

Mushroom Cultivation
at UI Organic Farm
Diversifying the Market

Whole Farm Goals:

An excerpt taken from the U of I Organic Farm Manuel exclaims, “As the farm grows and the capacity builds, we envision more opportunities for students to participate in credit-earning directed studies, paid internships, work-study and graduate research on the farm will become possible”.

- to promote conscious stewardship of natural resources
- enhance the viability of local agriculture and communities
- protect the safety of producers and consumers of food by reducing the use of toxic materials
- To promote crop and market diversification.

**This plan focuses on the diversification of the U of I CSA by expanding the production of “crops” to mushroom cultivation.*

Current Resources:

The U of I Organic Farm was established in 2003 and has almost 10 years of history and experience. The farm is run by the student club called Soil Stewards and Jodi-Johnson Maynard is their faculty advisor. The student club has a student farm manager that is the main person responsible for the farm and organization of volunteers. The U of I Organic Farm is situated on three acres of rented property from U of I including water, and has a small forested patch. The small forest patch would make a great shady and wind protected area for mushroom cultivation.

Financial Resources:

Some financial support has been provided by ASUI, the Department of PSES, USDA Higher Education Challenge and Sustainable Agriculture Research and Education (SARE www.sare.org) grant monies allocated by the former UI Sustainable Ag Coordinator, Cinda Williams, and through a grant awarded by an UI Sustainable Idaho Initiative (U of I Farm Manuel, 6). If additional money was needed in order to start this project, these resources could be solicited.

The pilot year of production for the mushroom cultivation would be from CSA share holders. The CSA members willing to pay an additional \$20, would join a CSA for mushrooms providing fresh oyster and shitake mushrooms. This would be an optional choice in addition to the existing CSA crops offered. This initial money would also access the interest and support from the current CSA shareholders in expanding the CSA crop production into mushroom

cultivation. The “pilot” year would include the donation of substrate as well as borrowing tools for the inoculation process.

Capsule Definition:

The U of I Organic farm will diversify its production of crops by expanding production to include mushroom cultivation. Oyster mushrooms fruit throughout all seasons and this will bring year round fresh crops for U of I CSA shareholders. Both the Shitake and Oyster mushroom production would tap into a specialty market that is currently not readily accessible by a local producer. The product will be distributed the same as the CSA shares and will be packaged in a brown paper bag, labeled with the mushroom variety, date harvested, and the name of the harvester.

Marketing:

Demand: “Behind the common button and oyster mushrooms, the shiitake mushroom is the third most widely produced mushroom in the world, and American production of shiitake has increased faster than any other specialty mushroom” (Kays & Drohan 1). According to the NASS report, the number of mushroom farmers has increased and the sales have decreased. The amount of percent increase in the worldwide production of Shitake and Oyster Mushroom production is greater than 100%.

Species	Fresh weight and percentage of total production				Percent increase
	1986		1994		
	(X 1,000 tons)	(%)	(X 1,000 tons)	(%)	(%)
<i>Agaricus bisporus</i> (button)	1,215	55.8	1,846	37.6	51.9
<i>Lentinula edodes</i> (shiitake)	320	14.7	826	16.8	158.1
<i>Pleurotus species</i> (oyster)	169	7.8	797	16.3	371.6
<i>Auricularia species</i> (wood ear)	119	5.5	420	8.5	301.0
<i>Volvariella volvacea</i> (straw)	178	8.2	299	6.1	68.0
<i>Flammulina velutipes</i> (enokitake)	100	4.6	230	4.7	130.0
<i>Tremella fuciformis</i> (jelly fungus)	40	1.8	156	3.2	290.0
<i>Hypsizygus marmoreus</i> (bunashimeji)	---	---	55	1.1	---
<i>Pholiota nameko</i>	25	1.1	27	0.6	8.0
<i>Grifola frondosa</i> (maitaki)	---	---	14	0.3	---
Others	10	0.5	239	4.8	2,290.0

Table 1 adapted from S.T. Chang, 1996. Mushroom research and development - equality and mutual benefit. *Mush. Biol. Mush. Prod.* Vol. 2:1-10.

World Production of Cultivated Edible Mushrooms, U of I Extension,
<http://www.cals.uidaho.edu/edComm/pdf/cis/cis1077.pdf>

While the NASS report on market sales for mushrooms in 2009-2010 have gone down ~25% since 2008-2009 the U of I Organic Farm would focus on a small scale local market beginning with CSA shareholders. The mushrooms will initially be marketed to the CSA shareholders as an optional upgrade to their membership. Once the mushroom beds are established and the production is documented and measured, the mushrooms could potentially be marketed at the Moscow Local Farmers Market, 1912 Center Street Winter Market, U of I Food Service, local restaurants, the Co-op and a specific mushroom only CSA.

The expansion of growing mushrooms in addition to crops is a great way to encourage permaculture practices both at the farm and within the Moscow community. The Pacific NW offers a great habitat and climate for mushrooms. Once the beds are established the farm could offer tours to the student body and the greater Moscow community to learn more about mushroom cultivation. Cooking demonstration and samples could be offered to participants taking a workshop and /or a tour of the farm. The workshop could be offered in the fall and participants could bring home an inoculated log for mushroom production the following season. A workshop fee would be charged for these events and this money would support the growth of mushroom cultivation at the farm, if the demand was greater than the current supply. Increasing opportunities for people to sample and get comfortable with “exotic” mushrooms will increase the market demand for the product.

Enterprise Requirements:

The Pacific Northwest offers great habitat and climate for mushroom growth and production. The U of I Organic farm has a shady tree patch available and this would be the perfect area to begin a small scale mushroom farm. Getting the enterprise off of the ground takes a small financial investment and a large amount of patience, time, and labor with long term benefits.

Oyster mushrooms:

Oyster mushrooms are easier to cultivate and are able to fruit year round. This is the most popular mushroom for beginners to the cultivation trade. The oyster mushrooms prefer hardwoods such as beech, oak, maple, alder. These also grow well on wheat straw and this might be a readily available product left over from fall harvests. The easy maintenance of these mushrooms and year round cultivation is a benefit, but they bruise and spoil very easy and can only keep for 5 day refrigerated. The oyster mushroom can be stored by dehydration or freezing.

Shitake Mushrooms:

Shitake mushrooms also grow on hardwoods. These mushrooms do not grown year round and produce fruit in the spring and fall. Shitake mushrooms have a longer shelf life spanning 3 weeks refrigerated after harvest. Shitake mushrooms can be stored by dehydration or freezing.

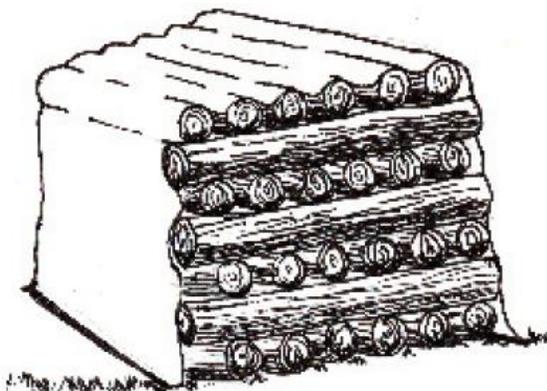
Mushroom Cultivation Design:

Mushroom Cultivation needs humidity and shade. The north facing slope in the shaded area under the tree canopy would be a very suitable area for a small mushroom crop. The two types of mushrooms that will be cultivated are the shitake and oyster mushroom. Each of these mushrooms grows on hardwood trees.

Inoculation:

The inoculation sites should be 6 inches apart across, 2 inch from the end, and 3 inches apart from each other around the log.

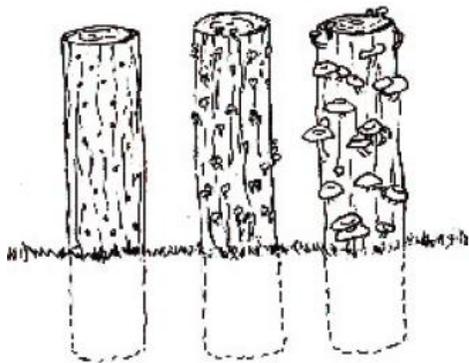
Shitake mycelium prefer to grow on a log cabin type structure. Please see the drawing below:



Shitake mushrooms (*Lentinula edodes*):

Make sure the wood is dry before “crib stacking”. Inoculate the logs and plug with wax. Cover this structure for 6 months. Soak each log for 24 hours and after this period – stack the logs in a lean-to design. Depending on the wood the logs will produce 3-10 years.

While the oyster mushrooms prefer the logs to be placed as such:



Oyster mushrooms (*Pleurotus ostreatus*):

Inoculate the logs the same way with the plug spawn and plant in the ground. This will help retain internal moisture.

Moisture:

The moisture of the logs should be kept at 45-60% moisture. Each log should be soaked once a week or two. The bark should dry out before the logs are soaked again. If you want to measure the internal moisture you can saw off a 2 inch piece of wood from the end and weight it. Dry this out (use a microwave or oven) and re-weigh. The difference in the weight divided by the wet weight X 100 will give you the percentage of internal moisture.

Regulatory/Liability Factors:

Mushroom identification is important and they can only be sold fresh without special requirements. When sold fresh they are considered a crop.

Regulations on Dehydrating or Freezing Mushrooms:

Mushrooms need to be processed the same as a regular crop. A commercial kitchen would need to be identified and a proper storage facility once the product was processed. The Greek Houses on campus would be approached to see if they would be willing to donate the use of their commercial kitchen.

For the first couple of years, the processes of the product for commercial sale would not be a focus of the project. The monitoring and documenting of the production of fruit would be the focus area. This will help move into the processing of excess fruit in order to capture all of the potential profits from this product.

Management:

A journal will be kept of the time frame between the spawn inoculations, watering cycle, and the fruit production of the mushrooms. The journal will be very important in documenting the time it takes for mushroom production to begin and how often the mushrooms fruit. Once the mushrooms begin to fruit they will be weighed and recorded. Watering is an important part of maintaining mushrooms and the watering schedule will also be recorded in the record keeping from the time of inoculation.

Methods for Monitoring Effectiveness of Program:

A written record will keep track of the watering and fruiting cycle of the mushrooms as well as the quantity produced. This will be recorded in a log throughout the year. The production of the first year will be the baseline data for mushroom production in this location for future harvests. Documenting the small scale production (phase I) will be important in achieving short and long term goals. Once the process for small scale production of mushrooms is more efficient and better understood, the long term goals (phase II) of the project can unfold. Phase II would seek additional markets and / or the creation of value added products in order to distribute the product.

A survey will also be sent to the participating CSA members after phase I, in order to assess their happiness with the new product expansion.

Sources, Suppliers, & Specifications:

The inoculant will be ordered in plug form to begin the project through the web page: <http://fungi.com/plugs/plugs.html>. If the mushroom cultivation project is successful in the first few years of production, students can experiment with different inoculation techniques that

might be more cost effective.

Insect, Fungus Contamination & Disease Control:

Prevention:

Placing the logs off of the ground for the shitake will help avoid contamination with other fungal species, whereas the oyster mushroom logs will be placed directly into the ground in order to retain moisture. Both species will be inoculated 3 weeks after the alder trees have been cut and the logs will not sit on the ground before inoculation. This will help reduce the chances of competing fungal growth and competition.

Insects:

Mushrooms should be inspected for small insects such as mushroom flies and slugs when harvested. Mushroom flies and slugs can occupy the gills of the mushrooms.

Fungus:

The fungus that are known for contamination are: *Trichoderma viride*, *Hypoxylon coccineum*, *Schizophyllum commune*, *Coriolus (Polystictis) versicolor*, *Cryptoderma (Hypocrea) citrinum*, *Merulius tremellosus*, *lacrymans*, *Poria vaporaria*, *Lenzites betulina*
A picture book will be made of these fungi and instructions and will be included guiding further identification and potential harm to the mushroom crop.

Monitoring & Identification of Pests:

As insect and competitor fungus are identified, a picture will be taken and this will be recorded. These records will be reviewed by harvesters and if they see anything that is either not a shitake or an oyster mushroom, and it has not been documented – they will document and add to the record book. If it has already been documented, then they will record the presence of this nuisance insect or competitor fungi.

Strategies for Control:

Pyrethrin sprays can be used for mushroom flies and an ammonia spray will be used for slugs (Greentree Naturals slug repellent recipe). Air circulation and proper moisture are important in order to deter nuisance insects and / or competitor fungi. Finding and maintain proper air flow and moisture will be important in maintaining a health crop. This will take some trial and error on finding what works well under the tree canopy at U of I. Keeping the weeds down around the perimeter of the stacked logs, and keeping the logs off of the ground while mycelium is growing will reduce insects and other fungi from contaminating the logs.

Anticipated/Expected Problems:

Some insect damage might occur, but mostly fungal contamination on the logs will be the area of concern. Proper techniques of handling the fresh cut wood will reduce pre-contamination

before inoculation, and is important in reducing the risk of competitor fungal communities. Maintaining the proper moisture and air circulation will be important and detailed record keeping will be important in identifying these conditions and any contamination that might occur. These records will help perfect the mushroom cultivation process and improve upon future production.

Disease Monitoring & Identification:

The developed resource guide will be valuable in identifying contamination. This will be an important aspect of record keeping / monitoring of the project.

Harvest, Distribution, and Storage:

Harvest Methods: Cut with knife at the base of the stem and collect in a basket. Brush off any dirt and check the gills for insects. Shitakes can be stored for up to 3 weeks, while the oyster mushroom is much more delicate and will only last for 5 days. Store in a refrigerator in a brown paper bag and keep away from water. Both species of mushrooms can be dried in a dehydrator. This might be a particularly useful preservation process for the oyster mushroom due to their short lifespan for freshness.

Facilities/Equipment:

Basket, knife, brush, brown bags, dehydrator, mini-fridge, plastic zip lock bags, marketing labels, printer, plastic bags (for dehydrated product)

Processing or Transportation Concerns:

The mushrooms should be harvested the same day as the CSA deliveries. This will ensure the highest quality and freshness. Once harvested, the fresh mushrooms will be distributed to each CSA shareholder in a labeled brown paper bag displaying the species, date harvested, and by whom.

If there is an over abundance of mushrooms in the first year, the dehydrator will be very important in preserving the food for later sales throughout the year. This process will not happen for commercial sales until phase II of the project. Any excess mushrooms in phase I that are processed will be used by volunteers and Soil Steward Members. The dehydrator will be located at the location determined by Jodi Johnson Maynard and extra mushrooms will be temporary stored in a mini-fridge, located at the U of I greenhouse, until they can be processed by the dehydrator. Once dehydrated, the mushrooms can be stored at room temperature in a dark and dry location. A shelf can be cleared in the U of I greenhouse filing cabinet for the dehydrated, packaged, and labeled mushrooms. In the first few years of production mushrooms will not be available for commercial sale, but will be gifted and or used personally by Soil Stewards members. Record keeping will be very important in order to determine the demand for a commercial kitchen in the future.

Financial Concerns:

The physical supplies are not that expensive, but the largest initial investment in order to get this project started would be time. Locating the donation of alder branches, building the log cabin and post structures, and inoculating the trees would take about 30-40 hours of work. Weekly monitoring for moisture and fruiting the following season would be a long term commitment. The farm manager at the U of I Organic Farm (or a dedicated Soil Steward) would need to monitor this project in order to ensure its success. The largest financial concern is staffing the project.

Financial Goals:

Mushrooms will be an option to the CSA shareholders at an additional cost of \$20 per share in the pilot year. This will gauge the demand in the CSA membership and will be investment money for the first year of operation. The baseline data on production will be accessed in the first year of production. The additional CSA fee can be increased the following year. Dependent on the amount of fruiting that occurs there is potential to moving into the value added sector for dehydrating the product. Shitake mushrooms currently sell for \$60 a lb. The mushroom cultivation project would be more focused on the learning aspect and technique (phase I) for the first couple of years and then once the technique is understood better and fruiting of the product has been recorded, the potential for marketing this product to a broader audience will be determined (phase II).

Start Up Capital Needed:

Many of the supplies needed for this project could be donated and or borrowed in order to begin the “pilot” year of inoculation. If the mushroom fruiting is successful after the pilot inoculation, the Soil Stewards can evaluate if they would like to purchase the supplies needed in order to do this process without donations. For the sake of this paper and exercise, we will assume that there are no donations received in the Enterprise Budget.

Supplies Needed:

Establishment Cost	unit	quantity	price/unit	total cost
(2) .5 5"x48" green oak logs	log	250.00	\$0.75	\$187.50
mushroom spawn	gal	5.00	\$16.00	\$80.00
POLYFOAM PLUGS	BOX	1.00	\$4.00	\$4.00
high speed drill	drill	1.00	\$250.00	\$250.00
Drill bits	bit	3.00	\$6.00	\$18.00
Water tank	tank	1.00	\$100.00	\$100.00
Used Refrigerators	unit	1.00	\$100.00	\$100.00
mISC / sprinkler or hose	unit	1.00	\$100.00	\$100.00
Labor-drill, plant, cut plugs, plug, rack	hr	20.00	\$10.00	\$200.00
Labor-inspect and water	hr	4.00	\$10.00	\$40.00
(3)Total establishment costs				\$1,079.50

Operating Costs:

The Initial labor will include 30-40 hours of to build structures; gather fresh cut logs, and to inoculate wood. Continued labor will be needed consisting of 5 hrs per week. The task of monitoring, recording, watering and harvesting the logs will be ongoing throughout the year. This would be an additional task for the farm manager and soil stewards volunteers during the pilot period.

Source of funds:

Grant, Farm Operating Cost, optional additional fee to CSA shareholders

Conclusions Drawn from Enterprise Budget:	With paid labor	Without paid labor
establishment costs	1079.50	1079.50
fixed cost	4218.03	615.25
total cost	5297.53	1694.75

The start-up cost is low (\$1,079.50) and many of these supplies can be donated and or borrowed in order to pursue the “pilot” years of expanding into mushroom cultivation. The time needed in order to gather resources, inoculate logs, water, and monitor the mushroom spawn requires labor and time. If the labor for this process was paid, it would be difficult to make a profit on the production of this crop. After the “pilot” process, the records kept will be extremely important in evaluating the potential to create value added dehydrated mushroom products from the yields. This might make this enterprise financially feasible; possibly hiring a staff person to manage the process.

Feasibility of Proposed Enterprise:

a. Short Term (phase I):

Small financial investment, time and resource gathering required

b. Long Term (phase II):

Mushroom cultivation takes a year before the mycelium populations are established in order to fruit. Once established, the attentive harvesting and watering of the logs will be required. The Farm manager and / or a dedicated Soil Steward volunteer would need to take long term leadership of this project. The record keeping during these first few years will be very important in determining if this enterprise should be continued, expanded, or discontinued at the U of I Organic Farm.

Risk Management:

Proper identification and harvesting would be the major area of concern with this enterprise. Students involved in the production and harvesting of this crop would be required to have some training from the farm manager or other qualified representative. Some people can have a mild allergic reaction to Oyster Mushrooms and this should be notated on the packaging of this species.

Conclusion:

Starting a new enterprise can be intimidating and challenging. There is a learning curve involved with the production of a new product and there is a financial investment tied to the potential failure of production. There is a growing market and demand for specialty mushrooms. The two species listed in this report, oyster and shitake mushrooms, are in growing demand and are currently being sold locally at Winco in Moscow, Idaho. To my knowledge, these mushrooms are not being produced locally.

Production beginning at the U of I Organic Farm would be a very good place to begin this venture, because the farm is focused on learning. Soil Stewards and the U of I Sustainability Center has “seed” money in order to aid students with projects focused on learning, student, and community engagement.

Many of the start-up costs could either be donated and or borrowed in order to start the “pilot” year, especially when this venture is tied to U of I and the learning process. The cost of labor and maintaining the mushroom production was the biggest expense in the production of mushrooms. Having students dedicated to the process, potentially earning U of I credit, would alleviate the labor cost associated with production. Efficiency and record keeping could improve upon the techniques needed in order to maximize the fruit production. The potential risks involved with the learning curve of starting a new enterprise would be cushioned through the world of academia, in which you can win through failure, because learning and professional growth has taken place.

Mushroom production and cultivation can be a business venture that many Idahoans could venture into. Idaho has access to the natural resources needed in order to make mushroom cultivation a success. The abundant timber and wheat straw available for a mushroom substrate could lead to a potential comparative advantage nationally. The weather and climate conditions of the Pacific Northwest also serve this industry well. Beginning a “training” ground for students to learn this type of crop production while at U of I could brighten the economy of many rural communities throughout Idaho. The lightweight nature of dehydrated mushrooms and the ability of the internet to market the product nationally offer the potential for this endeavor to have promise beyond the U of I Organic Farm.

Suppliers:

Field and Forest Products, Inc.

N3296 Kuzuzek Rd.
Peshtigo, WI 54157
715-582-4997

A small company selling shiitake and oyster mushroom spawn, growing supplies and books. Catalog is \$2, deductible from first order.

Fungi Perfecti

PO Box 7634
Olympia, WA 98507
206-426-9292

Catalog offers a variety of mushroom spawn, growing kits, supplies, and books for amateur and commercial growers. Owner Paul Stamets is co-author of "The Mushroom Cultivator" and teaches mushroom seminars. Catalog is \$3.

Mushroompeople

PO Box 220
560 Farm Rd.
Summertown, TN 38483
615-964-2200

Specializes in shiitake mushrooms. Offers supplies and books on mushroom growing, hunting, and cooking. Catalog is free.

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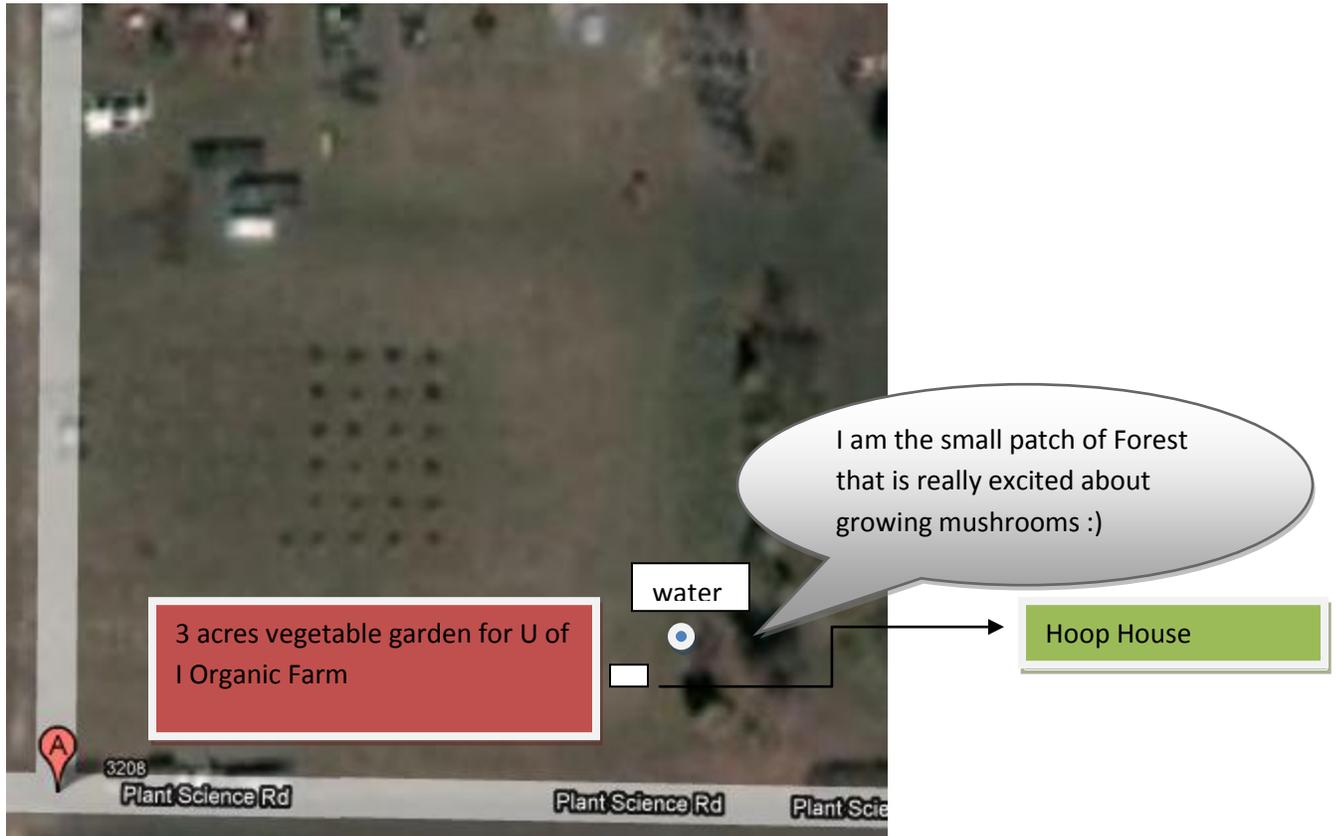
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<http://www.naturalresources.umd.edu/Publications/Rural%20Enterprise%20Series/RES11Shiitake.pdf> Accessed December 6th, 2010.

Appendix:

U of I Soil Stewards Farm Map

Directions from Moscow – <http://stuorgs.uidaho.edu/~soilstewards/maptofarm.gif>

Property Map:



Preliminary Financial Summary

<p>Overview</p> <p>Financial Goals:</p> <p>Start small, gather donated resources and work on building human capital, therefore increasing efficiency and cost savings for the (phase II) of the project. Phase II is the expansion of production, once the learning curve has been established onsite and good journals and record keeping has been established for effective production and techniques.</p> <p>Once human capital and efficiency has been ironed out, re-do the Enterprise Budget using the mushroom record keeping journals as a resource for actual labor and productivity onsite.</p> <p>Start-up Capital needed and possible source of funds:</p> <p>Human capital (efficiency / learning curve), donations of green hardwood, drill, truck, volunteer labor</p> <p>Financial capital – buy mushroom spawn plugs for \$160.</p> <p>Annual Operating Costs and potential source of funds:</p> <p>Volunteer labor (labor is the largest expense of the project). I am curious to see how much the logs (once inoculated) will fruit without forced fruiting (soaking the logs in water). Letting the mushrooms fruit naturally and just harvesting the crop will reduce the amount of labor needed in the process.</p> <p>Funds : U of I Organic Farm funding, Sustainability Center Student Grants</p>	<p>Enterprise Budget Summary & Analysis</p> <p>Conclusions Drawn from Enterprise Budget:</p> <p>Financial capital needed to get started is small with the proper donation received. Borrowing a drill should not be a problem, and getting donations of green wood should available.</p> <p>Being a “student project” the labor costs can be volunteer based.</p> <p>Feasibility of Proposed Enterprise</p> <p>a. Short Term: Good – Inoculate and keep Great Records, re-evaluate after a couple of years and determine if the project should be continued and or expanded.</p> <p>b. Long Term:</p> <p>T.B.D. – If Phase I shows promise, then Phase II would be inoculating a new set of logs. Students at this time can determine if they would like to inoculate from plug spawn or try to do a different technique.</p>
<p>Risk Management</p> <p>Describe a plan to help minimize risk in this enterprise:</p> <p>Journal / Resource Book helping “new” students to the project identify mushrooms and potential competitor fungi and pests.</p> <p>Address any potential issues and their solutions:</p> <p>Long-term commitment to the project. Start a side club off of Soil Stewards?</p>	<p>Next Steps</p> <p>What other information or resources do you feel you need to successfully attempt this enterprise?</p> <p>Dedicated RECORD KEEPING is critical to the success of this project.</p>

Enterprise Budget for Shitake Mushrooms							
					sum		
Income	Year 1	year 2	year 3	year 4			
# of logs	250.00	250.00	250.00	200.00			
(1) 1(lbs) of mush produced	25.00	550.00	375.00	150.00	1100.00	\$7,150.00	\$amt w/o cull
lbs sold fresh 20% cull rate	5.00	110.00	75.00	30.00			
minus cull	20.00	440.00	300.00	120.00	880.00	5720.00	\$amt w/cull
Price per lb (\$6.50)	\$6.50	\$6.50	\$6.50	\$6.50			
Total Revenue (Cull rate*\$6.50)	\$130.00	\$2,860.00	\$1,950.00	\$780.00	\$5,720.00		
Establishment Cost	unit	quantity	price/unit	total cost			
(2) .5 5"x48" green oak logs	log	250.00	\$0.75	\$187.50			
mushroom spawn	gal	5.00	\$16.00	\$80.00			
POLYFOAM PLUGS	BOX	1.00	\$4.00	\$4.00			
high speed drill	drill	1.00	\$250.00	\$250.00			
Drill bits	bit	3.00	\$6.00	\$18.00			
Water tank	tank	1.00	\$100.00	\$100.00			
Used Refrigerators	unit	1.00	\$100.00	\$100.00			
mISC / sprinkler or hose	unit	1.00	\$100.00	\$100.00			
Labor-drill, plant, cut plugs, plug, rack	hr	20.00	\$10.00	\$200.00			
Labor-inspect and water	hr	4.00	\$10.00	\$40.00		\$240.00	labor cost
(3)Total establishment costs				\$1,079.50			
Fixed Cost	year 1	year 2	year 3	year 4			
boxes (\$.50/3lbs mushrooms)	\$3.00	\$73.25	\$50.00	\$20.00	\$146.25		
hauling. \$.26/mile, 200 miles/yr 1. 1,500miles yrs 2-4	\$13.00	\$100.00	\$100.00	\$100.00	\$313.00		
utilities (.07/kwh)	\$6.00	\$50.00	\$50.00	\$50.00	\$156.00		
					615.25		
LABOR(\$10hr)					0.00		

soak/rackyr 1:once x 1 min	\$250.00				\$250.00	\$250.00	labor cost
yrs 2-4 times / yr x 1 min /log		\$1,000.00	\$1,000.00	\$800.00	\$2,800.00	\$2,800.00	labor cost
harvest (18 lbs/hr) *10	\$10.00	\$244.44	\$166.67	\$66.67	\$487.78	\$487.78	labor cost
hauling (wagexdistance / 40 mph)	\$5.00	\$20.00	\$20.00	\$20.00	\$65.00	\$65.00	labor cost
(4) Total Fixed Costs	\$287.00	\$1,487.69	\$1,386.67	\$1,056.67	\$4,218.03	\$3,842.78	total labor cost
establishment costs	1079.50	1079.50					
fixed cost	4218.03	615.25					
total cost	5297.53	1694.75					
(5)net revenue over total costs	1.08	3.38					
(6)break even price @ this yield (880 mushrooms)	0.00	0.00					
(7) Break even yield @ \$6.50 / lb.	815.00	260.73					
(8) Total labor cost	3842.78	0.00	no labor in this cost analysis				
Total labor hours	384.28	384.28					

assumption: the production rate is accurate
18lbs/hr are harvested

economic annalysis: the land rent is not needed due to U of I organic farm association
the equipment cost: (establishment costs) \$1079.50, need to divide this cost over 4 years for next "crop"

269.88 per yr needs to be saved from profits

*labor cost not relevant for U of I Organic Farm due to student / volunteer running the farm, I broke these out and highlighted these in green

alix karasev - mushroom hunter at U of I virology
opportunity cost (if I had a real job, what would it cost)
land rent (how much could the land be worth if rented)