

Medicinal and Edible Mushrooms in Switzerland: Development of Culture Techniques and Pharmacological Research

Daniel Job and Isabelle Giovannini

Laboratoire de Microbiologie, Université de Neuchâtel, Neuchâtel CH-2007, Switzerland

The mycology group has developed techniques for mushroom cultivation for food and medicinal research.

The aims of the project are:

- To develop reproducible mushroom cultures.
- To study the cultivated mushrooms' resistance to different bacterial and fungal contaminants.
- To test these mushrooms' crude extracts in different biological tests for the pharmacological industry.

This project is possible thanks to the collaboration of various specialized partners in the dietary and pharmacological industry.

For developing culture technique, the laboratory has conducted research in three areas:

- Selection of new wild-type strains of species suitable for industrial production.
- Design of substrates using available agricultural and industrial wastes.
- Analysis of the environmental factors that alter the physiology of growth.

So far, the cultivation techniques of the following species have been developed: *Agrocybe aegerita* (Brig.) Sing., *Fistulina hepatica* (Schaeff.) Fr., *Flammulina velutipes* (Kurt.: Fr.) P. Karst., *Fomes fomentarius* (L.: Fr.) Fr., *Fomitopsis pinicola* (Schw.: Fr.) P. Karst., *Ganoderma applanatum* (Pers.) Pat., *G. lucidum* (Curt.: Fr.) P. Karst., *G. resinaceum* Boud., *G. tsugae* Murr., *Grifola frondosa* (Dicks.: Fr.) S. F.

Gray, *Hericium erinaceus* (Bull.: Fr.) Pers., *Hypsizygus marmoreus* (Peck) Bigel., *Kuehneromyces mutabilis* (Schaeff.) Sing. et A. H. Sm., *Lentinus conchatus* Mont., *L. edodes* (Berk.) Sing., *Lyophyllum aggregatum* (Schaeff.) Kühn., *L. ulmarium* (Bull.) Kühn., *Meripilus giganteus* (Pers.) P. Karst., *Pholiota nameko* S. Ito et Imai, *Pleurotus citrinopileatus* Sing., *P. eous* (Berk.) Sacc., *P. eryngii* (DC.) Gill., *P. ostreatus* (Jacq.: Fr.) Kumm., *P. tuberregium* (Fr.) Sing., *Polyporus brumalis* (Berk.) Fr., *P. ciliatus* Fr., *P. squamosus* (Huds.) Fr., *P. tuberaster* (Jacq.) Fr., *Sparassis crispa* (Wulf.) Fr., *S. laminosa* Fr., *Pycnoporus cinnabarinus* (Jacq.) Fr., *Schizophyllum commune* Fr.: Fr., *Trametes gibbosa* (Pers.) Fr., *T. hirsuta* (Wulf.) Pil., *T. suaveolens* (L.) Fr., and *T. versicolor* (L.: Fr.) Lloyd.

For testing activities the fruiting bodies are cut, frozen, and lyophilized before extraction. The crude extracts are submitted to different biological tests: Antibacterial against the Gram-positive *Bacillus subtilis*, antifungal against the opportunist human pathogen *Candida albicans* (C. P. Robin) Berkout and the plant pathogen *Cladosporium cucumerinum* Ellis et Arthur, against the larvae of the yellow fever vector *Aedes aegyptii* and against the bilharzia intermediate host *Biomphalaria glabrata* mollusk, antiradical by reducing the DPPH radical, anti-tumoral against 60 cancerous cell lines issued from 9 cancer types, and antiangiogenic activity in rat embryos. All the tests have not yet been completed.