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Screening of Lupin Varieties for Organic Mixed Cropping in Switzerland



Photographs: C.Arncken

State of art and aim:

From 2010 to 2014, Swiss blue lupin (*Lupinus angustifolius*) acreage was only about 50 hectares annually[1] . White lupin (*Lupinus albus*) has not been grown at all since 2004 and is not recommended for Swiss agriculture due to risk of anthracnose infection causing severe damage to the crop. Recently, demand for domestically grown organic protein crops has been increasing rapidly in Europe. Therefore, efforts have started to encourage farmers to grow grain legumes. In order to promote organic lupin production in Switzerland, we started to screen cultivars and strains of white (*Lupinus albus*), blue (*Lupinus angustifolius*), and yellow lupin (*L. luteus*) for their tolerance to anthracnose and their suitability for mixed cropping systems in order to suppress weeds (Hauggard-Nielsen *et al*., 2008). Barley and wheat were reported as suboptimal partners (Böhm *et al*., 2008), so we tested intercropping with spring and winter oats (cvs. Scorpion and Wiland, respectively). According to previous intercropping soy trials conducted by our Extension Department, Winter oats were expected to only form tillers and no inflorescences and thus cover the ground till late summer.

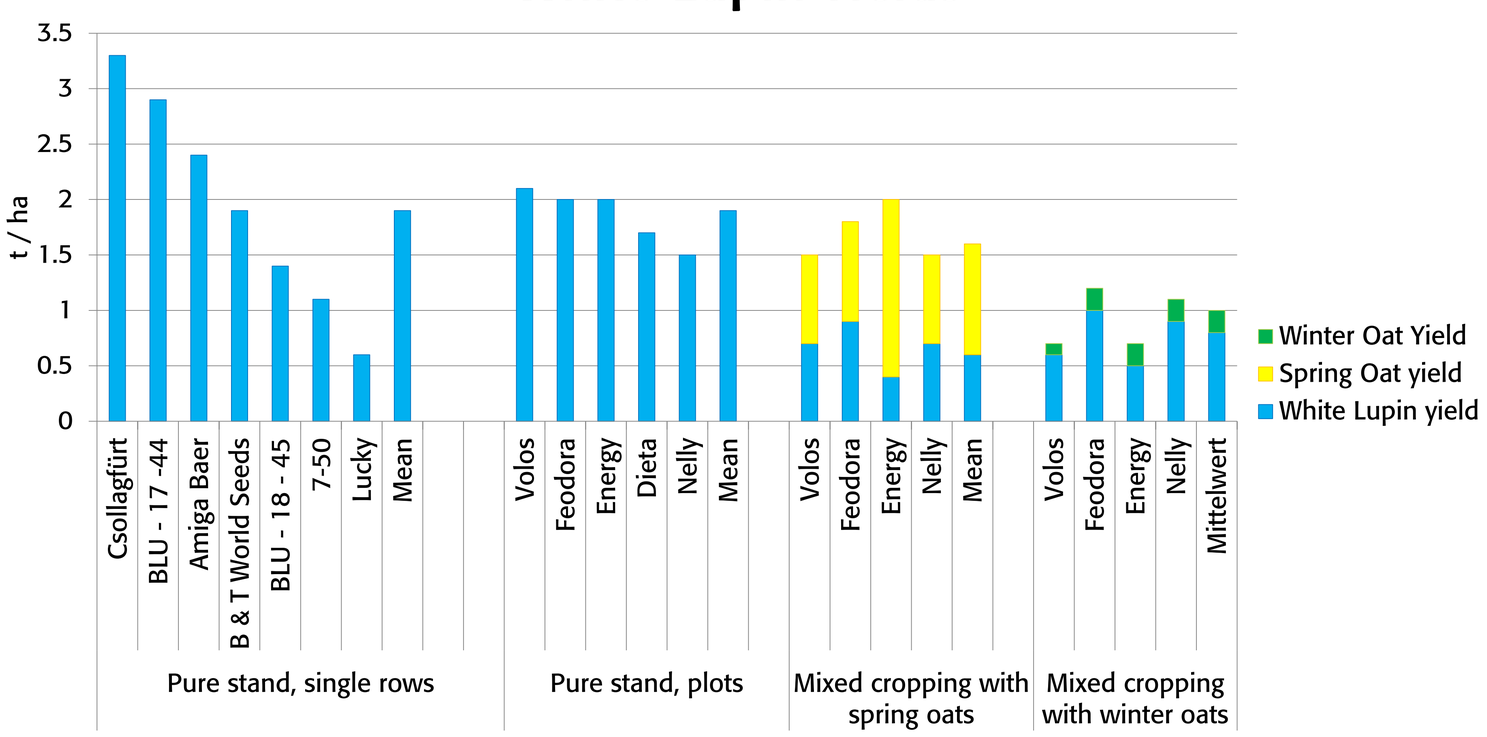

Figure 1: White lupin and oat yields under organic regime from a first variety screening and intercropping field trial in Mellikon (Rhine valley), Switzerland in 2014. Sowing density: White lupin 52 seeds m^{-2} (pure stand: 65 seeds m^{-2}), oats 100 seeds m^{-2}.

Results and discussion:

- The total yield of the white lupin/ spring oat mixture averaged 1.69 t ha-1 (lupin yield 0.66 t ha^{-1})
- In plots of pure stands the mean yield was 1.9 t ha^{-1}.
- In single rows, one Hungarian variety and one vonBaer breeding strain yielded 2.9 t ha^{-1} and 3.3 t ha^{-1}, respectively.
- The white lupin/winter oat mixture yielded 0.94 t ha^{-1} (lupins 0.74 t ha^{-1}). In spite of late sowing (April 10), winter oats produced some inflorenscences.
- Average yield of blue lupin/spring oat mixture was 2.91 t ha^{-1} (lupins 0.5 t ha^{-1}).
- The Yellow lupin/spring oat mixture, the respective results are 3.01 t ha^{-1} total yield (0.17 t ha^{-1} lupins).
- Anthracnose was present in all cultivars with less variation than reported by Jacob (2014).

Outlook

- Yellow lupin did not match well with the soil and rainfall conditions in the Northern part of Switzerland and will be discontinued.
- For white and blue lupin, we will continue searching for an optimized mixed cropping system with acceptable total yields by earlier sowing, testing other partner crops, and reducing partner seed density.
- Breeding activities will be initiated in order to develop a composite cross population in the scope of the European project DIVERSIFOOD.

References:
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Acknowledgement
Research is supported by Corymbo Foundation, Switzerland. We want to thank the following breeders/seed producers for sending us seed: Saatzucht Steinach, Südwestdeutsche Saatzucht, Jouffray-Drillaud, Nordsaat Saatzucht, Poznanska Hodowla Roslin, Dr. N. Drienyovszki (Univ. of Debrecen, HU), Edwin Nuijten (Louis Bolk Instituut, NL), Paolo Annichiarico (CRA-FLC, Lodi, IT), Erik von Baer (Semillas Baer, Chile), Boguslav S. Kurlovich, Sandor Vajda (Lajtamag GmbH, HU).

DIVERSIFOOD
Embedding crop diversity and networking for local high quality food systems European Commission Grant agreement n° : 636571 - H2020 - Research and Innovation Action