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GOOD NEWS FOR MUSHROOM LOVERS

The switch to organic methods has made Bob Bardi the first certified mushroom grower in California — and a happy, successful farmer.

MARK WEXLER

A LOGICAL RULE seems to be that if you've got a good thing going, don't change it. Right? Well, not necessarily. Just ask Bob Bardi.

Nine years ago, Bardi bought the Santa Lucia Mushroom Farms in Atascadero, California. Since that time, he has more than doubled his volume and has increased his number of mushroom houses from five to eleven. Yet, close to a year ago, he made a major change in his operation.

Like every other California mushroom grower, Bardi had been using various chemical sprays to ward off pests. Diazinon and DDVP were used over the farm's entire outside area, and a dyna-fogger spraying vapona was used every three days inside the buildings.

"My wife and I became unhappy with the fact that we were using chemicals," recalls Bardi. "We had two different strengths of vapona, one for before and one for after the mushrooms began to grow. I was worried that one of my men might pick up the wrong spray.

"Then we lost two of our animals. They had gotten into some chemicals while snooping around for food. That was the last straw. There would be no more chemicals on our farm."

Bardi has since ceased all spraying and has now become the only certified organic mushroom grower in California.

His first summer after going organic proved to be expensive. He had to experiment and lost crops in the process. Yet, he is now convinced that mushrooms can be grown profitably through organic means.

One of the major pests to mushroom growers is the phorid fly, a tiny gnat which ovulates every 72 hours. To cope with these flies, Bardi put up very fine-meshed screen doors on all of the mushroom houses. His major defense against them, though, is to break up their life cycle. The flies lay their eggs on the compost piles, and in 72 hours, mature phorid flies appear.

However, every 68 to 70 hours,

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Bardi turns his compost to let in air and release heat from the center of the piles, which average about 170°. In doing so, he also buries the eggs, which are then smothered by the heat.

The compost piles at Santa Lucia are approximately 100 feet long. Bardi recently spent $20,000 for a new tractor, to ease his work in turning the compost. His new tractor has a special fork attachment made to Bardi's own specifications. It is similiar to a forklift, with a backguard substituted for the loader bucket.

The mushroom farmed at Santa Lucia is called biologically *Agaricus bisporus*. It requires seven weeks before the first of the fruit is ready for harvest. Phases 1 and 2 of the growth cycle consist of positioning the compost and pasteurization, and require about two weeks.

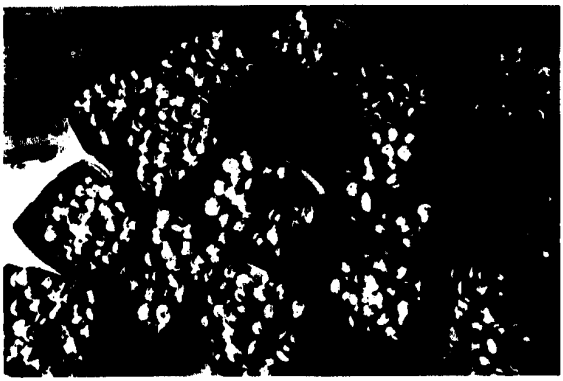
A special compost must be used to create a sub-strate on which the mushrooms will grow. The carbohydrate-protein-mineral make-up is especially important.

As do most other growers, Bardi uses horse manure for his compost, brought in from racetrack stables. The use of horse manure goes back 200 years, to France where mushroom cultivating began. At that time, it was noticed how readily mushrooms grew around stables.

Ecological implications can be found in recycling the manure. Any organic material with the proper bio-chemical make-up could be used for growing mushrooms.

To the horse manure, lime is added to work as a pH buffer. An extra organic nitrogen source is also added, such as chicken manure. The compost is first piled loosely in the beds. Each mushroom house is then tightly closed up, and a "cookout" begins to kill off any pests or competitors. Since some nematodes have adapted to high heat, the temperature must reach at least 150 degrees to kill all of them. This is the pasteurization process. If the compost is prepared properly, it should give off enough heat to do the job. If not, then steam is used to bring up the temperature.

Most of Bob Bardi's mushroom crops are marketed in the Los Angeles area where shoppers can be assured they are receiving organically-grown mushrooms.



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The two main molds which attack mushrooms are *Mycogyne* and *Verticillium*. Most growers use two pesticides to combat them, Zineb and Maneb. However, if the compost is prepared properly, if the employees wash their hands and remain clean, and if the cookout is done correctly, *there is no need for pesticides*. Furthermore, after pasteurizing, provided the workers are clean, there is no need to spray Diazinon or any other chemicals for protection.

After the cookout, the beds are inoculated with the spawn. These are really the *mycelium*, the part of the mushroom which grows underground. Bob Bardi buys his spawn from International Microbiological Products, whose laboratories are in Hawthorne, California. There, the spawn are raised virus-free, completely organically.

Once they are planted, the spawn grow rapidly. A "spawn-run" takes 14 to 18 days.

The next step is to "case" the beds, whereby about an inch of soil is placed over the top of each bed. This produces gases, which in turn produce the mushroom flower. After casing, in 7 to 10 days, the mushroom begins to form. Then, after another 10 days, it's ready to be picked. Cleanliness and good fly filters are extremely important. These two factors make the use of chemical pesticides completely unnecessary.

Tests have shown that mushrooms pick up residues very easily. One grower used olive oil as a protein (nitrogen) supplement in his compost. His mushrooms came up with a rancid, olive oil taste. The same fact obviously holds true for pesticide residues. DDVP mixed with one of the Monsanto PCB's is used by some growers to kill the phorid fly. Mushrooms raised under these conditions have shown high concentrations of PCB which has already been proven by the FDA to be dangerous in chicken feeds.

Bardi has not changed his prices since going organic. He charges the strong end of the market and stands firm on this. Most of his crops are marketed in the Los Angeles area, where most shoppers can at least be guaranteed that they are really receiving organic mushrooms. In other parts of the state, the same guarantee might be most questionable, since Santa Lucia is the only certified organic mushroom grower.

Mushroom growing can be profitable, but a person interested in the subject should keep certain factors in mind. One is that it demands exact temperature control and a knowledge of how to make the compost perfect in each phase. A tremendous amount of water is also required to maintain the crops (Bardi estimates about 15,000 gallons per house, per crop), and a knowledge of how to use this water properly is necessary. Most important, large-scale mushroom growing requires a tremendous initial expense. Bardi estimates that a beginner would need the following:

A minimum of 20,000 square feet which would mean five buildings (at a cost of $75,000), plus land (another $10-15,000). You would need heating equipment (a steam boiler = $10,000), commercial 220 service ($2,000), and an inch-and-a-half water line ($1,000). To this, you would have to add a tractor ($7-8,000), miscellaneous equipment ($1,000), and $5,000 operating capital. "Then gentlemen, you have to figure out where the hell you're gonna live."

Bob Bardi is more than amply demonstrating that mushrooms can be grown profitably – and organically. In fact, his farm procedures show how completely unnecessary the use of chemical pesticides are in the raising of mushrooms. Next time you're in his area, stop by and see for yourself. Find out why Bob says his mushrooms are "so good you can eat them raw."

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COMFREY AND HOW IT GREW ON US

"Comfrey has been such an easy, successful and nutritious crop for us that we are very enthusiastic about its possibilities for both the backyard gardener and the homesteader with an acreage. It's a tea . . . an animal food . . . a compost enricher . . . a vegetable . . . an herb . . . a healer . . . a silage ingredient."

NANCY BUBEL

WE HAD MOVED HERE in August and were anxious to get as many plants started as we could so they could spend a season putting down roots. And so we splurged and ordered ten established comfrey plants, ready to produce. Along with these we got ten crown cuttings (cheaper) containing eyes or buds, and ten root cuttings (cheapest). Ordering an assortment like this was our way of experimenting, too, so that we could report on the comparative results.

Here's what we observed: The following spring, the established plants were up and away a good two weeks before the crown or root cuttings. But by the end of the summer, there was very little difference between them. At the end of their second summer the plants appear the same in size and vigor. So we did get a head start, but if we were to do it again, we'd order cuttings or roots. A larger plant is so much more severely retarded by transplanting that it doesn't take long for the "grown from scratch" pieces to catch up.

Planting the Comfrey: We rotary-tilled and manured the comfrey patch in the fall before the roots arrived. It was November, and *cold* by the time we received the roots, so we didn't linger out there in the patch. First, we put in the whole plants, which we'd had soaking in a bucket of water. We dug big, generous holes for the plants, spacing them three feet apart, and set them in their normal position, but two inches below the ground surface, and watered well at root level before filling in the hole.

Next came the crown cuttings and root cuttings, also pre-soaked. These we planted lying flat, in a horizontal position, about four inches deep. In lighter soil, we'd have put them six inches down. We watered them well and filled in the hole, tamping it firmly. Making three rows of plants with ten plants in a row, we positioned the whole plants down the center row, with the cuttings on either side. The planting holes looked awfully far apart that first season. Two years later we can only say: They *weren't* too far apart!

Soil Requirements: Comfrey does best in sweet soil, with a pH of 6.0 to 7.0. To bring acid soil into balance for optimum performance of a com-

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