



# The **Temperate Agroforester**

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## **Designing Silvopastures with Animals in Mind**

by *S.H. Sharrow, Oregon State University*

Agroforestry research scientists work hard at generating, controlled, replicated “scientific” observations. The day-to-day operation of agroforestry systems used in research also produces practitioner experiences which, although lacking the control of planned experiments, nevertheless provide useful information. I would like to share some of the “scientific” and “practitioner” experiences which I have acquired during 16 years of grazing sheep in conifer/pasture silvopastures.

Agroforest system processes are primarily managed by manipulating vegetation composition and structure. Spatial pattern of trees is an important structural element in silvopastures. Trees are often grouped in clusters or rows in order to facilitate agricultural operations such as spraying, mowing, fertilizer application, and fencing. Although few replicated studies have been published, sufficient information is available to provide some principles for silvopasture

design, as follows.

Pasture production is greater when trees are aggregated together, leaving wide pasture interspaces free of trees, than when trees are spaced equally apart in grids. The influence of tree pattern on pasture production increases as number of trees per acre and individual tree size increases. Tree growth is little affected by pattern, provided that each tree has at least one side exposed to full sun. This means that single rows of trees and double rows of trees should grow at similar rates, while the inner row of triple row plantings will eventually suffer reduced growth from competition.

Surprisingly little has been written about the influence of silvopasture tree pattern on the livestock and native animal components of silvopastures. We have

► ***Silvopasture Design, p. 4***

## **National Survey of Agroforestry Activities Set for Launch**

A listing of institutional agroforestry activities nationwide will soon be available on the World Wide Web. Visitors can find information about teaching, research, extension and international activities related to agroforestry at over 60 institutions in the U.S. About 300 activities are included initially, but this number will change as listings are updated in future.

The listing was developed through a collaboration between the USDA National Agroforestry Center (NAC) and AFTA. Two years ago, NAC circulated a nationwide survey to collect information from universities, government agencies and private organizations

about agroforestry-related projects. Through a subsequent contract with AFTA, the results of this survey have been updated and compiled into a computer database. Web pages were then created that summarize the agroforestry activities at each institution.

Internet users will be able to reach the survey via the NAC home page: [www.unl.edu/nac/](http://www.unl.edu/nac/). Visitors can view the individual pages for each institution, or can search by keyword to find institutions having activities that match their search criteria. There is also a feedback form so that institutional participants can update their listings and new ones can be added. □

✌ **AFTA Annual Meeting, July 25, Columbia, MO (See p. 12 for details)**

## ***The Temperate Agroforester***

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The mission of AFTA is to advance the knowledge and application of agroforestry as an integrated land use approach to simultaneously meet economic, social and environmental needs. AFTA focuses on agroforestry in temperate zones, with an emphasis on North America. AFTA pursues its mission through networking, information exchange, public education, and policy development.

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Contributions related to agroforestry are welcome. Please submit items either on PC-formatted diskette, via e-mail, or typewritten. Deadlines for submissions are the 15th of March, June, September and December. Address all items to: Miles Merwin, The Temperate Agroforester, P.O. Box 266, Lake Oswego, OR 97034, Tel.(503) 697-3370, Fax (503)697-1767, E-mail [mlm1@teleport.com](mailto:mlm1@teleport.com)

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### ***President's Message***

## **AFTA Meeting and Buffers**

*By Joe Colletti, AFTA President*

I want to remind you that the annual AFTA meeting will occur on Saturday, July 25, 1998 in Columbia, Missouri. Sandra Hodge and Gene Garrett will organize the meeting hosted by the University of Missouri's Center for Agroforestry. The half-day meeting will have a walking tour of an historic town, followed by an agroforestry field tour, and ending with a "bo-dacious bar-b-que" (Sandy is cooking so it will be great!!) at the Horticulture and Agroforestry Research Center. Details on the meeting are in this newsletter.

One of the items to be discussed at the Columbia meeting will be the direction and focus of AFTA over the next few years. Because of the growth of AFTA, the increased interest in agroforestry, and US national programs affecting agriculture and forestry, AFTA needs to plan its course and develop its programs to facilitate the expansion of the science and practice of agroforestry. Come prepared to be involved!! If you cannot attend, contact your regional AFTA representative to share your views.

Well it's nearly June 16th and as I write these words the rivers in Central Iowa are near or at flood stage again! Several major rivers and streams that flow through Ames have already spilled out of their banks and the crests are yet to come!! Three times in six years! "It is not a good thing," as Martha Steward would say. While I'm not prepared to blame the past or recent midwest floods on El Niño, I am certain that "we (humans) are part of the problem and part of the solutions to the problem." Conservation buffers such as filter strips, grassed waterways, and riparian buffers are part of the package of Best Management Practices (BMPs) that landowners can use to protect our soil and water resources.

The USDA Natural Resources Conservation Service (NRCS) and over ninety partners known as the National Conservation Buffer Team are providing an excellent opportunity for landowners in the US to establish conservation buffers on their private land via financial incentives and technical assistance. As agroforestry systems the conservation buffers offer a WIN-WIN approach to protecting and enhancing our natural resources, sustaining food, fiber, and livestock production, and contributing to a high quality of life. □

# ARS Tests New Money-Making Options with Agroforestry

By Tara Weaver, USDA Agricultural Research Service

Farming is tough business for small farmers when livestock prices drop, forcing them to make some important choices. Do they keep their livestock and continue feeding the animals until the price per pound goes up? Or do they sell at the lower price and take the loss?

Now, Agricultural Research Service scientists at the Dale Bumpers Small Farms Research Center in Booneville, Arkansas, are developing other options for small livestock producers caught in this economic bind.

"We're looking at profitable alternatives to help small farmers deal with price fluctuations," says ARS for-  
ester Catalino A. Blanche. "Agroforestry is one way farmers can get the most use out of their land. Although other countries use agroforestry systems, it is a fairly new idea in the United States."

The two types of agroforestry being studied at the Booneville center are called silvopasture and alley cropping. Silvopasture is growing trees, cattle, and grass on the same land. Alley cropping is growing crops between tree rows. The idea is that farmers can use their land to make supplemental income during livestock down markets, without sacrificing their main source of income or losing profits.

## Silvopasture

"If farmers grow trees on their land, the trees will eventually generate a profit for them. If they introduce the right tree species into their pastures in the right manner, it can improve their income by as much as 300 percent," Blanche says.

Selecting the right tree species depends on several

factors, including climate, soil conditions, vegetation, product type, and acreage. Black walnut, pecan, loblolly pine, and slash pine are the leading tree species in the southeastern United States, because they are best suited for the region's weather and soil conditions.

"These trees are being introduced in traditional Arkansas farms and pastures to increase profitability and sustainability," says Blanche. "People are concerned about the environment and giving back to the land. Agroforestry does this.

"Trees also provide shade. This is important, because some cattle species eat less when they're hot. This causes them to lose weight, which results in an economic loss for the farmer," Blanche says. "Providing shade for the animals can mean a 15 to 20 percent weight gain, based on research in the tropics."

But cattle should be turned into a silvopasture only after young trees are well established, about 3 or 4 years after planting. And a sufficient number of trees should be planted

to avoid soil compaction from too many cattle seeking relief from summer heat underneath too few trees. Extra income from grazing can be about \$3,400 a year for a 50-cow, 200-acre pasture - the average farm size in Arkansas. And by planting 60 acres of the 200-acre pasture with trees over a 30-year period, extra income could be increased to about \$5,000 a year, he estimates.

That's one way to generate added income. Blanche points out that trees can also be used for pulpwood, timber, and pine straw production.



ARS researchers Michael Brown and Catalino Blanche examine field corn planted between rows of loblolly pine to provide fodder and cash flow while the trees mature.

➤ **Money-Making Options, p. 10**

## ► Silvopasture Design, continued

all seen animals seek out shade under trees during hot weather and shelter beneath trees during cold rainy weather. A grove or row of trees provides better protection from the elements than do single trees.

However, animals also react to tree pattern in more subtle ways. Many wild animals prefer a habitat which contains protective vegetation where they can shelter from the weather and can hide from predators together with more open feeding areas where preferred food can be found. These conditions are most commonly found at the edge where two plant communities meet.

Cluster or row silvopastures have a large amount of forest/pasture edge. This is very attractive to deer, rabbits, and birds which shelter in/under trees and feed in the pasture.

In one of our agroforests, deer began to commute in from adjacent oak woodlands to feed in our silvopasture soon after its establishment. Deer use increased as trees grew until they are now living entirely within the silvopasture. Deer damage to young trees has progressed from being primarily browsing damage of newly planted trees to being mechanical damage from rubbing the velvet off their horns in the fall. Because deer appear to select trees between 3 and 6 ft tall for rubbing posts, we expect this damage to end as trees grow.

Planting trees in rows and spraying strips to reduce competition from pasture can expose trees to browsing damage from deer and rabbits. Browsing animals will sometimes follow the rows, eating trees as they go. One year, I debated whether to spray the grass away from one-year-old Douglas fir trees. I was concerned that the grass, although reducing tree growth, might be concealing the rows of trees from deer. Sure enough, once I sprayed the grass, deer easily found

the trees and browsed every one. I would have been better off to accept the grass competition.

Birds such as flickers, robins, and thrushes use our conifer trees as perches. From the tops of tree rows, they can easily survey the pasture alleys for insects, worms, and other food items. Unfortunately, heavy bodied birds frequently break the terminal leaders off trees when attempting to perch on leaders which have not yet become woody. Birds faeces deposited near trees may contain weed seeds. Newly established poison oak under several silvopasture trees most likely arrived by this mechanism.

Livestock are generally easier to herd in row silvopasture than in grid or cluster plantings. Their natural tendency is to drift parallel to barriers such as tree

rows. Given a choice, animals will usually head downwind. This makes herding livestock between rows fairly easy.

However, they may be reluctant to cross between rows. This is especially true for animals who are used to electric fencing. Modern high voltage fence chargers deliver 5000-7000 volts of charge at high amperage for a very short dura-

tion. Once animals have experience with electric fences, they are not anxious to repeat it. When in doubt, they often perceive any hard edge as a potential fence line.

New Zealand sheep farmers, for instance, have successfully contained livestock by clipping the edge along strips of tall grass to produce a "grass fence". I used to keep our dog out of the vegetable garden by putting up a single piece of string, which he recognized as an electric fence wire. Low elevation remote sensing of our silvopastures shows slightly reduced pasture production in the center of alleys between tree rows. We believe that this results from trampling of livestock who are trying to stay away from what they perceive as a "tree fence". We have attempted to

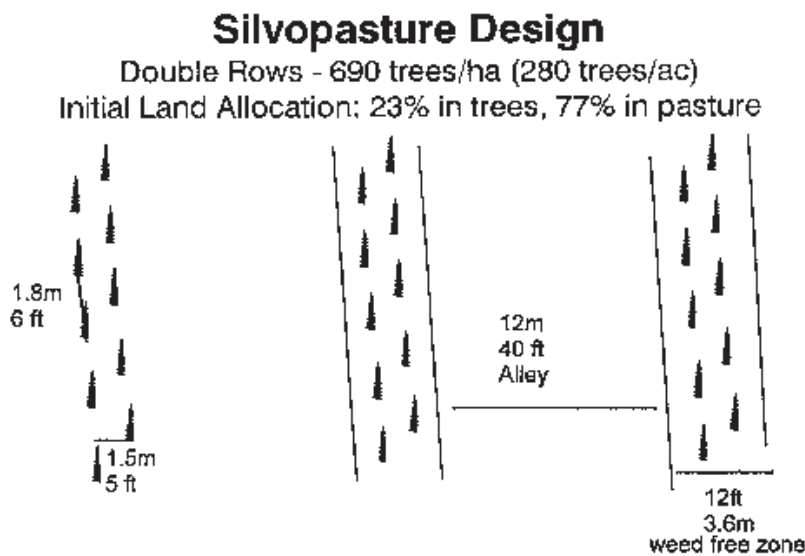


Figure 1. Design for a Douglas fir/grass-clover silvopasture for western Oregon hill lands. It will qualify as a fully stocked forest for regulatory and forestry cost sharing purposes.



# Agroforestry Sessions Planned for SAF National Convention

Richard Schultz and Frank Hershey are in charge of putting together a joint working group session at the Society of American Foresters' National Convention, Sept. 19-23 in Traverse City, Michigan. Working groups B4 Agroforestry and C3 Water Resources will co-sponsor a technical session on Monday, Sept. 21 from 1:30-5:30 PM entitled "Function and Use of Riparian Buffers in Forest and Agricultural Landscapes". This session will focus on riparian buffers as key management tools for reducing nonpoint source pollution to surface waters. The session will discuss the functions of riparian forest buffers, methods for assessing the need for them, and several models for use in both agriculture and forest landscapes. The session will prepare attendees for a technical tour the following day in which participants will be asked to assess the need for and design of a riparian forest buffer in a specific landscape setting.

On Tuesday, Sept. 22 from 7 AM - 5 PM the two working groups will host a field trip that will focus on healthy riparian forest buffers, the rehabilitation of

existing buffers that are not functioning at full capacity, and the design, installation, and management of buffers where none presently exist. The morning part of the trip begin by visiting sites along the presently undisturbed Jordan river. This will be followed by visits to sites where forest harvesting and agricultural practices are actively being pursued along rivers. At these sites, teams of participants will be provided with specific scenarios that they will use for assessing buffer functions and designing modifications during the afternoon session.

Following lunch in a park along Lake Michigan, teams will develop solutions for their specific sites and will present them for discussion to the group as a whole. These field activities will be conducted in picturesque Antrim and Charlevoix counties.

For more information, contact Richard (Dick) C. Schultz, Department of Forestry, 249 Bessey Hall, Iowa State University, Ames, IA, 50011, Tel 515-294-7602, Fax 515-294-2995, e-mail [rschultz@iastate.edu](mailto:rschultz@iastate.edu). □

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reduce this effect by encouraging sheep to browse the lower tree limbs so that they can easily see under them. A related off shoot of this principle is that you do not want trees planted near gates. I have spent a lot of frustrating time trying to get sheep to move through an open gate. They see the tall grass and trees as a fence line and will not pass through.

Livestock can be extremely difficult to herd in grid or cluster silvopastures. Animals attempt to maintain a personal space between them and a potential predator such as a herder. As you approach them, they will walk away to preserve this space. Once this space is reestablished, they will often stop and look around to see what is happening. Once livestock pass behind a tree, they lose sight of you. They assume that you can't see them, so lose all interest in being herded. When you suddenly appear around the tree, they are spooked and attempt to flee. This situation becomes really interesting when you are attempting to control a large group of livestock, some of whom can see you, and some who can't.

Tree rows on steep slopes are often planted on the topographic contours. While this is ideal for soil conservation, it may impede livestock movement. Livestock and native ungulates, just like people know better than to walk straight up or down hills. They

walk at a slight angle to the hill's contour. These use patterns are usually easily seen in big game or livestock trails. Planting trees along these travel contours should capture most of the soil conservation benefits without impeding animal movement.

In summary, my experience is that silvopastures planted in rows are far superior for livestock production than are either grid or cluster plantings. Trees planted in rows with wide open spaces for pasture production between them, support high forage production and facilitate agricultural operations and animal herding.

The large amount of edge created and maintained long into the timber rotation tends to maintain high biodiversity. Deer, rabbits, and perching birds find the structure of cluster and row agroforests appealing. Therefore, one should be prepared for the potential impacts upon trees and pastures which may accompany increased use by wildlife. Double rows should allow for fewer but wider pasture strips between rows without reducing tree production. If planting a new silvopasture today, I would plant trees in offset double rows as shown in Figure 1. □

*Dr. Steve Sharrow is Professor of Range Management and Agroforestry, Department of Rangeland Resources, Oregon State University, Corvallis, OR 97331.*

# Trees Forever Establishes Riparian Buffer Demonstrations

By Michael Tidman, *Trees Forever*

The first 20 projects in the Trees Forever Iowa Buffer Initiative have been selected and work is scheduled to begin this year. The 20 projects to be done in 1998 represent the first of five years of putting buffers on the ground in the state of Iowa and are the result of a unique, public-private partnership that will show landowners buffers at work, solving problems in varying soil types and terrain.

Trees Forever is working with landowners, the Agroecology Issue Team of the Leopold Center, and local natural resource professionals in developing the demonstration sites. More than 100 conservation professionals have now completed intensive workshops in buffer planning and implementation.

## Landowner Satisfaction

Buffers are winning support from those who already have them on their land. In 1990 Story County farmer Ron Risdahl had a buffer installed on a portion of Bear Creek that runs through his farm. His farm has since become one of the nation's preeminent buffer technology research sites. At the time, Risdahl wasn't looking to put a buffer on his land, but when he was approached by Iowa State researchers, he agreed to move forward with the project. "It was just something that came up. An opportunity came knocking and we answered - and it's worked out great."

Risdahl points out many benefits of having a buffer on his land. "Wildlife is one of the benefits we really enjoy - all the animals and birds we have out there now. And of course, we don't have gullies washing down into the creek now. And while we don't have any income from the buffer now, we could down the road. The trees and switchgrass can be harvested and used, and of course, both regrow."

Like many landowners, Risdahl had concerns about tree roots from the buffer plugging his tile lines. "But we just put in solid tile under the trees, and we haven't had any problems. As far as I'm concerned, the buffer is here to stay."

Since the installation of Risdahl's buffer in 1990, nine landowners have now invested in buffer technology on ten farms at the Bear Creek research site. In addition to improving water quality, and improving wildlife habitat, buffers hold potential as sources of biomass for forage, energy, timber or chip products, native prairie seeds, or berries and nuts.

The Trees Forever Iowa Buffer Initiative was created to show landowners the advantages of long-term land management practices by developing more demonstration projects like those at Bear Creek. Putting demonstration projects along streams and rivers will give landowners a chance to see how using trees and grasses will improve water quality, reduce soil erosion, and enhance landscapes and wildlife habitat. The Trees Forever Iowa Buffer Initiative will establish:

- ten demonstration sites each year for five years, where field days demonstrating buffer techniques will be held in 1998; and ten project sites in areas of high priority, but which are less accessible;
- a network of technical assistance to support landowners;
- shelterbelts as buffers around livestock confinement operations;
- a recognition program for landowners who protect streams and waterways with grass and tree buffers; and,
- field days for farmers, rural landowners and youth to increase awareness of the value of buffers.

In addition to the Iowa Farm Bureau Federation and Novartis Crop Protection, Inc., other key sponsoring partners of the project are the Iowa Department of Natural Resources, Environmental Protection Division; United States Environmental Protection Agency; and the Natural Resources Conservation Service. Also involved as key research partner is the Agroecology Issue Team of the Leopold Center for Sustainable Agriculture in Ames.

## Buffer Design

The buffer technology used in the Trees Forever Iowa Buffer Initiative, referred to as a riparian management system, was developed by the Agroecology Issue Team of the Leopold Center for Sustainable Agriculture at Iowa State University.

All waterways have a flood plain, scientifically referred to as a riparian zone, the waterway's natural buffer zone. Trees and plants growing in a buffer zone trap and hold waterborne sediment and filter out agricultural chemicals.

Riparian zones act as "living filters" for both surface and subsurface water by trapping sediment and modifying waterborne chemicals and pollutants be-

## Proceedings of Past Agroforestry Conferences Still Available

The biennial North American Agroforestry Conference series, initiated in 1989, has been a forum for researchers, teachers, extensionists, and practitioners to share up-to-date information about temperate agroforestry. After each conference, the papers and poster abstracts presented at the meeting are collected in a printed proceedings published by the hosting institution. These proceedings provide a wealth of information on a wide range of topics related to agroforestry.

Proceedings of the most recent (Fifth) North American Agroforestry Conference held in Ithaca, NY are forthcoming from Cornell University. Of the four previous conferences, a limited number of proceedings of the 1989, 1993 and 1995 conferences are still available for purchase. Discounts for some are available for current AFTA members. For information, contact the host institutions listed below.

If you have Web access, you can find an on-line table of contents of each proceedings (1989-95) on the AFTA web site ([www.missouri.edu/~afta/](http://www.missouri.edu/~afta/)).

### **Agroforestry in North America. Proceedings of the First Conference on Agroforestry in North America, August 13-16, 1989, Guelph, Ontario.**

To purchase, contact Andrew Gordon, Dept. Of Environmental Biology, University of Guelph, Ontario N1G 2W1, Canada, Tel. (519) 824-4120, ext. 2415, Fax (519) 837-0442, e-mail [agordon@evbhort](mailto:agordon@evbhort).

fore they enter streams. Buffers also stabilize streambanks, reduce streambank erosion, increase water-holding capacity of soil, control flooding and help recharge ground water supplies.

In the past 50 years, most riparian zones in the Midwest were cleared for row crops or converted to pasture. Stream channels were straightened and deepened, and a complex network of agricultural tile now drains directly into streams.

All these modifications reduced the amount of time that water naturally stayed on or in the soil, where it was cleaned by the natural filtering processes. And while complete restoration of every natural riparian zone is not economically or logically feasible, the Trees Forever Iowa Buffer Initiative proves that it is possible to recreate lengthy segments of riparian buffer zones, thereby putting a natural system back in place. Restoration and management of riparian areas

uoguelph.ca. Postpaid price is \$25.00 CDN for AFTA members and \$30.00 CDN for non-members; make checks payable to the 'University of Guelph.'

### **Proceedings, the Second Conference on Agroforestry in North America, August 18-21, 1991, Springfield, MO.**

OUT OF PRINT - check your nearest university library for copies.

### **Opportunities for Agroforestry in the Temperate Zone Worldwide. Proceedings of the Third North American Agroforestry Conference, August 15-18, 1993, Ames, IA.**

For purchase information, contact Richard Schultz, 249 Bessey Hall, Iowa State University, Ames, IA, 50011, Tel 515-294-7602, Fax 515-294-2995, e-mail [rschultz@iastate.edu](mailto:rschultz@iastate.edu).

### **Growing a Sustainable Future. Proceedings of the Fourth North American Agroforestry Conference, July 23-29, 1995, Boise, ID.**

To purchase, contact John Ehrenreich, College of Forestry, Wildlife and Range Resources, University of Idaho, Moscow, ID 83844-1135, Tel. (208) 885-7600, Fax (208) 885-5878, email [johne@uidaho.edu](mailto:johne@uidaho.edu). Postpaid price is \$30 for AFTA members and \$35 for non-members; make checks payable to 'College of Forestry, University of Idaho.' □

can lessen and perhaps reverse water quality problems as well as increase the quality of life for humans and wildlife.

Landowners can use any of the following components alone or in combination to create or restore a riparian buffer: 1) a buffer consisting of trees, shrubs, and grasses; 2) streambank stabilization, and 3) constructed wetlands. Live or dead plant material, fiber matting and rock can also be used to protect bare streambanks.

The Trees Forever Iowa Buffer Initiative is also serving as a national model for other states as they look to implement natural systems to maintain or improve water quality. □

*Michael Tidman is Communications Coordinator for Trees Forever and can be reached at (515) 331-1808 or via email at [MTidman@aol.com](mailto:MTidman@aol.com). For more information, call Trees Forever at (800) 369-1269.*

# Creating Forest Gardens for Temperate Regions

By Martin Crawford, Agroforestry Research Trust, U.K.

A forest garden is a designed agronomic system based on trees, shrubs and perennial plants. These are mixed in such a way as to mimic the structure of a natural forest - the most stable and sustainable type of ecosystem in many temperate climates. The primary aims for the system are: (1) to be biologically sustainable, able to cope with disturbances such as climate change; (2) to be productive, yielding a number (often large) of different products; and (3) to require low maintenance.

The crops which are produced will often include fruits, nuts, edible leaves, spices, medicinal plant products, poles, fibers for tying, basketry materials, honey, fuelwood, fodder, mulches, game, sap products.

Forest gardens (often called home gardens) have been used for millennia in tropical regions, where they still often form a major part of the food producing systems which people rely on, even if they work elsewhere for much of the time. They may also provide useful sources of extra income. Their use is intimately linked with prevailing socio-economic conditions. They are usually small in area, often 0.1 - 1 hectares (0.25-2.5 acres).

In temperate regions, forest gardens are a more recent innovation, many inspired by Robert Hart's efforts in Shropshire (UK) over the last 30 years. A major limiting factor for temperate forest gardens is the amount of sunlight available to the lower layers of the garden: in tropical regions, the strong light conditions allow even understory layers to receive substantial light, whereas in temperate regions this is not usually the case. To compensate for this, understory layers in temperate forest gardens must be chosen very carefully - there are plenty of plant crops which tolerate shady conditions, but many are not well known. Many of the more common shrub or perennial crops need bright conditions, and it may be necessary to design in open clearings or glades for such species.

Temperate forest gardens are also usually small in area, from tiny back garden areas up to a hectare (2.5 acres) in size. While food production and land use remain the concern of a majority of landowners and businesses, their use is likely to be limited to 'alternative' and organic gardeners and land users.

The key features which contribute to the stability and self-sustaining nature of a forest garden are:

- the very diverse number of species used - often several hundred in established tropical forest gardens.
- the careful inclusion of plants which increase fertility, such as nitrogen fixers, e.g., Alders (*Alnus* spp.), Broom (*Cytisus scoparius*), *Elaeagnus* spp., and shrub lupins (*Lupinus arboreus*).
- the use of dynamic accumulators - deep rooting plants which can tap mineral sources deep in the subsoil and raise them into the topsoil layer where they become available to other plants, e.g. Coltsfoot (*Petasites* spp.), Comfrees (*Symphytum* spp.), Liquorice (*Glycyrrhiza* spp.), and Sorrel (*Rumex* spp).
- the use of plants specially chosen for their ability to attract predators of common pests, e.g. umbellifers like tansy.
- the use, where possible, of pest and disease resistant varieties of fruits, nuts etc.
- the increasing role of tree cover and leaf litter that improve nutrient cycling and drought resistance.

## Seven Layers

The garden is organized in seven 'layers'. Within these, the positioning of species depends on many variables, including their requirements for shelter, light, moisture, good/bad companions, mineral requirements, pollination, pest-protection, etc.

- Canopy trees - the highest layer of trees. This may include large trees, e.g., Chestnuts [*Castanea* spp], Persimmons [*Diospyros virginiana*] and honey locusts [*Gleditsia triacanthos*]), or may only contain small trees and large shrubs, e.g., Strawberry trees [*Arbutus* spp], Siberian pea trees [*Caragana arborescens*], Cornelian cherries [*Cornus mas*], Azeroles and other hawthorn family fruits [*Crataegus* spp], Quinces [*Cydonia oblonga*], Apples [*Malus* spp], Medlars [*Mespilus germanica*], Mulberries (*Morus* spp), Plums [*Prunus domestica*], Pears [*Pyrus communis*], highbush cranberries [*Viburnum trilobum*]).

- Small trees and large shrubs, mostly planted between and below the canopy trees. Includes some of the above species on dwarfing rootstocks, and others such as various bamboos, Serviceberries (*Amelanchier* spp.), Plum yews (*Cephalotaxus* spp.), Chinkapins (*Castanea pumila*), *Elaeagnus* spp, and Japanese peppers (*Zanthoxylum* spp.) Others may be trees which are coppiced to keep them shrubby, like medicinal *Eucalyptus* spp, beech (*Fagus sylvatica*) and limes





### Share an Agroforestry Link

Found a new Web page or Internet mail group of potential interest to temperate agroforesters? Please share your discoveries with your fellow AFTA members. Send URL's to the *Temperate Agroforester* Editor (mlm1@teleport.com) and/or our Webmaster (c648324@showme.missouri.edu).

### ISU Agroforestry Research

[www.ag.iastate.edu/departments/forestry/res/agroforestry.html](http://www.ag.iastate.edu/departments/forestry/res/agroforestry.html)

This home page for the Iowa State Agroforestry Research Team (IstART) provides links to more information about current research at Iowa State University on riparian buffers, shelterbelts and contour strip-cropping with trees.

### Non-Timber Forest Products

NTFP-Biocultural-Digest is an e-mail list for announcements and facilitated discussions on topics re-

(*Tilia* spp.) with edible leaves.

- Shrubs, mostly quite shade tolerant. Includes common species like currants (*Ribes* spp.) and berries (*Rubus* spp.), plus others like chokeberries (*Aronia* spp.), barberries (*Berberis* spp.), Chinese dogwood (*Cornus kousa chinensis*), Oregon grape (*Mahonia* spp.), New Zealand flax (*Phormium tenax*) and Japanese bitter oranges (*Poncirus trifoliata*).

- Herbaceous perennials, several of which may be herbs, can also contribute to the ground cover layer by self-seeding or spreading. These include Bellflowers with edible leaves (*Campanula* spp.), Comfrets (*Symphytum* spp.), Balm (*Melissa officinalis*), Mints (*Mentha* spp.), Sage (*Salvia officinalis*), and Tansy (*Tanacetum vulgare*).

- Ground covers, mostly creeping carpeting plants which form a living mulch for the 'forest floor'. Some are herbaceous perennials (see above), others include wild ginger (*Asarum* spp.), cornels (*Cornus canadensis*), *Gaultheria* spp., and carpeting brambles (e.g., *Rubus calycinoides* and *R. tricolor*).

- Climbers and vines. These are generally late additions to the garden, since they obviously need sturdy trees to climb up. They may include hardy kiwis (*Actinidia* spp.), and grapes (*Vitis* spp.).

lated to non-timber forest products. Messages appear in digest format and are sent out approximately once a week. All back issues are available through an on-line archive. To get more information, send a message to: majordomo@igc.org, leave the subject line blank, in the body of the message put: info ntfp-biocultural. To subscribe, send an e-mail to majordomo@igc.org, leave the subject line blank, in the body of the message put: subscribe ntfp-biocultural-digest your e-mail address. If you have questions or problems you can contact Eric Jones (etjones@igc.org).

### AgriSurf

[www.agrisurf.com](http://www.agrisurf.com)

This is a comprehensive site for agricultural information, currently indexing over 10,000 web sites worldwide. Powerful searching capability quickly finds sites related to key words and phrases which you enter on the search page. Every topic related to farming is found here, from apiculture to weather. □

- The final 'layer' is the root zone, below ground. Any garden design should take account of different rooting habits and requirements of different species. In addition, there may be some species with roots/rhizomes of use such as liquorice (*Glycyrrhiza* spp.) and the barberries (*Berberis* spp.) whose roots furnish a good dye and medicinal products. Various beneficial fungi can also be introduced into this layer, including mycorrhizal species and others intended for cropping.

A forest garden can be a long-term biologically sustainable system for growing food and other products for a household which, once established, needs little work to maintain. However, getting started requires large numbers of plants and substantial work. □

### References

Gordon, A M & Newman, S M, 1997, *Temperate Agroforestry Systems*, CAB International, Oxford.

USDA NRCS Agroforestry Technical Note No.1: *Agroforestry for Farms and Ranches*.

USDA NRCS Agroforestry Note No. 7: *Forest Farming: An Agroforestry Practice*.

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## ➤ **Money-Making Options, continued**

Although agroforestry seems promising, Blanche is studying a critical issue for the Midsouth - the ability of a tree to coexist with, or even tolerate - other vegetation, such as legumes, bermudagrass, and fescue grasses. Tall fescue is one of the most dominant grass species in the Midsouth area and the major source of winter browsing for animals.

“Controlling competing vegetation while trees are getting established is important for best seedling survival and growth. This must be factored into the tree selection equation, if we are to successfully develop an appropriate agroforestry system,” says Blanche.

### **Alley Cropping**

Another profitable alternative for the farmer with limited acreage is planting crops between tree rows. “Alley cropping gives farmers an alternative income while they’re waiting for their trees to grow. They could grow and sell corn, for example, in addition to raising livestock. This offers them more immediate payoffs,” says Blanche.

Designing the right tree row configuration to provide optimum light and selecting the right crop are both important for overall productivity of a given piece of land.

“We have tried single-, double-, and quadruple-tree-row designs with wide alleys between them, to see which works best for different situations,” Blanche says. “If grasses are grown between tree rows, then the double-tree-row configuration might be better. We don’t have a clear explanation, yet, of why we get more forage per acre with this configuration than the other two,” he says.

The double-tree-row design involves planting two rows of trees close together and then leaving a 40 foot-wide alley before planting the next two rows, and so on.

As for which crops would work best in agroforestry systems and provide the best economic benefits for the farmer, Robert D. Webster, an agronomist at the Booneville lab, is looking at a wide range of alternative crops. These include corn, muscadine grapes, and plants with natural chemical compounds used in industry, medicine, and as dietary supplements.

“We have identified more than 100 species for their potential agricultural success, economic value, and acceptance by small farmers of the Midsouth region,” says Webster.

“I planted 41 species of herbs between single rows of 5-year-old pine trees, including ginseng (*Panax quinquefolia*), sage (*Salvia officinalis*), thyme (*Thymus serpyllum*), St. Johnswort (*Hypericum* spp.), and chamomile, (*Matricaria recutita*), to compare the yield and possible return,” he says.

“The results aren’t in yet, but the data will help us to characterize these herbs, define cultural requirements, and compare yields and the economic potential of these species in an alley cropping situation for midsouth geographic areas,” says Webster.

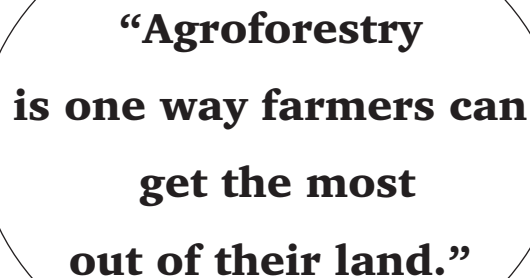
Do trees and salsa mix well together? Webster has also planted jalapeño peppers, the main ingredient in salsa, to test its success as an alley crop. Salsa just happens to be a top-selling condiment in the United States, right up there with catsup.

A crystal ball to predict the future? Not yet - but it’s on the way. The Agroforestry Economic Model, a software program developed jointly by the New Zealand Forest Research Institute and ARS, assesses the future value of planting certain crops.

“I put in such information as farm size, number of livestock, the tree type I plan on using, and what crops, if any, I plan to plant,” says Blanche. “The computer estimates how much money I will make, based on current market information. If I have 200 acres of land and I want trees, cows, and corn, the computer can predict a cash flow estimate for my business venture,” he adds.

“Agroforestry offers great potential to the small farmer, and the model allows evaluation of a wide range of scenarios and options, taking away much of the guesswork and helping the farmer to make easier choices and smart business decisions,” says Catalino Blanche. □

*This article appeared originally in Agricultural Research (USDA ARS); reprinted by permission. For more information, contact Dr. Catalino A. Blanche or Dr. Robert Webster, USDA-ARS Dale Bumpers Small Farms Research Center, 6883 S. State Hwy. 23, Booneville, AR 72927-9214; Tel. (501) 675-3834, Fax (501) 675-2940, e-mail cblanche@yell.com.*



**“Agroforestry  
is one way farmers can  
get the most  
out of their land.”**



### NAC Update

The USDA National Agroforestry Center has released the first issue of their biannual "Update" which summarizes current NAC products and activities. Included are educational materials, research, demonstration projects, international activities and upcoming events.

*Update*, Issue #1, 1998. Available free upon request from National Agroforestry Center, USDA FS-NRCS, East Campus-UNL, Lincoln, NE 68583-0822, Tel. (402) 437-5178.

### PNW Agroforestry Workshop

A limited number of copies of the program booklet for the recent workshop series, "Agroforestry: Integrating Conservation, Crops, Livestock and Trees in the Pacific Northwest," are available for purchase, while they last. For ordering information, contact Beverly Gonyea (Tel. 206-543-0867, [gonyea@u.washington.edu](mailto:gonyea@u.washington.edu)) or Don Hanley (Tel. 206-685-4960, [dhanley@u.washington.edu](mailto:dhanley@u.washington.edu)).

### Working Trees for Livestock

The National Agroforestry Center has issued a new 4-page bulletin describing silvopastoral systems for

the Southeast. Potential benefits and management considerations for combining forage and timber production are discussed. Three different patterns of tree planting are illustrated: initial 6 x 12 ft. spacing, later thinned; 40 ft. wide single rows; and triple rows.

*Working Trees for Livestock: Silvopasture for the Southeast*, 1998. Available free from USDA-NRCS Grazing Lands Technology Institute, P.O. Box 6567, Fort Worth, TX 76115, Tel. (817) 334-5232.

### Textbook on Poplar Biology

Poplars are important species for agroforestry practices such as windbreaks, riparian buffer strips and alley cropping in temperate zones worldwide. This text, published by the National Research Council of Canada, provides the most up-to-date information available on the genetics, physiology, productivity and management of poplars and inter-specific hybrids.

*Biology of Populus and its Implications for Management and Conservation*, R.F. Settler, H.D. Bradshaw, P.R. Hellmar and T.M. Hinckley, eds., 1997. To order, send a check for \$49.95 (US) to Monograph Orders, NRC Research Press, M-55, National Research Council of Canada, Ottawa, ON K1A 0R6, Canada, Tel. (613) 993-0151, Fax (613) 952-7656. □



## Mark Your Calendar

**Modeling of Complex Systems Conference** and Component Object Model Workshop, July 12-17, New Orleans, LA. For information, visit the conference web at <http://wally.usfs.auburn.edu/conference/>.

**AFTA Members' Annual Meeting**, July 25, Columbia, MO. Hosted by the University of Missouri Agroforestry Research Center, the meeting will feature a field tour and barbecue. To register, contact Sandra Hodge, SNR, 1-30 Agriculture Bldg., Columbia, MO 65211, Tel. (573) 884-6729, e-mail [Sandra\\_Hodge@mucc-mail.missouri.edu](mailto:Sandra_Hodge@mucc-mail.missouri.edu). See next page and AFTA web site ([www.missouri.edu/~afta/](http://www.missouri.edu/~afta/)) for details.

**Society of American Foresters 1998 National Convention**, Sept. 19-23, Traverse City, MI. For information, call (301) 897-8720, ext. 109; fax-on-demand (301) 897-8720, ext. 160, document #700, or [www.saf-net.org/conv/main.html](http://www.saf-net.org/conv/main.html).

**North American Conference on Enterprise Development Through Agroforestry: Farming the Agroforest for Specialty Products**, October 4-7, Minneapolis, Minnesota. For information, contact Scott Josiah at Tel. (612) 624-7418, fax (612) 625-5212, email [josia001@maroon.tc.umn.edu](mailto:josia001@maroon.tc.umn.edu).

**Sixth Conference on Agroforestry in North America**, June 12-16, 1999, Hot Springs, AR. The theme will be "Sustainable Land-Use Management for the 21<sup>st</sup> Century." For information contact, Dr. Catalino A. Blanche, Dale Bumpers Small Farms Research Center, 6883 South State Hwy 23, Booneville, AR 72927-9214, Tel. (501) 675-3834, email [cblanche@yell.com](mailto:cblanche@yell.com). □



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## Time Value Dated Material

### AFTA Annual Meeting

July 25, 1998

University of Missouri, Columbia

#### **Program Highlights:**

- Walking tour of the Historic River Town of Arrow Rock
- Tour of agroforestry research at the UMC Horticulture and Agroforestry Research Center, New Franklin
- Evening Barbeque. Music provided by any and everyone!

**Schedule:** Annual Meeting begins at 1:00 PM. Meet at the Ramada Inn - Downtown, 1111 E. Broadway, Columbia, to board vans to Arrow Rock. Fee for walking tour extra - about \$5 per person. Lunch not included. Vans will return to the motel after BBQ, approximately 9:00 PM. Prior to the Annual Meeting, the AFTA Board will hold a regular business meeting at 9:00 AM at the Anheuser-Busch School of Natural Resources Building Auditorium, University of Missouri; members welcome.

**Accommodations:** Rooms for Annual Meeting participants have been blocked for a limited time (until July 15) at the Ramada Inn - Downtown (\$46.86 per night with tax). Participants must make their own reservations by calling the Ramada Inn (573) 443-2090; refer to "Agroforestry" meeting, confirmation no. 29273.

**Travel:** *By air:* Fly to Kansas City or St. Louis and rent a car, or take Tiger Express van to Columbia (reservations required: 800-333-3026). *By road:* From I-70, take the Providence exit (#126) and go south. At Broadway, turn left. Ramada Inn is two blocks ahead.

**Registration:** Register by July 15 and save money! Registration per person, **received before July 15** - \$20.00; **after July 15** - \$25.00. Spouses, etc. welcome. Mail your registration (include name, address, phone, how many in your party, and how you're traveling) along with check payable to AFTA to: Sandra Hodge, AFTA Secretary, 203 ABNR Forestry Dept., University of Missouri, Columbia, MO 65211.