PRODUCING WOODLAND MUSHROOMS

FOREST STEWARDSHIP MANAGEMENT NOTE #21

Alpena-Montmorency Conservation District

INTRODUCTION

During the 1980's, methods became available for growing several types of edible woodland mushrooms. The two most commonly grown types are the shiitake (pronounced, "she-tah-key") and the tree oysters. Because of their excellent flavor and texture, these mushrooms are becoming popular many parts of the world.

Because the technology involved is relatively simple and low-cost, growing shiitake and oyster mushrooms is well suited as a supplemental income activity of farmers and certain other woodland owners. Cultivating woodland mushrooms can be profitable, and it certainly is a fascinating adventure for people who like to grow things. However, there has been a lot of "hype" about shiitake as a get-rich-quick scheme.

Successful shiitake cultivation requires occasional bouts of hard physical labor and frequent inspection of inoculated logs. Furthermore, the grower most understand the basic biology of the shiitake fungus, be willing to experiment with methods, and devote ample time to marketing, if the operation is intended to be profitable. This Note gives an overview of stages in shiitake and oyster mushroom cultivation and lists sources of further information.

OVERVIEW OF WOODLAND MUSHROOM CULTIVATION:

1. PREPARATION OF BEDLOGS - Shiitake and oyster mushrooms are wood-decaying fungi, so the first stage of cultivation is to select and prepare "bedlogs" that are suitable for these fungi to grow on. For both shiitake and oyster mushrooms, bedlogs should be cut in late winter or early spring (while still dormant) from parts of trees with few branch scars and no evidence of decay.

   For shiitake, beginners should use oak (any species) if at all possible. Other promising species include American hophornbeam (ironwood), sugar maple, yellow birch, paper birch and others. The ideal size for shiitake bedlogs is 4-8 inches in diameter and 3-4 feet long. Smaller logs dry out too quickly. Larger logs work, but they are hard to handle.

   For tree oysters, softer "hardwoods", such as aspen, are recommended. The most common method of small-scale oyster mushroom cultivation uses bedlogs that are relatively short (18-24 inches) and large in diameter (any size manageable).

   Woodland mushrooms can also be grown on sawdust and other fibrous wastes, but beginners are advised to start with natural logs.

2. INOCULATION OF BEDLOGS - The second stage is to inoculate the bedlogs with pure "spawn". Spawn is the vegetative body of the fungus growing in a sterilized medium (usually sawdust and grain). By using high quality, commercially produced spawn, mushrooms with known characteristics can be produced, similar to the way varieties of apples are vegetatively propagated from cuttings. Spores are not used. Many strains of shiitake and oyster mushrooms are available; these produce fruit with varying qualities and at different times of year.

   In northern climates such as Michigan, inoculation generally occurs in early spring. For shiitake, inoculation consists of three steps: drilling holes in the logs, inserting shiitake spawn into the holes with a plunger, and sealing the filled holes with melted wax. There are many inoculation techniques used for oyster mushrooms, but the most common method for beginners consists of stacking short logs end-to-end on top of each other with spawn layered between them.

3. TEMPORARY LAYING - When inoculation is complete, each bedlog can be thought of as a small garden that needs tending. Like garden plants, mushroom cultures are most vulnerable in the early stages of growth. But unlike regular gardens, bedlogs are moveable. By carefully locating bedlogs you can establish strong cultures and avoid many future problems.

Immediately after inoculation, bedlogs should be placed in a "temporary laying yard" with a moist, woodland environment that will favor rapid fungal growth. Oyster mushroom bedlogs are often first stacked for a few weeks in buildings inside plastic garbage bags where they will be warm and moist.

4. SPAWN RUN - During the "spawn run", the fungi colonize the bedlogs by growing microscopic threads (hyphae or the mycelium) throughout the wood. As the hyphae spread, the fungus accumulates nutrients by digesting wood. This colonization stage is often complete by the end of the first growing season as indicated by a white mat of mycelium appearing on the ends of the logs. To ensure good mushroom yields, growers should monitor the condition of the bedlogs during this period to make sure they do not become too dry (indicated by cracked wood) or too wet (indicated by moldy bark).

5. PERMANENT LAYING - When the spawn run is complete, the bedlogs are moved to a "permanent laying yard" (fruiting yard) where they are stacked so that the mushrooms can freely emerge and be easily harvested. At this point, non-commercial growers can simply wait for mushrooms to appear. To maximize long-term yields, commercial growers should keep close track of the condition of their bedlogs & be prepared to adjust the moisture in the logs by sprinkling or soaking them.

6. FRUITING & HARVEST CYCLE - When the fungus has digested enough wood, mushrooms will appear if favorable rains occur or if the grower stimulates fruiting by soaking the logs. The first fruiting often occurs about a year after inoculation, but may occur as soon as 4-5 months. After a fruiting flush, the fungus must have a few weeks of good growing weather in order to digest enough wood for another flush. Healthy logs commonly produce mushrooms for about 5 years before they become unproductive; no further inoculation is needed.

By creating conditions that mimic the natural environmental stresses that trigger fruiting, growers can exert a fair amount of control over the timing of mushroom production. Soaking the bedlogs in water is the primary means of doing this, and it can be amazingly effective.

7. MARKETING

Several options for marketing woodland mushrooms exist, but you will need some marketing skills to become a profitable grower. And this means marketing in a broad sense, including education of potential customers. Fortunately, some excellent support materials have been developed, including a thorough Marketing Manual and attractive promotional literature (#7).

CONCLUSION

Start small, experiment with methods, develop markets, and see how you like the work. At the very least, you will end up with some delicious mushrooms.

REFERENCES

FSMN #'s refer to other Forest Stewardship Management Notes in this series.

#1 Burnett, Christopher D. 1993. How to grow shiitake mushrooms outdoors on natural logs. A 2-hour videotape with accompanying 72-page handbook. Available from Superior Wild Mushrooms and Produce, HCR1, Box 183, Limestone, MI 49816, Phone/FAX 906/446-3328.

#2 Harris, Bob. 1986. Growing shiitake commercially - A practical manual for production of Japanese forest mushrooms. Science Tech Publishers, Madison, WI. 72 pp. [Good basic book with excellent photos].

#3 Kozak, Mary Ellen, and Joe Krawczyk. 1989. Growing shiitake mushrooms in a continental climate. Field and Forest Products, Inc., N3296 Kozuzek Rd., Peshtigo, WI 54157. 45 pp. [Excellent booklet, especially

for beginners in the Midwest. Very practical].
#4 Kozak, M.E., and J. Krawczyk. 1991. Year-round shiitake cultivation in the north. Available from SHII-GAW, P.O. Box 99, Birchwood, WI 54817. [34-page booklet on indoor growing].
#5 Kuo, Daniel D., and Mau H. Kuo. 1983. How to grow forest mushroom (shiitake). Mushroom Technology Corp., Naperville, IL. 108 pp. [The first good book written for growers; still useful].
#6 Leatham, Gary F. 1982. Cultivation of shiitake, the Japanese forest mushroom, on logs: a potential industry for the United States. Forest Products Journal 32(8):29-35. [Excellent introductory article].
#7 Melville, Patricia and Ann Potter. 1987. Shiitake mushroom marketing guide for growers. Southeast Minnesota Forest Resource Center, Lanesboro, MN 55949. 124 pp. [3-ring bound. Background and "homework" on all aspects of marketing].
#8 Przybylowicz, Paul, and John Donoghue. 1988. Shiitake growers guide. The art and science of mushroom cultivation. Kendall/Hunt Publishing Co., Dubuque, Iowa. 217 pp. [The most comprehensive book currently available].

RESOURCES

Shiitake News - The Information Clearinghouse for Shiitake Mushrooms. Issued 3 times per year (March, August and November) by the Forest Resource Center, a non-profit, educational corporation. Contact: Forest Resource Center, Route 2, Box 156A, Lanesboro, MN 55949. 507/467-2437. The best source of up-to-date information for growers; a must.

The following, partial list of suppliers is for information only; no endorsement is implied of any supplier. See advertisements in Shiitake News for new products & suppliers.

Allied Mushroom Products
P.O. Box 490
Tontitown, AR 72770 501/361-5938
Elix Corporation
Box 133-1A, Rt. 1
Arvonia, VA 23004 804/983-2676
Far West Fungi
P.O. Box 1333
Goleta, CA 93116
Field and Forest Products, Inc.
N3296 Kozuzek Rd.
Peshtigo, WI 54157 715/582-4997
Fungi Perfecti
P.O. Box 7634
Olympia, WA 98507 206/426-9292
L.F. Lambert Spawn Co., Inc.
P.O. Box 407
Coatesville, PA 19320 215/384-5031
Mushroom People
Box 220
Summertown, TN 38483-0220 615/964-2200
Mushroom Technology Corp.
P.O. Box 2612
Naperville, IL 60565 312/961-3286
Mycotek
7421 Pudding Creek Drive S.E.
Salem, OR 97301-9627 503/370-7674
Northwest Mycological Consultants, Inc.
702 NW 4th St.
Corvallis, OR 97330 503/753-8198
Sohn's Oak Forest Mushrooms
610 S. Main St.

Westfield, WI 53964 608/296-2456

J.B. Swayne Spawn Co.
P.O. Box 618
Kennett Square, PA 19348 215/444-0888

Western Biologicals Ltd.
Box 283 Aldergrove
Vancouver, BC CANADA VOX 1A0 604/856-3339

Won Shan Mushroom Farm
Rt. 1 Box 510
Catlett, VA 22019 703/788-1127

CITATION: Burnett, Christopher D. 1994. Producing woodland mushrooms. Michigan Forest Stewardship Management Note #21. Michigan Department of Natural Resources, Forest Management Division.

ACKNOWLEDGEMENTS: This project was supported, in part, by a grant from the Michigan Department of Natural Resources and the USDA Forest Service.