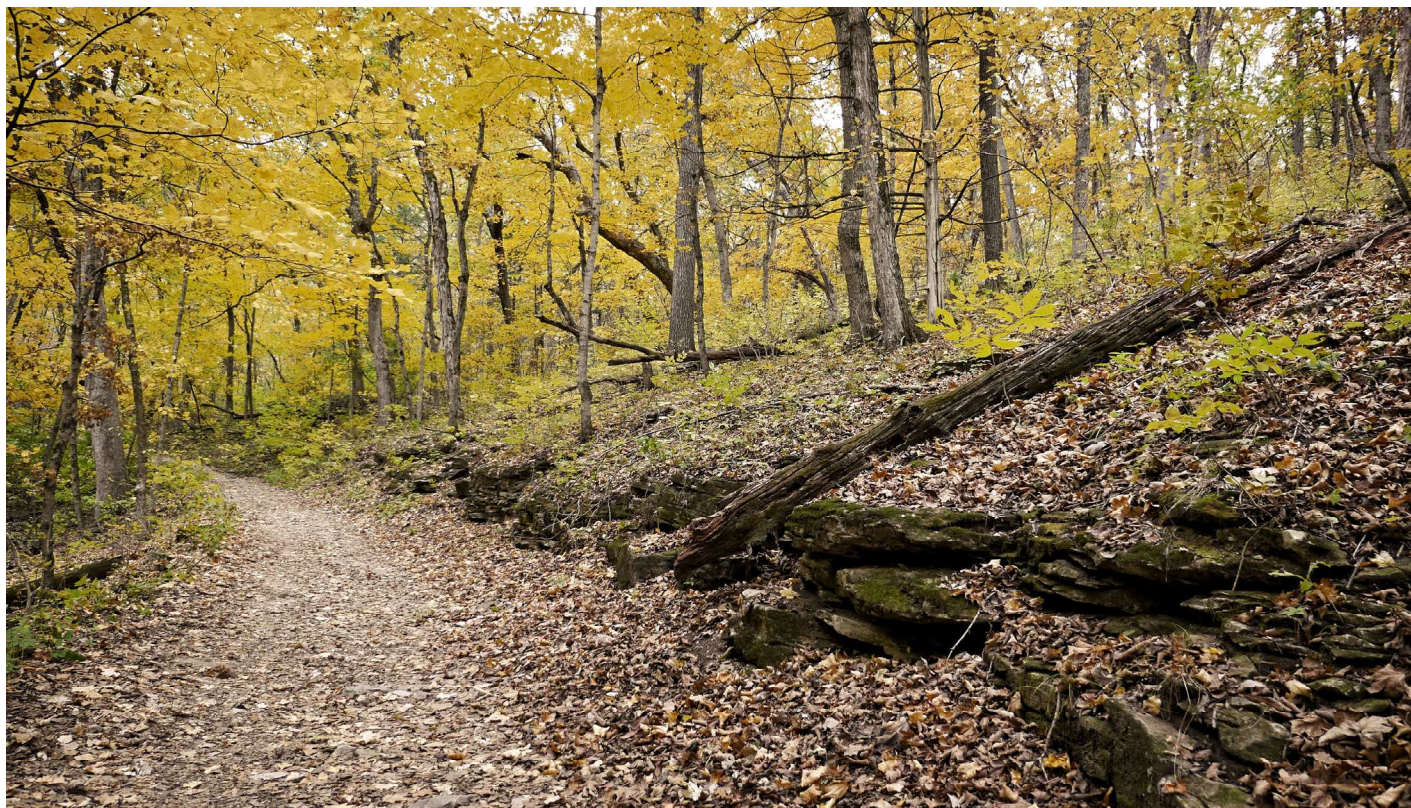


Forest Farming Site Selection and Preparation Guidelines



Missouri forest in autumn – (photo credit: adobe)



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LUCE #23-10(11)-FS003

Walk, Don't Run:

Planning a successful forest farm takes time and often experience. By going slow and being thorough in the planning and implementation phases, significant loss of time, money, and plants can be avoided. When experimenting with new crops, it is very important to keep careful records of the dates, weather/climate, and successes and failures of different species, techniques, and sites. Only successful plants and techniques can be developed and pursued by tracking what works and what doesn't.

For some protected species such as ginseng, proper documentation is essential if the landowner wishes to eventually sell any of the plant materials. This is especially crucial while working with many native plant species that are generally slow to germinate, with some taking upwards of 18 months from the time of planting to produce above-ground growth.

Site Selection:

The key to a successful forest farm is selecting a site that is appropriate for the species of interest. A poorly chosen and designed space can cause even the most well-intentioned and managed planting sites to fail. While growing sites can be evaluated at any time of the year, it is important to keep in mind-

-that sites can change significantly with the seasons, so it is best to examine potential forest locations multiple times throughout the seasons (Rural Action and United Plant Savers, 2019). There are several key factors to consider when selecting a site and ways to improve marginal sites to increase the chance of successful growth of the NTFP of choice.

Forest Parameters:

The structure of the forest is important for generating the desired microclimate for different NTFP species. The density and species of the trees present, the slope aspect, soil quality, and understory community structure should all be considered when selecting and preparing a site for forest farming.

The tree density and species composition will influence the available light that reaches the forest floor and determine the thickness of the leaf litter. These factors influence the rate of nutrient cycling, soil moisture retention, and the surrounding plant community. Tree species such as sugar maple (*Acer saccharum*), black walnut (*Juglans nigra*), shagbark hickory (*Carya ovata*), and spicebush (*Lindera benzoin*) produce thin leaves that decompose quickly and help improve soil quality (Rural Action and United Plant Savers, 2019). Most NTFPs prefer about 60% shade, although some prefer more sun (black cohosh), and others do better with greater levels of shade (ginseng). Apsley and Carroll (2013) share a quick way to get a rough estimation of canopy shade using paper plates.

"A quick method to approximate the amount of shade that is on a given site is to place 10 or more white paper plates at even distances on the ground at approximately noon on a sunny summer day. Count the number of plates that are at least half-shaded. Next, divide the number of shaded plates by the total number of plates placed on the ground. Multiply this number by 100."

The slope aspect is a crucial consideration for determining where to plant NTFPs. Most require a shaded site with moist, but well-drained soil. Generally, east and northeast slopes provide the cooler, moist conditions these species require. South to southwest-facing slopes receive more direct sunlight, making them hotter and drier. Typically, planting on a slight slope is preferred as this promotes drainage and reduces the risk of fungal infection and root rot, although it depends on other factors as well such as soil type, canopy cover, and accessibility.

Lastly, the understory species composition can serve as a key indicator of site quality. The best indication of a site that will support the species of interest is if it is already growing there. For example, if you are interested in growing goldenseal and there are already a few goldenseal plants on your land, the current growing conditions will be favorable to forest farming goldenseal. Many of these botanicals share similar site requirements, so even if the exact species of interest are not present, if others are growing in the area, such as wild ginger, Solomon's seal, and mayapple, the site is very likely a good spot for forest farming.



Image of the forest canopy over wild ramp population.



From left to right: Wild ginger (*Asarum canadense*) among liverwort (*Hepatica acutiloba*) and young goldenseal (*Hydrastis canadensis*), mayapple (*Podophyllum peltatum*) plant in flower, and false Solomon's seal (*Maianthemum racemosum*).

Bed Preparation:

Wild Simulated: Wild-simulated production aims to produce low to medium-density plantings that are essentially indistinguishable from wild populations. It involves very little site preparation, few inputs (fertilizer, time, water), minimal forest disturbance, and pest management. This approach is inexpensive, the only cost is acquiring seed. Many farmers will choose to start with this approach to experiment with forest farming as it carries fewer expenses and requires less time and labor. It is important to note that since the growing conditions are not optimized through the addition of soil additives, fertilizers, and tilling, plants tend to mature more slowly. Plants grown in a wild-simulated manner have a similar appearance to wild populations.

To prepare a site for wild simulated plantings, start by removing major debris, including fallen branches and rocks. It may be necessary to prune long hanging branches and selectively remove small trees and shrubs to improve airflow and light infiltration. Any invasive species present should be manually removed and/or controlled before planting.

Woods Cultivated: The woods-cultivated method is more intensive than wild-simulated method. Generally, this approach includes the building of raised beds, the addition of soil amendments, active pest control, and closer plant spacing. While more of an initial investment, woods-cultivated forest farms will produce higher quantities of NTFPs in a shorter time frame compared to wild simulated. Goldenseal and black cohosh are two species that do well in these more intensive plantings. For some species, such as Ginseng, this method produces lower-value roots (Frey et al., 2021). If the forest farm is meant to produce a supplementary income, careful consideration of the management approach, quantity, and value of the resulting NTFPs should be given before planting.



Woods-cultivation requires more intensive management but often results in greater plant growth and root yields. To start preparing a wood-cultivated site, mark the boundaries of your planting beds. These beds can be made to any size but should be narrow enough to allow you to reach across for easy maintenance. A good size for most people is four to five feet wide. Once beds are clearly marked, remove, thin, and/or prune the competitive vegetation within the plots.

Some of the surrounding vegetation may also need to be thinned to achieve more optimal growing conditions (light) and allow for easier access to the plots. After the vegetation is removed, apply any necessary soil amendments and shallowly till the beds with a heavy-duty tiller or small tractor to loosen just the top three to six inches of soil. Some producers will even hand till the beds if their soil is not too rocky and compacted.

Maintenance:

Both approaches to forest farming require attention to moisture and pest management. Mulch is an excellent way to conserve soil moisture, reduce runoff and erosion, and protect growing plants during the cold season. The best mulch is the leaf litter already on the forest floor. After planting seeds and/or roots, spread a generous layer (approximately two inches) of leaf mulch over the bed. Some growers have also had success with woodchips if leaf litter is limited. Generally, straw should be avoided as it can encourage the development of molds and other fungal pests.

Accessibility Considerations:

Another factor in selecting planting sites is their accessibility. This is especially important if wood-cultivated approaches are being used; therefore, more direct management is required. Being able to reach the planting sites easily by foot or by vehicle ensures plantings can be monitored for pest or disease problems. Depending on the size of the plantings, consideration should be given to spacing beds in a manner that allows a vehicle or ATV to navigate through the area, making checking on plants and harvesting much easier.

While ease of access is important, it is also beneficial to consider any potential threats from poaching, both intentional and accidental. Plants such as ginseng have high market value and take a long time to grow, making them more prone to theft. Currently, in Missouri, poaching is not a large threat as there is not a history of wild-harvesting non-timber forest plants including ginseng. Some simple ways to reduce the potential of NTFPs being poached include installing fencing, keeping the location of plantings secret, or telling neighbors about the plantings so they can help watch for suspicious activity. By choosing a planting site away from main roads and publicly accessible land, the chance of any poaching or accidental harvest by foragers is greatly reduced.

References:

Apsley, D., & Carroll, C. (2013). Growing American Ginseng in Ohio: Selecting a Site. OSU Extension Fact Sheet F-58. Columbus, OH: The Ohio State University.

Frey, G. E., Mercer, D. E., Cubbage, F. W., & Abt, R. C. (2010). Economic potential of agroforestry and forestry in the Lower Mississippi Alluvial Valley with incentive programs and carbon payments. *Southern Journal of Applied Forestry*, 34(4), 176–185.

The United Plant Savers and Rural Action. (2019). *The Forest Farmers Handbook: A Beginner's Guide to Growing and Marketing At-Risk Forest Herbs*. Rural Action.