PRACTICE ABSTRACT

Cultivation of white lupin

Problem

Lupins (figure 1) belong to the legume family and are well adapted to the northern climate. They offer a good opportunity for local protein supply (especially for animal feed, although opportunities also exist for human consumption), since they have a high protein content and a good amino acid profile. About 20 years ago, “anthracnose” (figure 2), a fungal disease affecting white lupin, became prevalent. Since then white lupin has disappeared from cultivation in Switzerland, with only blue lupin remaining. Nevertheless, in contrast to blue lupins, white lupins have several advantages: they have a higher yield potential, better weed suppression, and they are the grain legume that renders the most or second most nitrogen for the following crop (contrary to soybean which uses all the fixed nitrogen for its own seeds and leaves no surplus nitrogen for the following crop). Thus, it is important to find solutions to anthracnose to grow white lupins again.

Applicability box

Theme
Barriers and enablers, rotation, field, organic

Agronomic conditions
Free-draining soils with low lime content

Application time
March to September

Equipment
Hoeing using cameras/RTK and harrow

Best in
Fits well into crop rotations on farms with low or no livestock

Solution

Breeding has produced varieties of white lupin that are tolerant to anthracnose. These include the variety "Frieda", which has been approved in Germany and the new variety "Celina". The Czech variety “Zulika” also seems to be less susceptible. To avoid the fungal disease anthracnose, only certified and clean seeds should be used. Summer-dry and windy locations with a pH value below 7 also have a favorable effect against infection.

Benefits

- Lupins are cold tolerant, and can be sown as early as March
- No nitrogen fertilization necessary thanks to nitrogen-fixing nodules
- The lupin flowers offer a ‘welcome environment’ for bumblebees and bees at the beginning of June
- The broad-leaved white lupin shows a stronger ‘competitive power’ against weeds than the narrow-leafed lupin. Thanks to its larger leaf canopy, it achieves a faster soil cover.
- White lupin has good stability growing in pure stands and does not need to be grown in a mixture.
- Good threshing conditions thanks to sturdiness (better resistance against pod shedding than blue lupin) and long pods
- Yields between 3 and 4 t/ha can be expected for Frieda and Celina varieties.

Figure 1 (left). White lupin in flower, in pod filling stage, and ripe. (Photo: C. Arncken. FiBL). **Figure 2 (right).** The worst anthracnose disease patches may be removed from the field by hand at flowering time. (Photo: C. Arncken. FiBL)

Research Institute of Organic Agriculture (FiBL). Cultivation of white lupins. DiverIMPACTS practice abstract.

Practice abstract

Practical recommendations

- The presence of germinated weeds in the seedbed should be limited; if necessary, a mechanical weed treatment can be performed before sowing.
- For sowing either use narrow row spacing (12 or 24 cm) like for cereals, harrowing one or two times; or precision seeding with 50 cm row spacing and inter-row hoeing using cameras or Real Time Kinematic.
- Avoid soils with pH higher than 7 - ideal pH is less than 6.5.
- For an ideal nitrogen supply, the seed must be inoculated with bacteria. Order both the inoculant and the seed from the seed trader, protect the bacteria from UV radiation and store batches in a cool place. To preserve the bacteria, mix the seed with the inoculant just before sowing.
- Seed density is 55-65 grains/m^2, equivalent to 180-240 kg/ha (depending on the thousand grain weight).
- Weed control: weed treatment or 'blind weeding' up to 3 days after sowing. Up to 4-6 weeks after sowing (up to 5-leaf stage), hoeing or harrowing can be done. Due to lower turgor pressure, it is preferable to perform the hoeing or harrowing in the afternoon
- If you have little experience with white lupins, you can split the field in the first year and grow half with blue lupins and half with white lupins. Harvest the blue lupins at beginning/mid August and the white lupins at the end of August/beginning of September. The threshing time is reached when the seeds in the pods "rattle" when shaken and most of the straw is brown.
- **Visual evaluation:** At the beginning of flowering, about 8 weeks after sowing, check for anthracnose patches and weeds in the two plots (white vs. blue lupins). To prevent further spread, eliminate infected plants. In the blue lupins, you will hardly find any affected plants.
- **Quantitative evaluation**: It is recommended to compare the yield from both plots. The two plots must be harvested and weighed separately at different times.

Further information

Links

- Lupin factsheet with practical information (in German) https://www.fibl.org/de/shop/1308-lupinen.html
- General information about lupin cultivation (in German) https://www.bioaktuell.ch/pflanzenbau/ackerbau/koernerleguminosen/biolupinen.html
- Cultivation statistics, growing area, soil and climate, and crop rotation (in German) http://lupinen-netzwerk.de/Kategorie/anbau/allgemeines/
- Lupin factsheet in English or German: https://orgprints.org/id/eprint/38740/ (in English) https://orgprints.org/id/eprint/38571/ (in German)

About this practice abstract and DiverIMPACTS

Publisher:
Research Institute of Organic Agriculture (FiBL)
Ackerstrasse 113, Postfach 219, CH-5070 Frick
Phone +41 62 865 72 72, info.suisse@fibl.org, www.fibl.org

Authors: Christine Arncken, Hansueli Dierauer, Mathias Christen, (FiBL)

Contact: hansueli.dierauer@fibl.org

Permalink: https://zenodo.org/record/6875765

This practice abstract was elaborated in the DiverIMPACTS project, based on the EIP AGRI practice abstract format.

DiverIMPACTS: The project is running from June 2017 to May 2022. The overall goal of DiverIMPACTS - Diversification through Rotation, Intercropping, Multiple Cropping, Promoted with Actors and value-Chains towards Sustainability - is to achieve the full potential of diversification of cropping systems for improved productivity, delivery of ecosystem services and resource-efficient and sustainable value chains.

Project website: www.diverimpacts.net

The project DiverIMPACTS - "Diversification through Rotation, Intercropping, Multiple Cropping, Promoted with Actors and value-Chains towards Sustainability" is supported by the European Union's HORIZON 2020 research and innovation programme under Grant Agreement no 727482 and by the Swiss State Secretariat for Education, Research and Innovation (SERI) under contract number 17.00092. The opinions expressed and arguments employed herein do not necessarily reflect the official views of the EC and the Swiss government. Neither the European Commission/SERI nor any person acting behalf of the Commission/SERI is responsible for the use which might be made of the information provided in this practice abstract.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 727482 (DiverIMPACTS)

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs, Education and Research EAER
State Secretariat for Education, Research and Innovation SERI