

# Cultivation of Shiitake Mushrooms as an Agroforestry Crop in New England: *2011 Data Summary*

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# **Project Summary**

In 2010, a partnership between the University of Vermont and Cornell University, funded by a Northeast Sustainable Agriculture, Research and Education (NE-SARE) Grant began a project focused on mushroom production, entitled "Cultivation of Shiitake Mushrooms as an Agroforestry Crop for New England". The project sought to determine the profitability of a shiitake enterprise and the most productive means of growing them in northeastern forests. To answer these questions, we selected 23 interested growers to take part in a two year study. Locations of participants are show in Figure 1. The first year (2011), we provided participants with spawn and asked them to inoculate 100 logs. Participants recorded all their startup expenses and labor inputs as well as details about the logs they inoculated. During 2012, when the logs produce their first harvest of mushrooms, participants will record production rates on different types of logs, sales statistics, labor inputs, and expenses.

## Methods

In 2010, a partnership between the University of Vermont and Cornell University hosted five introductory and three advanced shiitake mushroom cultivation workshops. The workshops attracted over 200 farmers from eight different northeastern states. At the end of the year, participants were given the opportunity to apply to be part of two year research project; 65 farmers applied and 25 were selected based on farmer's experience, enthusiasm, and resource availably. The locations of the each participant are marked on Figure 1.

Each participant in the research project acquired 100 36-inch-long logs (bolts) between three and eight inches in diameter. Participants have the option of using one the six tree species: *Quercus rubra, Fagus granifolia, Acer saccharum, Acer rubrum, Ostrya virginiana, Carpinus caroliniana.* Bolts were inoculated following standard procedure with WR-46 (from Field and Forest) sawdust spawn. Bolts were divided into five groups of twenty bolts each with each group containing bolts of a single tree species felled and inoculated on the same day. The diameter of each bolt in each group was measured in order to estimate the volume of wood in each group.

All research subsequent parameters were recorded by group. Participants recorded the tree species, date the trees were felled, and date the bolts were inoculated for each group of bolts. Participant's monetary and labor inputs were coded into several categories. For each participant, an array of economic, social, and demographic characteristics was also collected. This rich database enables researchers to estimate the costs associated with the production of a shiitake productions under a variety of farm models.

### Results

As part of this project, participants inoculated 660 *Acer saccharum*, 480 Quercus rubra, 400 *Fagus granifolia*, 180 *Carpinus caroliniana*, and 140 *Quercus alba* bolts. In total more than 2,300 bolts were inoculated with shiitake



Figure 1. Location of each participant, farm advisor and project coordinator displayed on a map of New England



Figure 2. Timeframe during which trees were felled to generate research bolts and research bolts were inoculated with mycelium

mycelium during the spring of 2011. The majority of the bolts were taken from trees cut late in February and March (Figure 2). Most of the bolts were inoculated between early April and early May (Figure 2).

Starting a small scale shiitake mushroom operation took farmers and average to 67 hours. Of those hours, and average of 34.5% were worked by volunteers or friends (Figure 4). However there was substantial variation between the numbers of hours each participant invested in the operation, particularly the number of hours of labor contributed by volunteers and friends. Increasing the hours worked by volunteers did not necessarily affect the amount of time invested by owners; there is no relationship between the number of hours worked by business owners and those worked by volunteers and friends. Most of the time spent staring a shiitake mushroom operation was dedicated to inoculating the bolts (43%) and felling trees (39%). There was little time spent preparing the shiitake laying yard (16%) (Figure 3).

Participant stating a 100 bolt shiitake mushroom operation, spent on average 442.00 dollars. Of this, money 70% was spent on durable goods like chainsaws, angle grinders, and inoculation tools (Figure 5). For participants, more than fifty percent of the expenses went toward equipment and supplies associated with inoculating logs. The cost of the logs themselves, gasoline and equipment to fell and cut trees also made up a sizeable portion of their total expenses (20%).

#### **Future Work**

Total Labor:

**Total Cost:** 

During 2012, participants will begin to force fruit bolts by submerging the logs in water. Participants will record the pounds of shiitake mushrooms generated during each flush from each stack. They will also record where the mushrooms are sold and for what price.

SUMMARY

Year One - One-hundred Log Operation



Figure 3. Average percentage of time dedicated to different shiitake production activities.



Figure 4. Average percentage of time worked by different types of individuals. Mean total hours = 67.1



**Most popular time to inoculate bolts:** Early April to Early May

67 Hours

\$442.00

Most popular time to fell trees: Late February to Late March

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Figure 5. Average amount spent by participants during 2011 on durable and non-durable goods. Bars indicate mean values. Points represent the total spent by each participant.