

Alley Cropping Plans for Wilhelm Farm

In Wilhelm Farm Factsheet No.1, we wrote:

...in alley cropping, an agricultural crop is grown simultaneously with a long-term tree crop to provide annual income while the tree crop matures. Food, forage, nut or berry crops are common in the alleys.

As our NRCS Conservation Innovation Grant project has progressed, and we further define the specific challenges we face, it is clearer than ever that this agroforestry system is a suitable solution for some landscape challenges on Wilhelm Farm.

Challenges and Solutions

We have three opportunities where alley cropping can lead to higher productivity (see map below). The solution in each case is different to solve different problems:

- 1. *Stop erosion on our steeper sites*. One erosion-prone area is the south hay field. It has a steep slope from a flat bottom area to the top of the field. Historically, erosion carved a major gully in the hill, which often has surface water flows in the spring and following major summer rain events. Our plan is to plant rows of nut trees along the contours of the hill. The alleys in between tree rows might be planted to a forage crop for winter feeding of goats.
- 2. *Reduce seasonal high water table in the periphery of our center pasture*. Haying is difficult during the annual wet season and the periphery is prone to compaction if animals graze while the soil is wet. Curved rows of trees around the edge would grow more rapidly with the excess moisture and dry out the site. Nut trees could be used with a forage crop in the alley between two rows of trees. The center portion of the pasture is drier and could be used for both winter or summer grazing by animals housed in the adjacent barn and barn yard.
- 3. *Use extra moisture from snow drifts south of the snow/red cedar windbreak*. Alley crops of dwarf fruit trees, berry bushes, flowers or a mix of plantings would make the landscape more attractive and use the moisture stored in the snow drifts.

We also considered several locations for alleys of commercial fruit trees. We rejected these for two practical reasons. As the co-owners age, we will not have the energy to manage high-quality fruit trees on a commercial basis. Also, our scale would not be large enough to harvest commercially unless we reopened our roadside stand. Again, this would require labor and energy that we do not have. In the future, however, our sons, a tenant or another owner might find a shift toward high-yield dwarf fruit trees an attractive investment. Nut trees would provide a good environment for interplanting fruit trees and tending them until they are mature enough to produce harvestable fruit crops.



Three alley cropping sites are: (1) contour rows of nut trees (orange) with alleys in between; (2) circular rows of nut trees (red) with pasture grass in middle; (3) alleys of fruit trees (magenta) with flowers south of windbreak by drive.



Contour alleys of trees would protect the steepest slopes (currently in hay production) against ongoing erosion. One possible arrangement would be: (1) Nut trees like Chinese Chestnuts, walnuts, etc.; (2) Forage crop, squash, or berry bushes; (3) Clover, other legumes in tree alley and/or part of forage mix; (4) leaf litter and pruning can provide mulch. Alternately, the lower line of trees could be taller (e.g., black walnut), the middle line shorter trees (e.g., Chest-nut), and the highest line berry bushes. Other variations might be possible as well.

Tree Species



Wilhelm Farm Hybrid Chestnut tree



Wilhelm Farm Black Walnut sapling

High-value hardwoods, like walnut, oak, ash, and pecan, are favored tree species in alley cropping systems and can potentially provide high-value lumber or veneer logs. In the US South, New Zealand and other places, quality pines are the tree crop. Black locust for poles is grown in some NY alley cropping systems. Taller nut trees can be another intermediate product.



Chestnut demand is rising because of increased interest in nutrition and a broader consumer palate for nuts.

Our early reconnaissance and on site trials suggests that chestnuts are a good nut crop tree for our soils, and the market demand is growing. Chestnuts occurred naturally on our farm until the blight wiped them out early in the 20th century, but roots continue to sprout throughout the woods. We planted 20 hybrid chestnuts to test the results. Most seedlings grew well, but the blight eventually killed them in a few years. The two exceptions are over 12 years old. They appear resistant and one is quite tall. The results confirm that we could grow hybrid chestnuts for nuts. We planted 3 black walnut seeds, and the seedlings have done well. Our experience is that the moister microsites produce more rapid height growth of walnut saplings.

One possible design for the alleys on the contour is to have the lower row of trees be tall (e.g., black walnuts), and shorter trees in the next higher row (e.g. dwarf chestnuts) above the first alley. Berry bushes might make an excellent third row at the top of the hill.

Forage crops

We are considering some forage mixes suitable for dairy goats that would provide grazing and hay during the winter months. During the summer months, the goats will be in our silvopasture unit where they can eat a mix of brush species, perennial grasses and some clover. Most of the brush species are highly nutritious with high protein content: the natives include wild grape, wild berries and other brambles common to southern New England; the exotics like multiflora rose and Asian bittersweet also are nutritious; however, Japanese barberry is toxic in large amounts and is avoided by goats.

We might use the forage crop alleys for grazing when the trees are tall enough to not be destroyed by the goats, but most of the forage will be used as bailed hay. Some operators in the area still have relatively small hay cutting, tetting and bailing equipment, which would require alleys wide enough to use these machines. Another option would be the purchase of small hay harvesting, tetting and bailing machines. Italy produces several hay mowers, tetters, and bailers. Some models from Asia and Europe are walk behind, much like walk-behind tillers.

The alley design decisions will require comparisons among distinctly different alternatives:

- Harvesting and bailing hay with contract machinery
- Investing in small-scale harvesting, tetting and bailing equipment
- Forage mixes compatible with goat nutrition needs and equipment

These decisions will be postponed until selection of nut tree species when intercrop and alley width must be set. We will have discussions in the meantime with contract hay producers to get practical advice.

Summary

Our alley cropping plans, when implemented, will reduce soil erosion and utilize soil moisture for forage and nut or fruit tree production. Specialty trees with legume cover crops underneath will stabilize steeper slopes, reduce potential erosion, and use seasonal excess moisture. One site – dwarf fruit trees just north of driveway – will use moisture from the snow drifts and add an attractive landscape feature.

References

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