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Exploring machinery management logics for implementing species mixtures

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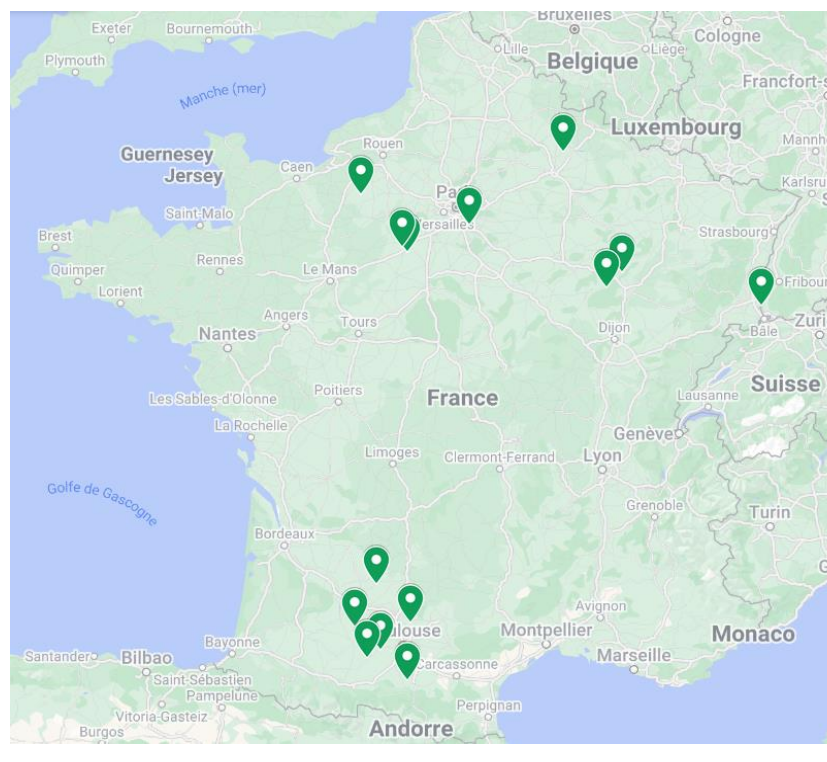
Context and objective

Species mixtures are a key lever for the agroecological transition (Bedoussac et al., 2015)

Access to suitable agricultural equipment is an obstacle to their development (Morel et al., 2018; Bellon-Morel et Hyughe, 2017).

Understand how farmers manage their equipment to implement different species mixture in their particular situation

Method



Tracking on farm innovation approach (Salembier et al., 2021)

Interviews of 14 farmers growing mixtures in different farming situations in France

Cross analysis of the farmers' practices to build categories of i) species mixtures, through the lens of equipment, ii) of agricultural equipment management logic in different farming situations.

Result ① - Characteristics of species mixtures through the lens of agricultural equipment

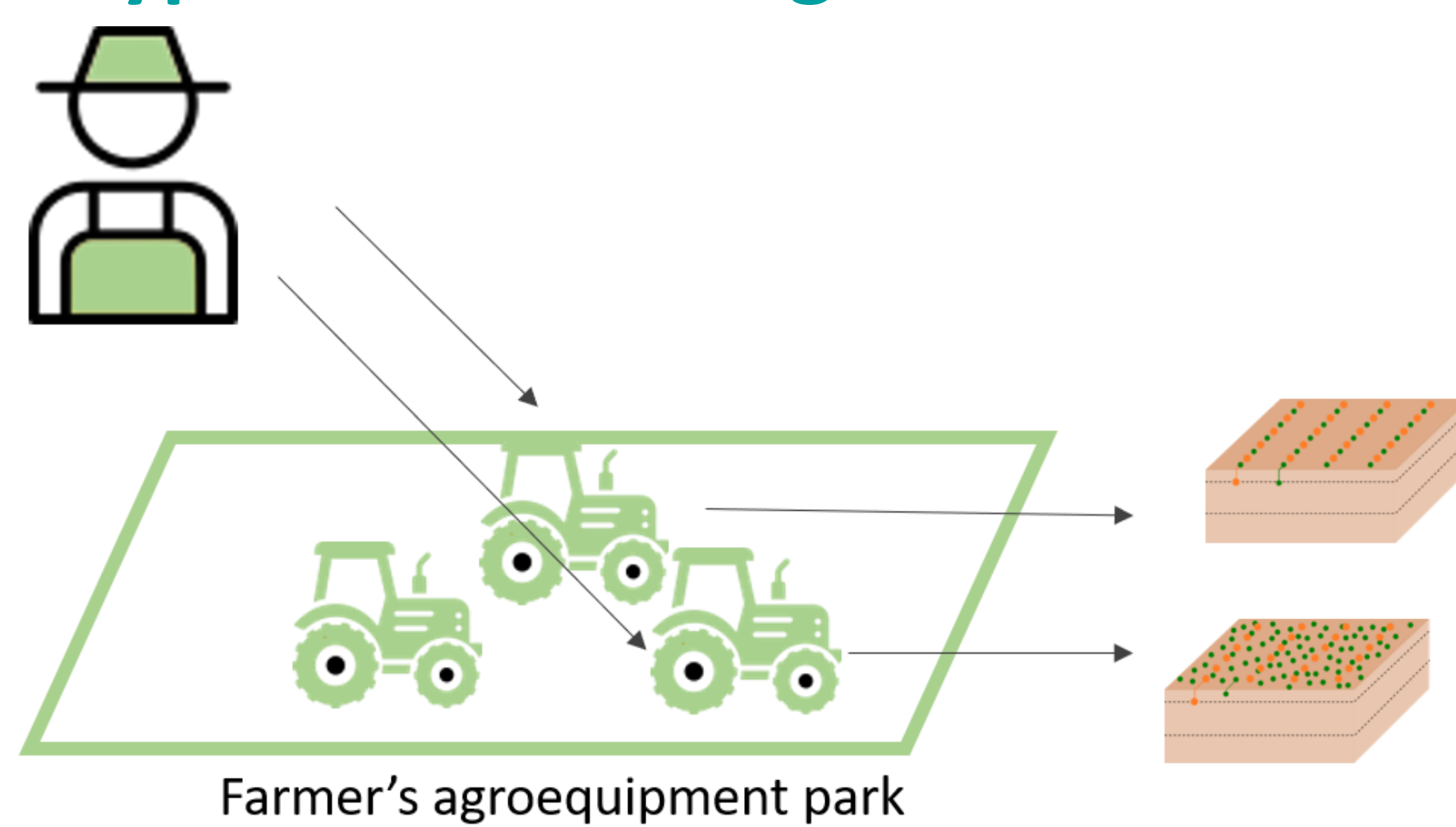
	Species sown on the same row	Species sown on different rows	At least one specie sown broadcast
Species sown at the same depth	<p>Type 1 wheat – faba bean triticale – pea oat – pea ...</p>	<p>Type 2 wheat – faba bean</p>	<p>Type 3 wheat – faba bean wheat – pea ...</p>
Species sown at different depths	<p>Type 4 rapeseed – faba bean</p>	<p>Type 5 wheat – faba bean rapeseed – faba bean...</p>	<p>Type 6 wheat – faba bean maize – soybean – clover ...</p>

- 22 species mixtures identified of which 17 cereals-legumes
- Wheat – faba bean is the most cultivated (8 farmers out of 14)
- 9 farmers cultivate two or more species mixtures
- According to farmers, two major characteristics of mixtures interplay with equipment logics: **the spatial arrangement of the species and their sowing depth**

→ No specific type for a given species mixture (e.g. wheat-faba bean in types 5 and 6)

Result ② - Equipment management logic to practice species mixtures

Type A: Minimizing mechanization costs by repurposing the existing farm equipment



Example Sowing combination: Microgranulator electric distribution and single-seed drilling (repurposed)

Species mixture: sunflower – alfalfa – clover

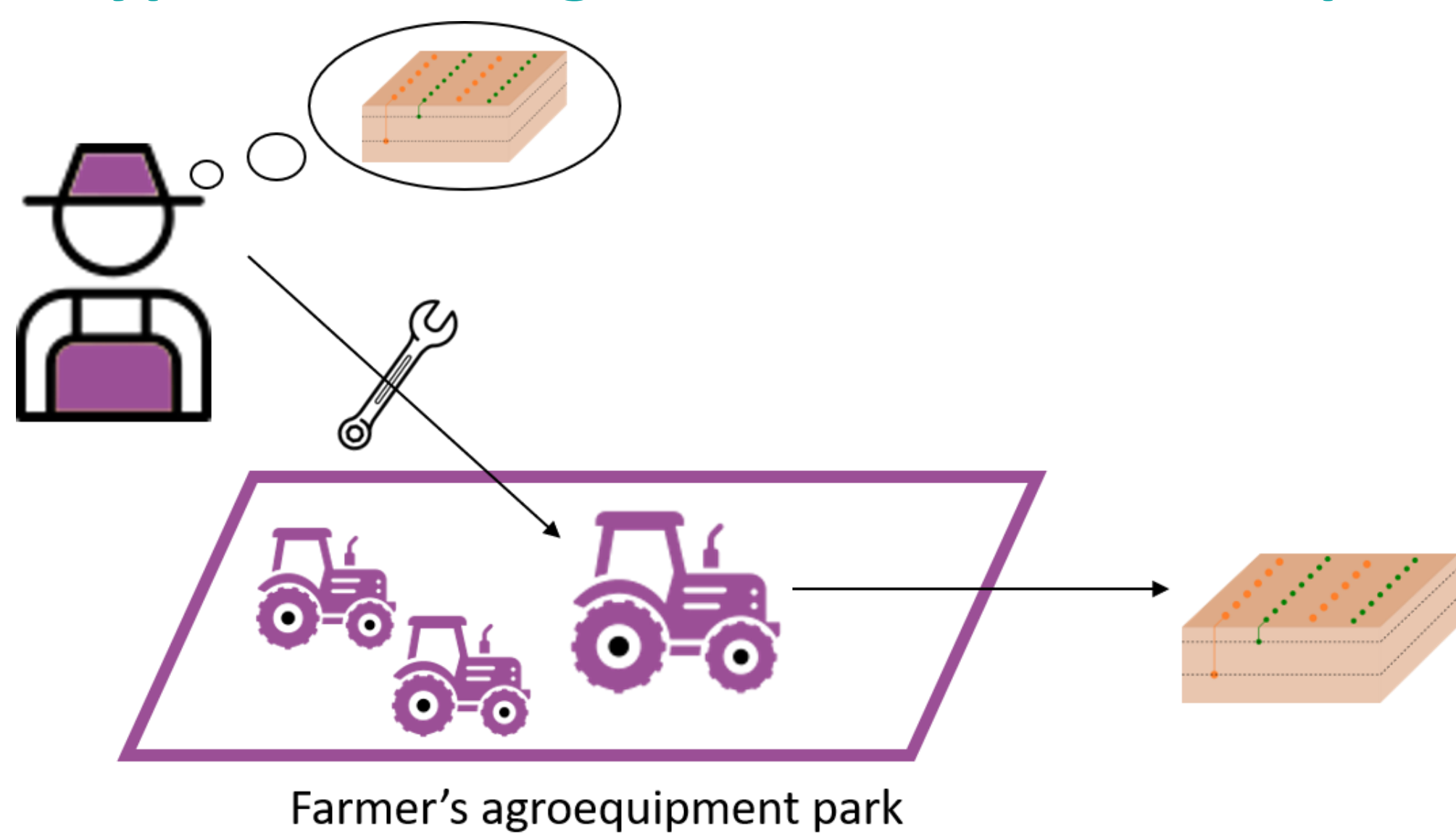
Harvesting: only sunflower is harvested

Sorting: none

Microgranulator electric distribution used to sow the mixture alfalfa – clover



Type B: Sowing mixtures based on species characteristics by adapting equipment



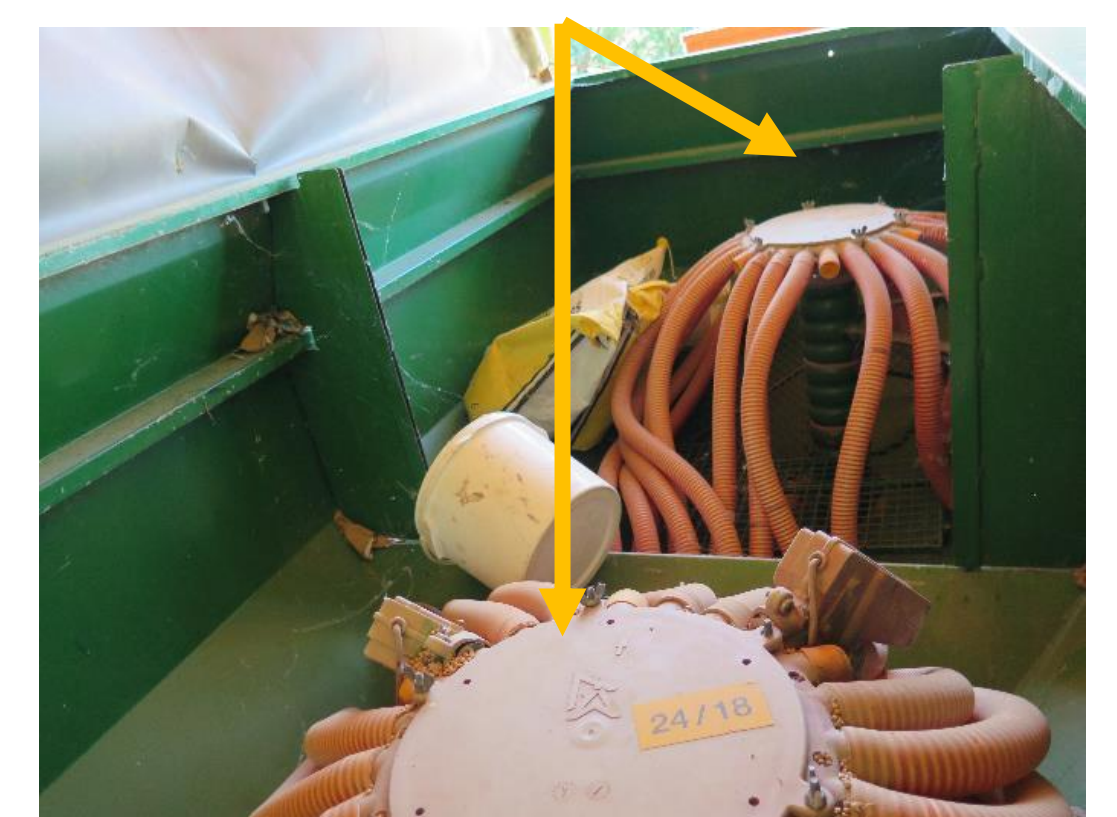
Example Sowing combination: no-till seed drill and hopper partitioning (tinkering)

Species mixture: wheat – faba bean

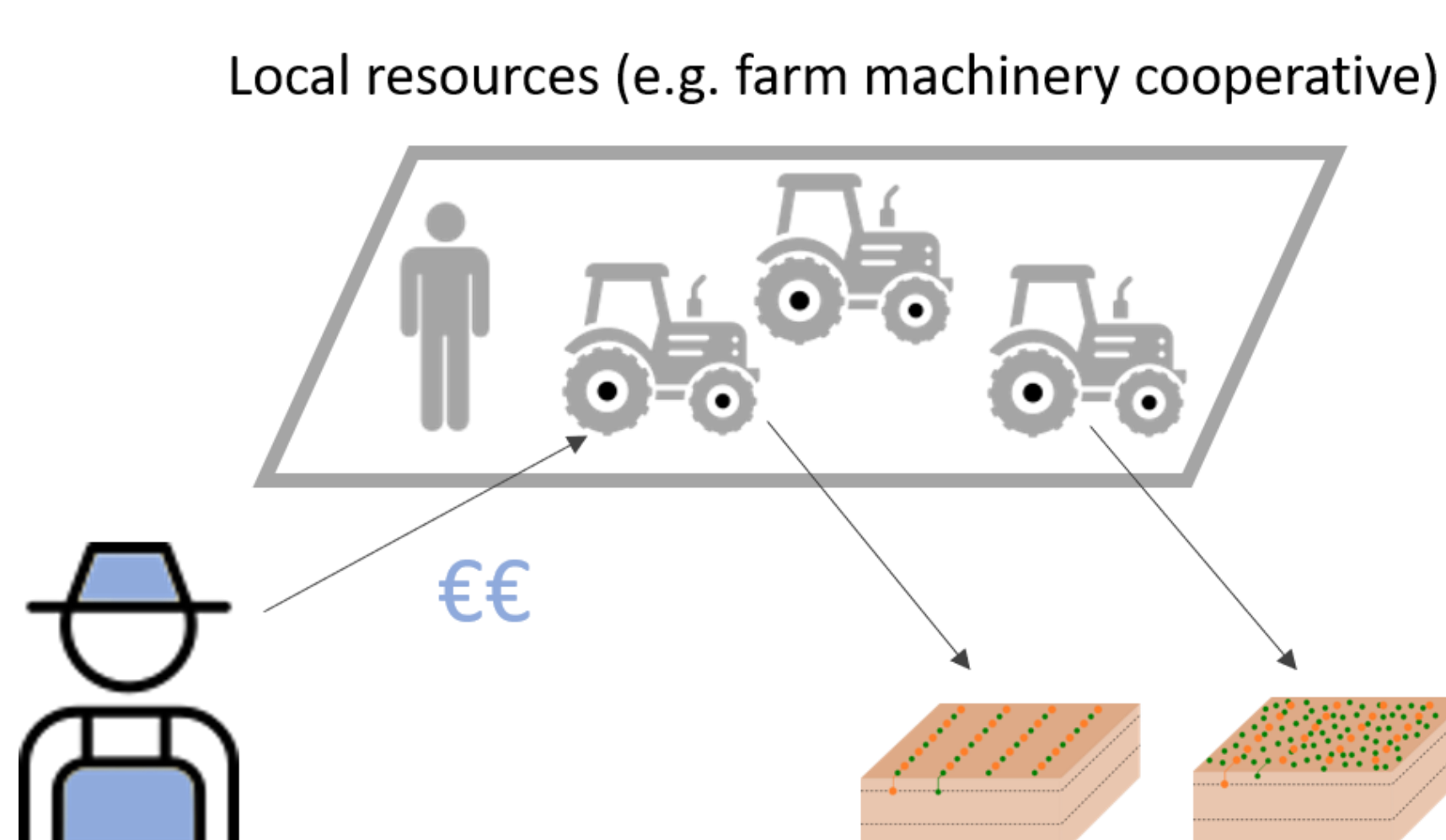
Harvesting: combine harvester

Sorting: rotary separator (service)

2 distribution heads



Type C: Choosing species mixtures and equipments according to resources available locally



Example Sowing combination: fertilizer distributor

Species mixtures: barley – lentil; buckwheat – clover; wheat – faba bean

Harvesting: diverse harvesting machines that adapt to each type of species mixture (service)

Sorting: sorting chain from rotary separator to optical sorter (service)

DP12 fertilizer
©Chambre d'Agriculture du Nord Pas de Calais



Conclusion

The agricultural equipment park is another way to study species mixtures that has remained unexplored until now, even though it is central to the development of this practice in mechanized agriculture. Our work opens up new perspectives by considering different *equipment management logics* – a concept we develop for this study – to support the development of agroecological practices.

References

Salembier et al., 2021 <https://doi.org/10.1007/s13593-021-00713-z>; Bedoussac et al., 2015 <https://doi.org/10.1007/s13593-014-0277-7>; Morel et al., 2018 <https://doi.org/10.1371/journal.pone.0229910>; Bellon-Morel et Hyughe, 2017 <https://doi.org/10.1051/ocl/2017028>