SOWING TIME & NUTRIENTS: IMPLEMENTATION IN PRACTICE

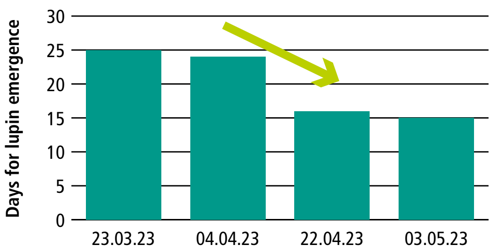
Because the white lupin could not be cultivated for a long time due to the fungal disease anthracnose, much knowledge about its cultivation has been lost. The new varieties FRIEDA and CELINA, which are tolerant to this disease, are boosting the cultivation of this protein supplier again. For this reason, Deutsche Saatveredelung AG (DSV) has initiated exact trials on production technology measures, the results of which are summarised here.

The sowing time of white lupin is a very decisive factor for the success of the crop and a clean stand. Only if the plants can grow through without disturbance can they "gain an advantage" over weeds. Therefore, according to the literature, a soil temperature of at least 6 °C should be reached before sowing begins.

When is the optimum sowing time?

Last year, Deutsche Saatveredelung AG (DSV) started a trial with four sites to determine the optimum sowing time of the white lupin. The trial comprised a total of four different sowing times. The first sowing date was targeted for the beginning of March. The other sowing dates were to follow 10 to 12 days after the first date. Due to wet soil conditions, the sowing dates were slightly delayed. Sowing therefore took place from the end of March to the beginning of May (see Fig. 1).

FIG. 1: LATER SOWING DATE = FASTER EMERGENCE?



It was found that the time between sowing and emergence was reduced by more than 10 days from the first to the last sowing date. This is because as spring progresses, the soil temperatures rise and the risk of cold air intrusion decreases. As a result, disturbances in the growth of the lupin are less frequent. Due to the earlier emergence and the more vigorous conditions, the plants develop more quickly. As a result, the lupin becomes much more competitive against weeds (see Fig. 4).

Further trial years will have to confirm this impression, but the initial results already show that the time of sowing plays an important role in the establishment of the lupin population. In practice, therefore, a compromise must be found between good conditions for sowing, plant protection and a vegetation, which is as free from interruption as possible after sowing.

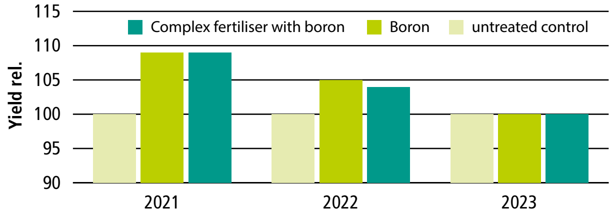
Fertilisation: different requirements

In principle, the white lupin does not have high fertilisation requirements. As a leguminous plant, it produces its own nitrogen. As it is also able to dissolve phosphorus in the soil, which is not readily available, phosphorus fertilisation is only necessary if the area is undersupplied (level A or B).

Around 60 to 80 kg/ha of potassium should be used as fertilizer. As with all grain legumes, the need for sulphur and magnesium is increased. Sulphur should be used as fertilizer at 20 to 30 kg/ha and magnesium at 15 to 20 kg/ha. Particular attention should be paid to the supply of micronutrients.

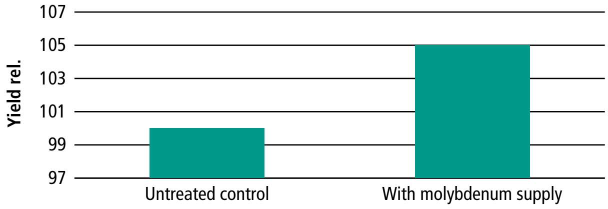
If they are deficient, they can cause a significant reduction in yield. Boron and molybdenum are particularly important here. The

FIG. 2: INCREASED YIELDS OF LUPINS WITH BORON SUPPLY



Source: Nutrient trials of the DSV

FIG. 3: INCREASED YIELD OF LUPINS WITH MOLYBDENUM SUPPLY



Source: Nutrient trials of the DSV; n = 3

supply of molybdenum serves the nodule bacteria and can therefore have a direct influence on the nitrogen supply of the lupins. Boron is used for pollen formation and thus ensures the fertilisation success of white lupins.

Boron and molybdenum under observation

Results of a multisite trial (three locations) by the DSV on boron and molybdenum supply, some of which ran for three years (from 2021 to 2024), consistently show benefits of supplemental nutrient supply, but vary significantly over the years. When considering and adjusting the boron and molybdenum supply, the current status of the soil's micronutrients should be determined in advance using soil analysis. In all trial years, molybdenum was already added at the end of the row with approx.

55 g/ha to promote nodule formation as early as possible. As boron is used for nodule formation, the application should be made at the start of flowering. A dose of approx. 150 g/ha was applied here.

With regard to boron supply, the following results show different average additional yields across the three locations in each year, despite the same amount of fertiliser having been applied. A distinction was made between pure boron fertilisers and complex fertilisers with boron. In 2021 in particular, significant yield advantages were recorded with boron application. 2023, on the other hand, showed the lowest additional yields. The results indicate that the application of boron generally achieves higher yields and applictaion can insure stable yield in deficient years.

The different higher yields for the same application rate shows that micronutrients are not in short supply every year. An addition nevertheless results in higher yields and thus stabilises the yield expectation. For this reason, boron should be applied in order to avoid yield losses in deficiency years. Acute boron deficiency manifests itself in growth inhibition of the shoot tip with subsequent black-brown discolouration. The leaf blades are thickened with asymmetrical deformations. There is an increased formation of axillary buds.

For **molybdenum**, only one year's results are available, also from three locations. Overall, the application resulted in higher yields. Similar to the boron applications, the addition of molybdenum should also be seen as a kind of insurance against yield losses in years of deficiency.

Conclusion

In order to stabilise the yields of white lupins in the long term, a few points should be considered during cultivation. The trial results can already provide valuable insights. They show that the sowing date has a decisive influence on weed control and weed suppression in white lupins. As the trial is still in its early stages, only trends can be recognised so far. However, these initial trials already show that a later sowing date followed by good growing conditions has advantages in terms of stabilising yields.

The data basis for the nutrient trials is much easier to interpret. Boron always provides surplus yields in three years. An application of 55 g/ha is therefore recommended. The fluctuations in additional yields can be explained by the varying availability from the soil in the years.

A soil analysis helps to determine the soil's supply of micronutrients. Nevertheless, in some years there will be shortages because nutrients become scarce, for example due to drought. Therefore, the supply of micronutrients should become a standard in order to have an insurance.

The one-year results of a molybdenum supplement also confirm a yield effect here. A standard measure to stabilise yields should also be considered here. The trial is currently being continued in order to gather further findings and consolidate the results already obtained.

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Fig. 4: Effect of the different sowing times on the emergence of lupin using the example of sowing time 1 and sowing time 3. The lupin of the earlier sowing time (sowing time 1) shows a higher weed population, whereas the plot at sowing time 3 appears much more homogeneous

Source: DSV white lupin sowing time trial, Site University of Applied science Soest-Merklingsen 2023