



# Agroforestry

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## Forest Farming: An Agroforestry Practice

Mary Ellen Dix, Forest Health Protection; Deborah Hill, University of Kentucky; Louise Buck, Cornell University; W.J. Rietveld,

### Introduction

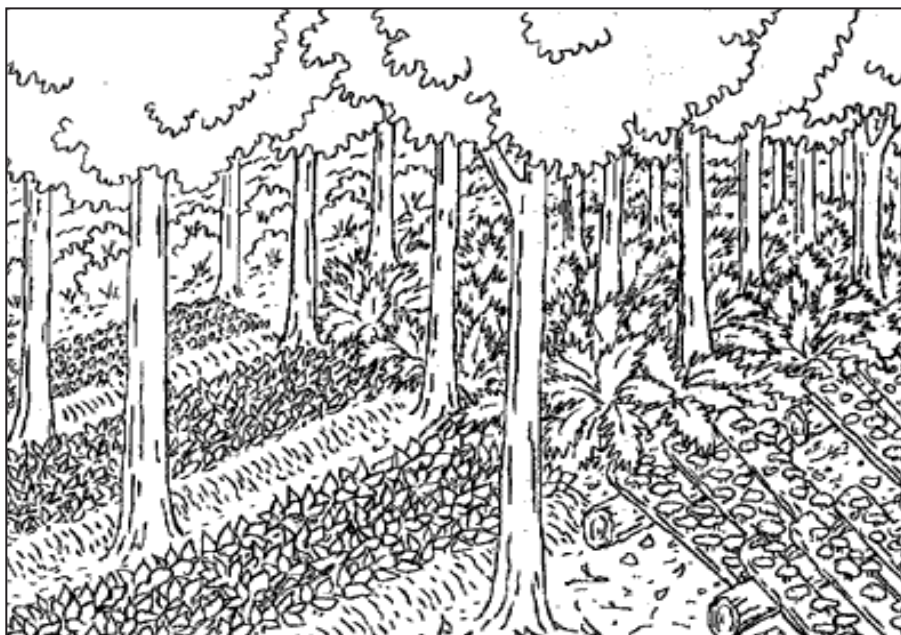
Most public and private forest lands of North America have been modified to varying degrees from years of human activity. Certain high-value 'non-timber forest products' have been over-exploited and are difficult to find. Forest farming practices can be used by private enterprise to grow desirable non-timber forest products on private lands, to supplement family income, and to allow biodiversity to reestablish within forests.

### Definition

*Special forest products (SFPs) or non-timber forest products (NTFPs)* are high-value specialty product items derived from green plants, fungi, invertebrates, and other organisms that inhabit forested areas.

These products fall into four general categories (See table on page 2):

- food (e.g., mushrooms and nuts)
- botanicals (e.g., herbs and medicinals)
- decoratives (e.g., floral greenery and dyes)
- handicrafts (e.g., baskets and wood products)



In forest farming, high-value specialty crops are cultivated under the protection of a forest canopy that has been modified to provide the correct conditions. Forest farming provides short-term income while high-quality trees are being grown for wood products.

# Special Forest Products

Specialty Products	Examples	Use	Region of the United States							
			Northeast	Southeast	Midwest	N. Plains	S. Plains	Intermountain	Pacific N-west	Pacific S-west
<b>Food</b>	Shiitake, matsuki, and other mushrooms	food, medicinals	X	X	X	X	X	X	X	X
	Black locust and plum honey	food, candy	X	X	X	X	X			
	Walnuts, acorns, pecans, and Pinon pine nuts	food, dyes	X	X	X	X	X	X	X	X
	Blueberries, huckleberries, and other berries	food, dyes	X	X	X	X	X	X	X	X
	Maple, birch, and boxelder sap	syrops, candy	X	X	X	X		X	X	
<b>Botanicals</b>	Ginseng	longevity, general strengthening, teas, herbs	X	X	X	X	X	X	X	X
	Goldenseal	eyewash, laxative, tonic, hemorrhagic	X	X	X					
	Saw-palmetto	food, prostate health		X						
	Slippery elm bark	food flavoring, laxative	X	X						
	Elder flowers	food flavoring, eye and skin health	X	X	X	X	X	X	X	X
	Eucalyptus leaves	flavoring agent, expectorant							X	X
<b>Decoratives</b>	Salal, beargrass, sword fern, and other greenery	decoration, crafts, baskets				X	X	X	X	X
	Club fern, spanish moss, and other mosses	decorations, crafts, baskets	X	X	X				X	X
<b>Handicrafts</b>	Wild grape, kudzu, vine maple, and other vines	baskets, crafts		X					X	X
	Cedar and pine oils	aromatics	X	X	X	X	X	X	X	X
	Poplar, willow, and switchgrass biomass plantings	fuel, paper	X	X	X	X	X	X	X	X
	Cedar, poplar, and willow residues	mulches, animal bedding, litter products	X	X	X	X	X		X	
	walnut crotches, wormy chestnut, diamond willow, cedar veneer, and mesquite	wood decorations and carvings			X	X	X	X	X	

## Concepts and Principles

In forest farming practices, high-value specialty crops are intentionally cultivated under the protection of a forest overstory that has been modified and managed to provide the appropriate microclimate conditions. Typically, these systems are established on private land by thinning an existing forest or woodlot to leave the best crop trees for continued wood production and to create the appropriate conditions for the understory crop to be grown. Then, the understory crop is established and intensively managed to provide short-term income.

## Planning and Design

A forest farming practice is usually a small area of land (5 acres or less) whose vertical, horizontal, and below-ground dimensions are managed intensely to produce multiple crops simultaneously. Systems usually focus on a single SFP plus timber, but can include several products. Examples of systems include:

- ginseng + maple syrup + bee products + timber
- shiitake mushrooms + timber
- ferns + beargrass + mushrooms + timber
- ginseng + walnuts + black walnut veneer logs

The amount of light in the stands is altered by thinning, pruning, or adding trees. Existing stands of trees can be intercropped with annual, perennial, or woody plants. Compatibility among understory and overstory plants and cultural methods is essential.

Before investing time and money in growing a particular SFP, an entrepreneur needs to:

- obtain production and processing information
- locate a source of technical expertise
- locate or develop potential markets

A common problem with developing an enterprise around a new product is the scarcity of technical information. Sources of expertise for producing SFPs can be obtained from state forestry and conservation agencies, the Cooperative Extension Service in county offices or state universities, the Natural Resources Conservation Service, and the USDA Forest Service.

A market analysis and business plan are essential before starting an enterprise. The existence and type of market depend on the SFP. Markets are often local stores or cooperatives. For example, shiitake, matsutake, morel, and chanterelle mushrooms, and truffles, may be sold directly to gourmet French and Asian restaurants, Asian and natural food stores, or to a middleman or cooperative for resale to larger more distant markets. Markets for decorative products like salal and beargrass are in urban areas and overseas. Decoratives may be sold through cooperatives or to local buyers. Non-local buyers may also be reached through the internet.

## Benefits

### Economic

Some products especially medicinals and botanicals can have tremendous economic value, while others provide a lower but steady supplemental income. For example,

- Forest-cultivated ginseng averages \$200-\$400 per pound, depending upon how closely the product resembles wild ginseng
- A cord of wood worth \$50-\$100 can produce \$500 worth of shiitake mushrooms. In 1990, wholesalers paid from \$3.50 to \$10 per pound for shiitake mushrooms in the Southeast. Retail prices were between \$9 and \$12 per pound

- Markets for floral decoratives have been steady or increasing. In 1991, buyers paid \$1.00 and \$1.00-\$1.60 for salal and beargrass, respectively, and about \$0.01 per swordfern frond
- In 1996, honey was worth approximately \$3.00 per pound

### Conservation and System-Level

Forest farming activities modify the forest ecosystem but do not significantly interfere with its crucial contributions of water capture and filtering, soil erosion control, microclimate moderation, and wildlife habitat. Producers should avoid harmful species and follow EPA approved guidelines for herbicides, fungicides, and insecticides.

### Social

Forest farming provides opportunities to generate short-term income from existing woodlots, with minimum capital investment. Especially on small family farms, this can contribute significantly to rural economic development and diversification.

### Additional Information

“Alternative Forest Products.” by Nancy P. Army, Deborah B. Hill, and Alan J. Worms. 1994. pp 133-138 In: Southern Hardwood Management Bulletin R8-MB67. USDA Forest Service, Southern Region, 114 p.

“American Gensing - Green Gold.” by Scott W. Persons. 1994. Bright Mountain Books, Asheville NC, 203 p.

“American Ginseng Production in New York State.” by R.L. Beyfuss. 1994. Cornell University Cooperative Extension Service, USDA Farmers Bulletin 2201, 20 p.

“Forest Farming: Revitalizing and Expanding Crop-Yielding and Forest Based Enterprises.” by Deborah B. Hill and Louise buck 1998. Chapter 8 In: Agroforestry - An Integrated Science and Practice. W.J. Rietveld, H.E. Garrett, and R.F. Fisher (eds.). American Society of Agronomy Special Publication (In Press).

“Income Opportunities in Special Forest Products.” by M.G. Thomas and R. Schermann. 1993. USDA Agricultural Information Bulletin 666, 206 p.

“The Forest Beyond the Trees.” USDA Forest Service. 1993. USDA Forest Service, Pacific Northwest Region, 13 p. (unnumbered brochure).

### Authors \*Primary Contacts

Mary Ellen Dix, Forest Health Specialist, USDA Forest Service, State and Private Forestry, Forest Health Protection, AB-2S, PO Box 96090, Washington, DC 20090-6090. Phone 202-205-1600; FAX 202-205-1139; e-mail FSWA/S=M.Dix/ou=W01b@MHS.ATTMAIL.COM.

\*Deborah B. Hill, Extension Professor, Forestry Department, University of Kentucky, Lexington, Kentucky 40546-0073. Phone 606-257-7610; FAX 606-323-1031; e-mail dhill@ca.uky.edu.

\*Louise E. Buck, Senior Research and Extension Associate, Department of Natural Resources Management, Cornell University, Ithaca, New York 14853. Phone 607-255-5994; fax 607-255-0349; e-mail leb3@cornell.edu.

W. J. Rietveld, Program Manager, USDA Forest Service, Rocky Mountain Forest Research Station, National Agroforestry Center, East Campus, University of Nebraska, Lincoln Nebraska 68583-0822. Phone 402-437-5178 ext 27.



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Contact: USDA National Agroforestry Center, 402.437.5178 ext. 4011, 1945 N. 38th St., Lincoln, Nebraska 68583-0822. [www.unl.edu/nac](http://www.unl.edu/nac)

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