Spent Compost as an Alternate Casing Material

By Charles C. Brosius
Marlboro Mushrooms, West Grove, Pa.

Tremendous quantities of spent compost are generated as a by-product of commercial mushroom farms. In areas of concentrated mushroom production, disposal of this spent compost is a difficult problem. Recycling for use as a casing material is one solution that has proven successful. With a combination of proper management procedures a casing soil can be obtained that has superior qualities to either the local mineral soil or spagnum peat moss. Conversely, failure to observe any of a few standard practices can result in a totally unacceptable casing material with corresponding problems.

SITE SELECTION

Choice of site for disposal of spent compost for preparation of casing soil is one one of the most important decisions that will determine success or failure of this operation. A preferably high, well drained, reasonably level area is essential. It must be level enough to allow for the safe operation of dump trucks and loader tractors. It is most important that run-off occuring at times of heavy rainfall remain within the property boundaries. This leachate must be contained long enough to allow it to disperse naturally so that it is not a source of pollution to streams or a contaminate to water supplies. The size of the site is determined by the topography, the speed or number of years required to recycle, and the volume that is necessary to maintain a complete circle or cycle in your operation. It may be necessary or desirable to have several locations. We maintain approximately four acres in various stages of decomposition and case approximately 350,000 sq. ft. per year. It is suggested that this is not an aesthetically "pretty" operation and for public relations purposes might best be conducted at some location that does not receive constant public scrutiny.

COMPOST AGING

We know of no good formula, rule of thumb or chemical measurement that will consistently guarantee that spent compost is sufficiently aged to provide the ideal casing material. Our experiences and those of others, as well as the results of many laboratory tests, lead us to conclude that the most uniform characteristic of spent compost is that it lacks uniformity. Although we have no hard scientific proof, it would appear that there are many factors contributing to this variability. The proportions of the basic ingredients of the initial compost, hay, straw, manure, and the length and success of the Phase I and Phase II composting periods will affect the physical appearance. The initial chemical composition of the materials, supplements added before and during Phase I and after Phase II, the length of cropping and total production will affect the chemical composition at clean-out time. The spent compost from one house that I recall in particular with an extremely poor cook-out and low production was still growing ink caps in the casing soil field three years later.

METHODS

A standard practice in our growing operation is to steam all houses at the end of cropping until compost temperatures reach 160°. The compost is then removed and dumped in the casing soil field in preparation for leveling. We prefer to level as soon as possible to a depth of about 18 inches. It requires about half of the spent compost removed from our growing houses to maintain the casing operation. The balance is spread on stands of alfalfa-orchard grass that is later harvested to be used as compost. After initial leveling of the spent compost is completed, it is almost impossible to begin tillage for about 18 months. By then the compost has settled to about 12 inches in depth and can be plowed to bring up the mucky, sometimes anaerobic bottom layer. The soil is tilled occasionally to provide aeration and mixing, allow for uniform leaching, and control growth of week plants.

At one time we were of the opinion that sufficient salt leaching has occured when te compost would support the growth of weeds. We are now convinced, however, that this is not always a true indicator. Ragweed, lamb's quarters and Canadian thistle appear to be extremely salt tolerant. Close examination when the plants are small often reveals that they are growing from a seed which sprouted on a lump or small piece of casing soil from the previous crop.

During this time of soil tillage, ground limestone is applied at rates as high as 12 tons per acre. pH tests indicate that compost at clean-out time is about neutral. We attempt to increase this to pH 8 before storage as casing soil. Variations in soil pH do not appear to significantly affect yield. It has been our experience that there is a reduction in weed molds during cropping if the soil pH is maintained at the higher levels.

We do not attempt to use spent compost for casing soil until it is at least two years old. By then the original depth of 18 inches has settled, decomposed, and disintegrated to approximately 6 inches. On occasion we have found three year old compost that is physically acceptable but is chemically unacceptable. We know that others have found less weathered compost that will produce good results. Our method to determine sufficient aging is to prepare a small portion of that compost soil in question, load one tractor scoop on the back of a steam truck loaded for pasteurization and case it onto a top bed. Insufficiently aged soil will not support good spawn growth, will produce fewer and larger mushrooms and reduced yield.

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STORAGE AND TREATMENT

The most important single factor in the handling of spent compost for casing is moisture. The highest moisture level that will allow screening to remove lumps and hauling without compaction will provide the best casing soil. Excessive drying reduces particle size, complicates pasteurization and encourages sealing of the soil after casing. Moisture level is extremely critical if chemical sterilization such as Vapam or chloropicrin are to be used. Excessive moisture inhibits chemical transfer while low moisture levels do not provide sufficient chemical reaction and may allow the chemical to escape before treatment is completely accomplished.

The method of soil treatment that we have found most successful is aerated steam. Controlled steam temperatures can be maintained for long enough to assure complete pasteurization with a minimum effect on soil moisture and structure. Steam at 150° F is continued for two hours after the load is completely hot. The load is covered to prevent recontamination and air filtered through a 1 micron filter unit is used to cool the soil as necessary for use as casing the next day.

Pasteurized soil is placed on the beds approximately one inch deep. Watering begins immediately and maximum water holding capacity is usually accomplished within 2 days after casing.

Weathered spent compost used for a casing layer is a practical, economical material when handled properly. It will assist the conscientious grower in achieving maximum yields of high quality mushrooms. In as much as modifications and adjustments in our handling procedures are constantly being made to compensate for changing conditions in our growing operation, this is intended only to be a progress report. It is not presented as a blanket recommendation to mushroom growers whose farms are in areas that have climatic conditions that differ extremely from those in Chester County, but perhaps will serve as a set of guidelines within which others may successfully produce an alternate casing material.