SARE Tables of results for Final Report FNE10-678
Modified Use of Spored Oil for Profitable Production of Mushrooms
By Lawrence T. Beckerle

SUMMARY OF RESEARCH METHODS AND RESULTS

This project included five experiments, called five studies in the initial grant request. Logs of 16" length were used in all experiments and all treatments. Stumps were included in three of the five experiments. Freezer paper and lumber end wax were included as treatments in four of the five experiments. Treatments using sawdust spawn on the ends of logs were included in three of the five experiments*.

*Dr. Mario Morales, who served 2009-2011 as technical adviser, on more than one occasion in 2009 suggested reducing the proposed project to one or two experiments. However, Mr. Beckerle feared that some valuable information would be missed with a less demanding project. Mr. Beckerle was also cognizant of the many years it can take to reach the end of an experiment, so he believed it was better to do the five experiments concurrently rather than consecutively. He hope to save several years both for himself and for anyone who may want to pursue similar research.

Table 1, summary of yield of oyster mushrooms in ounces from logs in totem pole arrangement in Study 1

	TOM 1	TOM 2	TOM 3	TOM 4
2011	0	1.0	0	24.2
2012	0	0	0	0
2013	0	0	0	0

Study 1: Oyster mix on logs in totem pole arrangement
For cultivation of Oyster mushrooms it is common to set the logs in a black plastic bag with sawdust spawn on the ends of the logs, enclose in a black plastic bag for the spawn run and after the spawn run set the lags in a totem pole arrangement as described by Joe Krawczyk and Mary Ellen Kozak of Field and Forest Mushrooms, Inc. in their catalog of recent years, including the 2014 catalog.

In the totem pole experiment Mr. Beckerle used logs $\geq$ 10 inches in diameter and used a vertical stack of logs, similar to the totem pole setup described by Krawczyk and Kozak 2014. However, the bottom log was set into the ground like a post with a black plastic bag as a barrier between the ground and the bottom log of the totem pole. Oyster mushroom spawn was placed on top of this log and then another log was placed on top of it end to end and then more spawn before the next log was added. With four16-inch logs placed vertically in this manner, each totem pole was about 54 inches tall. All logs were cut using a chainsaw that had oyster mix spored oil lubricating the bar and chain, resulting in spores and oil on the ends of logs. The logs in each of the totem poles received one of the following treatments:
TOM 1 = No spawn in between logs with black plastic as barrier to soil fungi (control)
TOM 2 = Sawdust logs in between log ends with black plastic as a barrier to soil fungi (a near standard practice or positive control)
TOM 3 = Totem pole on top of stump

TOM 4 = Totem pole with spawn in between logs on top of stump
The study was arranged in a randomized complete block design. There were seven randomly distributed replications (blocks) so the experiment had a total of 28 totem poles.

Log experiments

Table 2, summary of yield of oyster mushrooms in ounces from red maple logs in standard ricks on pallets in Study 2

	LOM 1	LOM 2	LOM 3	LOM 4	LOM 5
2011	0	0	0	6.1	4.2
2012	0	0	0	0	0
2013	0	0	0	0	0

Study 2 Oyster mix on logs

Oyster Mix: LOM1 = No covering on log ends (control)
Oyster Mix: LOM2 = Freezer paper on log ends
Oyster Mix: LOM3 = Lumber-end-wax on log ends
Oyster Mix: LOM4 = Sawdust spawn on log ends covered with freezer paper (positive control)
Oyster Mix: LOM5 = Sawdust spawn on log ends covered with lumber-end-wax and then wax paper*

*Dr. Mario Morales helped Mr. Beckerle put the LOM4 and LOM5 treatments on the log ends in Study 2 and Study 3. At the time they worked on these two studies, February 2011, there was a challenge in that the lumber-end wax did not dry quickly enough. So wax paper was put over the lumber-end-wax covering to hold it in place until it dried.

16-inch long logs were cut from small diameter red maple trees using a chainsaw with spored oil to lubricate the bar and chain, and deliver spored oil to the ends of logs as each cut was made. Most of the stumps left after harvesting of those trees were used for Study 4. Five logs were stacked with three laying one way and two on top laying perpendicular to the three. Periodically the logs were rotated within their stack to maintain even moisture within each log. Each stack, rick, was kept in its assigned place on a wood pallet.

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The study was arranged in a Randomized Complete Bock Design. Five stacks, each with a different treatment, was randomly assigned inside a replication (block). The study had four randomly distributed replications across 5 treatments. 5 logs x 5 treatments x 4 replications = 100 logs.
The logs were sorted according to size (diameter), so each replication would have logs of the same size and weight. Aluminum tags were attached to logs. Dr. Morales etched numbers onto the tags and Mr. Beckerle applied the appropriate treatments.

Table 3, summary of yield in ounces of shiitake mushrooms from chestnut oak logs in standard ricks on pallets in study 3

	LSH1	LSH2	LSH3	LSH4	LSH5

2011	0	0	0	0	0
2012	0	0	0	9.4	15.0
2013	0	0	0	12.0	64.0
2014		?		24.3	12 .0
2015					
2016					
2017					
2018					
2019					
2020					

Mycelium of shiitake still shows up on the ends of LSH2 logs during cool, wet weather, so it is still possible that some of these logs may produce shiitake mushrooms.
Yields for 2014 are through 4-22-14

Shiitake: LSH1 = No covering on log ends (control)
Shiitake: LSH2 = Freezer paper on log ends
Shiitake: LSH3 = Lumber-end-wax on ends
Shiitake: LSH4 = Sawdust spawn on log ends covered with freezer paper (positive control)
Shiitake: LSH5 = Sawdust spawn on log ends covered with a thicker than normal layer of lumber-end-wax and then wax paper*

Stumps treatments

Table 4, summary of yield of oyster mushrooms from red maple logs set on live red maple stumps in Study 4

	SOM 1	SOM 2	SOM 3
2011	0	0	0
2012	0	0	0
2013	0	0	0

Fifteen red maple stumps were inoculated using Oyster Mix (OM) spored oil delivered by a chainsaw. Each 16-inch log that had been inoculated on both ends with OM spored oil delivered by a chainsaw as each end was cut and then set on top of a red maple stump. The top end of each log then received one of the following treatments:
Oyster Mix: SOM1 = No covering of top of log set on stump (control)
Oyster Mix: SOM 2 = Freezer paper covering top of log set on stump*
Oyster Mix: SOM 3 = Lumber end wax covering top of log set on stump

Table 5, summary of shiitake mushrooms from chestnut oak logs set on live chestnut oak stumps in Study 5

	SSH 1	SSH 2	SSH 3

2011-2013	0	0	0
2014 and later	?	?	?

There is a mass of shiitake mycelium at the juncture of the log and stump. Of the two replications that were examined, shiitake mycelium occurred up to ¾ inches into the stump and up to 2 inches into the 16-inch log. The shiitake mycelium did not occur in the sapwood layer which was occupied by competitors, so it is doubtful that any shiitake mushrooms will be produced.

Fifteen chestnut oak stumps were inoculated using shiitake spored oil delivered by a chainsaw. A 16-inch log that had been inoculated on both ends with spored oil delivered by a chainsaw as each end was cut, was then set on top of the stump. The top end of the log received one of the following treatments:
Shiitake: SSH1 = No covering on top of log set on stump
Shiitake: SSH2 = Freezer paper covering*
Shiitake: SSH3 = lumber end wax covering