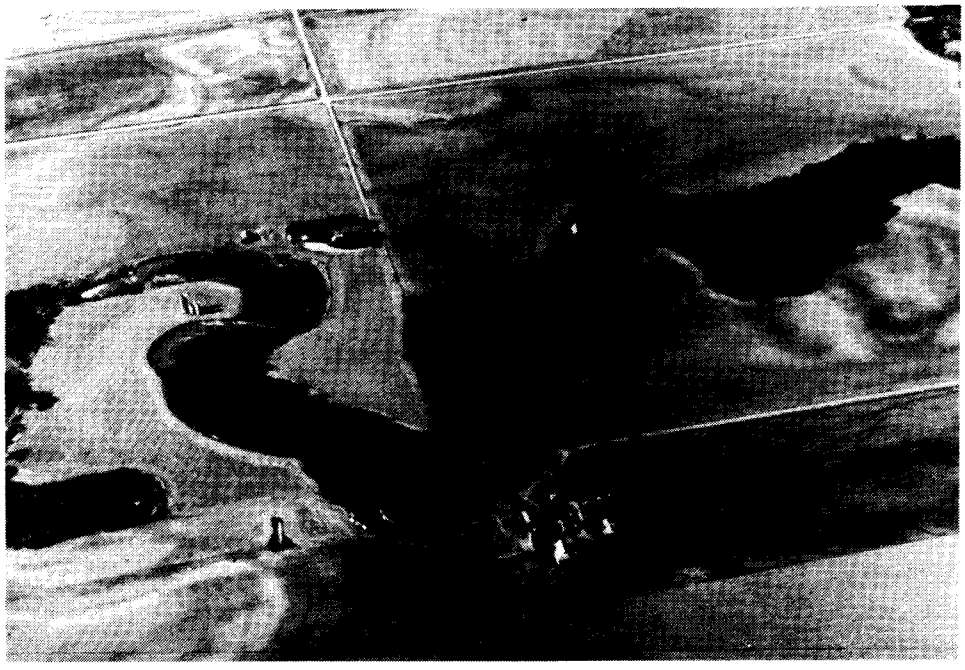
Inside Agroforestry

USDA Forest Service, Lincoln, Nebraska

Summer, 1993



Filter strips help to reduce the level of sediment, crop nutrients, pesticides, and other chemicals introduced into our surface water resources. Both wildlife and people benefit as a result of improved water quality.

Dollars From Filter Strips

Some farmers are finding there's a good alternative to hanging the planter out over a streambank.

Trees and shrubs planted for protective cover along streams can filter chemicals and sediment from cropland runoff, stabilize stream banks, provide wildlife habitat, and serve as field borders.

Adding Up The Benefits

A team that includes farmer Ron Risdal, Story County, Iowa officials, and a group of Iowa State University researchers are studying how filter strips can be managed as part of a farm routine. Besides looking at the environmental benefits of filter strips, the group is also working to develop economic enterprises that can compensate farmers for the loss of land taken from crop production.

The half-mile-long planting along a creek on the Risdal farm includes high-value hardwood species and fast-growing trees that can be harvested early for biofuel production. A strip of switchgrass in the filter strip could be utilized as a forage or processed to provide energy.

The planting is 66 feet wide and is testing several species of fast-growing trees on the farm. The five rows closest to the creek are poplar or green ash, or a silver maple-black walnut combination. The next two rows of shrubs are red-osier dogwood and ninebark. The outside edge of the filter strip is a 24-foot wide switchgrass planting. The cover is designed to filter large quantities of surface water, and the tree roots take up nutrients that could be leached into

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Great Plains Initiative Solves Problems

Federal, state, and local government employees, nongovernmental organizations, and landowners have come together to find solutions to some of the environmental problems facing the Great Plains.

Initiated in 1991, the Great Plains Initiative (GPI) began as an effort to safeguard the habitats of birds that migrate between Mexico, Canada, and the United States along the Central Flyway. Since that time, GPI has evolved into an innovative management strategy geared toward ensuring future ecological protection and economic growth on the Great Plains through voluntary, bottom-up problem solving. It is a cooperative effort to protect declining species and the habitats that they rely on for survival — before they reach endangered status. The Initiative intends to demonstrate, through cooperation rather than conflict, that economic and environmental interests are compatible.

The Great Plains Initiative working group met in February to discuss current efforts and future strategy. A symposium was held in April that brought together scientists and other stakeholders to share current social, economic, and ecological information and to recommend solutions to the region's problems. Questionnaire-based inventories of related projects underway in the Great Plains are currently being analyzed to determine successful efforts, productive methods and techniques for management, and potential pitfalls.

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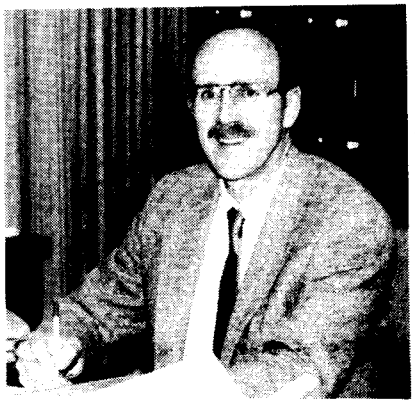

Message From the Manager

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

What Is a "Center"?

A "Center" is one of the best mechanisms we have to focus energy and talent on a particular problem or need. Conceptually, a Center should be integrated, be research-driven, have a strong technology transfer and applications component, and emphasize cooperative, partnership efforts. These are all attributes that most people would agree that we need more of. A Center is an excellent way to make it all happen because it achieves its mission through cooperation. The basic formula to create a cooperative or partnership effort is to identify a need or opportunity within the Center's subject area, identify appropriate cooperators and working partners, develop a proposal, obtain the needed resources, and carry out the work together. The credit goes to the team; the Center is only the catalyst that helps make it happen.

The Center approach is ideally suited for agroforestry. Agroforestry is a single subject area but has a broad context where it can be applied. The need and opportunity for agroforestry practices are almost overwhelming when you give some thought to our definition of agroforestry: working trees in agroecosystems to provide tree products and at the same time protect, conserve, diversify, and sustain vital economic, environmental, community, and natural resources.

There is clear need for cooperation on fundamental long-term research to develop genetically improved multipurpose trees, as well as applied research and applications projects to get the right tree in the right place for the right purpose. Several multidisciplinary team efforts have been organized since the Agroforestry Center was implemented 18 months ago. Other teams and partnerships are being formed. These will be featured in future issues of *Inside Agroforestry* and in presentations at various meetings.

"The credit goes to the team; the Center is only the catalyst that helped make it happen."

Tree Pest Group Reformed

By Dr. Judy Pasek
USFS Rapid City Service Center, Forest Health Management

The Great Plains Tree Pest Workshop (GPTPW) was established in April, 1993 during a meeting in Lincoln, Nebraska, attended by extension, regulatory, research, and pest management personnel. The primary purpose of GPTPW is to provide information exchange among Great Plains practitioners and researchers concerning forest pest management and tree health. This exchange will facilitate the distribution of current information on management of common Great Plains insect problems to resource professionals who then transfer the information to landowners. This new independent organization will fill the void left by the dechartered Pest Management Task Force of the Great Plains Agricultural Council, Forestry Committee.

The day and a half meeting drew 20 attendees from six states. Participants provided information on various pest problems, projects, research, and concerns. Specific topics included: pine tip moth impact and distribution in the northern Great Plains; exotic pest situations (gypsy moth, Japanese beetle, and pine shoot beetle); research on screening of elm hybrids and poplar for insect, disease, or drought resistance; Forest Inventory and Analysis survey plans for North Dakota, South Dakota, Nebraska, and Kansas; and creation of a regional biological control project.

Items identified for further action included: assembling a slide set that portrays herbicide damage to a variety of tree and shrub hosts; compiling information about important herbicide/host combinations; developing a list of needs and priorities for biocontrol work on trees in the Great Plains; and updating an organizational mailing list.

If you would like to be added to the GPTPW mailing list and receive meeting minutes and announcements, please send your name, address, and phone number to: Carol Bell, USDA Forest Service, Northern Region, P.O. Box 7669, Missoula, MT 59801. Questions pertaining to the GPTPW organization can be directed to executive board members: Dr. Judy Pasek, Past Chairperson, USFS, Rapid City, SD, (605) 394-1960; Dr. Bill Jacobi, Chairperson, Colorado State University, (303) 491-6927; or Carol Bell, Secretary/Treasurer, (406) 329-3428. The next meeting is scheduled for spring, 1994 in Colorado.

Just How Economical Are Field Windbreaks Anyway?

By Jim Brandle
Associate Professor of Forestry, Windbreak Research, University of Nebraska-Lincoln

When gusts of wind blow across the plains, people aren't the only ones who run for cover. Crops and animals also welcome shelter and protection from winter's biting blasts.

Luckily, some clever person developed the concept of windbreaks. Early settlers on the Great Plains planted both residential and farmstead windbreaks. Although the earliest plantings were prompted by a general desire for a forested landscape like those left behind, these pioneers soon realized that tree plantings did indeed protect their farmsteads from unflagging winds.

The status of today's agriculture emphasizes the need not only to protect farms and ranches from harsh winds of the Great Plains but to develop efficient and environmentally sound production systems. For these systems to be successful, one must consider the relationship between input and final production. Field windbreaks can increase crop yields, increase production efficiency for the producer, and enhance environmental quality for the benefit of society.

More specifically, windbreaks in an agricultural setting reduce abrasion by windblown soil and reduce risks associated with drought. They improve crop water-use efficiency, distribution of irrigation water, and overall irrigation efficiency. Windbreaks enhance natural controls of crop insects, provide wildlife habitat, and increase biological diversity.

To accommodate modern farming methods and equipment, narrow one- and two-row field windbreaks have been designed. These windbreaks, when properly located, can provide complete protection of a field while utilizing as little as 5.5 percent of the land area.

Research indicates that windbreaks multiply wheat yields by an average of 15 percent; corn yields by 12 percent; and soybean yields by 13 percent (see Table 1). But, two questions remain: Are windbreaks a sound economic investment? Can the benefits of increased crop yields and decreased wind erosion compensate for the land dedicated to windbreaks?

Economic profitability of windbreak investments must be based on various costs and benefits over time. Costs and benefits include the value of foregone production resulting from land taken out of production. They also consider anticipated yield increases, the period for windbreak maturation, and any alterations in the cost of crop production due to the windbreak.

The following research data uses a net present value (NPV) of income method to assess the economic viability of a windbreak system. NPV expresses the value of a windbreak investment at some time in the future in today's dollars.

Windbreak establishment costs vary depending on local site conditions. Landowners can spend as little as $0.286 per tree when using a 50 percent cost-share program which then increases the net present value of the investment. Typical establishment costs run about $0.571 per tree but can be as high as $2.28 per tree depending on local conditions. However, analyses indicate that these additional costs have minimal effect on the break-even yield level. Furthermore, a producer could spend as much as $4.56 per tree (enough to cover the cost of a drip irrigation system) and still need only a 10 percent yield increase to

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Table 1: Relative Crop Response to Shelter

Crop	**Number of Field-Years	Percent Increase
Spring Wheat	190	8
Winter Wheat	131	23
Barley	30	25
Oats	48	6
Corn	209	12
Soybeans	17	13

**Field-Years - Number of fields sampled over number of years. Example: One field sampled over a 10 year period is 10 field-years and 10 fields sampled over one year period is also 10 field-years.
Source: J.Kort, Windbreak Symposium, 1986

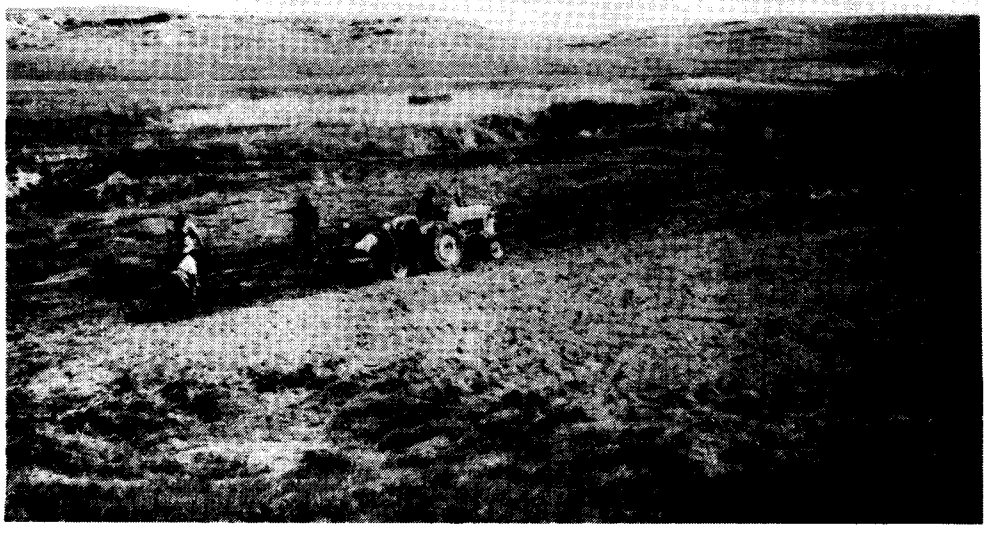
A field windbreak improves crop water-use efficiency, distribution of irrigation water, natural controls of crop insects, provides wildlife habitat, and increases biological diversity.

Cold Water Fishery in Eastern Colorado Will Benefit from Riparian Demonstration Area

Editors note: The Agroforestry Center is working with numerous cooperators throughout the Great Plains to establish demonstrations of needed agroforestry practices under local conditions. This article illustrates the value the demonstrations will have to cooperators and landowners.

The only cold water fishery in eastern Colorado maintains a consistent flow throughout the year. Approximately 15 miles southwest of Wray, the spring-fed North Fork of the Republican River originates.

Landowner Genova Deterding of Wray, agreed to work with the Colorado State Forest Service, Colorado Division of Wildlife, USDA Soil Conservation Service, Yuma County Soil Conservation District, and the Center for Semiarid Agroforestry (CSA) to reestablish riparian vegetation along the river on a portion of her land.



A plum thicket planted adjacent to the river will enhance wildlife habitat.

The river has been periodically stocked with trout in the past. However, its quality as a fishery has declined according to landowners, local natural resource professionals, and field observations. One of the most visible factors impacting the habitat is the degradation of vegetation and bank stability adjacent to the river channel. The main cause of this is livestock activity.

Approximately 600 feet of river channel and an adjacent four acres will be excluded from grazing. Once significant vegetation is reestablished, low intensity grazing will be introduced. As grazing continues on downstream pastures, the impact of unmanaged grazing on the riparian zone should be noticeably demonstrated. Phil Schwolert, Colorado State Forest Service Assistant Staff Forester, feels that livestock exclusion and managed grazing will provide significant benefit to the riparian areas. Vegetation in the fenced area has already begun to recover. The planted material is meant to provide additional wildlife habitat.

Planted vegetation along the river consists of willow, cottonwood, American plum, and Rocky Mountain juniper. Once established the trees and shrubs will provide fish cover, reduced water temperature, wildlife habitat, and stream bank stabilization.

The site has great potential. It will not only serve as a demonstration site for the Colorado State Forest Service and CSA but it will show that livestock exclusion and managed grazing can benefit both riparian resources and landowners. Schwolert plans to take photos each year to document progress. He added that he's "encouraged about the future of the project, especially since it's the first riparian demonstration site to be established by the Forest Service in the eastern plains."

Alva Deterding, Genova's son, would like to open the property up as a recreational area sometime in the future. It will be perfect for camping, fishing, and hunting. Using the property in this way will also provide an added source of income for Deterding.

Watch for more stories on demonstration and application projects in future issues of *Inside Agroforestry.*

Vegetation has already begun to reestablish on eroded banks this spring since livestock have been fenced out.

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the groundwater.

A key part of the "energy plantation" part of the research is to develop planting and harvesting techniques that use standard farm and forestry equipment.

Other Tree Planting Efforts

A number of farmers responded to a Successful Farming Magazine Farm ReLeaf survey and described other tree planting efforts along creeks and rivers.

For example, William Graff of Middletown, Illinois, simply quit mowing a riverbottom area, allowing cottonwood and willow trees to become established. "The trees are excellent for stopping scour erosion and slowing the water when the river floods," he reported.

Other farmers have planted grass filter strips for a combination of conservation and crop production benefits. Dave Salomon, Churubusco, Indiana, planted 30-foot grass filter strips totalling 16 acres along drainage ditches to improve the water quality of cropland runoff and to provide places to park trucks during harvest. Brush control along the drainage ditches is easier now that these areas are in grass, he says.

New Ideas From Research

Filter strips are getting increased attention for production of alternative crops and enterprises. New research and demonstration projects include a mix of traditional and experimental ideas, including:

Timber production. Iowa State University foresters are experimenting with plantings that combine high-value hardwoods, such as walnut and oak, with grasses and fast-growing tree species.

Horticulture products. Shrubs grown on filter strip areas can provide products for the floral industry, according to Brian Miller, a Purdue University extension wildlife specialist.

Miller is working with shrub species which yield branches that are valuable for their attractive bark color and growth habits, including ninebark, red-osier dogwood, nanking cherry, and serviceberry. Some grow especially well in moist soils, such as corkscrew willow and pussywillow. Shrub plantings may provide an economic return within two to three years after establishment, Miller believes.

Livestock forage. Purdue University forage specialist Keith Johnson is testing several forage species for use on filter strips, including smooth bromegrass, reed canarygrass, and fescue—all in combination with clovers.

Even for conventional corn and soybean farmers, cash crop production of high-quality forage from filter strips is possible, according to Johnson. "There are people in north and central Indiana who are doing this right now," he says.

Energy plantations. At Ron Risdal's farm in Iowa, a forestry team from Iowa State University is testing a variety of fast-growing trees that can be planted, managed, and harvested with standard farm equipment.

In the system, the trees are harvested for energy production in four to six years or left longer to produce small dimension lumber. Harvested in winter, species such as hybrid poplar and silver maple vigorously resprout in spring.

Source: Successful Farming Magazine, February, 1992; copyright Meredith Corporation

Where Trees Come From

According to a survey conducted by the USDA Forest Service and the American Association of Nurserymen, more than 100 million trees are produced annually by private nurseries for landscape purposes. This represents about 80 percent of all new landscape trees each year. Garden centers distribute most of these trees (34 percent), followed by landscape contractors (22 percent), wholesalers (20 percent), general merchandisers (16 percent), municipalities (4 percent), and others (4 percent). Broadleaf and coniferous evergreens are the most popular type of tree, representing 37 percent of the total, followed by deciduous shade trees (31 percent), deciduous flowering trees (24 percent), and fruit or nut trees (8 percent).

Source: Arbor Day, May/June, 1993

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have a positive NPV.

In addition to the benefits received from increased yields, the value of wind erosion control must be added to the economic analysis. As a soil erodes, its productivity is decreased due to the loss of fine soil particles containing organic matter and nutrients. In many cases, these losses are made up by the addition of fertilizer, which increases crop production costs. By controlling wind erosion, windbreaks limit long term losses in soil productivity and reduces the need for added inputs. Therefore, the reduction of these losses from wind erosion is an added economic benefit following the windbreak investment. Over the life of a windbreak, wind erosion control can increase the NPV of a windbreak significantly.

Other benefits flow from windbreaks. These include energy conservation, snow control, livestock protection, wildlife habitat, and aesthetics. Measuring these types of benefits in the economic analysis of windbreaks is difficult. Dollar value is much harder to assess and perhaps is best left to the individual. From a societal point of view, resource preservation for future generations is important and thus investments that conserve natural resources for future productivity should be encouraged.

If our world were one where wind was only warm and gentle breezes, there would be no need for windbreaks. However, people, livestock, soils, crops, and wildlife know that this is not true. That's why windbreaks play such a vital economic and environmental role in our society.

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GPI partners continue to reach out to new groups that may want to know about or be involved in the Great Plains Initiative. Partners met again in May to discuss outcomes of the symposium, develop next year's working plan, and prepare a report for the Western Governors' Association that was given at its annual meeting in June.

For more information regarding GPI, contact Jo Clark or Patsy Goodman at the Western Governors' Association at (303) 623-9378.

Watch for the next issue of *Trees for Agroforestry* this October. Article deadline is September 1, 1993.