

MUSHROOM CULTIVATION

Mushroom cultivation brings additional income to forest owners



THE WHAT AND WHY

Why mushroom cultivation?

For many of the more than 600 thousand private forest owners in Finland, forestry is an additional source of income. However, the income generated from harvesting small-diameter trees during thinning is quite low and amounts to just a couple of euros per tree. Active mushroom cultivation in forests can markedly increase the earnings from forests. Mushroom cultivation as a way to create value from forests can yield anytime between 1 year from inoculation to as much as 8 years with chaga (*Inonotus obliquus*). In addition, it is an ecologically friendly way of increasing food production in

forests. Instead of producing only wood as a raw material, the forest now also delivers high quality food. Moreover, mushroom cultivation on living trees can be applied as an ecological forest management tool saving costs on thinning operations. There are intensive mushroom cultivation techniques which will produce a mushroom harvest every year, as well as more extensive techniques producing a mushroom harvest every 5–6 years. The more extensive techniques are particularly suitable for forest owners who live far away from their forest or for people without much time.



Shiitake mushrooms (*Lentinula edodes*) grown on birch logs, Karjalohja, Finland.
Michael den Herder



Shiitake mushrooms grown on birch stacks in a mixed forest on the Suomen Agrometsä oy forest farm
Michael den Herder

HOW IS THE CHALLENGE ADDRESSED

Managing a mushroom forest farm

Shiitake, oyster (*Pleurotus ostreatus*) and lingzhi mushrooms (*Ganoderma lucidum*) are grown on logs. Shiitake and oyster mushrooms are edible mushrooms and lingzhi is a medicinal mushroom mainly used in Asia. These mushroom species are grown on birch, alder, oak or aspen logs (about 10 cm in diameter) cut to 1 m length and piled in stacks.

Logs are inoculated with mushroom mycelia from early spring to autumn. Holes are drilled in the logs with a 10–12 mm drill to insert cultured mycelium. Shiitake and oyster mushrooms can be harvested twice during the

growing season, with about 8 weeks between harvests. A log can produce mushrooms for about 3–4 years. Chaga is a medicinal mushroom used in Asia and it is grown on living birch trees. After inoculation, the first chaga mushrooms are harvested after 5–6 years. Hereafter, it is still possible to get two additional mushroom harvests every fifth year after the last harvest until the tree dies after about 15 years. Hereafter the tree can be harvested and sold as fire or fibre wood. This mushroom cultivation method can be used as a forest management tool by selecting those birches which will be cut later on during thinning.



HIGHLIGHTS

- Mushroom cultivation can provide a significant additional income for forest owners and makes forest management more eco-friendly and profitable.
- Chaga mushroom cultivation can be applied as a forest management tool by selecting small-diameter trees which will be cut during tending or thinning.
- Mushroom cultivation increases eco-efficiency by producing food in addition to wood production.



Chaga mushroom on birch
iStock.com/amarinchenko

watch video

FURTHER INFORMATION

Suomen Agrometsä oy provides advice, equipment, inoculum (dowels and spawn) and full hands free service for growing mushrooms <https://www.agrometsa.fi>

Gifts from Metsä organises courses on mushroom cultivation <https://www.giftsfrommetsa.fi>

Vanhanen, H. & Peltola, R. 2015. Rerouting Finland's Agroforestry Scheme. Conference Proceedings: Public Recreation and Landscape Protection - with Man Hand in Hand, 3-5 May 2015, Brno, Czech Republic, pp. 215-219. Available online: https://www.researchgate.net/publication/276420578_Rerouting_Finlands_Agroforestry_Scheme

Lee, K.-H., Morris-Natschke, S.L., Yang, X., Huang, R., Zhou, T., Wu, S.-F., Shi, Q., Itokawa, H., 2012. Recent progress of research on medicinal mushrooms, foods, and other herbal products used in traditional Chinese medicine. *Journal of Traditional and Complementary Medicine* 2, 1-12. [https://doi.org/10.1016/S2225-4110\(16\)30081-5](https://doi.org/10.1016/S2225-4110(16)30081-5)

ADVANTAGES AND DISADVANTAGES

Mushrooms a superfood?

Higher added value

Mushroom cultivation makes forest management more ecologically friendly and profitable. It is possible to get a higher value from your forest as compared to conventional management only. Shiitake and oyster mushrooms are sold in the supermarket, through direct on-farm sales and to restaurants. The value of birch harvested during first thinning is only a couple of euros, but the production of for instance chaga mushrooms on a single birch can be worth 100 euros.

Mushroom cultivation can be used as a new forest management tool as it increases the profitability of early thinning operations. It fits with conventional forest management practices as well as continuous cover forestry. As chaga cultivation doesn't need much management apart from inoculation and harvesting, it also suitable for forest owners who live far away from their forest or for people without much time. If you don't have any time, you can even outsource the whole cultivation process to a professional mushroom cultivation company. If you don't own any forest, you can still grow mushrooms as a hobby in a small garden, on a balcony or even on the kitchen table. Frequent watering is needed!

Healthy food

The health benefits of mushrooms have been demonstrated in many scientific studies (Lee et al. 2012). Oyster and shiitake are edible mushrooms. Lingzhi and chaga are used in the preparation of nutritional supplements and medicines.

Eco-efficiency

Mushroom cultivation contributes to more efficient land use. In addition to producing wood, the forest now also produces food.

Market opportunities

Medicinal mushrooms such as chaga and lingzhi create opportunities in the Asian market. Medicinal mushroom production in Finland is currently low, but if cultivation starts now the first harvest is expected in 5-6 years when the demand is predicted to be much higher than the availability.

Things to bear in mind

Mushroom logs need to be sufficiently moist for the mycelia to develop. It is beneficial for mushroom growth that it rains at least once a week. If the logs become too dry, mushroom mycelia start degenerating or can even die. In dry periods during summer, it is important to have access to water in order to sprinkle the mushroom logs when needed.

MICHAEL DEN HERDER, ERIC MT PURO, HENRI LOKKI, HENRI VANHANEN
European Forest Institute (EFI)

Suomen Agrometsä oy
Natural Resources Institute Finland (LUKE)
michael.denherder@efi.int

Content editor: Maria Rosa Mosquera-Losada (USC)
18 FEBRUARY 2019

This leaflet is produced as part of the AFINET project. Whilst the author has worked on the best information available, neither the author nor the EU shall in any event be liable for any loss, damage or injury incurred directly or indirectly in relation to the report.