

BOOK REVIEW

Paul Stamets, 2000. Growing Gourmet and medicinal mushrooms. Third and fully updated edition. Ten Speed Press, Berkeley, California, USA. ISBN 1 – 58008 – 175 – 4, 574 pages, more than 500 photographs of which about 80 in full colour. Price \$ 39,95 + shipping costs by MycoMedia Productions and Fungi Perfecti. P.O. Box 7634, Olympia, WA 98507, USA. E-mail mycomediamedia@aol.com

Both professional and amateur mushroom growers are familiar with Paul Stamets' cultivation books. Some of these people frankly admit that they owe much to the manuals of the American expert. Like a Swiss commercial grower from Payerne expressed it, not long ago : 'Stamets? His book is our Bible!' Moreover, well-known mycologists like S.T. Chang, Scott Redhead, G. Lincoff, A. Besette, S.C. Jong, D. Largent and R. Watling have sung the praises of his cultivation manuals in renowned periodicals. The 2nd edition was especially warmly welcomed by both the scientific and the mushroom growing community all over the world. Now, only four years later, the fully updated third edition is here! Surprisingly, the book appears less bulky than the previous edition, but it has, however, the same number of pages, since it was printed on thinner paper. Moreover, lay-out and typography were improved, allowing for more text per page.

This reviewer has found little change or additions in the first 20 chapters. On pages 14 and 15, where the subject of eliminating toxic wastes by mycelia is treated, the author mentions a revolutionary patent for the destruction of army surplus nerve gases such as Sarin and VX. Moreover, the well-known Oyster mushroom, *Pleurotus ostreatus*, proved most efficient in the breakdown of petroleum residues. Not only did the mycelium degrade the oil itself, but also its contaminants such as the cancerogenic polycyclic aromatic hydrocarbons.

In the voluminous 21st chapter, which treats the growing parameters for cultivating the various mushrooms, we make acquaintance with half a dozen mushrooms that were not yet treated in the second edition. The most important of these is *Agaricus blazei*, a remarkable mushroom still unknown to the public in the UK, USA and Australia. Cultivation centers in Brazil and China are now well-established. Since it is a warmth-loving mushroom, it can be cultivated outdoors during summer in many temperate regions of the world including the southern United States. The very first market for *A. blazei* is Japan, where the imported dried Himematsutake (as they call the mushroom there) is converted to expensive medicinal preparations. The mushroom contains up to 14% of beta glucans, which are polysaccharides having not only immunopotentiating properties, but also the ability to selectively kill tumor cells. Consequently, on the Internet many companies are selling *A. blazei*-based drugs, but the often exaggerated claims about the cancer-healing properties do not inspire much confidence. The mushroom is undoubtedly a rising star, not only because of its medicinal virtues, but also as a gourmet mushroom. It has a pronounced almond flavour and a pleasant texture. Commercial cultivation has just reached the USA, and a few European countries. Stamets expects that the white button (*Agaricus bisporus*) growers will awaken to the potential of this mushroom. However, there are also some less favourable reports about *A. blazei*. In Brazil cultivation now seems to be past its prime. Although still encouraged by training courses and promises of guaranteed purchase of the harvest, the growers often find no customers. In addition, there are serious objections against eating *A. blazei* which are neither mentioned in the medical literature nor in the leaflets distributed by the growers. Indeed, the mushroom belongs to the subsection *Arvenses* which is notorious for the uptake of heavy metals of which cadmium is the most dangerous. Moreover, the mushroom also contains agaritine, a methylphenylhydrazine derivative suspected to be a potential carcinogen by many toxicologists. Investigations carried out in the reviewers' laboratory revealed that commercially available dried *A. blazei* often contained objectionable amounts of agaritine, cadmium, mercury and sometimes even lead. On the other hand, the more expensive medicines from Japan were free of these toxicants, presumably because they consisted of the purified beta glucan fraction.

Another newcomer in the book is the Portobello mushroom, a big brown variety of *A. bisporus*, which is most popular in the USA. Stamets deplors the high agaritine content of this mushroom, which makes it impossible to recommend it as a health food. However, it should be pointed out that the carcinogenicity of pure agaritine as well as that of the cultivated mushroom is still a matter of controversy. Indeed, among the published research it is often difficult to separate chaff from wheat. For years, the risk of agaritine was minimised by pointing out that the compound rapidly breaks down during cooking of the mushroom. However, in the USA as well as in Europe, *A. bisporus* is increasingly eaten raw. If the Button/Portobello mushroom industry wants to stay in business, it should recognise the risks, and endeavour to develop low agaritine or agaritine-free strains.

Stamets also presents *Pleurotus tuber-regium*, a tropical Oyster mushroom, which was formerly classified in the genus *Lentinus*. In Nigeria this mushroom has a long tradition as a cure against a wide range of ailments, including

heart disease and diabetes. It forms true sclerotia from which spiked primordia develop into large mushrooms. *P. tuber-regium* can be cultivated on sawdust as well as on pasteurised straw. Surprisingly, even in these cultures it forms small sclerotia, even when exposed to light! Just like the Gray Oyster (*P. ostreatus*), the mycelium of the King Tuber mushroom traps nematodes.

The easily cultivable Turkey Tail (*Trametes = Coriolus versicolor*) has also been included in Stamets' manual. This common polypore is said to be found everywhere in the USA, except in the state of Nevada! The Turkey Tail is the source of KRESTIN, the commercial name of a protein-bound polysaccharide that is good for several hundred millions of dollars of annual sales as an anti-cancer drug. Contrary to the often doubtful stories about the miraculous curing properties of many other mushrooms, there are reliable studies about the medicinal virtues of *T. versicolor*.

On pages 402–407 we find an elaborate culture method for the White Jelly Mushroom, *Tremella fuciformis* whose lifecycle is not yet fully understood. In its primary stage it is a slow-growing yeast who has to parasitize on an ascomycete e.g. *Hypoxylon archeri* before a mycelium can be formed. Subsequently, the spawn is cultivated for 4 to 5 days on sterilised grain, whereupon it is used to grow mushrooms on sawdust supplemented with 20% of rice or oats, 1% gypsum and 1% sugar. The medicinal properties of *T. fuciformis*, which is sold dried or candied, have mainly been reported in the Chinese literature. It is said to contain heteroglucans which are active against liver disease and tumors.

Finally, the author has mastered the cultivation of the Cauliflower mushroom, *Sparassis crispa*. He reports the impressive yield of 1 lb per 4 lb block of sterilised supplemented sawdust. No medicinal virtues are ascribed to this species, but it is a good edible mushroom that is commonly sold in market places in Switzerland. Of course, Stamets also gives new information about cultivated mushrooms already treated in the 2nd edition. For example, he has news about Shiitake, *Lentinula edodes*, which, as a health food—no agaritine, no heavy metals, but marked cholesterol-reducing properties—is still number one. Stamets cites the recent papers of Ghoneum who found that arabinoxylenes in fermented Shiitake inhibit the HIV virus. The (mainly) Japanese literature on the mushroom's antiviral and immunopotentiating properties is updated to 1999.

The colour illustrations are really outstanding. There are beautiful photos of *A. blazei* and *Pleurotus citrinopileatus* in various development stages. Just as in the former edition, the whole Stamets family was mobilised to present the often spectacular cultivation results. For example, daughter LaDena is pictured in various stages of growth each time presenting yet another mushroom. An endearing picture shows the toddler Ebikare Isikhuemhen, son of the Nigerian mycologist, carrying an impressive fruiting of *Pleurotus tuber-regium* from a large sclerotium.

The attentive reader will find here illustrations of some mushrooms which were not or hardly mentioned in the text, e.g. *Lentinus squarulosus*, a fast growing cousin to Shiitake. This mushroom, and also such exotic species as *Polyporus tuberaster*, *Flammulina populicola*, *Macrocybe crassa* and perhaps even *Termitomyces robustus* will probably be treated in the next edition. This practical manual and indeed, most readable book is again warmly recommended to all people with an interest in mushrooms. Considering the quality and quantity of the information provided, the price of this book is very low.

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