

Forest Farming

Expanding Farm and Forestry Opportunities

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ABOVE Ginseng under walnut canopy, September 1995. (Photo courtesy of Bill Slagle, WV.)

Forest Farming: Working Both Sides of the Fence

Agroforestry is well recognized as an alternative approach to farming and forestry. Essentially, this land-use practice is the intentional combination of agricultural and forestry activities on the same land to increase production while improving conservation of natural resources. Trees, crops, and/or animals are integrated into a management unit, with an objective to better utilize and conserve the land's productive capacity. The components (trees, crops, animals) are managed intensively to maintain productive and protective functions. Agroforestry management strives to manipulate interactions between the biological and physical components to boost harvest of all pieces, as well as providing conservation benefits.

The National Agroforestry Center (www.unl.edu/nac) recognizes five general types of agroforestry: forest farming, alley cropping, riparian buffers, windbreaks, and silvopasture. Forest farming has been defined as the intentional introduction of agricultural or cropping practices into forest systems. It has been characterized as the management of forestlands to produce

things other than timber, particularly food, herbal medicines, ornamental, and other non-timber products. Some folks have described forest farming as the cultivation of high-value specialty crops under a forest canopy. The general definition can also include activities that incorporate farming type of actions. For example, the production of pine straw when integrated into the growing of timber species requires farm machinery and other farming type of activities. Likewise, silvopasture integrates forestry (growing trees) and farming (planting forage grasses and grazing cattle) actions to improve overall production. Utilizing shade generated from the tree canopy to produce farm type crops (e.g., honey, mushrooms, syrup) would be included in an expanded definition of forest farming.

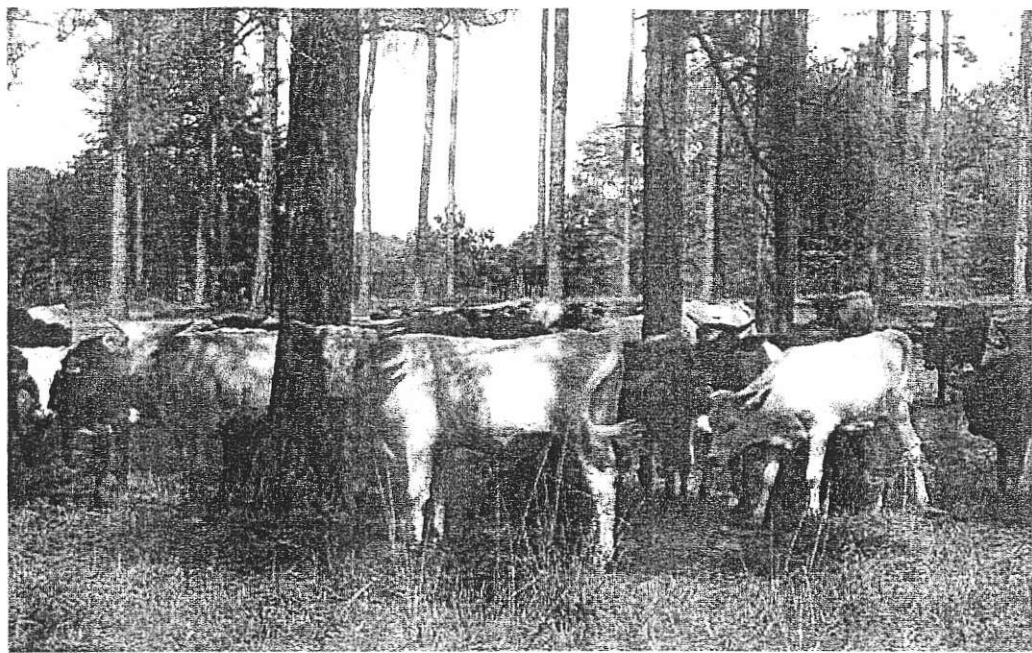
Non-Timber Products and Forest Farming

Non-timber forest products (NTFPs) come from plants; parts of plants, fungi, and other biological material. They are harvested from within and on the edges of natural, manipulated or disturbed forests. NTFPs come from fungi, moss, lichen, herbs, vines, shrubs, or trees. Roots, tubers, leaves,

bark, twigs and branches, fruit, sap and resin, as well as wood, are harvested to make non-timber products. In general, NTFPs are found under the forest canopy and thrive in shade, which makes them appropriate for forest farming. They are commonly classified into five categories: culinary products, crafts, floral and decorative products, medicinal and dietary supplements, and landscape products.

Culinary non-timber products include mushrooms, fungi, fruits, ferns, greens, as well as roots and tubers. Mushrooms and fungi are probably the most well-known forest edibles. The production of maple syrup is big business, particularly in the northeast. Eastern black walnuts, muscadine grapes, berries, and persimmons are gathered, consumed, and sold as well. Wood-based crafts are produced from trees or parts of trees, excluding products made from cut timber. Many forest species, including moss, lichen, and princess pine, are harvested and used in the floral industry as compliments to flower arrangements. More than 125 plant species are harvested from southern forests for their medicinal value. The estimated value of the non-timber forest products

RIGHT Slash pine silvopasture system with Bahia grass/crimson clover forage and longhorn rodeo steers. Good grazing distribution and forage production under trees, Chipley, Florida, 2003. (Photo courtesy of Jim Robinson, USDA-NRCS.)



industry in the United States exceeds \$5 billion.

Farming the Forest for Pine Straw

Managing pine forests for the harvest of the needles, also known as straw, offers an interim income stream while timber or pulpwood stands are maturing. Pine straw makes attractive landscape mulch as the mulch protects the roots of plants from extreme temperatures; supplies some nutrients upon decomposition; and reduces weed growth, erosion, and evaporation of water from the soil. The low pH of the resin on the needles creates a preferred environment for acid loving landscape plants such as azalea, rhododendron, camellia, gardenia and blueberries. Compared to other mulches, pine straw may last longer and cover more area per cost of materials. It has become a preferred mulch across the south.

A good site to establish a pine straw operation should be relatively flat with minimal soil erosion potential. The species that produce the most desirable straw are longleaf (*Pinus palustris*) and slash (*Pinus elliottii*) pine. Loblolly pine (*Pinus taeda*) also may be used, though the needles are shorter and more difficult to bale. Stands with basal areas of 75 to 125 square feet per acre can produce approximately 125 to 175 bales per raking, respectively,

each weighing about 30 pounds. If pine straw is the secondary crop to timber, then spacing should be determined by the primary objective of growing wood. The first harvest can begin as early as 8- to 12-years-old in old plantations, later in natural stands.

Farming Forests for Cattle Production

The term "silvopasture" refers to the deliberate and thoughtful combination of trees and pasture in the same landscape to accommodate livestock and timber production. The concept can be realized by deliberately planting forage grasses among trees, or conversely by planting trees within established pasture. Silvopastoral systems provide opportunities for multiple-use production that can ensure short- and long-term economic benefits. They can help landowners to diversify farm production to include wood and non-wood products, fuelwood, fodder, and livestock

A silvopasture system consists of three main components: trees, forages, and livestock. The key to success is selecting a suitable site, matching trees and forage to that site, and selecting livestock appropriate for the system. Subsequently, success is dependent on managing these three components judiciously and simultaneously. Successful silvopasture relies on producing high-quality marketable trees

that are fast growing to reduce above-ground competition with grasses, and have deep roots to reduce below-ground competition. Planting 100 to 400 trees per acre, with a 4 by 8 foot spacing of a double row of trees with 40 feet between the rows, is recommended for silvopasture systems. Perhaps the most important characteristic in selecting forage species is tolerance to low light levels. Pensacola bahiagrass (*Paspalum notatum*) may be the most shade-tolerant forage grass species. The yield of bahiagrass under a stand of 21 to 25 year old trees ranges from .5 tons per acre to almost 2 tons per acre, depending on site characteristics and environmental conditions. When the silvopastoral system is well established, cattle can remain on pine-based silvopastures year-round, with active management. Stocking rates should be based on forage yields and cattle conditions. The amount of forage that is grazed is critical to the success of a silvopasture system. A good rule of thumb is to graze half and leave half of the forage for next year.

Loblolly pine planted with high-quality forage has been shown to have up to 70 percent greater net present value than pure pine plantations. In general, silvopasture has been shown to be more profitable than plantation forestry and as profitable as pure cattle production.

Farming the Forest for Edible Mushrooms

Many edible mushrooms, such as shiitake (*Lentinula edodes*), maitake (*Grifola frondosa*), lion's mane (*Hericium erinaceus*), and oyster (*Pleurotus* spp.) can be farmed under a forest canopy. The shiitake mushroom is the most popular for small-scale forest farming. Production of shiitake in this country started about two decades ago, when demand exceeded the ability of importers to fulfill orders, and the technology for landowner production became readily available and simple.

Shiitake mushrooms grow best on hardwood logs, cut from live trees in a moist climate ranging in temperatures from 65 to 75 degrees Fahrenheit. Moderate temperatures and high humidity promote fast growth of the threadlike structures from which the mushrooms grow (called mycelium). A site with at least 60 percent shade is preferred for best production. If possible, select a mixed softwood/hardwood forest because the softwoods provide shade throughout the year and contaminants common to hardwood forests are less prevalent.

BELOW Harvested pine straw, Chipley, Florida, April 2002. (Photo courtesy of Richard Straight, USFS, National Agroforestry Center.)

Farming the Forest for Medicinal Plants

The hardwood forests of Appalachia, known for their diversity of plants, are particularly attractive for farming medicinal plants. With more than 100 species of plants collected from these forests for their medicinal qualities, a forest landowner has many opportunities to diversify farm income. The most popular and well-known medicinal plant of the eastern hardwood forests is ginseng, but, this woodland herb is only one of a dozen species that thrive in these forests. Other plants with medicinal qualities include black cohosh, slippery elm, and bloodroot.

Sugar maple, butternut, yellow birch, and American beech are a few of the trees under which ginseng and a dozen other medicinal plants grow. Selecting the site to undertake forest farming for medicinal plants is crucial. Trying to farm woodland herbs in forest sites where they would not naturally grow is not advised. Having companion plants growing on the site may be the most important indicator that the location will work well for forest farming of woodland herbs. Many understory, medicinal plants prefer well-drained, loamy soils. Gently sloped forestlands with a northern exposure are best for growing woodland herbs. Ginseng and many other medicinal herbs grow best under a canopy that provides about 75 percent shade. The understory of shrubs and saplings can

be cleared to reduce competition and to make tilling easier. Raised beds under the canopy will improve production, as well. With current market trends, growing medicinal herbs in a forest farming setting can be lucrative, even though 7 to 10 years may pass before the first harvest.

Final Thoughts on Forest Farming Opportunities

There are many other opportunities for landowners to integrate farming and forestry activities to generate additional income. Forest landowners who have cattle may consider intercropping high valued forage grasses and trees to increase overall economic productivity. Those with large holdings of pine forests might think about tapping trees for the resin or selling the needles for straw. A forest landowner with an inclination for growing or digging native plants might do well to investigate starting a business to provide landscapers with native plants. If oil and natural gas prices continue to sky-rocket, forest landowners might consider growing short-rotation woody crops for bioenergy. Those with a partiality to gardening or animal husbandry could grow mushrooms or raise bees under a forest canopy for additional income.

Landowners interested in farming their forests for alternative enterprises need to examine all internal and external factors that could influence their success. Many new enterprises may require additional skills and expertise. There may be additional capital or labor investments for which landowners will need to budget. The competition in some markets, such as edible mushrooms, firewood, and bees, may be such that the profit margins make these alternatives less attractive. Interested landowners need to examine the markets and fully understand the potentials and pitfalls of each possible venture. Though there are many challenges for developing alternative forest enterprises, a diversified land use and management strategy can be economically rewarding to landowners willing to invest time and energy. ♦

