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Growing of champignons at ''Moskovski'' Sovkhoz on synthetic substrate

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Growing of champignon at "Moskovski" Sovkhoz, a vegetable and mushroom growing enterprise with up-to-date technology, is described. The compost is prepared from corn and rye straw and bird manure. The pasteurization and subsequent cooling is carried out in strictly controlled conditions. The mycelium, spread evenly on the compost, is grown at a temperature of 26-27° C and at relative humidity of 95 %. The formation of fruit-bodies is initiated by lowering the temperature to 19-20° C.

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"Moskovski" Sovkhoz is a specialized enterprise. Its main spheres of activity - vegetable growing on protected ground and mushroom growing - are determined by its location near the capital. The Sovkhoz occupies an area of 3 000 hectares. Winter hot-houses occupy an area of 54 hectares. At the end of 1976 a big mushroom production complex with an area of one hectare was commissioned. Such a complex was also built near Leningrad.

By area of protected ground covered "Moskovski" Sovkhoz ranks highest in the country. At the end of 1977 its output will amount to 18 600 tons of fresh hot-house vegetables and 760 tons of champignons. Such big mushroom raising enterprises require new up-to-date technology and the quality of mycelium is essential for high yields. In such complexes it is effective and highly recommended to use specialization and division of labour.

Preparation of the substrate

Annually an amount of 4 800- 5 000 tons of compost for champignons, grown in an area of 1 ha, at a 12 -week cycle, is needed. Our specialists, using the available data in compost preparation from different components, employ technology, based on corn and rye straw and bird manure, without adding other organic constituents. Compost preparation (including mixery of bird manure, insertion of gypsum, breakage, etc.) is carried though by effective machines. At our disposal we have a water-sprinkling system for soaking the straw, special reservoir for waste water, etc. We get 3-3.3 t compost from 1 t dry straw. The characteristics of compost, when inserted into the chamber are the following:
pH 8.0-8.5, nitrogen 1.8-2%, moisture 71-74%.

Pasteurization and transpiration cooling of compost

Pasteurization ensures compost treatment at high temperatures, by means of vapour, for destruction of all micro-organisms harmful to champignons. Usually they die at a temperature higher than 55° C during 8-16 hours in humid environment. When the temperature of the compost reaches 55° C, we maintain the temperature of air at 57-58° C for six hours. Then the air temperature is decreased to 47-48° C by means of fresh air supply (2 000-2 500 m^3/h). When a temperature of 47-48° C is reached, we diminish the supply of fresh air to 800 m^3/h.

Transpiration cooling of compost is carried through during 10 days. The temperature of compost decreases 1-1.5° C every 24 h. On the 9th day quick cooling is carried through decreasing the temperature of compost to 26-27° C by means of fresh air supply. During transpiration cooling compost looses water, its humidity decreases to 60-69%, it looses its smell of ammonia, pH decreases to 7.4-7.7. At the end of pasteurization, on the surface of compost, actinomycetes actively develop, which gives it a greyish -white colour. On the 10th day we introduce mycelium for growing.

Insertion and vegetative growing of mycelium

We plant grain mycelium, usually 0.5-0.6 l/m^2 of seed bed or 5-6 l for 1 ton of compost. Workers evenly spread mycelium on the surface of compost, then with special electric milling machine, they mix it with the compost and then shape the beds with a vibrator. After additional manual shaping and evening of beds, they are covered with clean paper and the chamber is treated with tiodan (usually 3 g/m^2 of effective area). In the course of 12 days mycelium grows in the compost under

the paper cover. At this stage we maintain a temperature of 26-27° C and relative humidity above 95%. Fresh air is supplied only in case the temperature of compost raises above 28° C. Daily we moist the paper with water, and once a week as a precaution, with a 0.5% solution of formaline. After two weeks we remove the paper and cover it with a layer of 3.5-4 cm of soil. This soil we prepare by mixing peat with 10% marl. The soil has pH 7.5 and high hygroscopic moisture. It is very important that the surface layer is evenly spread. If we cannot assure that difficulties in maintaining optimal moisture of the soil will arise, the growing of mycelium will be uneven. All this will effect the yields. The ingrowing of mycelium in the soil is carried out in the same way as that of compost. The first 5-6 days after the insertion of soil we pour 13-14 l of water/m^2. On the 9-10th day of fresh-air supply we decrease the temperature to 19-20° C in order to cause formation of fruit-bodies. After the temperature has been decreased to 19-20° C we diminish the supply of fresh air. At this stage it is very important to maintain the humidity of air at 90-93%. The quantity of water used at this stage is 1 l/kg of expected mushroom crop.

Fruit bearing

During the period of fruit bearing we maintain the temperature of the air between 16-18° C and relative humidity 80-85%. The quantity of fresh air supply depends on the crop expected. At a temperature of 18° C 1 kg of mushrooms needs 1 m^3 of fresh air. We maintain the circulation of air above the beds to 0.5 m/s. After soaking we increase ventilation to 1.5 m/s. The quantity of water for each fruit bearing cycle depends on its magnitude. For 1 kg of expected crop we use 1 l of water. We start watering when the fruit-body has the size of a big pea. At the time of picking the pileus is closed. In plastic cases the mushrooms go to a department, where they are put in cardboard boxes, 0.5-0.6 kg in each. On an automatic conveyer they are covered with perforated polyethylene and weighed on electronic scales. On each box the automat glues a label with the price, weight, date, etc. Now they are ready for marketing. This year, for a period of 9 months, a yield of 555 tons of champignons has been obtained, i.e. 55.5 kg/m^2 of effective area.