BIOLOGY

Mushroom Boom Seen

Two scientists have found a way to grow mushrooms in two weeks on waste sawdust at room temperature. The process promises year around, plentiful and cheaper mushrooms.

By HOWARD SIMONS

➤ MUSHROOMING may soon find itself in a mushroom boom.

A sudden interest in mushrooms has sprung up in this country following the announcement by two University of Florida scientists that they have successfully grown mushrooms in only two weeks on waste sawdust.

As exciting as this scientific achievement is, the future of sawdust-nurtured mushrooming appears even more promising. Dr. S. S. Block and George Tsao of the University of Florida, the chemists responsible for the process, foresee this future from their find:

1. Cheaper and more mushrooms for the housewife.
2. The utilization of tons of sawdust now being discarded as waste.
3. Year around production of mushrooms at room temperatures.
4. Easier handling of sawdust for both the hobbyist and the professional, compared to other forms of compost.
5. Re-use of the sawdust used for mushrooming as a valuable fertilizer.

The process of quick-growing mushrooms on waste wood products is still in its initial stages. However, the Florida scientists report, small laboratory tests indicate 500 pounds of fresh mushrooms can be grown in two weeks time on a ton of ordinary dry sawdust, supplemented with oatmeal.

Some Problems Unsolved

They caution would-be do-it-yourself mushroomers, "boosting production from laboratory scale to commercial size presents serious problems that still have to be solved."

It is interesting to note that the process developed by Dr. Block and Mr. Tsao has similarities to an ancient and primitive art of mushrooming that is practiced in the Orient.

To raise mushrooms, the Japanese bored a hole in a tree. Into the hole was injected a mushroom fungus. The hole was then plugged and time allowed to take over. Eighteen months after injection, mushrooms would sprout from the treated tree.

Dr. Block and Mr. Tsao are modern practitioners of this early art. However, whereas the Japanese mushroom grower took 18 months to produce his wares, the Florida scientists can perform the same feat in two weeks.

To do it, they use sawdust, a nutrient and a mushroom known popularly as the oyster mushroom.

In their experiments, the scientists have found mushrooms can be produced on the sawdust waste of pine, gum, oak and magnolia woods. Gum wood waste proved to produce mushrooms the fastest.

Most of the work in the Florida laboratory, however, was with pine sawdust. The pine sawdust, plus the oatmeal nutrient, yielded mushrooms at a constant room temperature of 78 degrees Fahrenheit. Room temperature, it was found, was best. The mushrooms did not flower at either 50 degrees or 90 degrees Fahrenheit. Although the two scientists report that special care and equipment has been necessary in their experiments, and have not published all the secrets of their process, they have mentioned some of the tricks in their scientific bag.

Best growth, they report, was obtained by adding a nutrient to the dry sawdust. Oatmeal, they claim, gives "excellent results," but less costly nutrients can also be used. In their successful experiments, five percent of oatmeal was added.

Too much nutrient retards the mushroom formation.

The oyster mushroom used in the experiments deserves comment. It is known scientifically as *Pleurotus ostreatus.*

In the Orient, Dr. Block and Mr. Tsao point out, a different type mushroom is cultivated and eaten. In Japan it is called the "Shii-take."

In the Western world still a third mushroom is popular, known as the *Agaricus campestris.* This is the mushroom most familiar in the United States.

It appears from the Florida experiments that the oyster mushroom has some distinct growing and gustatory advantages over both the Oriental and Western favorites.

Flavor Is Different

The oyster mushroom's appearance and texture is like that of its Japanese cousin. Its flavor, however, is between that of the *Agaricus campestris* and the "Shii-take." It is white, has a shell-like look, and grows open rather than in "buttons."

Mushrooms, Dr. Block and Mr. Tsao say, are one food that has found favor for centuries.

"In fact," they point out, "mushrooms are so highly regarded that people continually risk their lives by eating wild mushrooms, some species of which contain deadly poisons."

Now, it appears, man will have his fungal fruit in abundance, for the Florida scientists anticipate even larger yields for their sawdust-nurtured food than they have produced to date.

SAWDUST GROWN MUSHROOMS—These oyster mushrooms are growing on waste sawdust. It took just two weeks at room temperature for them to flower. The discovery that sawdust nurtures mushrooms was made by Dr. S. S. Block and George Tsao of the University of Florida, who have hit upon a find that may spell a mushroom boom for the nation and the world.

Much of the excitement caused by the announcement of the find results from two factors: use of room temperature and use of sawdust.

As Dr. Block and Mr. Tsao see the picture, the fact that the oyster mushroom can be raised at 78 degrees Fahrenheit points the way for open season on the steak embellishers the year around. The process would no longer have to be seasonal and would not have to be confined to the cooler areas of the world as is now the case with *Agaricus campestris.*

Waste Product Used

Use of sawdust in the process can mean the utilization of a by-product now being dumped or burned as waste. Sawdust, wood shavings, wood bark, bagasse and similar cellulosic and ligneous waste products are in abundant supply in many areas of the world.

"In the United States alone, 7,500,000 tons of sawdust go to waste every year. The significance of a process to convert this waste into a flavorful nourishing food is self-evident," the scientists state.

Sawdust, unlike manure and straw, is uniform in composition and can be handled readily by mechanized equipment.

However, as if all this were not enough, the researchers have also looked ahead to find a use for the used sawdust. With their desire to use waste in a productive, chain-reaction fashion, Dr. Block and Mr. Tsao believe that the spent sawdust in which mushrooms have been cultivated will have by-product value as an organic fertilizer.

"Mushrooms," says Prof. Clyde M. Christensen of the University of Minnesota, "have been long regarded all over the world as the most delectable and succulent of foods. Their peculiarly delicate flavor charmed the luxury-loving Roman aristocrats more than 20 centuries ago, as it charms all civilized folk today."

Although the mushroom has been collected and eaten for 20 centuries, it has been commercially cultivated as an industry for only about 200 years.

When Dr. Block and Mr. Tsao made the announcement of their work, they modestly told fellow scientists of the American Chemical Society there "are a number of different species of mushrooms that grow on trees in nature and are considered quite desirable for eating by mushroom collectors. It occurred to us that these mushrooms might be produced from sawdust, an abundantly available waste product."

Fortunately for mushroom fanciers, the American housewife, and the mushroom industry, the Florida team has so far been correct in their assumptions and experiments.

As an industry, the mushroom business may soon mushroom into a mushroom boom.

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BIOCHEMISTRY

Acid Added to Bread Almost Triples Growth

➤ ADDING a small amount of the amino acid, l-lysine, to white bread almost tripled the growth rate of laboratory rats, Drs. J. B. Hutchinson, T. Moran and J. Pace of the Research Association of British Flour-Millers' Cereal Research Station at St. Albans found.

What effect the lysine enrichment of white bread may have on other aspects of development still needs to be learned, the scientists state in *Nature* (July 7).

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TECHNOLOGY

Hydrocarbon Fuel From Western Mineral

➤ A SOLID FUEL, neither coal nor asphalt, although it resembles both, is to be tested.

Latest mining and transportation methods are put to use in a new processing plant, to be completed in 1957, which will make high purity coke out of an unusual geological formation found near Salt Lake City.

The formation, known to geologists as Uintaite, is of hydrocarbon origin. Black like coal, it contains more resin and less sulfur than asphalt. Petroleum-like by-products, similar to those from oil shale, are expected to be recovered in the coking process.

Barber Oil Corporation and Standard Oil Co. of California have joined in the effort to adapt the hydrocarbon mineral to fuel use. They have re-named it "Gilsonite," after an early explorer of the formation where it is found, and are building the processing plant near Grand Junction, Colo.

A six-inch pipeline will be used to pump a suspension of the mineral over the mountain from the mines at Bonanza, Utah.

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