



# W I L H E L M F A R M F A C T S H E E T

## Forest Farming Opportunities on Wilhelm Farm

Forest farming is defined by the Forest Service and Natural Resource Conservation Service as:

*The intentional cultivation of edible, medicinal or decorative specialty crops beneath native or planted woodlands that are managed for both wood and understory crop production. Forest Farming does not include the gathering of naturally occurring plants from native forests, also known as wild crafting.<sup>1</sup>*

Forest farming systems, sometimes also called multistory cropping systems, are observed throughout the world and can be categorized by the intensity of management required.

**Forest gardening** requires the most intense management of forest farming systems. The overstory is thinned and the understory cleared of undesirable vegetation. Other practices, such as tillage, fertilization, weeding, and protection from diseases, insects, and wildlife are like other cultivated crop systems. Forest gardens take advantage of vertical levels of light and the space available under the forest canopy, so that more than one crop can be grown at once, including the tree crops.

Forest gardens may be the world's oldest form of land use. They are resilient agroecosystems, which originated in prehistoric times along river banks and in the wet foothills of monsoon regions in the tropics. As families gradually improved their immediate environment, useful tree and vine species were identified, protected, and improved. Undesirable species were eliminated, and desirable foreign species were selected and incorporated into the gardens. Forest gardens are still common in the tropics in South India, Nepal, Zambia, Zimbabwe, Tanzania, Sri Lanka; Mexico, and Java. The gardens are significant source of income and food security.

The Indian state of Kerala, which boasts no fewer than three and a half million forest gardens, may have the most advanced forest gardens. For example, one 0.30 acre Kerala plot had twenty-three young coconut palms, twelve cloves, fifty-six bananas, and forty-nine pineapples, with thirty pepper vines trained up its trees. In addition, the small holder grew fodder for his cow.

**Wild-simulated** forest farming seeks to maintain a natural growing environment, while enriching local non-timber forest product (NTFP) populations to create an abundant renewable supply of the products. Minimal disturbance and natural growing conditions ensure products will be similar in appearance and quality of those harvested from the wild. These products often command a higher price than NTFPs produced using the forest gardening method.

**Forest tending** involves adjusting tree crown density to manipulate light levels that favor natural reproduction of desirable NTFPs.

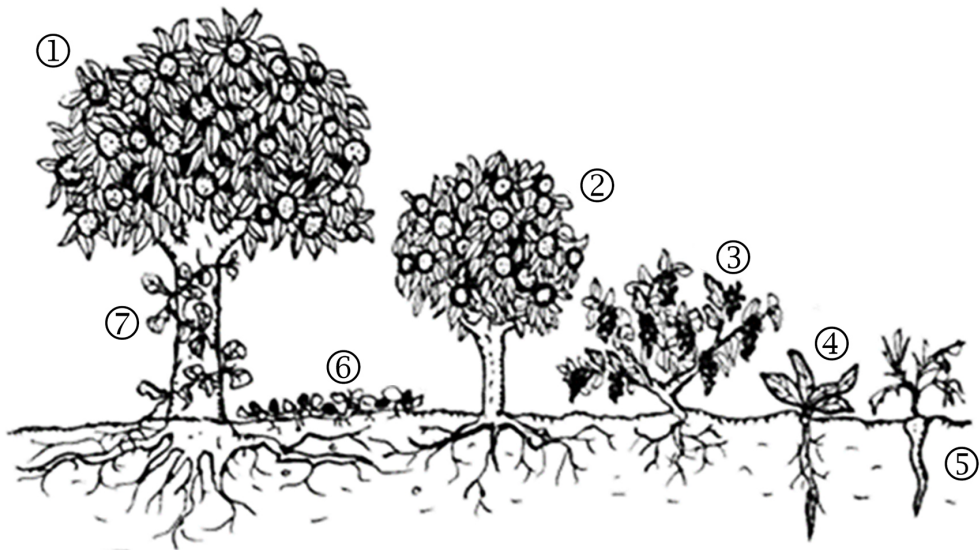
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<sup>1</sup> See Schoeneberger, et al. 2017. *Agroforestry: Enhanced Resiliency in U.S. Agricultural Landscapes Under Changing Conditions*. In *Glossary*, p. 141. See also Chamberlain, et al Ch. 2 On Nontimber Forest Products and Production for focus on U.S. situation, In Chamberlain, et. al *Assessment of Nontimber Forest Products in the United States Under Changing Conditions*.

**Wildcrafting** is the harvesting of naturally growing NTFPs. It is not a forest farming practice because there is no human involvement in plant establishment and maintenance. However, wildcrafters protect NTFPs with future harvests in mind.

## US Experiences with Forest Farming

Robert Hart pioneered a forest gardening system based on the observation that the natural forest can be divided into distinct levels. He used intercropping to develop an existing small orchard of apples and pears into an edible polyculture landscape consisting of seven layers illustrated in the following sketch.



**The Forest Garden:** A seven level beneficial guild

1. canopy (large fruit and nut trees);
2. low tree layer (dwarf fruit trees);
3. Shrub layer (currants & berries);
4. Herbaceous (comfreys, beets, herbs);
5. Rhizosphere (root vegetables);
6. Soil surface (ground cover, e.g. strawberry, etc.);
7. Vertical layer (cucumbers, vines).

The plants he selected are key components of the seven-layer system. Most of the traditional vegetable crops grown today, such as carrots, are sun-loving plants not well selected for the more shady forest garden system. Hart favored shade-tolerant perennial vegetables.

Dr. Jim Chamberlain, a researcher with the US Forest Service and expert on non-timber forest products, explains why research on forest farming systems is important:

*The paradigm of ecosystem management cannot be fully realized until all plants and animals are included. We do a tremendous job managing forests for timber and wildlife, but we do very little to manage those same forests for food or medicine. Forests are more than trees! To manage for biodiversity, we must consider the understory vegetation that is harvested for subsistence and commercial gain. The people who harvest these products are underserved, and often represent a part of society that lives on the margins of the economy. They rely on these plants for income to make it through rough times, and for many families the consumption of these*

*products helps to ensure food security. Further, the value of the forests products industry will not be completely understood until the segments of the industry that include food, medicine, floral and decorative products are included.*<sup>2</sup>

## **Wilhelm Farm Experiences**

Wilhelm Farm is exploring a couple of avenues into forest farming, including outdoor cultivation of mushrooms on logs and the introduction of ramps and fiddle head ferns to simulate growth in the wild.

We have casually cultivated log-grown shiitake mushrooms outdoors for many years, for personal consumption and barter, and believe there is opportunity to create a profitable and sustainable revenue stream from what has been a hobby.

The substrate used has primarily been oak. Logs have been periodically available from logging done on the property, or through neighbors and a local arborist. Iron Wood has also been used successfully. Naturally regenerated oak seedlings are being protected within the area being developed as silvopasture, with the idea that over time some of these oaks will be removed and used for mushroom cultivation. We have recently delved into the use of birch as a substrate. Birch is competing with young pines within our managed stand of white pines and birch stems should be removed. Birch logs are a free by-product of our forest management. Although birch is not the preferred wood for shiitake production, we have had some success. The trade-off between lower yield on birch logs and the low-cost substrate needs to be examined in more depth. Birch is better suited for the cultivation of Oyster mushrooms and we have begun trials with a couple of different strains. Reishi mushrooms have been found naturally occurring within our forest, and we may try to cultivate these in the future, simulating their natural occurrence.

Over the past two years, we have also planted bare-root fiddle head ferns. The coiled head of the Ostrich Fern is an early spring edible that many consider a delicacy. They are abundant naturally in the woods of New England and are seasonally available in local groceries from people who practice wild crafting. Though we have not found any occurring naturally on our property, we hope to get them established in riparian sections of the forest. In the wild, they are generally found in damp, lowland forests and along wooded streams. We believe that we have an appropriate habitat, but have planted without keeping records of costs, locations, and success. More attention is needed!

Ramps, also called wild leeks, is another early spring, wild edible that grows naturally in the forests of Connecticut. We have not found ramps growing on Wilhelm Farm, but we believe we have suitable conditions. They like rich, moist deciduous forests. Areas that also grow Trout Lily and Trillium should have suitable conditions for ramps. For the last two years we have planted small ramp bulbs. We have done better at record keeping with the ramps, and some that were planted in 2018 were found again the follow spring.

Both the ramps and the fiddleheads are long-term projects undertaken more as an experiment for fun than because we have weighed the investment in plant material and labor against a projected

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<sup>2</sup> Dr. Chamberlain is the Forest Service research expert on non-timber forest products and forest farming. He is stationed at Virginia Tech, Blacksburg VA. This is from his section in the Forest Service Research webpages. For insight into his work in the southern Appalachians see <https://www.youtube.com/user/exforestfarming>

income. While we hope to establish both ramps and fiddleheads in the forest, we don't anticipate them yielding an income stream. For either plant, it will take some considerable years to establish patches large enough to yield a sustainable harvest of any quantity, but much like planting trees, we hope that future generations on this land might enjoy the fruits of our labor.

The riparian zone of Mountain Brook offers potential for forest farming with crops that require high moisture levels and can tolerate shade. However, a higher potential opportunity may develop as we work to solve water challenges on wet areas that are currently in the hayfields and silvopasture areas. We plan to invest to improve water management on the landscape, so we can better withstand high rainfall events without erosion and retain that water for use during dry periods. As we develop water courses and storage ponds, the strips of land adjacent to the waterways have an advantage of near full sunlight, high moisture, and ease of entry to plant and harvest.<sup>3</sup> There could be opportunity to grow decorative branches for the florist market, tree and shrub fodder for animals, willow for folk crafts, and edible fruits and berries along these water courses.

### **Summary Comments**

At this stage, forest farming is being explored on Wilhelm Farm, with on-site trials that largely follow the work of others. If successful, forest farming could add several small revenue streams to Wilhelm Farm while improving carbon sequestration and enhancing habitat for wildlife. Forest farming has potential to increase and diversify habitat for wildlife as well as a farm-based income. With 35 acres of forested land, forest farming is an obvious growth node for our farm enterprise.

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<sup>3</sup>This opportunity will be discussed in context of our emerging agroforestry and permaculture strategy in WF Factsheet 15, *Agroforestry Systems as Key Elements in Wilhelm Farm's Permaculture and Landscape Design Strategy: The Wilhelm Farm Case Study in Adaptive Agroforestry Management Systems* (forthcoming).