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Benefits of Implementing Agroforestry

I was recently asked by a client, “What can we do in regards to climate change?” This seems to be a global issue, yet is there something we can do as an individual? Regardless of your opinion of this controversial subject, agroforestry is a business enterprise you may want to consider. Agroforestry is the intentional integration of trees and shrubs into crop and animal farming systems. Think of it as a way to benefit the environment and pollinators while creating a secondary source of income. Examples include planting windbreaks with edible fruits and berries or planting trees for biomass energy or conifers for lumber production.



A three row windbreak

Livestock owners are often looking for ways to diversify their income. Agroforestry or silvopasture can be utilized on both irrigated and non-irrigated land to create secondary streams of income. Silvopasture is the intensive management and growing of perennial grasses or grass-legume mixes in a forest stand for livestock pasture. A great example can be found in the Columbia Basin where Ted and David Melgren planted hybrid poplars in the corners of a center pivot field. Twenty eight acres were planted (seven acres per corner) with hybrid poplars utilizing a drip irrigation system. Grass was planted in between the rows of trees as a way to inhibit weeds. In ten years the poplars will be cut down and sold. In the meantime, the trees are planted far enough apart (18') that livestock can graze in between the trees or the grass can be harvested as a hay crop. Once the trees are established and providing shade, ponderosa pines will be planted as a permanent wind break that will provide wildlife habitat, sequester carbon and help protect crops from the wind. By planting the trees, the Melgren's have saved money on weed control and increased crop yields due to the reduced crop evaporation rates provided by the windbreak.

A lot of research has been done on the benefits of windbreaks. A study performed at the University of Nebraska Mead Research Station utilized windbreaks on 40 acre fields. Their research indicated an increase of 18% for Soybeans, a 20% increase in corn yields and a 22% increase in wheat yields. Hay and pasture yields have also been shown to increase when protected by windbreaks. Additional research by University of Nebraska determined the cost of establishing the windbreaks was more than offset by the increase in crop yields.

By incorporating multiple rows of trees in their pastures, livestock owners will provide much needed shade for their cattle. Beef cattle research in Kentucky demonstrated a reduction in deep body temperature as much as 1.4 degree F, with improvement in daily gains as high as 1.25 pounds per day during summer heat stress periods. Minimizing the “summer slump” on your feeder steers would help pay for the cost of planting trees. In the winter, feed costs drop when cattle are protected from wind chill. An Iowa research project with calves and yearlings concluded feed requirements were seven percent greater in open lots than in lots with shelter.

An additional benefit is newborn calves have a lot better chance of surviving if they are protected from the wind.

Trees benefit not only the farmer/rancher but the wildlife, too. Trees provide nesting habitat for raptors who will return the favor by eating voles, mice and gophers. It is estimated that one barn owl typically consumes 6 voles or vole-sized rodents per night. That adds up to 2,190 rodents per year and less damage to your hay field. Increased wildlife on your land not only helps convey a positive image, but trees, shrubs, and grasses serve as carbon sinks, storing atmospheric CO₂. As an example of this, it is estimated there are 300,000 farms in the North Central U.S. without wind protection. If windbreaks were planted around these 300,000 unprotected farms, it would result in 120 million trees storing 13 million metric tons of CO₂ within 20 years. In addition to the carbon sequestered, soil erosion from wind would be curtailed. When the wind blows, so does soil, and in the winter, snow. Landscapes with windbreaks had 29% more snow water equivalent on the field than unsheltered landscapes.

Recently, the precipitous decline in bee populations has been a major concern for farmers. A windbreak is an opportunity to provide habitat and food for bees. By planting a wide variety of plants with overlapping blooming times, farmers can provide a source of pollen and nectar for bees, even when their crops are not blooming. I hope everyone would agree that increasing bee populations is worth a bit of extra effort, money and time. As an extra bonus, one could include berry producing plants like blueberries and raspberries for additional income opportunities. Diversification of income spreads out market risk and can provide much needed cash flow.

To determine the best place on your ranch for a windbreak, look for fields that have the strongest wind pressure on the north or west end of your property. Where can a windbreak be planted that will do the most good? Do you have corrals that have access to water? These are often good areas to plant trees along the fence line in order to produce shade and it helps reduce dust, too. Do you have a calving pasture that would benefit from a windbreak? Also, fence lines in pastures are often great areas for utilizing native plants like chokecherries, wild roses and elderberries that when fully grown will become a natural fence that never needs repaired. I realize wild roses can encroach into the field and choke irrigation ditches. However, with a bit of maintenance, roses can be kept in check and the pollen on the wild rose's many bright yellow anthers are a valued food source for many beneficial insects, including bees. Rose hips are a winter food for birds and mammals such as waxwings, pine grosbeaks, grouse, and rabbits. One might even develop a market for the rose hips, they have 50% more vitamin C than oranges. Look for a marginally productive field or a pasture without trees that could be planted with apple, cherry, chestnuts or hazelnuts for fruit and nut production. Of course, check if your climate will allow for these types of trees to survive.



A lilac & conifer windbreak

Riparian areas are also great locations for planting trees, shrubs, forbs and grasses for wildlife habitat and bees. Fish will benefit as trees shade the water keeping it cooler and filter runoff improving water quality. Pivot corners, as mentioned previously, can be an area that with some labor and capital investment produce income. A recent USDA bulletin regarding the Conservation Reserve Program (CRP) now encourages more bird habitats to be established in irrigated farmland regions by encouraging the planting of center-pivot corners. This is not a new program, as pivot corners have been eligible for the CRP program before, but only if there was a linear strip of

grassland between them. This requirement for a grassland strip has now been lifted. USDA hopes this will result in more acres enrolled, which will increase plantings of native grasses,



Courtesy USDA-NRCS

wildflowers and other wildlife habitat. The new policy allows producers interested in habitat creation to use disconnected pivot corners to help increase the population of upland birds. Not just birds will benefit as farmers establish long-term plant species that control soil erosion, sequester carbon, improve water quality, and strengthen declining wildlife populations. In return, participants receive annual rental payments between 10 and 15 years in length. When developing agroforestry and silvopasture opportunities, it is strongly recommended to make a plan before planting as your success rate depends on

providing the correct amount of water, shade and weed control to your new seedlings. Landscape fabric is strongly recommended as a weed barrier, otherwise weeds will take up the water and nutrients your new seedlings require. In the hot, dry parts of Oregon you may need to plant a drought tolerant tree like Rocky Mountain juniper, once established it will provide shade and better growing conditions for other less drought tolerant plantings. Without a plan, critical steps may be overlooked and money is wasted on dead trees. So plan carefully and your windbreak will be successful. Key components of a good windbreak plan include the following:

1. Plant a multi species, multi row windbreak on the north and west side of the field.
2. Leave enough space between trees for summer air circulation.
3. Check to see if your trees will shade a road in the winter or limit visibility, causing dangerous driving conditions.
4. Match plant species with the type of wildlife and bees you wish to attract.
5. Be sure to fence off windbreak area to protect it from livestock and deer.
6. Have a quality weed barrier in place.
7. Include a row or rows of evergreens for year round protection.
8. Provide adequate spacing between rows of plantings or they will crowd each other and slow growth of the windbreak.
9. Plan out a drip or alternate type of irrigation system if there is not adequate moisture in your area.
10. Be prepared to fertilize plants as needed.

Remember, if a windbreak is going to be effective, it takes extra care in the first five years before it reaches maturity or it may become an eyesore rather than a growing, working, income producing part of your land. Windbreaks have many benefits for farmers and rural landowners, and more than make up for the loss of land they use. If more landowners will plant bee friendly habitat, perhaps we can combat the decline in bee populations. Good quality windbreaks require some time, labor and initial investment, but the benefits live on for generations to come.

Remember, the best time to plant a tree is yesterday. For more information, please consult local NRCS and OSU Extension personnel. Also, the U.S. National Agroforestry website has lots of information at: <http://nac.unl.edu/index.htm>.

References

Macher, R. 1999. Making Your Small Farm Profitable. Storey Publishing.

- Angima, S. 2009. Silvopasture: An agroforestry practice. Oregon State University. EM 8989-E.
- Kuhn, G. 2000-2001. Don't leave pivot corners "Empty". USDA Inside Agroforestry.
- Hanley, D. P., and G. Kuhn. 2003. Trees against the wind. Washington State University, Oregon State University, University of Idaho. PNW0005.
- Josiah, S. 2000. Discovering profits in unlikely places: Agroforestry opportunities for added income. University of Minnesota.