

Mushroom growing in Bulgaria

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Mushrooms have been grown in Bulgaria since 20 years. First specialists have studied in Hungary. Because of lacking of many and large cellars as in Hungary the Hungarian mushroom growing technique for primitive (extensive) conditions has been modified according to the local conditions in Bulgaria.

There is only one comparatively big mushroom producing enterprise in large cellars for 170 t fresh mushrooms per year, with peak-heating rooms according to the tray system.

In winter some co-operative farms grow cultivated mushroom in their modern tobacco -drying rooms.

The most of the annual production (from 1700 to 2000 t) is coming from thousands of small amateur mushroom houses, organized from the Central Co-operative Union. Growers use available and adapted rooms.

The Central Co-operative Union is buying up their mushrooms, cans them and trade with.

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Interest in the cultivated mushroom in Bulgaria has arisen in the last 20 years, together with the industrial development of the country and the growth of the towns. With 2 000 to 3 000 tons of annual production, mushroom raising is only a small branch of agriculture today. The main characteristic of Bulgarian mushroom growing is the small production scale. Thousands of small mushroom growers are organized by the Central Co-operative Union, which is transforming amateur mushroom growing into a well developed business.

To illustrate the popularity of mushroom growing is enough to say that the handbook "Production of Cultivated Mushrooms", printed in 1965 in an edition of 18 000 copies, was out of print in 5 years only.

There is only one big enterprise of the Central Co-operative Union having an annual production of about 100 tons and using modern technology. All the other mushroom growers are working with comparatively primitive technology.

Experimental work useful for the practice is carried out at the Experimental Station Negovan, near Sofia. Two research workers perform their experiments directly in different but typical mushroom production houses. This method of work shortens the investigation -introduction process. With the help of the research workers, by lectures, production experiments, films and so on, the Central Co-operative Union popularizes new production methods. The same organization has its own specialists who help the growers directly in their mushroom houses through consultations. They supply the growers with chemicals for mushroom pest and disease control and buy all produced mushrooms in three grades for the local market or for canning and export.

Mushroom houses

The small growers adapt old cow-sheds, stables, poultry -houses and other buildings, not in use, as well cellars under private and public houses. The average size of these mushroom houses is from 50 to 300 square metres of beds, most often on shelves.

Depending on the local microclimate the small growers produce mushrooms throughout the year or seasonally. The wooden shelves are changed for every crop. When the shelves are of metal with cheap bottoms made of material at hand, only the bottoms are changed.

Some co-operative farms in the mountainous regions use their sheep-houses for the summer mushroom crop grown on ground beds. At this time, from May 1st to September 1st, the sheep are in their summer camps high in the mountains, so their winter shelters are empty.

Some small growers and especially pensioners also prefer to grow mushrooms in summertime in the favourable climate of the high mountains with optimal air temperature and high relative air humidity. With the permission of the Ministry of Forests they choose a place near a small river with clean water and build plastic houses with wooden frame construction, most often under the shade of trees. To provide better shade against sunshine they also use paper, straw, hay or branches. With 3 or 4 floors, the shelves form 200 to 300 sq. m of beds. The annual production of these mushroom houses (collectively) often exceeds 1 000 tons of trimmed mushrooms of an excellent quality and at a comparatively low cost.

The largest mushroom enterprise in the village

of Krassen, near the town Russe, works in old stone-pit cellars. They use wooden trays of 2 sq. m each.

Compost

On the recommendation of the Experimental Station most of the growers use the so called universal compost prepared of 60% horse manure, 20% wheat straw and 20% poultry manure with litter of short straw or sawdust (broiler manure), on the base of dry matter. Heat treatment (peak-heating or pasteurisation) of the compost is not a common practice in the country. So the preparation of an inactive compost of high quality is a real "art" for the growers.

In some mountainous regions a part of the wheat straw is substituted successfully by flax stems. In the last few years many growers have begun to use also a type of "corn cob compost" with 30% horse manure content, wheat straw, broiler manure and some mineral additives. This compost is a good substitute for the insufficiently obtainable horse manure, easy to be turned by hand, with correct fermentation during the composting period, and higher mushroom yield, for example 20% higher in average in comparison to the universal compost.

The composting period for an inactive compost is about 18 days. Most often Rasmussen's composting rhythm is used: 0 - 6 - 10 - 13 - 16/17. Three turnings with replacing of the compost zones are done by hand, with a small turning machine, or sometimes with a manure spreader.

In the past few years the ready-made compost has become more popular. The Central Co-operative Union has organized several large composting yards and introduced the Dutch "Tillot" composting machine. Without any heat treatment the quality of the compost is naturally not very high. Sometimes the small growers have to turn this compost additionally by hand.

Beds, spawn, spawning

Bulgarian growers prefer flat beds and, at our recommendation, spot spawning. A small spawn laboratory produces manure spawn, and when this is not sufficient, French grain spawn is imported. The most popular *Agaricus* strains during the past few years have been "Somycel 97" and "Somycel 92". Our experiments in 1977 show that some other Somycel strains give a better yield, for example 459, 22, 85 or 53 - all of them white, and 56 - a brown strain.

Casing

The casing material is a standard one for all the growers. A special enterprise supplies a mixture of 70% by volume black peat and 30% ground chalk, packed in clean plastic bags. This casing material is practically free of pests and diseases and does not need disinfection.

Pest and disease problem

Dactylidium or soft mildew was the main mushroom disease for many years in Bulgaria. One may also see some spots of *Verticillium* sp., virus or mummy disease here and there. Nowadays one gramme of Fundasol (50% benomyl) per sq. m of bed surface, used after casing or some days before formation of the first pinheads is enough to control the soft mildew but not the *Verticillium*. Mummy and virus diseases are controlled mainly by changing the self constructions.

Mushroom flies are the main problem in all primitive mushroom houses. The best chemical at the moment is DDVP and especially "nuvan", used periodically as an aerosol in a dose of 1 kg per cu. m of room.

Yields

The average yield has for many years been about 6 kg of fresh trimmed mushrooms per sq. m of standard bed, or 80 kg per ton of compost for a crop. There are, of course, some much better yields, for example 10 to 12 kg, but many failures too, so characteristic for amateur primitive mushroom growing everywhere. Most often the failures are due to the hot weather in summer and the rainy weather in May and October-November, when many growers have to prepare their composts on open wharves and also directly on the ground.

Marketing

Only small quantities of fresh mushrooms are consumed by the domestic market because the mushroom houses are often far from the big towns. As a rule, special trucks transport all fresh mushrooms to the cannery and the canned mushrooms are delivered to the Central Co-operative Union for marketing.

Prospects

The Central Co-operative Union plans to modernize the old composting yards by introducing heat treatment of the compost and mixed spawning with grain spawn and to offer for sale spawned compost in plastic bags. The Experimental Station has proved that new technology is intensifying amateur mushroom growing and thus the "home mushroom production" will continue for a long time. Meanwhile we hope that the large State and Co-operative Farms will turn their attention to modern mushroom cultivation on a large scale.

There were some experiments to grow *Pleurotus* sp. and *Stropharia rugoso-annulata* but the local market had very little interest in them. Only some people in the mountain regions know the wild *Pleurotus* and sometimes prefer to buy it instead of *Agaricus* strains.