



Photo courtesy: Deborah Hill

Alley cropping is the fifth of a five-part series of Agroforestry articles.

Agroforestry also includes the following practices: wind breaks, riparian buffer strips, silvopasture, and forest farming. See Kentucky Woodlands Magazine Vol. 1 Issue 2 for more information.

Non-Timber Forest Products

Agroforestry Part Five: Alley Cropping

by Deborah B. Hill

Alley cropping is probably the most commonly used technique of agroforestry. It simply involves planting single lines of trees and/or shrubs intercropped with a wide “alley” of either row crops or pasture grasses. The width of the alley is determined by the size of the harvesting equipment needed for the crop grown in the alley. Sometimes the alleys are fairly narrow—for corn or other row crops for example—and sometimes the alleys are very wide (greater than 60 feet, for example). The trees may include valuable hardwood veneer or lumber species; nut, fruit, or Christmas trees; or desirable softwood species for wood fiber production. As we learned in silvopasture, the alleys may also be used for pasturing livestock.

Benefits of alley cropping systems include:

- making the existing agricultural system more sustainable,
- improving plant and animal diversity on the site,
- improving economic stability by mixing short-term and long-term crops,
- increasing cash flow as tree crops produce something marketable, and
- improving the aesthetics of the site.

Some options for crops for the alleys include row or cereal crops such as corn, soybeans, wheat, barley, oats, potatoes, peas, beans, and forage crops such as fescue, alfalfa, orchard grass, bluegrass, ryegrass, brome, timothy, and clovers. The tree/shrub component could be landscape plants such as blue

spruce, dogwood, redbud, Christmas trees, dwarf fruit trees, or certain medicinal plants. They could also include biomass crops such as true poplars (*Populus* spp.), willows, birches, or switchgrass. Another option is shrubby species that are known as “woody florals”—species that are used in the florist trade, such as curly or corkscrew willow or red-leaf osier, species with stems of unusual shape or color. These latter species, once established, can be cut either every year or every other year and will sprout back with new growth. As with the other techniques that mix tree and non-tree plant species, it is important to be aware of maintenance needs and the appropriate use of chemical fertilizers and biocides.

Whatever is used on the site must be compatible with all crop species present. Siting the lines of trees in an east-west direction is best for making sunlight available, but if the main reason for including trees in this type of technique is to prevent soil erosion on slopes, then the lines of trees should follow the contours of the land.

When choosing the tree crop, look for species that will produce a high-value product or a multiple of high-value products (e.g., wood, fruits or nuts, chemicals). Also consider their usual rate of growth, and select for species that are either fast growing or moderately fast growing (note options for shrubs above). Tree species need to be tolerant of a variety of soil conditions and, if full-sized trees, they need to produce a lighter rather than a heavier shade so that they will interfere less with the companion crop. Also in consideration of the companion crop, the trees should be deep rooted so

that their roots will not compete directly with the more shallow roots of the companion crop. Other factors to be considered with regard to the trees are possible nitrogen fixation, a short growing season, production of a foliage that decomposes quickly and does not acidify the soil, and absence of allelochemicals (chemicals produced by some trees — black walnut for example — that inhibit the growth of other plants around them).

Crops in the alleys may change over time unless one begins with crops that are at least partially shade tolerant. When the trees or shrubs are first planted, they will need protection from animals and from equipment so that they have a chance to establish well.

This may involve fencing, herbicide applications, tree shelters, lines of electric fencing, or other protective measures. This would probably be necessary only for the first year or two after planting.

Alley cropping is one of the easiest agroforestry techniques to implement — and one that can bring economic and aesthetic benefits to a farm in a relatively short period of time.

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Photo courtesy: Center for Agroforestry at UMO

Alley cropping usually involves single rows of trees separated by a wide enough “alley” to grow another agricultural commodity.

If livestock are involved, the alleys would support pasture grasses. Otherwise, the alleys can support agronomic crops, either row crops (milo in the above example grown with pecan trees), or hay crops for cutting, or vegetable crops such as pumpkins or other ground-covering crops.