Forest Farming

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Gregory Ormsby Mori (UMCA)



The Center for Agroforestry University of Missouri

A Global Center for Agroforestry, Entrepreneurship and the Environment

Forest Farming: Overview

- Forest Farming Defined
- Non-Timber Forest Products (NTFPs)
- Types of Products Range of Possibilities
- Benefits
- Challenges and limitations
- Forest Management start with overstory
- Forest Farming Methods
- Designing a Forest Farming Operation
- Case Examples/ Success Stories
- Is it Right for You?
- Resources

Forest Farming Definition(s)

Various definitions, but AF professionals use:



The intentional manipulation, integration, and (*intensive*) management of forested lands that capitalize on specific plant interactions to produce specific nontimber products.



Non-timber forest products (NTFPs) are any product or service other than timber that is produced in forests. They include fruits and nuts, vegetables, fish and game, medicinal plants, resins, essences and a range of barks and fibres such as bamboo, rattans, and a host of other palms and grasses.





A new name for some very old practices

"Aboriginal people have a long history of sustainable management of their lands and the timber and on-timber resources, including propagation, pruning, tending, weeding, selective harvest and habitat modification (e.g. burning)." (Chamberlain, J. 2009)





A PERMANENT AGRICULTURE

by J. Russell Smith

Introduction by Wendell Berry

"I see a million green hills with crop yielding trees and a million neat farm homes snuggled in the hills." Forest Farming: Towards a Solution to Problems of World Hunger and Conservation

FOREST FARMING

J Sholto Douglas & Robert A de J Hart Foreword E F Schumacher

New Edition

Shade tolerant specialty crops can be grown beneath trees for personal use and/or market sales.



American Ginseng (Panax quinquefolius L.)

- Most valued North American forest herbal root
- Extract from the root used in tonics for strength and vitality
- <u>Ginsenosides</u> are believed to play a role in ginseng's activity
- Seen as "marker" compounds indicating type and quality
- Established markets, Asia and herbal/dietary supplements











Factors Contributing to the Emergence of Forest Farming / NTFPs:



Expanding markets for NTFPs / medicinals / ornamentals
Over collection of native plant populations
Fragmented patterns of forest ownerships

In many cases, mature, expanding and highvalue markets...

- Aggregate annual value of NTFP harvests in North America likely runs in the tens of billions of dollars (McLain and Jones, 2005)
- Ginseng exports valued at \$51.9 million in 2007. (Mitchel and Chang, 2009)



- 2011 consumer sales of herbs and Botanicals in the U.S. reached \$5.28 Billion, raw materials \$500 million. (Nutrition Business Journal)
- Sales of herbal dietary supplements in the United States increased by 7.9% in 2013, exceeding \$6 billion for the first time. (American Botanical Council, 2014)
- Balsam fir tips, \$50M annually in Northern Great Lakes states.







Md. bans ginseng hunting on state land wapo.st/12j2bfu



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Post Local

Maryland bans wild ginseng harvest on state land, upsetting diggers

Maryland banned ginseng hunting on state land after a study showed a steep drop in the number of plants.



View on web





Who might consider Forest Farming?

- Woodland owners managing for timber and farmers with woodlots looking to diversify operations and add supplemental income
- New land-owners for whom timber management is not the primary objective.
- People looking for non-traditional, comprehensive or diversified approaches for managing their woodlands.

Non-timber Forest Products

Medicinal
Edible
Specialty
Floral and Decorative

Medicinal Nutraceutical Holistic Ethnobotanical

Wood (cedar oils) Bark (slippery elm) Buds (cottonwood) Leaves (catnip) Roots (goldenseal) Fruit/flowers (St. John's Wort) Pollen (ash)





- Mushrooms
- Nuts
- Honey
- Syrup and saps
- Fruits and berries
- Leaves, roots and shoots of plants
- Ferns



Floral and Decorative

Greenery (galax) Tips (balsam fir) Berries (holly) Flowers (rhododendron) Straw and cones (pine)





Specialty wood and crafts







Advantages and Benefits of Forest Farming

- *Economic* : add to and diversify incomes
- *Conservation:* add diversity, can manage to enhance the forest's capacity to provide ecosystem services, avoid their degradation.
- *Social:* provides options, contributes to development, generational continuity of farms, cultural traditions, quality of life.
- Scale: Range of operation sizes possible

Challenges

Limited production information Informal or immature markets Market volatility Poaching Identity Large landowner interest

Forest Farming Methods

• Woods Grown

• Wild Simulated

• Managed Wild Populations

Woods Grown (machinery; materials; amendments)

Benefits – more control, success, higher potential yeilds Challenges – may impact price, labor, costs, with ginseng, less desirable characteristics than wild



Wild Simulated

Less intensive, less labor and inputs Challenges – success, less control

Wild Simulated

Benefits -Wild Simulated Method

- Easier and less expensive
- Extremely desirable roots
- More modest investment seed and labor (but not inexpensive)
- Little care and maintenance
- Majority of work is in digging when profit is nearly assured
- Commands higher price

Limitations -Wild Simulated Method

- Longer to get a marketable root
- Plant survival may be lower
- Increased potential for poaching

Managed Wild Populations

Least amount of labor and other inputs Challenges – , less control, varying yields

Net profit - Davis (2009)

- Wild simulated <u>ginseng</u>: \$20,460 US half-acre after nine years
- Woods-cultivated ginseng: \$5,865 US half-acre after six years
- Wild-simulated goldenseal: \$10,100 US per half-acre after five years
 - Woods grown <u>ramps</u>: \$770 US per one-tenth acre after three years

GROWING AND MARKETING Ginseng, Goldenseal and other Woodland Medicinals



Davis and Persons, 2014

Farm Enterprise Budget for Wild Simulated Ginseng (dried) - 1/2 Acre Estimated per 1/2 acre Costs and Returns

Price

Wild Simulated	9 Year Totals	Quantit y Unit	per Unit
Income			
Dried root sales	\$28,000	80 lbs	\$350/lb
Total Income	\$28,000		
Operating Expenses			
Seed Fertilizer, soil amendments, pesticides,	\$875	12.5 lbs	\$70/lb
etc Backpack sprayer & misc tools	\$200 \$150		
Machinery, rental (rototiller) Labor includes:	\$160 \$5,850	585 hrs	\$10/hr
Soil prep and planting Maintenance Harvesting roots		35 hrs 200 hrs 350 hrs	
Drying area (adaptation of existing room)	\$400		
Utilities (related to drying)	\$50		
Advertising/Promotion Organic Certification Phytochemical Analytical Testing Shipping/Transportation			
Total Expenses	\$7,685		
Return atter Expenses	\$20.315		

Designing a Forest Farming Operation

- What are your objectives, preferences?
- Assess site conditions
- Is it a good fit for you and your land?
- Market analysis
- Business Plan
- Start small

Companion/Indicator Species for Ginseng



- Trillium
- Jack-in-the-pulpit
- Rattlesnake fern
- Blue & Black cohosh
- Goldenseal
- Solomon's seal
- Maidenhair fern
- Dutchman's pipe
- Spicebush

Where to Start? – Start with the Timber

Make forest farming activities part of overall forest management plan

> Forest farmed NTFPs can provide more regular, short term income

Management for timber and wood products for long term income

Proper Management of Woodlots Timber Stand Improvement - TSI



http://www.extension.umn.edu/ environment/treeswoodlands/managing-oak-inthe-driftless-area/

Before treatment



Figure 6. Crown release will stimulate crop tree growth.

Maximize the value of products after the timber sale

- Lumber has value nothing new
- \$ per board foot
- \$ per cord
- More \$ for higher grades, e.g., veneer
- Some species preferred, e.g., walnut, red oak, white oak
- What about the residual after harvest?
 What about those "other" species?

Forest Farming Mushrooms



Log- Grown Shiitake



Wine-cap Stropharia on Straw/woodchips



Oyster on Totems

Other more challenging or lesser known Species





AGROFORESTRY in the Ozarks

A success Story

Nicola Macpherson, Ozark Forest Mushrooms, LLC

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Growing shiitakes the oriental way

FO

Restaurant



Home

Farm

Ozark Forest Mushrooms is a family owned 18,000 shiitake log farm located in the Missouri Ozarks Big Springs region, an area designated as one of the *Last Great Places* by the Nature Conservancy. The area abounds with vast tracts of oak forests and clear clean springs. This micro climate provides the ideal conditions for growing wild simulated shiitake on oak logs that produces the best tasting shiitakes.

For Your Restaurant



For Your Home

20,000 log operation

Click here learn more about our Ecological Holidays



http://www.ozarkforest.com



Timber Marking (sustainable forest management)



Tops for Shiitake Logs



Brush for Wildlife – Whole Tree Utilization



SHIITAKE: Cultivation Process – Inoculation





Incubation in the Shade House





SHIITAKE: Outdoor Production - Soaking, Forced Fruiting



SHIITAKE: indoor production (year round markets)





Fruiting and Harvest

Typical Markets Include:

- Supermarkets
- Natural or health food stores
- Restaurants
- Farmer's markets
- Roadside stands



Value added products

Recommendations for log-grown shiitake in an agroforestry setting

- Grow shiitake on logs as a side business
- Consider creating indoor facilities (greenhouses) to extend production times (continuity w/ clients)
- Produce value added products, especially dried shiitake
- Sell mushrooms (broker) for other growers to ensure continuity in supply
- Capitalize on the log-grown shiitake properties (meatier, richer flavor, better shelf life, higher nutritional and medicinal value)
- Create strong relationships with buyers
- Direct marketing to restaurants and stores, to build market share for fresh and value-added sales

HARD WORK and COMMITMENT!

Should we recommend log-grown			
shiitake in an agroforestry setting?			
Strengths	Weaknesses		
 Popularity for taste, nutritional and medicinal properties Sustainability Low capital investment Use of available resource Quality product Provides additional income Available information about production and marketing Trend in demand is upward Prices remain strong Most sales are local 	 Hard work and serious commitment One year time lag to obtain a return on investment Seasonal production Dependence on weather Competition from sawdust grown shiitake and imports Issues regarding organic certification Need for strong and direct relationships in the market 		

UMCA Shiitake Growing Guide



University of Missouri Center for Agroforestry

AGROFORESTRY IN ACTIO

Growing Shiitake Mushrooms in an Agroforestry Practice

by Johann Bruhn, Ph.D., Research Associate Professor, Division of Plast Sciences, University of Missouri-Cohonbia & Michelle Hall, Senior Information Specialist. Center for Agroforestry, University of Missouri-Cohonbia

Cultivating Shiitake Mushrooms through Forest Farming

Cultivating shiitake mushrooms represents an opportunity to utilize healthy low-grade and smalldiameter trees thinned from woodlobt as well as healthy branch-wood cut from the tops of harvested saw-timber trees. When the mushrooms are collected and marketed, the result is a relatively short-term payback for long-term management of wooded areas.



The cultivation of shiitake mushrooms on solid wood requires a significant amount of shade and wind protection, but not a significant amount of acreage. Therefore it is an excellent opportunity for landowners with smaller acreages to utilize forested or shaded areas. Shiitake producers can often obtain wood for cultivation from land "When I walk into a restaurant and see my mushrooms on the menu, it gives me huge pleasure and makes all the work worthwhile."

management agencies or private landowners. In addition to making productive use of woodlots and forested acres, logs that have been used for shitake production, called "spent" logs, can be ground and recycled as compost (see page 12 for Kinnmons and others, 2003) or used as a fuel and heat source for winter mushroom production (see box page 6).

Shiitake mushrooms can be grown indoors or outdoors on almost any deciduous wood that retains its bark for a number of years. When shiitake are cultivated outdoors on logs in a managed shade environment, a forest farming practice is initiated.

The practice of intentionally managing shade levels in a forest to favor the production of certain crops represents the agroforestry practice called forest farming. Properly applied, forest farming can enhance and diversify income opportunities, while at the same time improving the composition and structure of the forest for long-term stand health, quality and economic value. By developing an understanding of the interactions between the overstory trees and the understory environment, forest management activities can be used to create understory sites ideal for growing profitable shade-loving crops like shiftake mushrooms. The shade-loving plants that may be grown in the



http://www.centerforagroforestry.org/pubs/mushguide.pdf





FARMING THE WOODS TEMPERATE FOREST FARMING & PERMACULTURE STRATEGIES

farmingthewoods.com



RECENT POSTS

 Shiitake: the ABCs of endless culinary delights

Shiitake: the ABCs of endless culinary delights

July 11, 2013 · by steveflpci | 1 Comment

Greetings & Happy Summer from Upstate NY. Since our campaign ended in May (thanks again to all the supportive folks!) Ken and I have been

HOME

THE BOOK

AUTHORS

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THE SURVEY

FOREST FARMER'S NETWORK



Farming the Woods

An Integrated Permaculture Approach to Growing Food and Medicinals in Temperate Forests

KEN MUDGE AND STEVE GABRIEL



With information on forest farming in a changing climate, mushroom segaring, ginseng, fruit and hut trees, and more . . .

eXtension.org/forest_farming

exforestfarming

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Four Stages of Shiitake Mushroom Cultivation

179 views 1 month ago

Biologically, forest cultivation of mushrooms involves fungal decay of an organic substrate, usually wood. The substrate is the "food source" for the fungus that allows the fungus to grow and eventually produce mushrooms. The process consists of four stages:

What We Do

•• 0

- 1. Substrate Acquisition
- 2. Substrate Inoculation
- 3. Substrate Colonization
- 4. Mushroom Production





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Welcome



My name is Jeanine Davis and I am an associate professor in the Department of Horticultural Science at North Carolina State University. My research and extension programs are dedicated to the development of sustainable and organic production systems for herbs, vegetables, and a wide variety of specialty crops.

The purpose of this website is to provide access to up-to-date, practical information on the production and marketing of these crops and to

keep you informed about the current projects in my program. I encourage you to visit the other websites I maintain that are listed below. Also visit <u>NC Medicinal</u> <u>Herbs</u> which is a collaborative site with the University of NC-Chapel Hill.

Some of the current projects my staff and I are involved in include working on a regional Chinese medicinal herb production project in which we are overseeing the



You will need the free <u>Adobe Reader</u> program to view Adobe PDF formatted publications.

New! <u>The presentation on hops</u> production given at the Hops Field Day in Raleigh, NC on July 14, 2012 (this is large and takes a little time to download)

New! Southeast Organic Training
Page

Link to <u>Survey on China Consumer</u> Demand for USA Grown Chinese Medicinal Herbs by Galen University Business Students

From the Western NC Forest Products Marketing Project: National Agroforestry Center Resources nac.unl.edu/index.htm USDA Extension Forest Farming http://www.extension.org/forest_farming ✓ MU Center for Agroforestry www.centerforagroforestry.org/pubs/index.asp#pubs ✓ Institute for Culture and Ecology http://www.ntfpinfo.us/ ✓ Missouri Alternatives Center http://agebb.missouri.edu/mac/links/index.htm Association for Temperate Agroforestry http://www.aftaweb.org National Sustainable Agriculture Information Service http://attra.ncat.org/horticultural.html#Agroforestry **Farming the Woods** http://farmingthewoods.com/



Forest Gardens





Tropical Home Gardens

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