

HAFL Master's Thesis Abstract

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English Title: **Weed suppression in Maize by cover crops in a Conservation Agriculture system.**

English Summary:

In the current situation of population growth, there is a need to develop sustainable production systems to produce more or to maintain yield, while preserving the environment. The decrease of herbicides use is one of the objectives to develop Maize (*Zea Mays* L.) production in Conservation Agriculture system more environmentally friendly. Winter Wheat-Maize and Maize-Maize are common rotations in Europe. The period between winter Wheat or Maize harvest and Maize planting is an ideal time for establishing a cover crop. Through many studies, the cover crops attested different ecosystem services including weed control. The cover crops properly managed are a good solution for weed suppression and therefore herbicides use decrease in Conservation Agriculture system.

In that context, two cover crop mixtures of Field pea (*Pisum sativum* L.)/ Rye (*Secale cereale* L.) and Hungarian vetch (*Vicia pannonica* Grantz)/ Chinese turnip (*Brassica chinensis* x *Brassica rapa*) were tested at 5 different ratios compared to a no cover crop control in a randomized complete block design with 4 repetitions. Soil coverage, dry matter production, Maize youth development and weed suppression during the cover cropping period and at early Maize stage were assessed for all cover crop mixtures.

The present study indicates that cover crop mixtures have the potential to reduce weeds in Maize in a Conservation Agriculture system. The total weed dry matter could be reduced from 46% up to 75% and the total weed cover from 63% up to 78% compared to the treatment without cover crop.

The residues of the plant mixtures did not reduce the density and the plant height in the subsequent Maize crop compared to a no cover crop control 8 weeks after Maize planting.

The cover crop mixtures containing Rye (*Secale cereale* L.) in the range of 50% to 100% demonstrated a weed reduction during the cover cropping season which persisted into the main crop 3 weeks after Maize seeding.

In this study the linear regression between the total weed dry matter and the cover crop mixtures dry matter (t/ha) was statistically significant with $R^2 = 0,613$, despite a heterogeneity of treatment compositions. This study supports the recognized statement that increasing the biomass of cover crop enhances weed suppression.

The growth issues of certain species in the mixtures due to bad weather conditions and interspecies competition emphasize the difficulty to implement cover crop mixtures. On the other hand, growing cover crop mixtures secure biomass production when the cultivating conditions are unfavorable.

Therefore, there is still a need for more research on preferred species partners, species spatial distribution and species maturing synchronization, to develop cover crop mixtures in order to maximize the biomass production and the ecosystems services while optimizing their termination by mechanical control.

Keywords:



Maize
Weed
Cover crops mixtures
Mechanical control
Conservation Agriculture
Herbicides

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