



Inside

Agroforestry

Rocky Mountain Research Station, Agroforestry Center

Fall, 1994

Agroforestry and Sustainable Systems Symposium A Success

Judging from broad-based attendance and enthusiasm at the *Agroforestry and Sustainable Systems Symposium*, it is evident that agroforestry in the United States has developed and progressed a great deal in the past five years. Over 130 people, representing nearly every agency, institution, and organization interested in agroforestry, attended the two and one-half day Symposium, held August 7-10, 1994 in Fort Collins, Colorado.

"Agroforestry is growing tremendously as more agencies, universities, organizations, and landowners recognize its potential to simultaneously provide economic, environmental, and social benefits. The bottomline is that agroforestry is a win-win situation for

(See Symposium on page 2)



Over 130 natural resource professionals attended *Agroforestry and Sustainable Systems*, the first Symposium hosted jointly by the Agroforestry Center and the USDA Soil Conservation Service. Based on positive feedback and enthusiasm about agroforestry, the future looks bright for another Symposium in the next couple of years.

Money Does Grow On Trees...And Under Them

Windbreaks, living snowfences, filter strips, and wildlife habitat. Sound familiar? How about shiitake mushrooms, ginseng, and grapevines? With a little preplanning and proper management, these are just a few of the alternative products that can be harvested from an agroforestry system. These "alternative" or "specialty crops" not only have the potential to produce additional income for landowners but they provide an opportunity to diversify farm management practices. Currently, many landowners view whatever forest resource that they might have as simply a place to graze or shade livestock, or as a place to obtain firewood or fenceposts for their farm. This issue of *Inside Agroforestry* features tree crops with specialty uses. Following are a few examples of how they can be incorporated into standard agroforestry practices.

Medicinal Plants

American Ginseng and Golden Seal both have significant economic value and can be "wild" cultivated under a forest cover. In Kentucky alone, ginseng is a five million dollar-per-year

commodity. Ginseng, for its 4,000-year known history, has been taken as a general health tonic or to bring about a level of "balance" in the body. Golden seal, used widely in Native American medicine, is specifically used for eye ailments, but is also used as a tonic and a diuretic stimulant. For both plants, it is the root that is used for medicinal purposes. More and more people in the United States, and in other western countries, are beginning to listen more attentively to the folk wisdom of people who have been reaping the benefits of these medicinal plants for centuries.

Shiitake mushrooms, or "forest"

mushrooms are a gourmet's delight. Originating in Japan, they are grown mainly on native oak species, since being domesticated from the wild. They are more widely available in the United States as their gustatory and medicinal benefits become better known. Shiitake are particularly interesting to forest landowners because

Shiitake Mushrooms



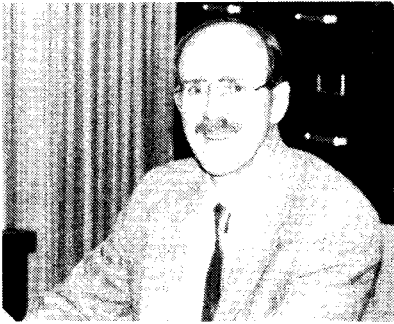
Ready for harvest when cap is 75% opened.

When cap is flat or curled up, mushroom is overmature.

(See Products on page 5)

Inside This Issue

- Agroforestry is on the Move!...page 2
- Alternative Tree Crops...page 3
- Apple Trees and Windbreaks...page 4
- How Does Wood Outperform Plastic?...page 5



Message From the Manager

*A column of important events and programs
as reported by Program Manager Bill Rietveld*

Agroforestry on the Move

My Spring, 1994 message, entitled "Coming Together," noted that agroforestry is becoming better defined and the science and practice of agroforestry are becoming more broadly recognized nationally. This is being driven, I believe, by the larger issue of sustainable development — the need to attain a more sustainable agriculture and diversify local economies, while providing multiple environmental benefits now and for future generations. Agroforestry is right on target with these trends and needs.

There have been several key developments this year that have helped to achieve the increased recognition of agroforestry. In February, the Soil Conservation Service published its Resource Conservation Act (RCA) appraisal for agroforestry entitled: "Agroforestry: an Integrated Land-Use Management System for Production and Farmland Conservation." This report was the first of its kind for agroforestry, and provides a comprehensive assessment of the national needs and opportunities for agroforestry.

The awareness created by the RCA assessment resulted in a June workshop to assemble representatives from the national agroforestry community of interest (federal agencies, universities, and conservation organizations) to develop a framework for a Coordinated National Agroforestry Program. The product of the workshop was a white paper entitled: "Agroforestry for Sustainable Development: a National Strategy to Develop and Implement Agroforestry." The white paper represents another important step because it presents specific recommendations from the unified agroforestry community of interest.

A third significant development this year was the selection of agroforestry for one of approximately 21 USDA issue papers to identify possible issues and actions for the 1995 Farm Bill. This is the first time agroforestry has been identified as a USDA issue relevant to the Farm Bill. At this time it is not clear if the issue papers

will be published, and in what form.

I mention these developments to illustrate my point that agroforestry is on the move. Agroforestry is being recognized as an integral part of sustainable agricultural land-use systems. It's important to point out that agroforestry is not in competition with the sustainable agriculture movement, but should be considered part of it. For example, the recent National Academy of Science report on "Soil and Water Quality: an Agenda for Agriculture" recommends increased emphasis on field and landscape buffer zones in concert with development of improved farming systems. We feel that agroforestry practices can play an important role in providing the buffer zones needed to help attain improved soil and water quality.

I'm excited about the future for agroforestry, but I realize that the future needs more than agroforestry. For agroforestry to add value, it needs to be considered a part of farm, watershed, and landscape-scale systems. Thus the need for an ecosystem- and team-based approach.

For further information about the National Strategy to Develop and Implement Agroforestry, write or call Dr. Michael Gold, president, Association for Temperate Agroforestry (AFTA), Michigan State University, Department of Forestry, 126 Natural Resource Building, East Lansing, Michigan 48824-1222. Phone 517-353-4751. AFTA sponsors the biannual "North American Agroforestry Conference," and is expanding its role as an advocacy organization to advance agroforestry. AFTA's newsletter will serve as a forum (rather than *Inside Agroforestry*) to exchange viewpoints on agroforestry issues and how agroforestry should be addressed in the 1995 Farm Bill. Contact Dr. Gold if you are interested in joining AFTA or contributing an article to AFTA's newsletter.

(Symposium from page 1)

farmers, the environment, and the public, now and in the long-term," says Bill Rietveld, Program Manager for the Agroforestry Center.

The *Agroforestry and Sustainable Systems* Symposium was sponsored by the Agroforestry Center, USDA Soil Conservation Service, and over 50 endorsing sponsors. The program consisted of 30 invited speakers and 23 poster papers reporting state-of-the-art and special applications of agroforestry technologies and how agroforestry contributes to ecosystem sustainability. Sessions explored the many facets and barriers to agroforestry and visioned the future of

agroforestry as an integral part of sustainable agricultural land-use systems. A workshop provided an overview of the Coordinated Resource Management process, a vehicle to reach agreement on natural resource management for all users and to promote quality resource management through collaborative efforts. Conference participants also had the opportunity to discuss agroforestry research, technology transfer, and education/training issues and needs.

Rietveld added that "The Symposium was a huge success, there was strong consensus that agroforestry has much to contribute to an ecosystem-based,

watershed/landscape scale approach to the attainment of sustainable agricultural land-use systems for the future."

Copies of the Symposium Proceedings will be available after January, 1995.

"Perhaps the most serious obstacle impeding the evolution of a land ethic is the fact that our educational and economic system is headed away from, rather than toward, an intense consciousness of the land."

-Aldo Leopold

Alternative Tree Crops

By Jim Mayhew
Hedgerow Foundation, Fairfield, Iowa

I once heard a story about a small eastern European town where, more than a hundred years ago, citizens were given the option of planting trees or paying taxes. Needless to say, a lot of trees were planted, among them long-lived nut and fruit varieties. Over the course of the next century — through droughts, plagues, floods, wars,

*"There are many species
that produce nuts
and fruits,
valuable wood and
other forest products,
and provide necessary
habitat for wildlife.
These same trees
have a role in
agroforestry systems as well."*

and economic fluctuation — these townspeople withstood hardship more easily than those around them. They had fruits and nuts to store and eat, valuable wood to sell or build with, and the forest to house wildlife, which provided them with another source of food. It was as if the trees insulated this town from all the suffering around it. This is the story that inspired me to begin researching trees and shrubs that bear crops.

There are many species that produce nuts and fruits, valuable wood and other forest products, and provide necessary habitat for wildlife. These same trees have a potential role in agroforestry systems too. Examples below give you an idea of how alternative products can be derived from their incorporation into an agroforestry system.

Currently, the Springtree Agroforestry Project in Scottsville, Virginia is experimenting with thornless honeylocust as a complementary food source for livestock to pasture grass. The honeylocust produces sweet pods which are relished by cattle, sheep, and wildlife, and when ground they

are suitable for human consumption. (Honeylocust flour muffins were once served at a potluck and everyone wanted the recipe!). Thornless honeylocust trees are beautiful trees that allow filtered sunlight to pass through the crown of the tree. As a result, they do not shade out the grass that livestock graze or any other crop that may be planted beneath, all while holding the soil in place and helping to stabilize the environment.

Philip Rutter, Director of Badgersett Research Farm and Farmer from Canton, Minnesota is developing hazelnut trees that can be used as windbreaks, and at the same time as perennial crops. He speculates that an acre of hazelnuts — which do not have to be replanted each year — will produce as much food as an acre of corn or soybeans. Hazelnuts can be processed into a number of valuable products including cooking and salad oil, nut butter which is high in protein, and the nuts can be fed to animals as well. Hazelnut trees also greatly reduce soil erosion and do not require toxic sprays.

Cardinal Olive is a nitrogen-fixing shrub that has been promoted as wildlife food and growth aid for trees. Since birds eat Cardinal Olive fruit and disperse the seeds, critics say that it's too invasive. It is because of this that I am researching another variety of the nitrogen-fixing family *Elaeagnus multiflora*. The fruit is larger and I suspect that the seeds of this variety are also larger than those of the Cardinal Olive which may be harder for birds to swallow, thereby reducing proliferation. This variety is also a delicacy in Europe and Asia.

Many trees and shrubs show great promise as alternative tree crops. Several of these fruit-bearing varieties not only provide a food source but help sustain the environment and can easily be incorporated into an agroforestry system. We know from research that windbreaks increase yields of row crops by sheltering them and improving the microclimate. If we are going to promote windbreaks, why not promote windbreaks that produce an additional cash crop and food for wildlife? This applies to the urban population too. Fruit trees planted in a backyards or parks are not only

beautiful but provide prime habitat for wildlife.

Some examples of the benefits of berries, which all have the potential to be a part of a cash-producing windbreak with the fruit serving landowners as a pick-your-own-crop, are the serviceberry, which tastes and looks like a blueberry. Another species, caragana, is a nitrogen-fixer which produces small peas that chickens love. The edible berries of the tough *Hippophae rhamnoides* shrub can be eaten fresh or used as a source of vitamin C in commercial products. The hardy jostaberry, or thornless jostaberry, produces a delicious berry the size of a grape that tastes like a cross between gooseberries and currants. An edible honeysuckle from Russia produces a berry similar to a blueberry, and of course, the elderberry, buffaloberry (a good nitrogen-fixer), and certain viburnums produces wonderful berries.

In addition to berries, other fruit trees can work well as food-producers and require little care. *Princepia sinensis* produces a cherry-like fruit that does not require the spraying that most cherries do. The nanking cherry also produces good-tasting cherries with little or no care. Persimmon and certain mountain ash have edible fruits, and a specie of dogwood, grown in Europe and Asia, bears fruit the size of plums, which is made into the valuable "royal jelly."

In the category of nut trees and shrubs, *Xanthocerus sorbifolium* or yellowhorn is a handsome nut tree from China, which has leaves and nuts animals can eat in times of drought. Ginkoes also produce tasty nuts — if you can stand the odor when the fleshy fruit drop and begin decomposing. The chestnut has great potential as a tree crop because it can be processed into a number of nutritious foods. Finally, what about pine nuts? Pine nuts are expensive and would be an excellent cash crop for landowners. As a result, much work is being done with ponderosa pine, but what about the pinion nut, Korean stone pine, and digger pine, all of which produce valuable nuts.

We at the Hedgerow Foundation presently have about half of the

(See *Alternative* on page 5)

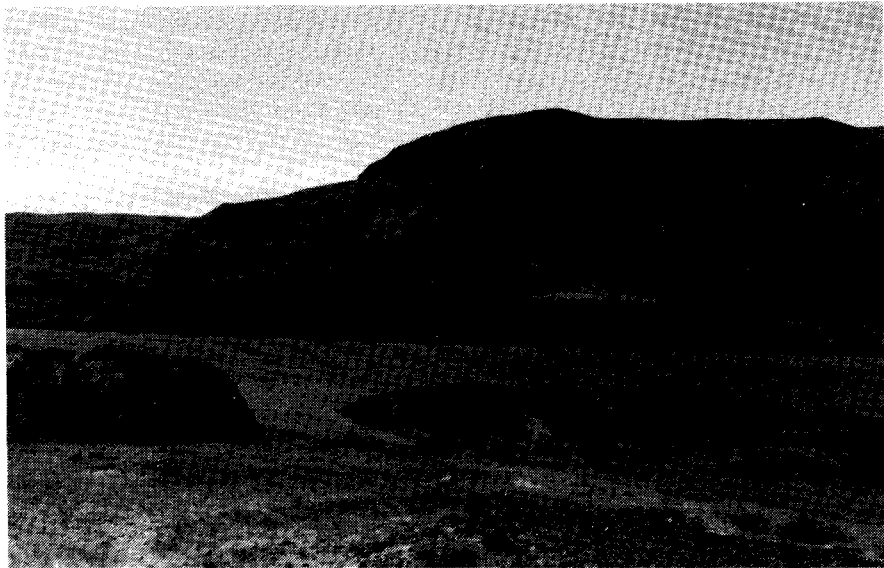
Protecting Apple Orchards -- It's A Tough Job But Some Windbreak's Gotta Do It!

With its dry climate and some of the highest wind energy patterns in the state of Washington, the Columbia Basin area is unique — especially for apple orchard production. Land is quite valuable in this area and land-owners want protection for their orchards, but aren't willing to take many acres out of production. Yet, over 90 percent of the orchards in the Columbia Basin have windbreaks protecting them.

There has been a rich history of windbreaks coupled with apple orchards in this part of the country. Harold Crose, District Conservationist for the Soil Conservation Service, Grant County, Washington continues to assist land-owners with the design and layout of new windbreaks in his county. He says that there is a tremendous amount of money that has gone into the 35,000 acres of orchards (apples, cherries, pears, and apricots) in the Columbia Basin. Up to \$20,000 per acre! "Everything is state-of-the-art. We only use the best irrigation systems and the best monitoring devices available. The whole orchard system is highly sophisticated from an agricultural standpoint." And, windbreaks are a part of that system.

Most of the windbreaks in this area, if not all of them, consist of one row of hybrid poplar trees, mostly selected for their fast growth rate. They are usually planted seven to 10 feet apart and provide approximately 600 feet of leeward protection. Orchards are typically 40 to 120 acres in size, but some are as large as 2,000 acres. Most orchards have windbreaks around the perimeter and the larger orchards will have cross windbreaks throughout the middle.

The Columbia Basin is very young as far as the orchard industry is concerned. Fifty to 60 percent of the orchards aren't even mature yet, which is why Crose's role is so important. When establishing a new orchard, a windbreak is as much a part of the layout plan as the orchard trees



An orchard near Mattawa, Washington with single row poplar windbreak spaced at approximately 660 feet. Picture taken looking across the Columbia Basin.

themselves. Crose feels that as a conservationist, his first and foremost concern is conservation, which actually involves getting land *ready* for apple production. Windbreaks and a cover crop such as a companion mix of elka rye and creeping red fescue, are the first phase of orchard establishment. They stabilize the fragile, sandy soil of this region. Then the apple trees are planted, and once they've established, the windbreaks *conservation* role becomes more of a *production* role.

Since apple trees are fairly delicate, wind protection is a necessary management tool. Windbreaks protect trees, heavy with apples, from wind damage and also protect the fruit itself. Reductions of windspeed within orchards will reduce the amount of mechanical damage caused by the whipping of leaves, branches, buds, flowers, and fruit. This, in turn, improves fruit quality and quantity and can result in substantial economic gain.

Furthermore, windbreaks improve pollination and fruit set, reduce premature fruit drop, and improve yields. The profitability of any orchard is a function of yield, price, waiting time to first cropping, and cost. Although yield is an important profit generator, it is the quality of the fruit that determines the price, and ultimately the profit margin.

It should be mentioned that windbreaks are a tremendous asset to orchard protection and production, but if designed and managed *improperly*, they can cause damaging frost pockets and harbor pests. However, research is currently underway to find solutions to these problems. Researchers are working to find ways to improve air movement within the orchard which will help minimize frost pockets and are also working to develop biological control procedures and other pest management techniques to minimize pest problems.

Much of the credit for the continued success of windbreaks and orchards in the Columbia Basin area goes to the Soil Conservation Service and District Conservationist's like Harold Crose. Thank you!

They're Coming! Agroforestry Notes are Coming!

Soon...a technical series
for natural resource professionals
will be available from the
Agroforestry Center.
It will be a straightforward approach
to the most current
agroforestry technology available.
Watch for it in 1995!

they grow on small diameter logs of hardwood trees like oak, maple, sycamore, sweetgum, and birch. They are somewhat nutty or garlicky in flavor and are high in B vitamins and essential amino acids. Japanese medical studies have found that eating these mushrooms seems to reduce blood cholesterol levels. Shiitake have also been found to have antiviral and antithrombic activity. The National Institutes of Health are currently investigating shiitake's antiviral activity in the battle against AIDS. Hence, there is potential for development in the pharmaceutical market as well as in the gourmet food market.

Many other tree species provide valuable drugs which play an important part in human health. A few of them include: yellow poplar which is a source of tulipiferene, an alkaloid that eases rheumatism pain and dyspepsia (impaired indigestion); oak species supply medicines that are derived from the inner bark and used as an astringent and also a hemorrhoid ointment; Dogwood bark is used as an antiperiodic (a drug used to prevent regular recurrence of fever or disease); and Basswood is used to derive a medicine which supposedly brings relief to hysteria and indigestion.

Woodcraft Materials

Many species that do not have commercial value as timber or medicinal value do have wood of unusual color or grain that is highly prized by woodworkers. Such species include dogwood, osage-orange, and Kentucky coffee-tree, all of which have especially beautiful wood that can be worked fairly easily. Persimmon wood can also be used for crafts, and is prized regionally in Kentucky for premium quality professional golf club heads. Small diameter white oaks are in demand by traditional split oak basket makers. Grapevines, although highly desirable from a wildlife standpoint, are severely damaging to trees. Grapevine wreaths are in great demand, and someone in the southeast made better than \$3 million one year from truckloads of grapevines. Seedpods from leguminous trees such as black locust and redbud, gumballs from sweetgum, and cones from pines, spruces, and hemlock, along with holly, mistletoe, and other berries can also be collected for ornamental or craft use.

In 1989, the floral greens and Christmas ornamental market generated an estimated \$128.5 million in product

sales in western Oregon, Washington, and southwestern British Columbia. In Kentucky, white pine, Virginia pine, and scots pine are the commonest species grown for Christmas trees, but people are experimenting with everything from douglas fir to fraser-fir, and even leyland cypress.

Miscellaneous Uses

This list of specialty crops doesn't stop here. There are many other alternative forest products, some of them include: maple sugar production, beekeeping, deer tounge, berries, Spanish moss, sassafras, nut and fruit crops, and forest recreation. Black walnuts, hickory, persimmon, pawpaw all produce edible nuts or fruits that are marketable.

Most of the crops mentioned in this article require specific growing conditions, so it's necessary to find out exactly what can be grown in your region. Remember, generating income from any of these endeavours will depend to a large extent on marketing. Landowners willing to invest some time (and some money) could develop a successful operation and be pleasantly surprised!

City stores and country markets alike sell products generated from America's woodlands, some with amazing prices. Ginseng roots may retail for over \$100 per pound. Shiitake mushrooms sell in some areas for \$28 per pound. A boutique in Florida sells 10-pound bags of mesquite wood (a pest species in the west) for \$25 each. Wood shavings swept off your workroom floor can be mixed with fragrant spices and oils, leaves from bay trees, and a few rose petals to sell for \$1 per ounce! Marketing is the "magic" ingredient in most cases, knowledge of production then maximizes profitability.

This is just a sample of the many options for integrating food, medicinal, or craft crops into agroforestry systems that may allow forest landowners to obtain greater economic benefit from their land on a sustainable basis. Good luck!

Sources: Agroforestry in the South and East, Henry A. Pearson; Southern Hardwood Management, R8-MB 67, March 1994; Agroforestry Specialty Crops and Mid-South Conference on Agroforestry Practices and Policies, Alternative Forest Products, Deborah B. Hill; Agroforestry Opportunities in Northern California, Oregon, and Washington Linda Hardesty and Linda M. Lyon; and The Foresters' Log, January 1994.

varieties mentioned growing in nursery beds. Within the next year, we expect to plant the remaining species described. For more information contact Jim Mayhew, Hedgerow Foundation, 905 N. 12th, Fairfield, Iowa 52556. Phone 515-469-3939.

The trend toward the use of trees and shrubs as cash crops is growing and it would be very easy to incorporate them into a new or existing agroforestry system. We see evidence of this progression as harvesting machines are now being adapted to mechanically pick many of the fruit and nut species mentioned. Hopefully more people will see the benefit of planting a alternative tree crop and plant trees and shrubs that provide an abundance of good, nutritious foods. A good book to read on this subject is *Tree Crops* by J. Russell Smith.

Appearance of an article in Inside Agroforestry does not imply that the Agroforestry Center agrees, nor endorses the facts or opinions contained.

Wood Outperforms Plastic

Ever-suprising wood!
New medicines are constantly turning up from the chemicals of tree tissues; laminated wood beams are found to hold up better than steel in fires; and now researchers have found that wooden cutting boards are more sanitary than those made of plastic. It had been assumed for years that plastic would be easier to clean. However, testing in the laboratories of the Wisconsin Research Institute found that 99.9 percent of salmonella bacteria and other common causes of food poisoning died within three minutes on wooden boards while none died on plastic ones. The researchers then tested seven species of wood and four types of plastic — all with similar results. So far the scientists have not been able to isolate the chemical that is responsible for this most recently discovered contribution of wood to the benefits of humans.

Source: Arbor Day, July/August 1993