

Looking back HIGH-PROTEIN CROPS FOR HUMAN CONSUMPTION



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On November 21 2022, for a mixed audience of farmers and researchers, Kevin Dewitte shared the intermediate outcomes of CROPDIVA's research on legume crops at Ghent University.

Despite the fact that several high-protein crops, such as yellow peas and faba beans are quite well-known in the region of Flanders, legume crops have these days almost disappeared from cropping rotations on the farm. The lack of increase in yield and yield instability compared to e.g. winter cereals can be indicated as main reason. Compared to cereals, breeding efforts didn't result in the same production potential up until now. Yet, recent trends clearly indicate a bigger interest in grain legumes (e.g. lupins) by the farming industry. Lower requirements for nitrogen fertilization, their ability to restore soil carbon and the fact that they contribute to diversity in rotation systems make high-protein crops the upcoming plants to lookout for in the field.

Resilience to climate change

One of the interesting qualities of lupins, is that they can root up to 1.5 meters deep. As a result, the crop manages to bring up nutrients from deeper soil layers while increasing soil capillarity for the following crop. This doesn't just make the lupin crop itself more drought resistant, it also makes succeeding crops less drought-

prone. In a context where climate change will result in more and longer dry weather conditions, this ability of the plant is to be applauded.

Another interesting fact about grain legumes in general and lupins in particular, is the ability to deliver nitrogen to a succeeding crop in a rotation thanks to its nitrogen-fixing ability.

Recommendations for the farmer

Lupins are not the only interesting crop to grow when it comes to legumes. Which legume is suitable for a specific farm land, obviously depends on the soil type. For example, lupin will not grow well on heavy clay soils, but thrives on more (acidic) sandy soils. Given the wide variation between and within the different grain legumes, it's important for a farmer to be well-informed before growing them.

Another thing farmers should consider when choosing a legume, is how they want to market their crop. Farmers should ideally already have an idea of the requests of the processors, since the nutrients and their composition can vary greatly between different crops. A point of attention with leguminous plants for human consumption are the anti-nutritional factors (ANF's). These are components that can interfere with e.g. digestion. Breeding can play a role in evolving towards varieties that contain less ANF. In the search for alternatives to soy in the feeding of pigs, it was discovered that animal performance and food conversion improves when a mix of different legumes is used, rather than

using only one alternative as a protein source. As pigs are monogastric like humans, the same findings might stand when it comes to human consumption.

Zooming in

For each crop that was researched at the UGent (yellow pea, narrow-leaved lupin, faba bean), Kevin presented some more specific findings that are relevant to a farmer public. For example, for peas or faba beans that are sown early in the season, it might be useful to apply a small amount of nitrogen fertilizer. Especially at the beginning of the growing cycle under cold temperatures, humification and mineralization (and nitrogen-release) is slower, so less nutrients are available for plant and leaf growth. This results in a shortage of the sugars needed for the nitrogen-fixing bacteria. Stimulation of plant youth growth via added nitrogen can trigger this sugar production.

A common concern with all legumes is bird damage. Faba beans seemed to be less prone to this, however, this fall, a lot of damage by crows was observed. In terms of yield, there seem to be fewer fluctuations with winter crops compared to summer crops. However, bird damage, which is more of a problem during fall, is an added complexity during winter seasons and might compensate for the difference between both.

Mixed cropping

From trials with faba bean in mixed cropping systems with cereals, the UGent researchers observed less weed



and disease pressure, faster soil cover, lower nitrogen inputs and finally better utilization of soil nutrients. In mixed cropping situations with barley and peas, an added advantage was the reduced lodging: the cereal crop provided support for the peas, which resulted in less crop loss overall.

Next to benefits for mixed cropping, the team also observed some attention points. For example, in a conventional farming system, the choice of crop protection products is more limited as only products that are approved for both crops can be applied. For the mixes where oats were involved, researchers also noticed that the oat seemed to be quite competitive compared to its companion crops. Hence, the ratio between oats and other crops should be balanced carefully.



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