Lentils

Lentil is a grain legume which has a range of varieties of different size and colour and thus is attractive for human consumption. It is also tolerant to high temperatures and drought, which can make it resilient to climate change. Notable advantages are the high level of protein, good taste and variability that make lentils an excellent food ingredient while it has also good potential to be grown in an intercrop.

Crop Description

Annual bushy crop; it can reach 20-40 cm high and has hairy, slender multi-branched stems. Depending on species, its roots can extend to 70 cm. The pods are small containing two or three lens-shaped seeds, which vary in size depending on the cultivar type.

- **Life cycle**: 3-4 months
- **Protein content:** 20-30% [1]
- **European yields:** 1076 kg/ha [2]

Market Potential

Lentils are one of the most important and cultivated legumes worldwide. Currently Canada and India are the biggest producers while Europe produces only 3.6 % of global lentil production [2]. In Denmark the cultivation of lentils is almost non-existent. However, lentils can be found in Sweden, and some Swedish materials were tested in the experimental trials in Taastrup, University of Copenhagen (KU).

Lentils are grown mainly for human consumption due to their good taste and nutritional value. Their high demand as food keeps their economic value very high. Some lentil by-products can be also used for animal feed which can further increase their value (i.e. straw, hulls). Moreover, like other legumes, lentils do not contain anti-nutrients, which makes them suitable as food ingredients (e.g. bread, plant-based milk, etc).

Beside the consumption as grain, lentils can be milled to flour, while young pods and leaves are also eaten as a vegetable [3]. The Protein2Food project has found successful uses for lentils in bread and infant food. In Denmark, 90% of vegetarians would like lentils to be included in more plant-based foods [3].

“Demand for lentils is expected to increase due to its excellent properties as a food ingredient.”

Challenges

Major diseases and pests: Aphids and mildew infect lentil production with high crop densities[4]. In four years of trials at the University of Copenhagen no significant disease or pest damage was observed. Seed shattering may occur if harvest is delayed.

Recommendations

Land preparation/rotation: Lentils are grown best when at least three years have passed after lentils or other legumes were grown and should not be grown after rapeseed [3].

Soil types: Lentils can grow in most soils, but best yields are obtained at a pH of 6-6.5 and well drained soils of low nitrogen content [4].

Sowing dates: Early sowings produced higher yields while also resulting in larger seeds. Sowing four weeks after the beginning of the sowing season can reduce yields by 484 kg/ha compared to early sowing.

Sowing depth and distances: materials at KU were sown at 0.8-1.5cm depth, and with 120-150 plants/m^2, depending on the cultivar. Lentils grow slowly and that favours weeds, however dense sowing can help to reduce competition [4].

Intercropping: Intercropping can be a major contributor to reduce weed competition. KU trials (2017-2019) found that weeds reduced by 74% in a lentil-oat intercrop. Oats also provide support to lentils which can help with lentil harvesting and reduce shattering.

Harvesting: Lentils are best harvested when pods are fully dry. If done mechanically it is best to harvest at higher moisture content to avoid seed shattering [4]. Intercropping with cereals is recommended for improved harvesting as the cereal provides support against lodging.

Trial results

Table 1. Data from University of Copenhagen field trials under a low input production system in Taastrup, Denmark.

Cultivar	Yield (kg/ha)	Protein (%)	TSW (g)	Seed colour
Gotlandlins	1264	28	28	Brown
Morena	1131	27	36	Brown
Eston	1024	27	31	Green
Pardina	1142	25	36	Brown
Anicia	978	28	30	Green

The table shows mean yields over 5 years (2015-19) in Taastrup, however maximum yields reached 2.1 t/ha. Other trials indicate yields of 1-1.4 t/ha in DK [1].

Summary of Benefits

- Good response in intercropping systems
- Improve microbial community and nitrogen availability
- Low input requirements (i.e. chemicals, water)
- Short life-cycle
- Well established in the food market and increasing potential as a food ingredient.

References

[1] SEGES (2018) Danskproduceret planteprotein til human konsum. Futurefarming project .

[2] Food and Agriculture Organization of the United Nations. (2019). FAOSTAT Database

[3] Dansk Vegetarisk Forening (2019) Økologi præferencer i det vegetariske forbrugersegment.

[4] Jacobsen, S.E (2015) Dyrkningsvejledning linser. Glutenfri økologi fra muld til mund, GUDP Project.

Acknowledgements

With great thanks to Anders Kristian Nørgaard for his valuable feedback.

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Note: Results of Protein2Food trials at Copenhagen University are in **orange**. Trials were run from 2015-2019 in Taastrup under a low-input system

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grants agreement No 635727

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