Oyster mushrooms are examples of the saprobic mushrooms which are grown on cellulosic material in factories.
This is a sizeable industry with annual production in China alone estimated by S.T. Chang to be 14 billion kg in 2006.

Another group of mushrooms grow on the roots of trees

These are the mycorrhizal truffles and mushrooms
Mycorrhizas are essential for most plants, help break down soil organic matter and benefit tree growth by increasing the uptake of nutrients.

Some of the mycorrhizal mushrooms are poisonous, for example, *Paxillus involutus* and *Amanita phalloides*. 
But there are more than 1000 edible species

Chanterelle

Saffron milk cap

Painted bolete

Porcini

The Périgord black truffle (Tuber melanosporum) is another
Falling production in the Northern Hemisphere made it an obvious research opportunity for New Zealand in the late 1970s.

The first truffières were established in 1987.
Soil preparation on high pH soils can be as simple as mixing the subsoil with the topsoil.

But most growers used lime to raise the pH – typically about 100 t/ha – to get the pH up to the optimum of 7.9.
The first Southern Hemisphere truffles were harvested in New Zealand in 1993.

In Gisborne production reached 120 kg/ha in 1999. 800 trees/ha, in year 10.

400 trees/ha in year 20.
Maximum production was on a volcanic ash in the Bay of Plenty - more than 300 kg/ha

The Italian white truffle (*Tuber magnatum*) might seem to be the next choice but it has yet to be cultivated.
The bianchetto truffle (*Tuber borchii*) was a good alternative with a superb flavour considered by some to be superior to the Périgord black truffle.

The first commercial harvest of bianchetto in New Zealand was in 2006 on hazel and oaks after 4 years.
We have known since Gilmore’s work in the 1950s that mycorrhizas are essential for Douglas fir – only one of these 10 year old trees is mycorrhizal.

All plantation forest trees should be infected with mycorrhizal fungi prior to sale – methods are available.
During the 30 to 45 year cycle New Zealand forests produce no income.

So why not inoculate with edible mycorrhizal mushrooms?
Twelve years ago Ian Hall and his group at Crop & Food Research decided to try growing edible mycorrhizal mushrooms as secondary crops in our pine plantations.

Ian first made cultures of the saffron milk cap (*Lactarius deliciosus*) in the UK and Wang Yun produced the trees.
Nine years after planting saffron milk cap trees near Nelson.

600 trees/ha, mushrooms after 1½ years, 60 kg/ha after 2½ years, NZ$20/kg
The saffron milk cap can produce more income in year 10 than the value of the timber at maturity.

Current work by EFFNZ includes the painted bolete (Suillus lakei) on Pseudotsuga menziesii (Douglas fir) and porcini (Boletus edulis) on oaks and pines.
Thank you!

EDIBLE AND POISONOUS MUSHROOMS OF THE WORLD

IAN R. HALL
STEVEN L. STEPHENSON
PETER K. BUCHANAN
WANG YUN
ANTHONY L. J. COLE

TAMING THE TRUFFLE
The History, Lore, and Science of the Ultimate Mushroom

IAN R. HALL
GORDON T. BROWN
ALESSANDRA ZAMBRONELLI

www.trufflesandmushrooms.co.nz