Experiment #2, Brittany, France:

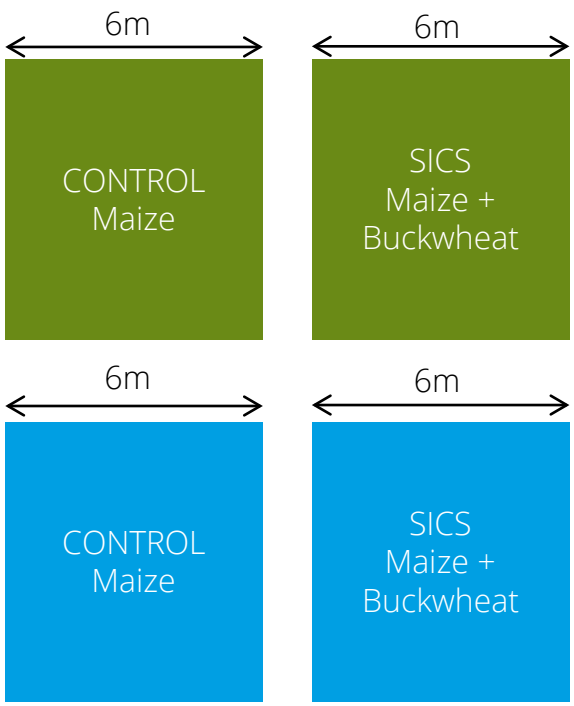
SEEDING OF A COVER CROP IN MAIZE (ON THE ROW) FOR REDUCING MECHANICAL OPERATIONS AND IMPROVING WEED CONTROL

The problem

Weeds and soil compaction: Organic maize cultivation requires a succession of weeding operations (harrow, rotary hoe, interrow hoe) to control weed pressure. As these tools are drawn by a tractor, these numerous interventions can negatively impact soil compaction. These techniques also have a low-efficiency in controlling weeds on the cultivated row.

The proposed solution

This experiment trialled the sowing of a cover crop in maize (on the row). The objective was to reduce the number of mechanical interventions, thus limiting soil compaction and reducing weed development on the cultivated row (maize).

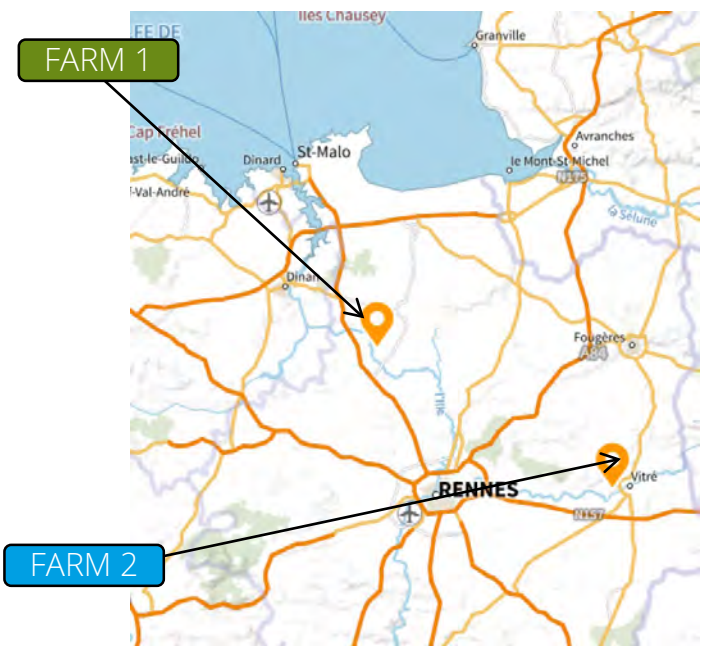


Experimental design

Control: sowing of maize (102,000 seeds/ha) with common soil cultivation (stubble cultivation, ploughing) and weeding (harrow, rotary hoe, interrow hoe) interventions.

Experiment: sowing of maize (102,000 seeds/ha) with common soil cultivation interventions (stubble cultivation, ploughing) and sowing of buckwheat cover-crop on the row (11 seeds/m² = 1 seed every 13 on the row).

Measurements taken
Weed abundance
Maize yield
Soil organic carbon
Mineral nitrogen availability



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Results

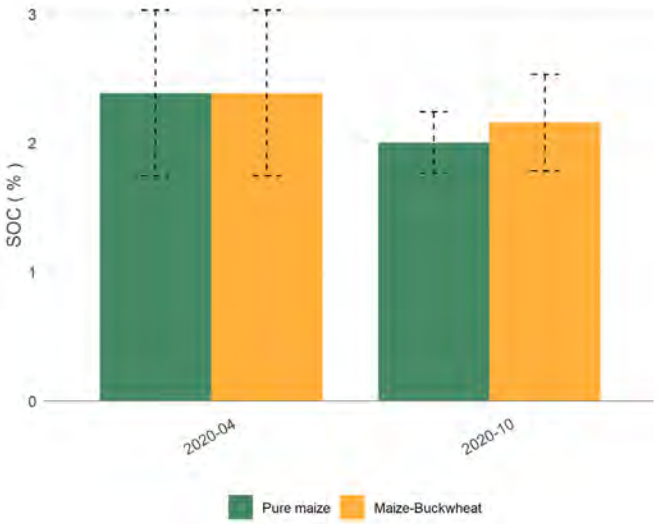

Figure 1. Effects of pure maize versus maize with buckwheat on soil organic carbon. There was no significant difference found.

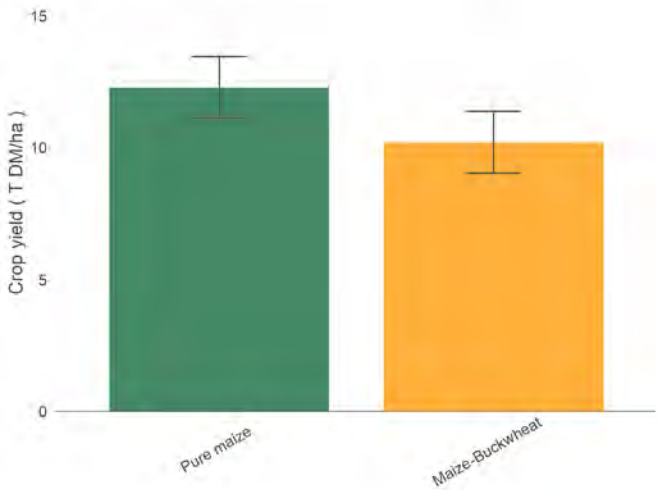

Figure 2. Effects of pure maize versus maize with buckwheat on crop yield. No significant differences were found, but pure maize resulted in slightly higher yields.

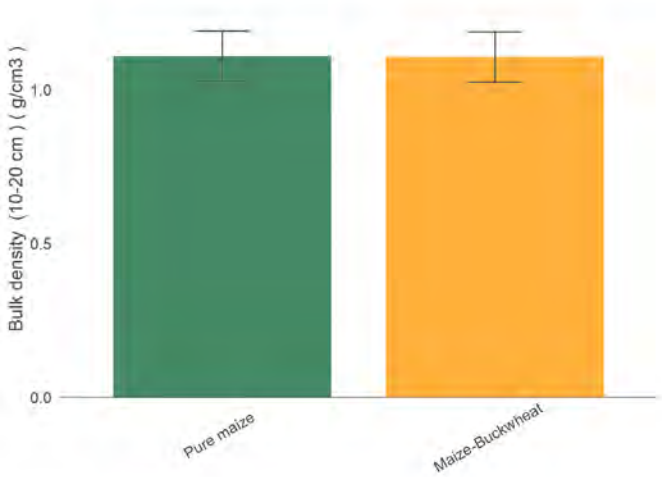

Figure 3. Soil bulk density (10-20cm) was consistent regardless of which treatment was used.

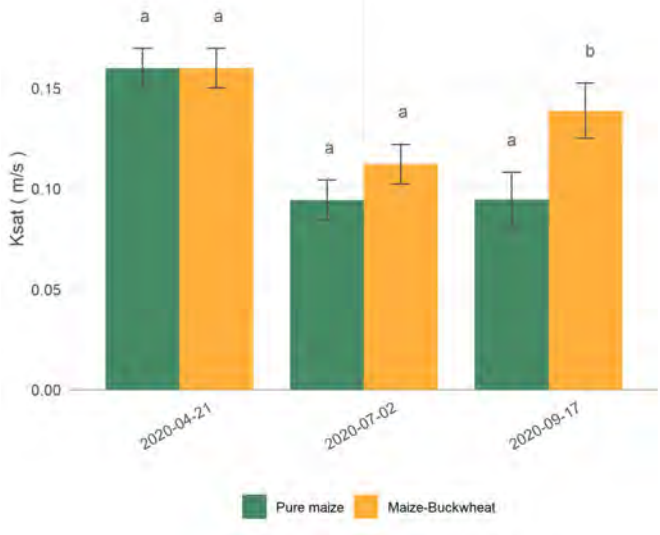

Figure 4. Kstat (m/s) (hydraulic conductivity) was significantly different depending on treatment and was significantly higher in the maize-buckwheat treatment than with maize alone.

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Economic results

- This trial found that seeding cover crops on the row in maize led to negative economic impacts.
- This impact was due to the potential reduction in yields due to competition between the maize and buckwheat cover crop.
- In addition, the buckwheat seeds posed an extra production cost.
- There was, however, a slight reduction in labour costs due to the need to hoe less.

Picture of maize and buckwheat association

Stakeholder feedback

- This trial confirmed the feeling of some stakeholders that buckwheat is too competitive to be used alongside maize, instead suggesting that a future trial should use a less competitive option such as dwarf clover.
- SoilCare has helped stakeholders to learn more about soil processes and provided a platform for discussion about the potential of various SICS.

Difference in weed infestation between control (left) and SICS (right)

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Key findings

- Hoeing was not possible in the maize and buckwheat association
- Yields were slightly lower for the maize and buckwheat association than for the control maize
- Weed infestation was higher in the maize and buckwheat modality than in the maize alone
- Hoeing was more efficient to manage weed infestation than the competitive ability of buckwheat
- Water infiltration capacity was higher in maize and buckwheat association. This observation could be related to no hoeing
- Other trials were conducted with more covering plants (squash). They did not provide positive results at this time
- This SICS do not provide significant effects on soil quality parameters

Conclusions

There were no significant differences found between treatments aside from Kstat, which was higher in maize-buckwheat plots. However, the short duration of this study means that significant differences were unlikely due to the time required to observe significant changes in soil health. A longer term study is needed and other SICS should be tested to determine whether they can reduce soil erosion in maize-cropped fields.

Fact sheet authors

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