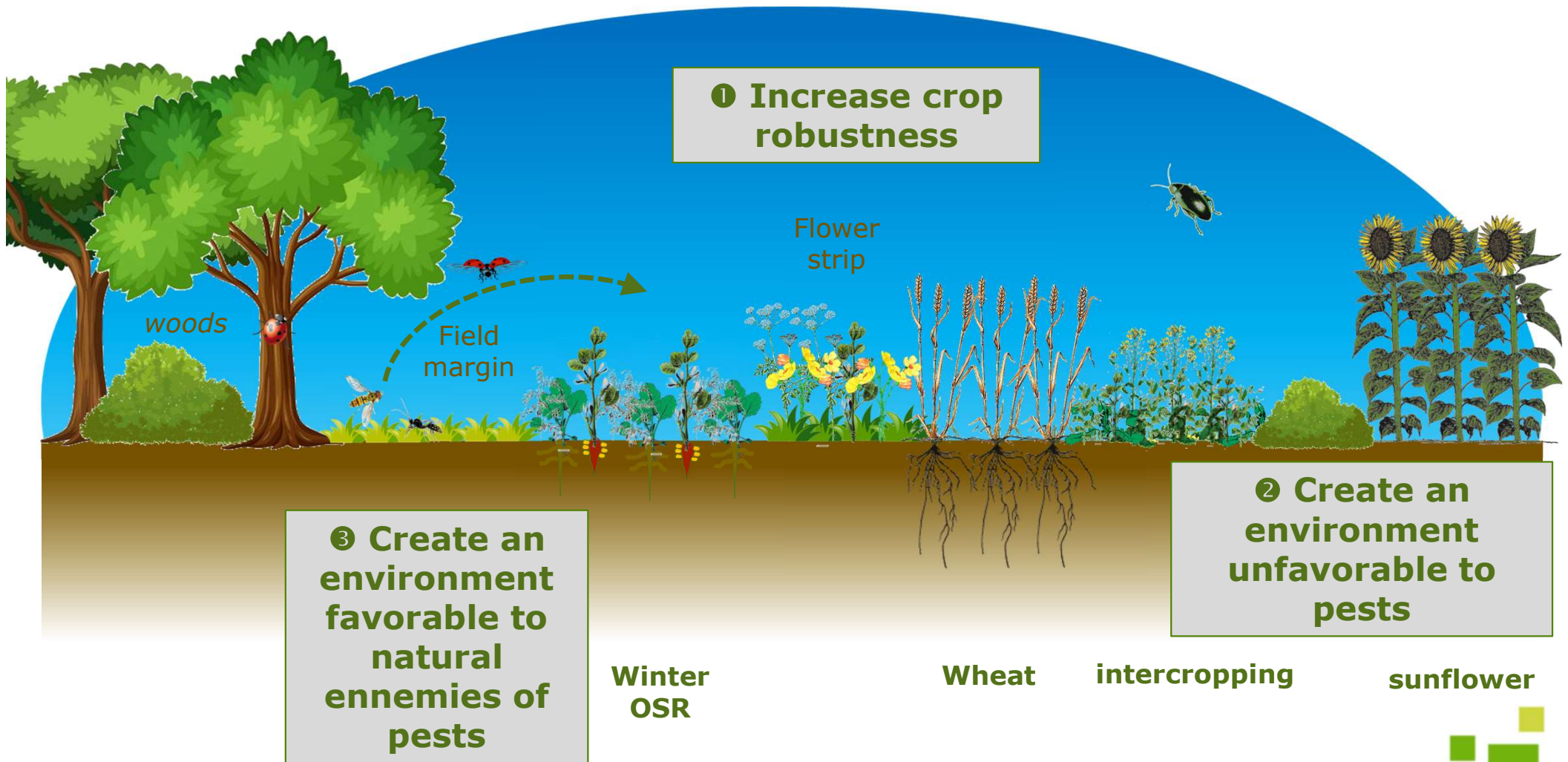
Winter
OSR

Wheat

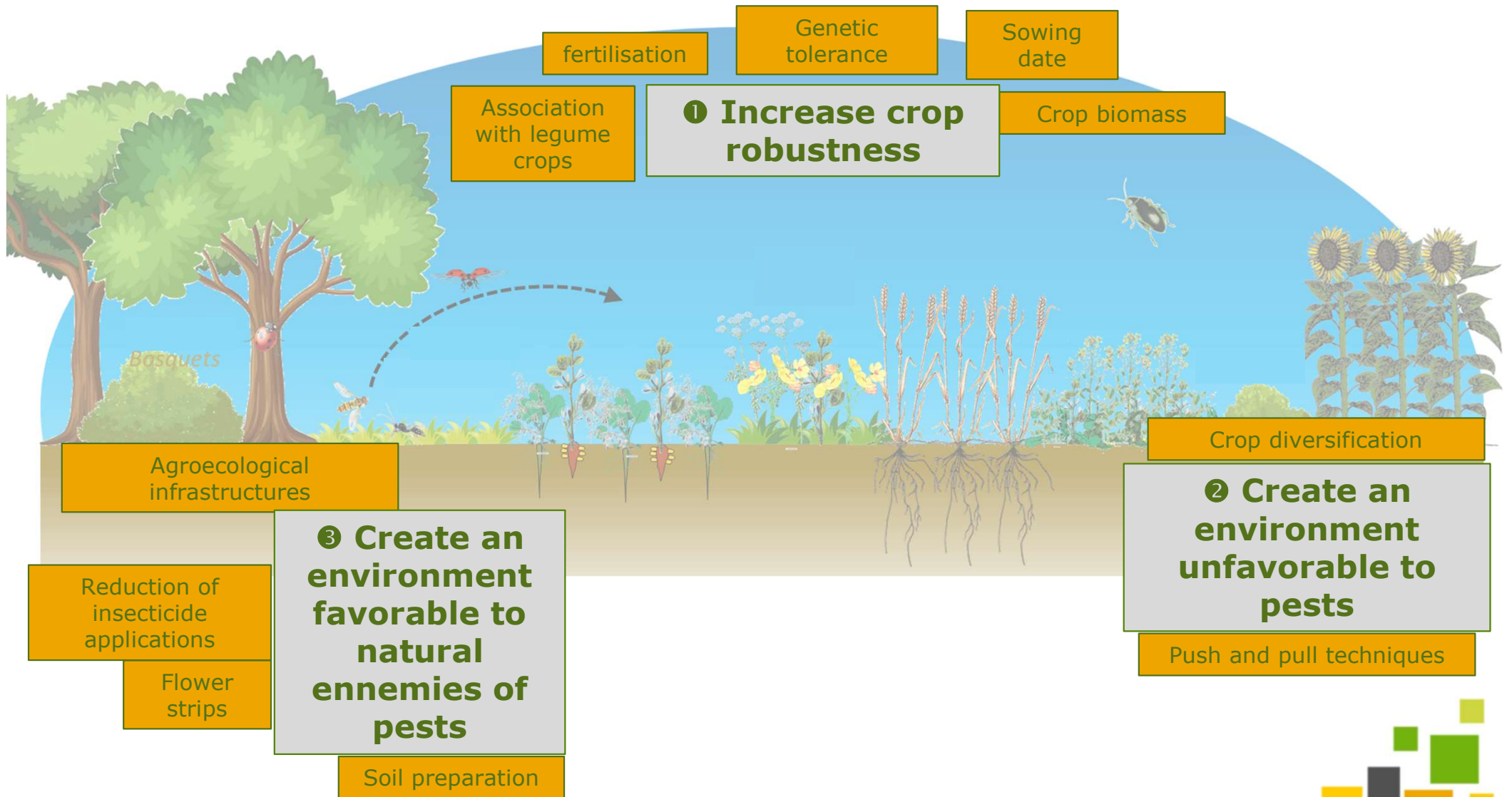
intercropping

sunflower

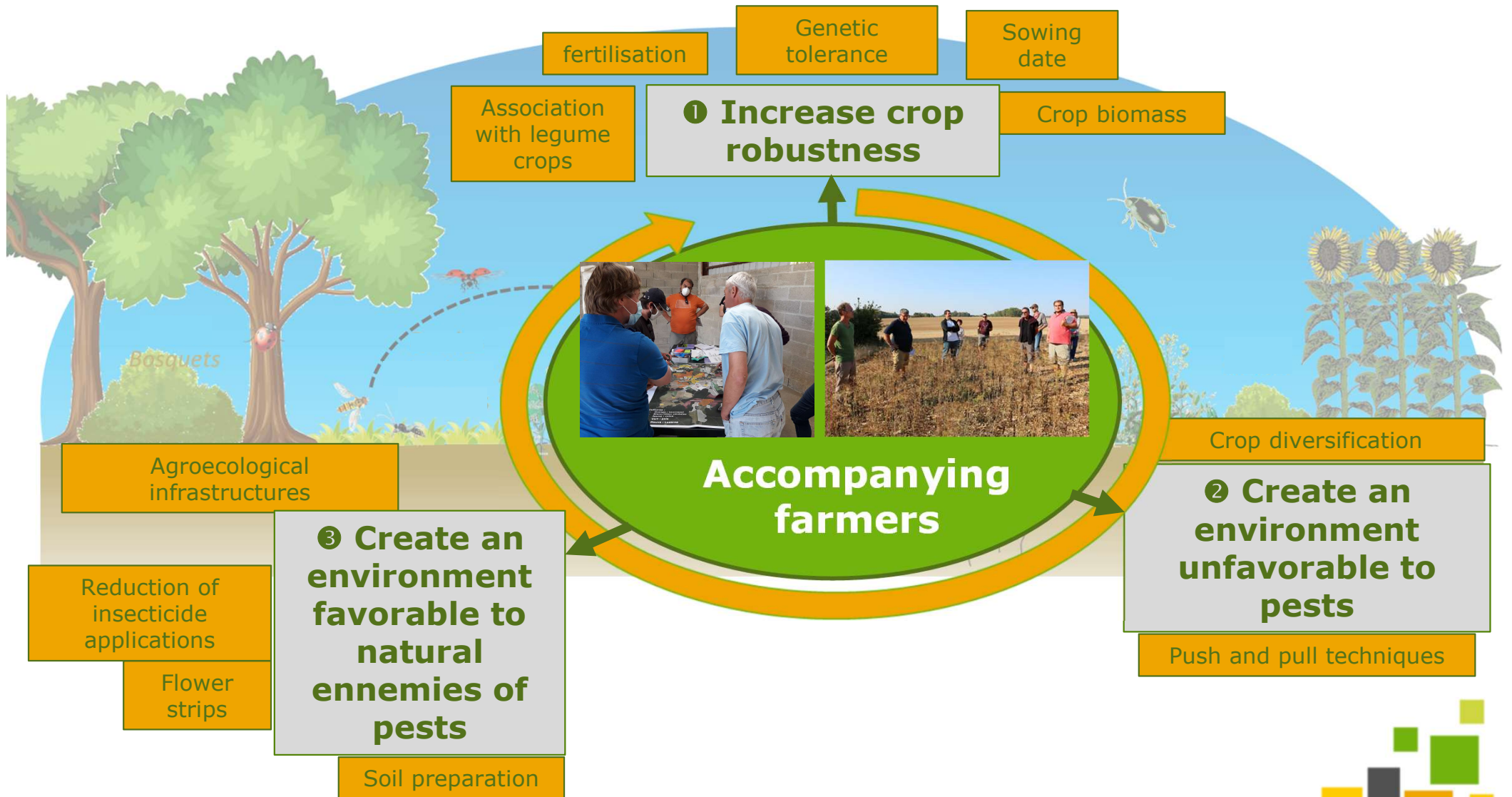
Working areas on R2D2 project territory



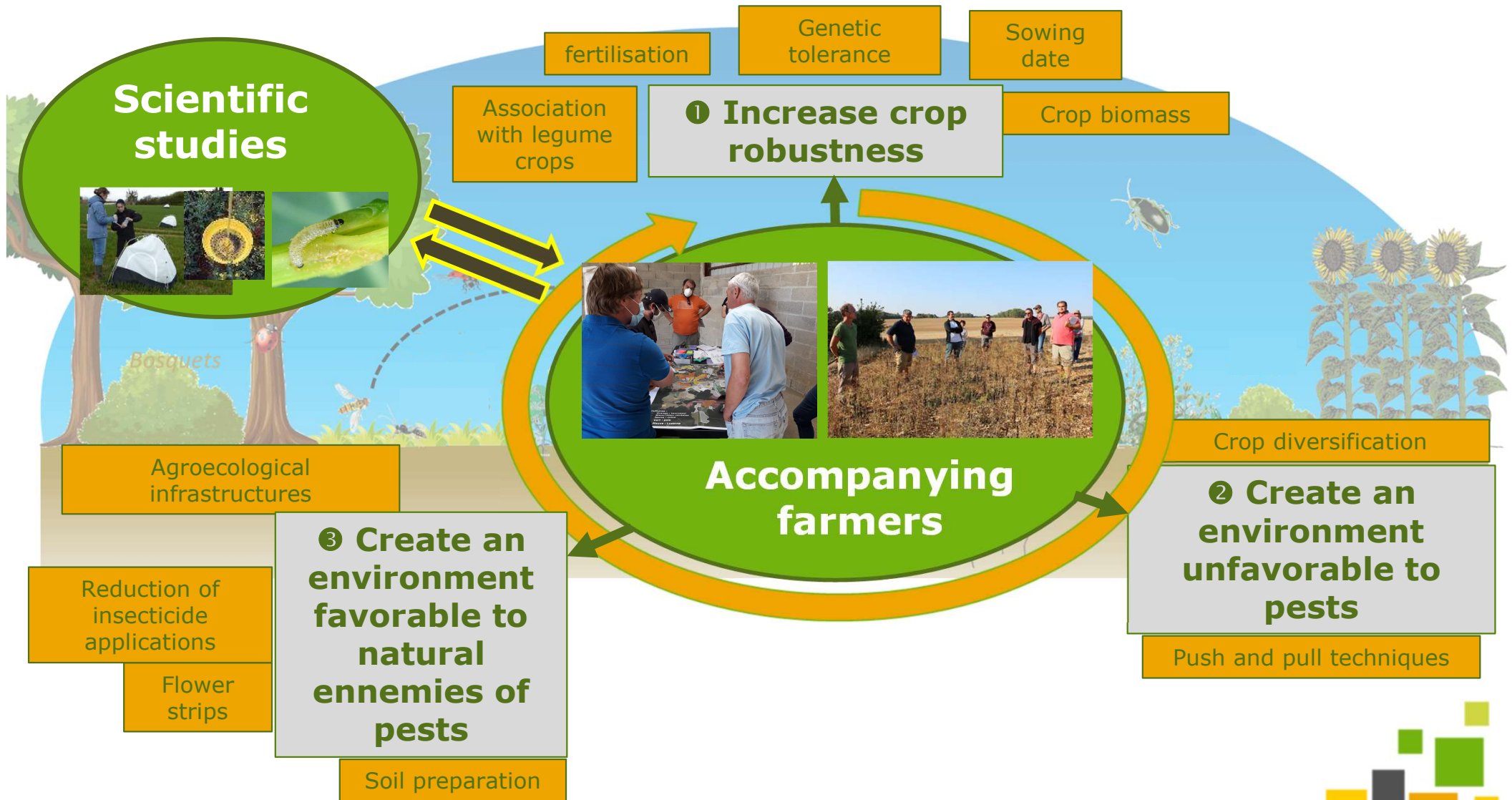
Working areas on R2D2 project territory



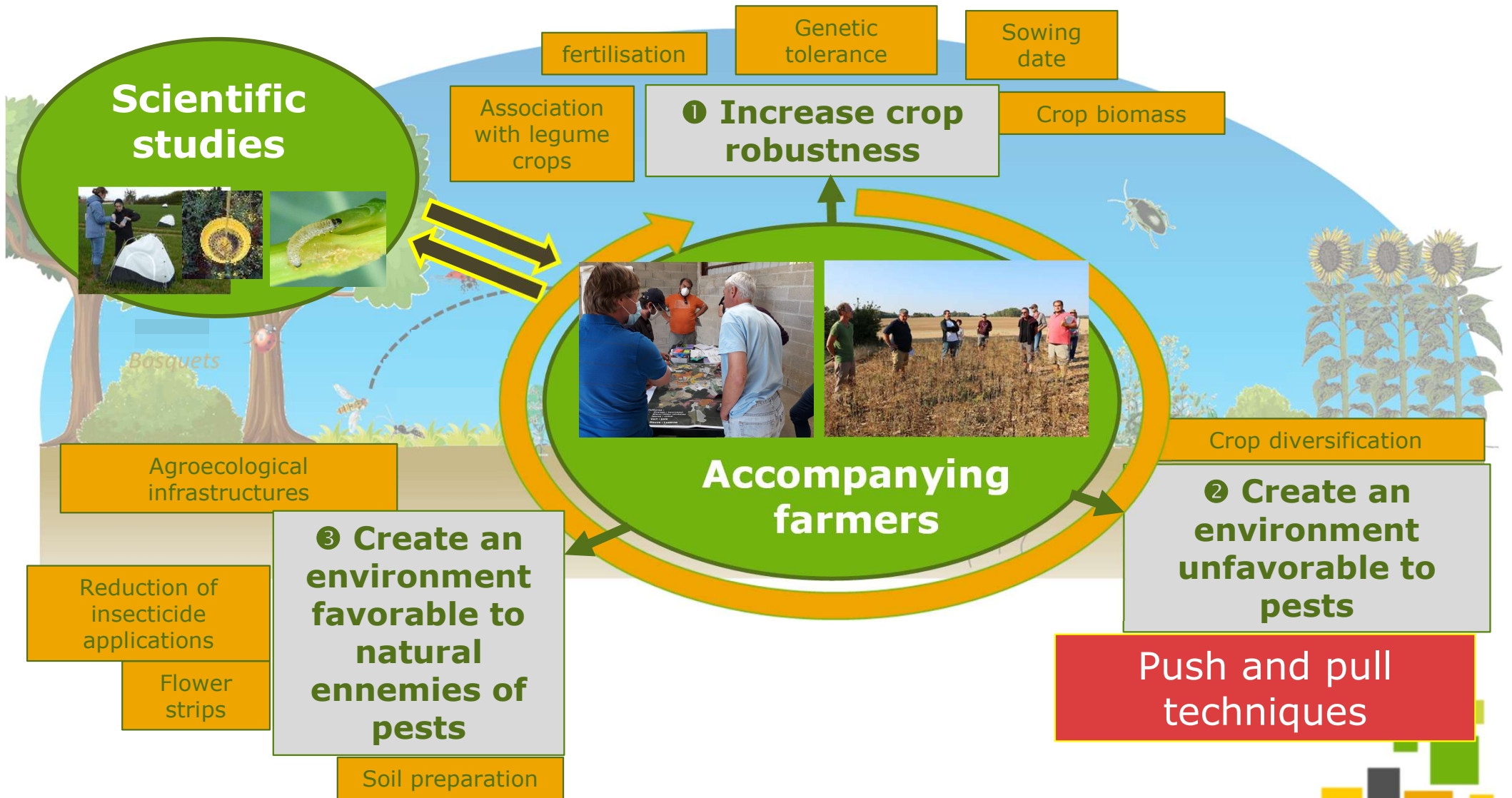
Working areas on R2D2 project territory



Working areas on R2D2 project territory



Working areas on R2D2 project territory



Large scale experiment :

Push & pull technique to trap cabbage stem flea beetle



Which
cover crop
can
attract
this
insect?



Selection of the best Brassica candidates to sow at large scale

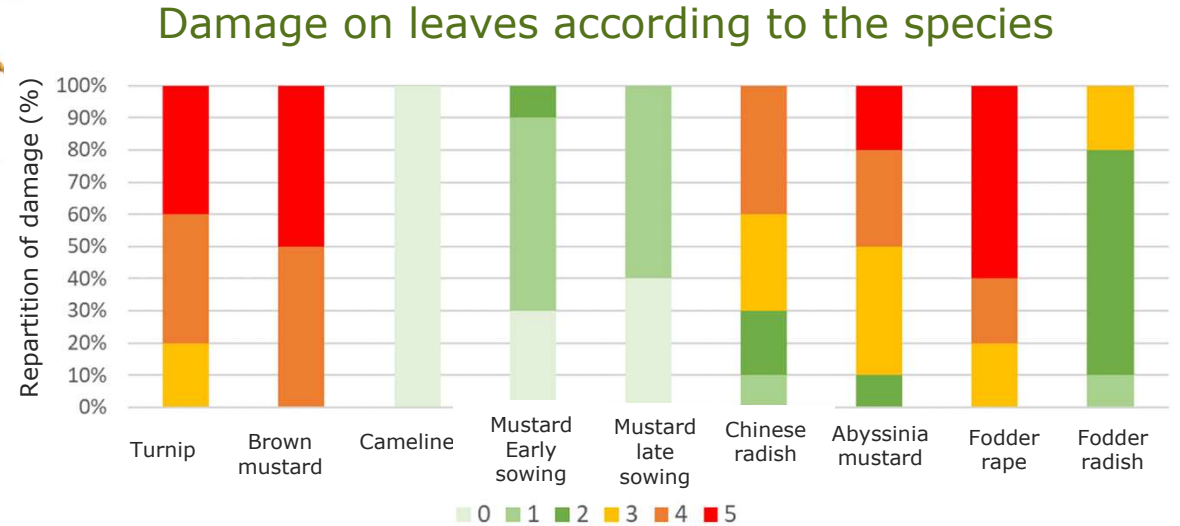
One experimental platform to determine different Brassica species' attractiveness for cabbage stem flea beetle

TURNIP
BROWN MUSTARD
CAMELINE
WHITE MUSTARD var Architect
WHITE MUSTARD Var Verte
CHINESE RADISH
ABYSSINIA MUSTARD
FODDER RAPESEED
FODDER RADISH

Measurement of the damage on leaves

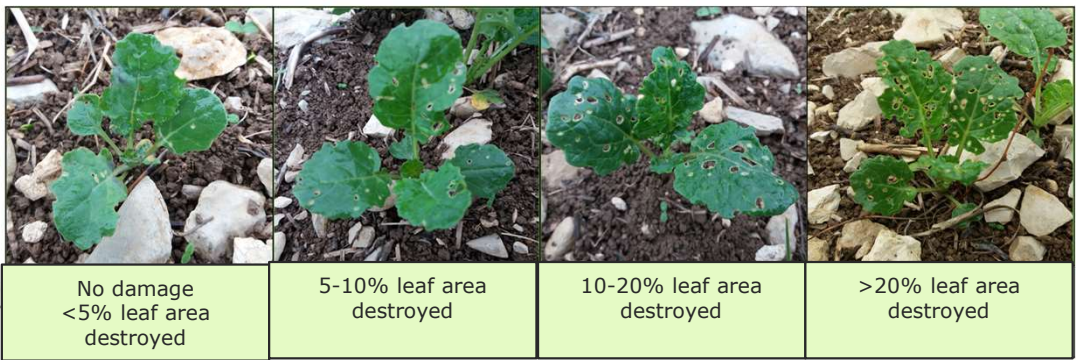
CABBAGE STEM FLEA BEETLE

OCTOBRE 9 2020



Cameline

DAMAGE SCALE:



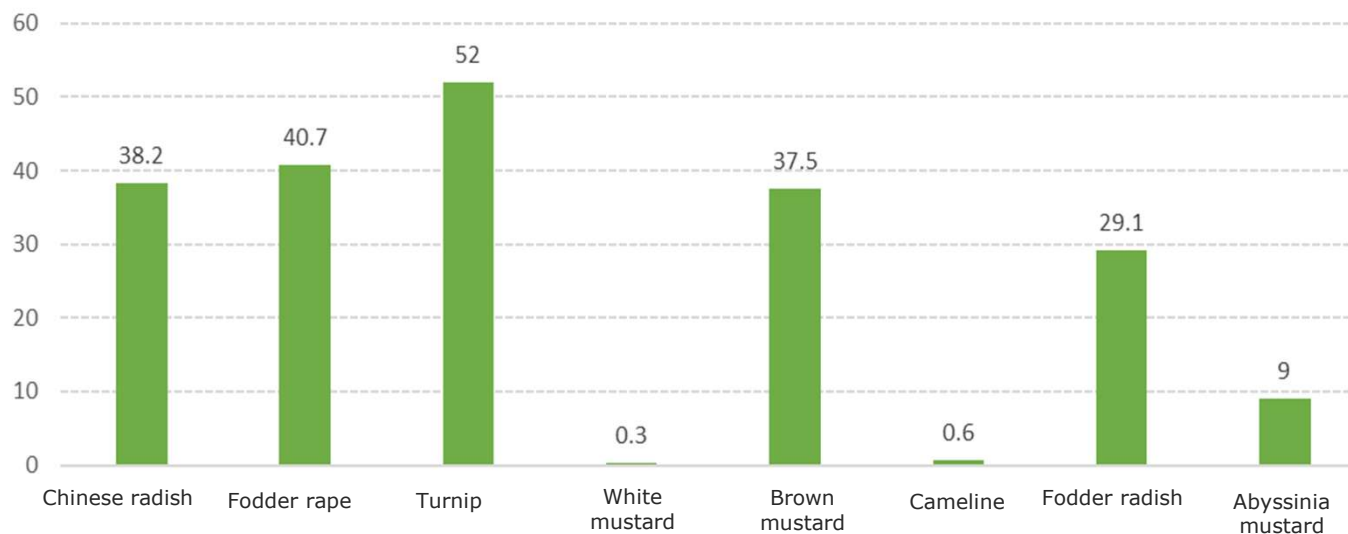
Leaf area destroyed

- 0 : <5%
- 1 : 5-10%
- 2 : 10-20%
- 3 : 20-30%
- 4 : 30-40%
- 5 : >40%



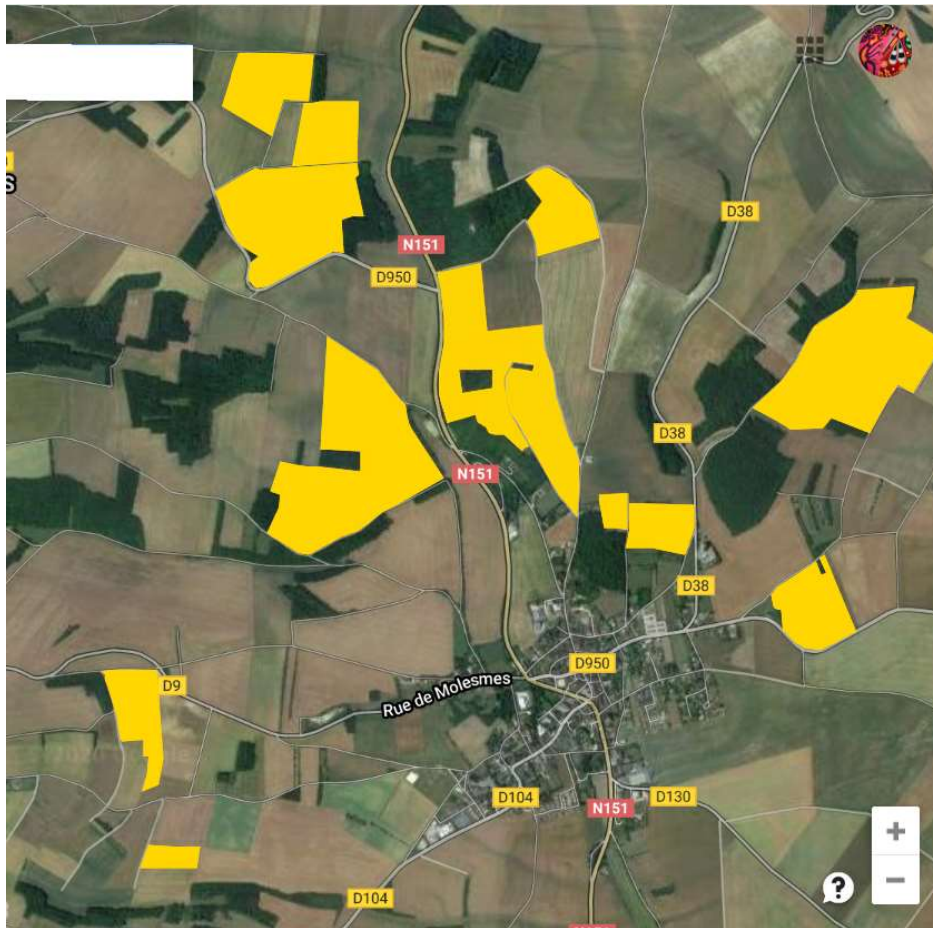
Measurement of cabbage stem flea beetle larvae pressure in plants

Number of larvae per plant



February 15, mechanical destruction of cover crops

Sowing best candidates at large scale

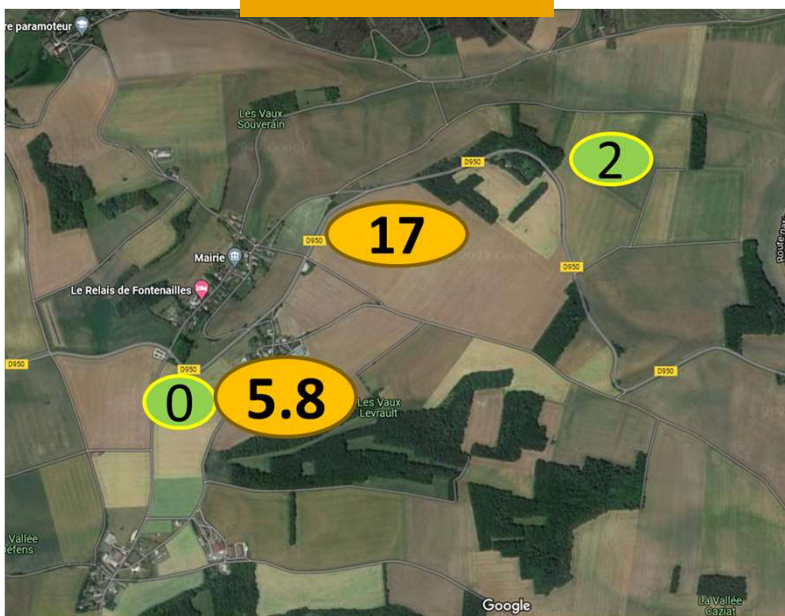


- In 2020 and 2021, approximately 250 ha of intercropping containing turnip and Chinese radish sown in R2D2 territory.
- Intercropping and OSR sown at the same time.
- Aimed density : 15-20 plants per square meter

Cabbage stem flea beetle larvae presence on intercropping

Exemple of 2 sites on R2D2 territory

AREA 1



AREA 2



Nb of larvae per plant

-  <5 larvae
-  >5 larvae
-  WOSR
-  Intercropping

→ We now have to check whether cabbage stem flea beetle adults are likely to emerge in the next generation in spite of intercropping destruction

Conclusion

- Working at a territory scale with 10 farmers allow to test innovative solutions :
 - To improve biological control (flower resource, natural habitats)
 - To reduce pest pressure (push & pull techniques)
- First results in experimental conditions and on farms at territory scale are encouraging
- Further investigations are needed to check whether the techniques are fully operative

Thank you for your attention !

Projet R2D2 : « Restaurer la Régulation naturelle et améliorer la robustesse des cultures pour réduire Durablement la Dépendance aux insecticides sur les plateaux de Bourgogne »

Many thanks to :

- Farmers

- Partners :

INRAE

ARVALIS
Institut du végétal



SeineYonne
union des coopératives
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soufflet
agriculture

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- Financial support :

