

Soil conservation practices with low herbicide use to control weeds in field crops in Switzerland

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Spread of soil conservation practices

- Time and cost saving potentials of the technique (e.g. Khakbazan & Hamilton, 2012)
- Improvement of soil characteristics such as physical stability, biological and chemical fertility (e.g. Holland, 2004)

Weed issue in the absence of inversion tillage

Increasing **herbicide reliance** (Johnson, 1994)

- Risk of **environmental burden** (Mottes et al., 2013)
- **Loss of resilience** of the cropping system

Objectives

Find **cover crop species** that control weeds in **no tillage** systems **without glyphosate** use before maize sowing

References: Holland, J.M., 2004. The environmental consequences of adopting conservation tillage in Europe: reviewing the evidence. *Agric. Ecosyst. Environ.* 103, 1–25.
Johnson, R.R., 1994. Influence of no-till on soybean cultural practices. *J. Prod. Agric.* 7, 43–49.
Khakbazan, M., Hamilton, C., 2012. Economic evaluation of tillage management practices at the watershed scale in southern Manitoba. *Soil Tillage Res.* 118, 40–51.
Mottes, C., Lesueur-Jannoyer, M., Le Bail, M., Malézieux, E., 2013. Pesticide transfer models in crop and watershed systems: a review. *Agron. Sustain. Dev.* 34, 229–250.

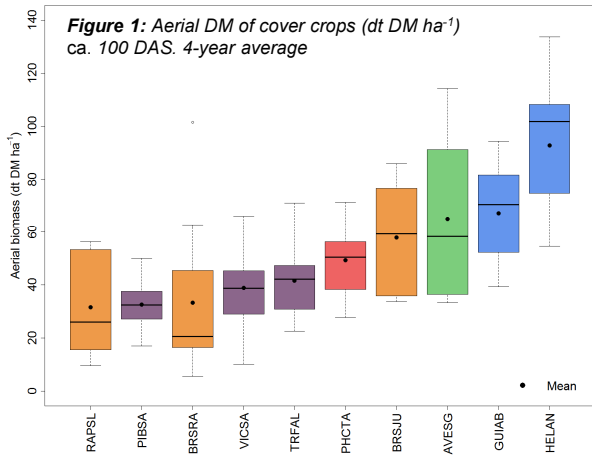
Methodology

- **10 cover crop species** sown in August, before maize crop.
- **Herbicide use depending on weed pressure** of the year: pre- and/or post-sowing of maize.

From 2011 to 2014, on-station trials in Nyon (430 m a.s.l., 999 mm and 10.2°C 30-year average annual precipitations and temperature).

Results

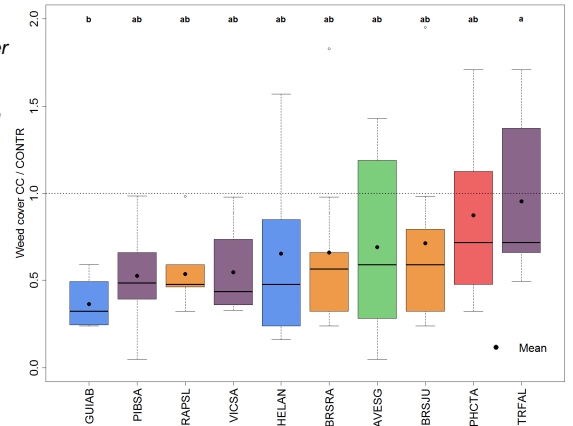
Cover crop growth



→ Asteraceae species and AVESG performed well

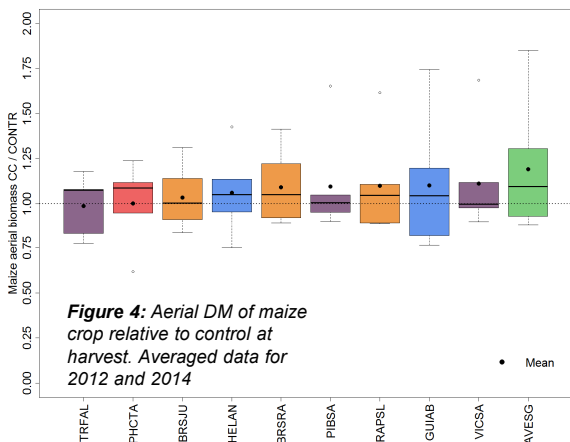
Weed control

Figure 2: Weed cover relative to control in maize at 2-4 leaves stage. Averaged data for 2011, 2012 and 2014

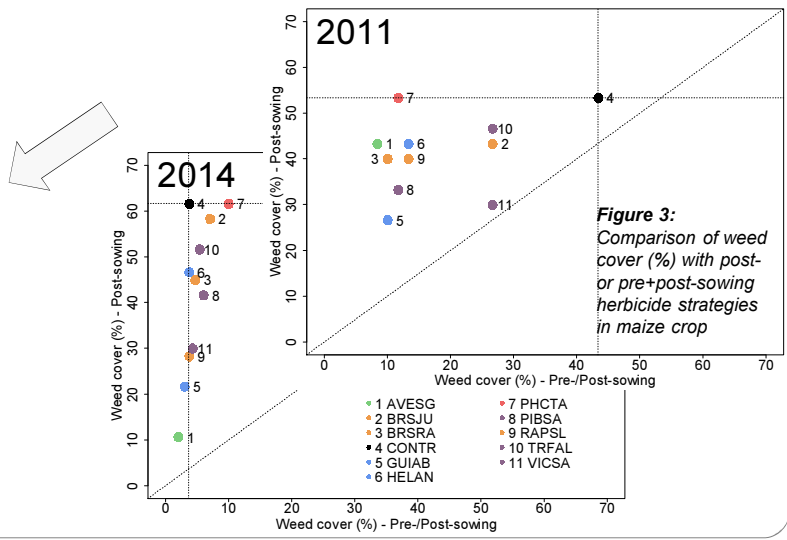


→ Good weed control of GUIAB due to DM production, PIBSA due to soil cover and RAPSL due to allelopathy (Fig. 2)
→ GUIAB and VICSA tend to be as efficient as a pre-sowing herbicide in maize ([5] and [11], Fig. 3)

Maize performance



→ No significant effect of previous CC on maize performance but an upward trend



Abbreviations: AVESG = *Avena strigosa*; a.s.l. = above sea level; BRSJU = *Brassica juncea*; BRSRA = *Brassica rapa sylvestris*; ca. = circa; CC = Cover crop; CONTR = Control without cover crop; DAS = Days after sowing; DM = Dry matter; GUIAB = *Guizotia abyssinica*; HELAN = *Helianthus annuus*; PHCTA = *Phacelia tanacetifolia*; PIBSA = *Pisum sativum arvense*; RAPSL = *Raphanus sativus longipinnatus*; TRFAL = *Trifolium alexandrinum*; VICSA = *Vicia sativa*.