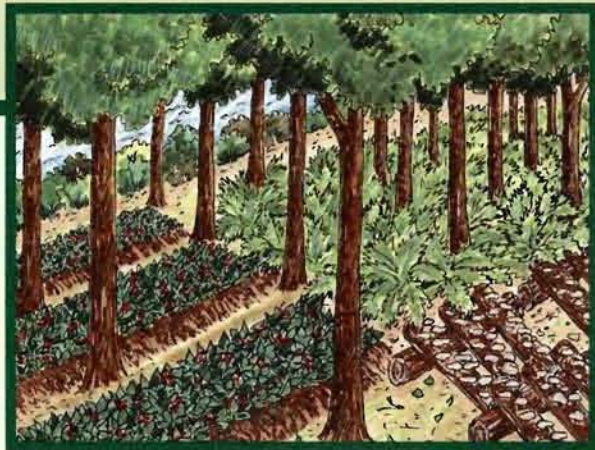


Discovering Profits in Unlikely Places: Agroforestry Opportunities for Added Income



by Scott J. Josiah

Acknowledgments

Author

Scott J. Josiah, formerly of the Center for Integrated Natural Resource and Agricultural Management, University of Minnesota. Currently Assistant Professor and State Extension Forester, University of Nebraska, Lincoln.

A special thank you goes to the many members of the Minnesota Agroforestry Coalition who provided extensive advice and input on the development of this publication.

Contributors

Drawings on pages 11-13 contributed by the National Agroforestry Center, Lincoln, Nebraska.

Drawings on pages 4-9 by Gerreld Pulsipher, Visual Concepts, Inc.

Series Editor

Debra Elias Morse, Minnesota Institute for Sustainable Agriculture

Design and Layout

John Molstad, Studio 31 Graphics, Inc.

Product Coordinator

Phyllis Petersen, University of Minnesota Extension Service

Reviewers

Mel Baughman, University of Minnesota Extension Service

Eunice Biel, Agricultural Producer

DeEtta Bilek, Agricultural Producer

Jaime DeRosier, Agricultural Producer

Carmen Fernholz, Agricultural Producer

Paul Flynn, Natural Resources Conservation Service

Bill Gustafson, University of Nebraska

Hans Kandel, University of Minnesota Extension Service

Dave Pfarr, University of Minnesota Extension Service

Greg Reynolds, Agricultural Producer

Funding for this project approved by the Minnesota Legislature, 1995 Minnesota Laws, Ch. 220 Sec. 7, Subd. 2.

Table of Contents

Searching for Profit Niches on Your Farm	4
Profits in Your Pocket: The Potential of Agroforestry	10
Agroforestry Practices for Profit	11
Windbreaks	11
Forest Farming	11
Alley Cropping	12
Riparian Forest Buffers	12
Woody Crop Plantations	13
Silvopasture	13
Trees, Shrubs, and Herbs Used in Agroforestry	14
Getting Started in Agroforestry	16
Additional Resources	16

Searching for Profit Niches On Your Farm

Let's take an armchair tour of your land. Let your mind wander over the fields, woods, creeks, and ditches around the farm. Are any of these areas underutilized? Can field borders, center pivot irrigation corners, and other areas less suitable for row crops be planted to trees or shrubs which can provide income and improve conservation? This publication highlights opportunities for Midwestern farmers to introduce agroforestry practices on their farms, outlines some of the benefits associated with agroforestry, describes six different agroforestry practices, and provides a list of resources for additional information.

Let's start by taking a closer look at your land.

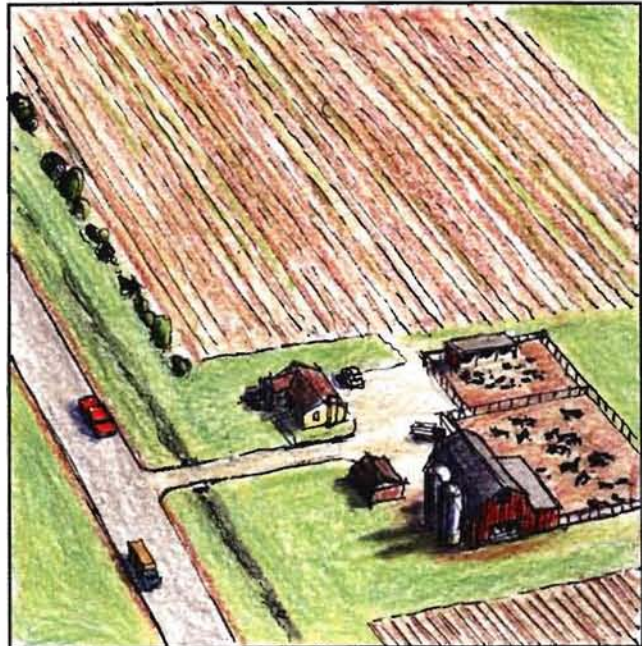
**Does your farm have...
...unsheltered farmsteads and
livestock areas, fencelines,
roads, and degraded
windbreaks?**

Profit Opportunities:

Wood fiber, lumber, and specialty forest products

Agroforestry Practice: Multipurpose windbreak

Multiple row windbreaks can be used to produce marketable products like hybrid poplar, black walnut wood and nuts, hazelnuts, and woody floral products from shrubs (such as curly, pussy, and basket willows, and red-and yellow-stem dogwoods). Evergreens such as spruce, pine, and firs add color in winter, protect birds and other wildlife, can provide boughs for the seasonal floral industry, or can be sold as Christmas trees or landscaping stock.

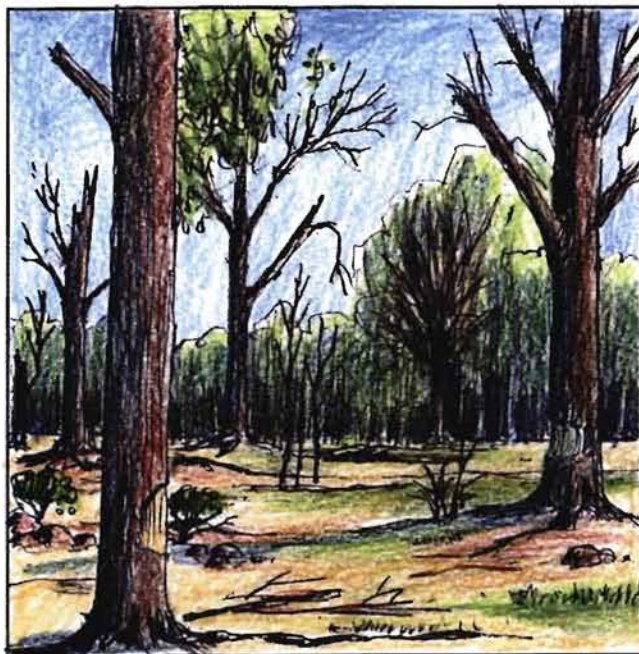


Searching for Profit Niches On Your Farm

**Does your farm have...
...neglected or grazed woodlots?**

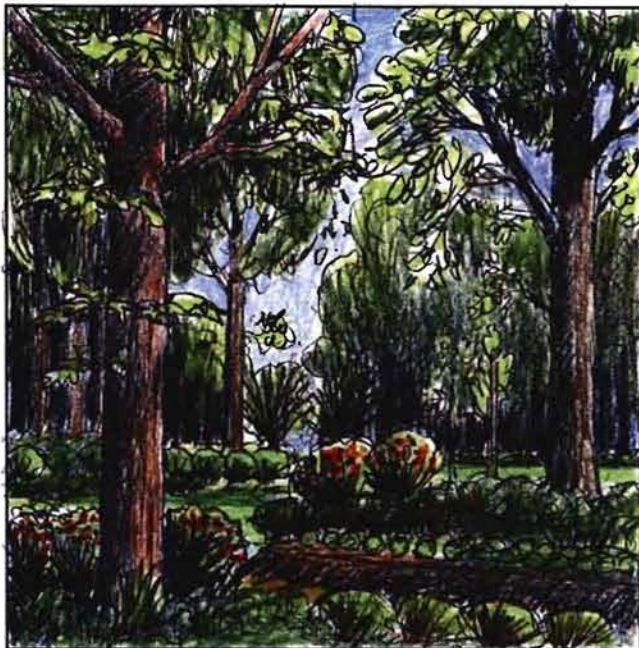
Profit Opportunities:

Timber and specialty forest products



Agroforestry Practice: Forest farming

Improved woodlot management can produce higher quality timber and firewood. Woodlots also can be managed to produce valuable specialty forest products like ginseng and other medicinal plants, which are grown under shade. While prices fluctuate considerably, high-quality, woods-cultivated ginseng roots can sell for \$370/pound or more.¹ Producing seed of oak-savanna prairie plants in more open forests is also a potentially profitable option.



¹Persons, W.S., "Growing American Ginseng in its Native Woodland Habitat," *Proceedings of the North American Conference on Enterprise Development through Agroforestry: Farming the Agroforest for Specialty Products, October 1998* (Center for Integrated Natural Resources and Agricultural Management, University of Minnesota. St. Paul, Minnesota).

Searching for Profit Niches On Your Farm

**Does your farm have...
...marginally-productive upland
fields?**

Profit Opportunities:

Fruit and nut crops



Agroforestry Practice: Alley cropping

Blueberries, chokecherries, highbush cranberries, sand cherries, elderberries, currants, gooseberries, and many others have great potential when marketed as locally-grown products, and with processors who produce high-end jams, preserves, and wines. In north central Minnesota, one producer has established alley cropping with chokecherries, highbush cranberries, and blueberries. The taller shrubs and trees redirect snow onto the blueberries, insulating them from winter weather. These shrubs and small trees can also be part of wind-breaks, living snow fences and forested riparian buffers, producing products while protecting the land.

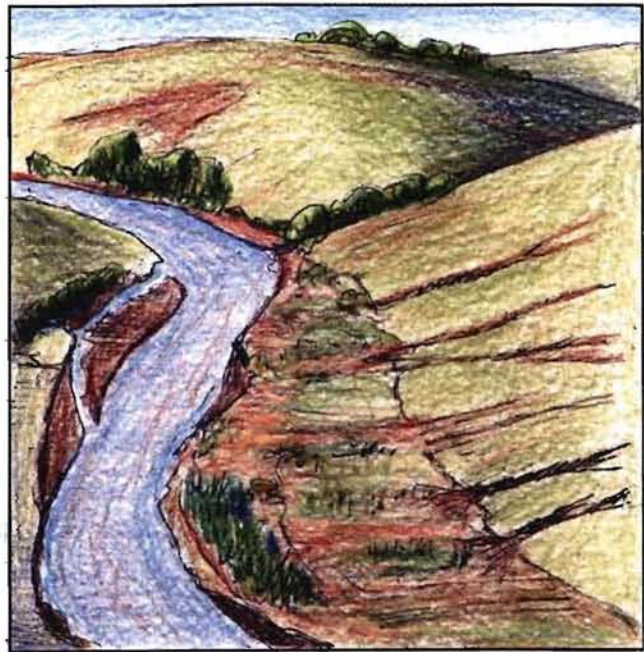


Searching for Profit Niches On Your Farm

**Does your farm have...
...areas along streams?**

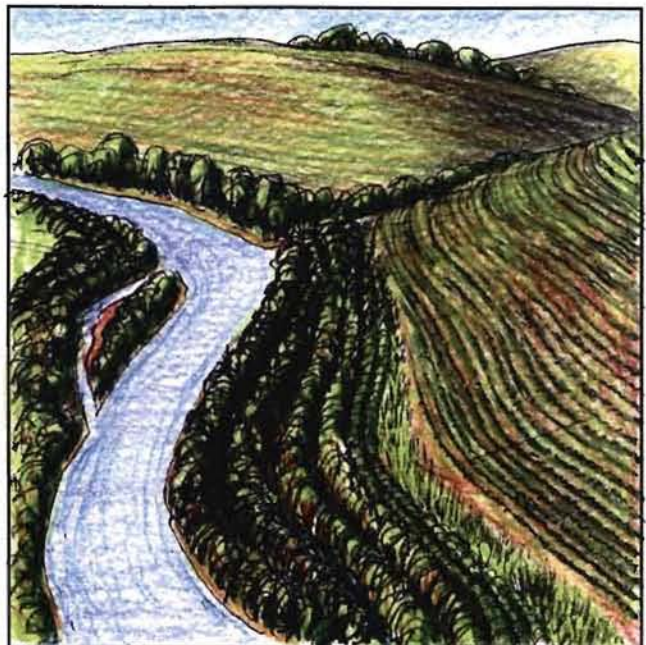
Profit Opportunities:

High-value hardwoods and specialty forest products



Agroforestry Practice: Riparian forest buffer

A wooded riparian buffer strip along a stream can combine trees, shrubs, herbaceous plants, and grasses to produce a variety of products. These can include wood from high-value hardwood species such as walnut, oak, maple, and ash, plants used for medicinal and botanical purposes, food products (berries, nuts, and mushrooms), specialty woods, woody floral products, and prairie grass seeds. The buffer also protects the stream, particularly in upland areas, intercepting chemicals and nutrients from adjacent agricultural lands and improving water quality.

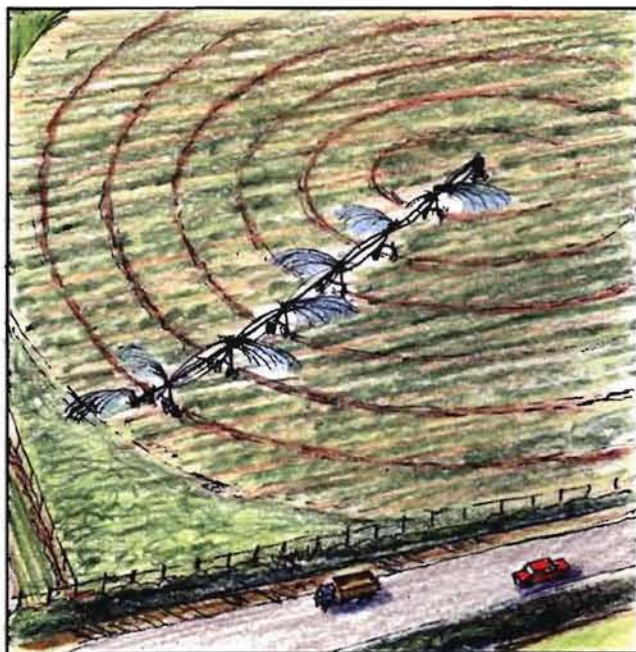


Searching for Profit Niches On Your Farm

Does your farm have...
...corners not reached by pivot irrigation, or inconvenient, out-of-the-way or small parcels?

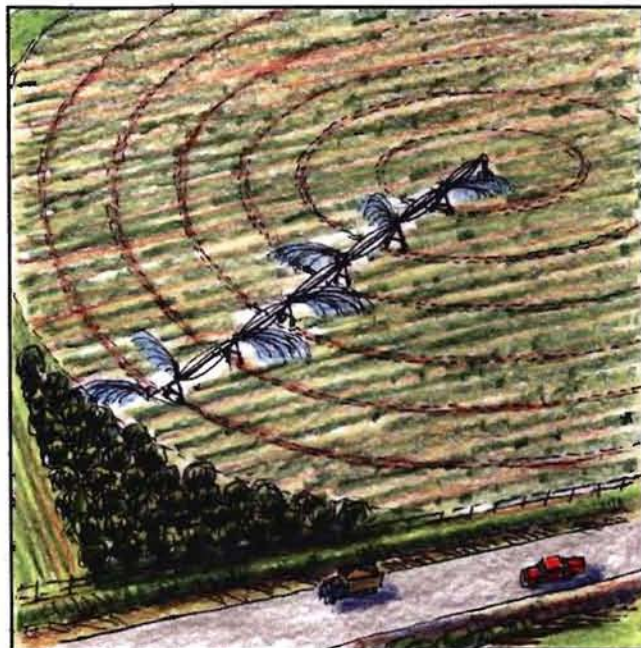
Profit Opportunities:

Hazelnuts, fruit, prairie seed



Agroforestry Practice: Woody crop plantation

Hybrid hazelnut, a new woody crop currently under development, shows good potential across the central and upper Midwest. Experimental plantings at Badgersett Research Farm in southeastern Minnesota suggest potential yields from clonally-produced selected lines of hazels ranging from 800 to 2,000 pounds per acre per year (dry pounds of whole nuts including shell) depending on spacing, variety, and weather.² As new cultivars are developed, higher yields may be possible. In 1998, the wholesale price for inshell hazelnuts was \$0.49 per pound.³



²Rutter, Phil., *Badgersett Research Farm*, July 1996, Personal communication, Canton, Minnesota.

³Crop Values, National Agricultural Statistics Service, Agricultural Statistics Board, USDA, Feb. 2000.

Searching for Profit Niches On Your Farm

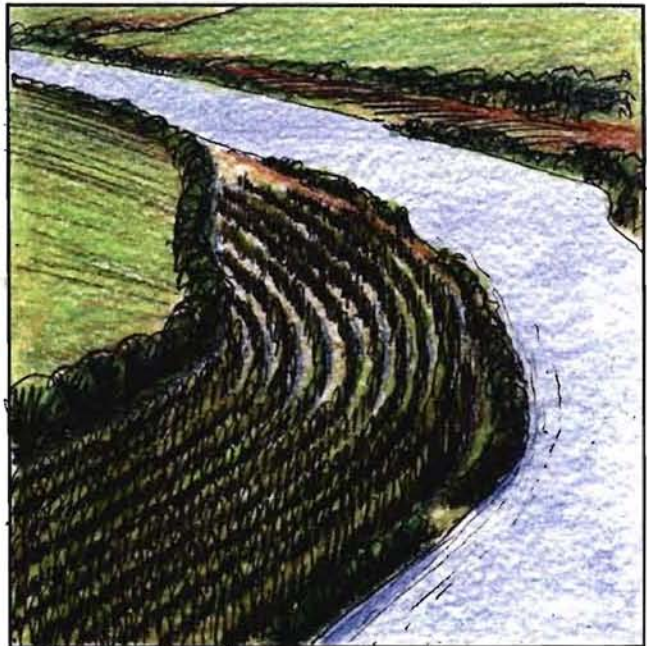
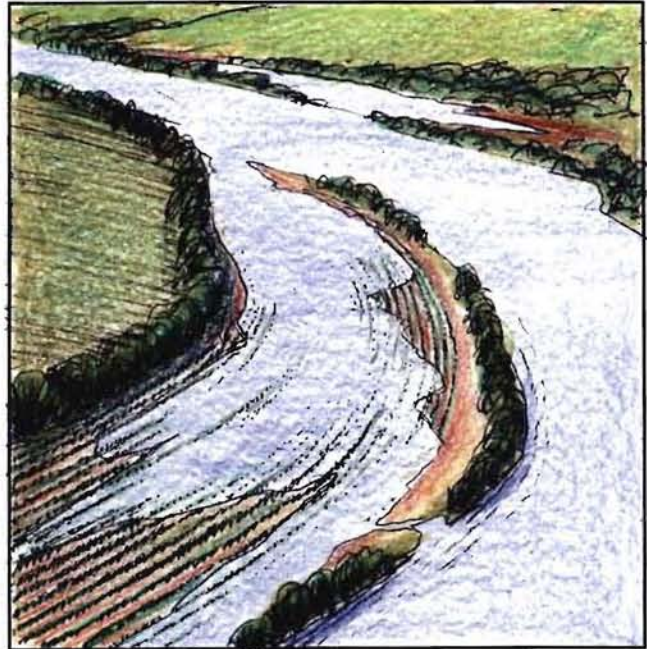
**Does your farm have...
...river bottomland fields where
crops are frequently flooded?**

Profit Opportunities:

Hybrid poplar or hybrid cottonwood wood fiber, or lumber

Agroforestry Practice: Woody crop plantation

On bottomland susceptible to flooding, a plantation of hybrid poplar or cottonwood may provide a more reliable crop over the years than corn or soybeans, whose yields can suffer from delayed planting or flooding. Fast growing trees like hybrid poplar or hybrid cottonwood can be harvested and sold for pulpwood and other wood products every 10 to 15 years in Minnesota. The market for hybrid poplar pulpwood is still developing, but it is expected to sell for prices similar to aspen (about \$60/cord in 1997 delivered to the mill).⁴ On average, most land can produce 30 to 40 cords/acre or more during a ten-year period.⁵ Some forest product companies have advanced purchase or lease agreements that can provide annual payments before the trees are harvested. And because these plantings can attract wildlife, hunting leases are also a possible income source.



⁴"The Market Place Newsletter," Summer 1998, *Minnesota Department of Natural Resources Forestry Division*, St. Paul, Minnesota.

⁵Teynor, T.M., and Edberg, K.L. "Market Opportunities for Hybrid Poplar in Minnesota," March 1996, *Minnesota Department of Agriculture*, St. Paul, Minnesota.

Profits in Your Pocket: The Potential of Agroforestry

Agroforestry is an approach to land use that incorporates trees and shrubs into agricultural systems, and allows for the production of trees and crops and/or livestock from the same piece of land. It offers ways to take advantage of new and profitable product markets while at the same time improving your land and the environment.

Agroforestry Can Help Increase Farm Profitability

Matching woody crops to your own unique conditions offers several ways to increase farm profitability:

- **Increased total production from your land.** The total output per unit area of tree/crop/livestock combinations can be greater than any single component alone. The addition of forest products and specialty crops to your existing agricultural enterprises means more sources of income from your existing resource base. Wood, wildlife, specialty forest products, Christmas trees and products, landscape plants, herbs, nuts, seeds, fresh and dried fruit, and honey are just some of the many alternatives.
- **Greater financial diversity and flexibility.** More sources of income means greater financial diversity and flexibility of the farming enterprise, thus reducing risk.
- **Higher productivity of existing crops and livestock.** Plantings of trees and shrubs provide cover and protection from wind and sun, and can help manage soil moisture by trapping snow. This can mean higher crop values, increased crop yields, and better livestock production and survival.
- **Reduced costs.** Providing wind protection can also have money-saving results, such as reduced ditch cleaning and snow removal costs, lower farmstead heating and cooling bills, and reduced irrigation and energy costs.

Agroforestry Can Protect and Enhance Your Resources

Agroforestry practices combine economic production and environmental protection to a greater extent than can agriculture or forestry alone. Agroforestry can help conserve natural resources and create more pleasant places to live and work, through:

- **Improved air quality** with less blowing soil, dust, and odors, and reduced noise
- **Improved water quality** - vegetation acts as a natural filter and reduces streambank erosion, sediment, and chemical/nutrient inputs
- **Increased recreational and hunting opportunities** with improved game and non-game wildlife habitat
- **More diverse and visually-appealing landscapes.**

The combined increases in income and cost savings from agroforestry can make a big difference in a poor crop year and can be a financial bonus in a good one... all while enhancing your resources.

Agroforestry Practices for Profit

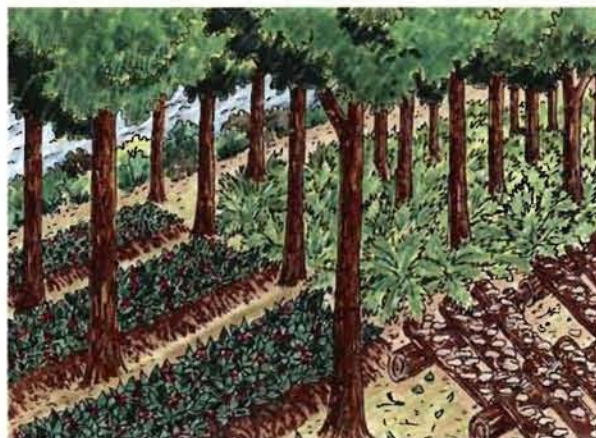
The following are descriptions of six agroforestry practices that can be used to produce income and conserve natural resources. All use trees, shrubs, grasses, and herbaceous plants to produce commercially valuable products, helping to improve your bottom line.

Windbreaks



- Windbreaks are agroforestry systems in which trees and/or shrubs are planted in widely spaced rows to minimize negative impacts from excessive wind.
- Field windbreaks are used to protect row crops and livestock from damaging wind and to control wind erosion.
- They can also function as living snow fences to disperse snow more evenly across cropland, increase soil moisture in dry areas, and prevent drifting over roads and driveways.
- Multiple row windbreaks of hybrid poplar or cottonwood (known as timberbelts), can protect crops from wind until mature trees can be harvested for wood products (10-15 years). Other fruit, nut or decorative floral-producing plants can be used in windbreaks to provide income.
- Farmstead and community shelterbelts protect homes from wind. They can help save household heating energy, manage snow drifts, provide products for use by the community, and create a more pleasant place to live.

Forest Farming



- Forest farming is producing specialty crops under a tree canopy.
- Forest farming can provide annual or periodic income either before, or as an alternative to, harvesting the trees for wood products.
- Potential understory crops are those that grow naturally under forest conditions or are adapted to shade, and that can be sold for medicinal, ornamental, handicraft, or culinary uses.
- Shade-tolerant crops such as ginseng, decorative ferns, goldenseal, black or blue cohosh, or shiitake mushrooms can be intensively cultivated under a forest cover that has been modified to provide the correct level of shade.

Agroforestry Practices for Profit

Alley Cropping



- This practice mixes trees, planted in single or grouped rows, with agricultural, horticultural, or forage crops that are cultivated in the wide alleys between tree rows.
- Alley cropping can be a way to convert marginal cropland to a high value woodland while continuing to earn income from annual crops during the early years of the project, or to protect sensitive crops such as vegetables and fruits from wind.
- Annual crops (row crops, forages, vegetables) cultivated between rows of trees provide extra income before nut or fruit trees bear or early in the long-term timber rotation.
- High-value hardwoods (oak, walnut, ash), fruit and nut trees, fast-growing trees (hybrid poplar and cottonwood), or fruit, nut, or floral producing shrubs are potential species for alley cropping.

Riparian Forest Buffers



- Riparian buffers are strips of perennial vegetation (trees/shrubs/grass) planted between cropland or pastures and streams, lakes, wetlands, ponds, or drainage ditches.
- They reduce runoff and non-point source pollution from agricultural activities on adjacent lands by trapping sediment, filtering excess nutrients, and degrading pesticides.
- They can also stabilize streambanks, protect floodplains and enhance wildlife habitat. Buffer strips can be planted with trees, shrubs, grass and herbaceous plants that produce harvestable products such as pulpwood, fruits, nuts, seed, or floral products.

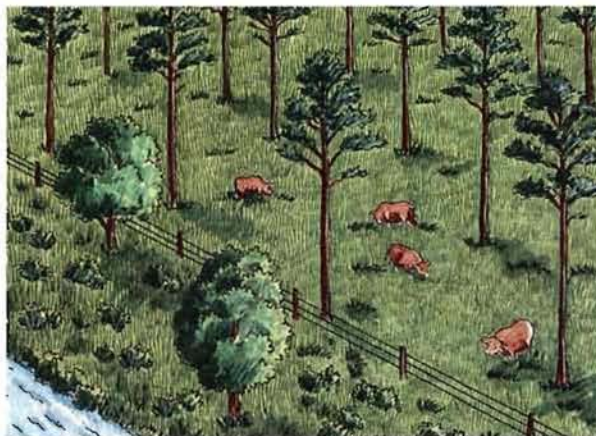
Agroforestry Practices for Profit

Woody Crop Plantations



- Woody crop plantations are larger areas of trees or shrubs often planted in a block.
- Plantations of woody crops can be added to the farm enterprise to increase income and biological diversity, and to help address special concerns such as disposal of animal wastes and filtering irrigation runoff (recycled from ditches).
- Plantings can be designed for conditions and needs of a specific piece of land.
- While woody crop plantations are not considered agroforestry in the traditional sense (because they do not provide tree/annual crop interactions), they can provide a mix of tree-based conservation and production benefits when used as part of a whole farm diversification strategy.
- Possibilities for woody crop plantations include short rotation woody crops, nut and fruit groves, and Christmas trees.

Silvopasture



- This practice combines trees with forage (pasture or hay) and livestock production.
- The overstory trees provide shade and wind shelter for grazing livestock, and yield additional income when the trees or tree products are harvested.
- Silvopasture is different from traditional forest or pasture/range management systems because it is intentionally created and intensively managed.
- Branches and leaves of some trees can be pruned from the trees and fed directly to livestock.
- Some nut and fruit orchards may be carefully grazed to produce income before and while trees are bearing.

Trees, Shrubs, and Herbs used in Agroforestry Practices

The following is a short list of tree, shrub, and herbaceous plant species that produce valuable products and that can be used in agroforestry systems. This list is far from complete, but it will give you an idea of the wide range of plant species appropriate for the Midwest and Eastern Great Plains. We know that some species work better than others in particular agroforestry practices, but there is still a lot to learn about how to best use and combine species for maximum benefit. Each species or cultivar has specific climate zones and growing conditions where it will do best. You will want to investigate the suitability of the species you are interested in for your farm's climate and particular conditions.

Fast Growing Trees	
Eastern Cottonwood (<i>Populus deltoides</i>) Hybrid Poplar (<i>Populus hybrids</i>) Hybrid Willow (<i>Salix hybrids</i>)	Products: Wood fiber for pulp and oriented strand board (OSB), lumber production, biomass for energy
High Value Hardwoods	
Basswood (<i>Tilia americana</i>) Black Walnut (<i>Juglans nigra</i>) Butternut (<i>Juglans cinerea</i>) Green Ash (<i>Fraxinus pennsylvanica</i>) Maples: Red, Sugar (<i>Acer rubrum</i> , <i>Acer saccharum</i>) Oaks: Bur, Red and White (<i>Quercus macrocarpa</i> , <i>Quercus rubra</i> , <i>Quercus alba</i>) Russian-olive (<i>Elaeagnus angustifolia</i>) Smooth Sumac (<i>Rhus glabra</i>)	Products: High value lumber, pulpwood, fuelwood and biomass, specialty wood products for artisans
High Value Conifers (Softwoods)	
Black Hills Spruce (<i>Picea glauca</i> var. <i>densata</i>) Colorado (Blue) Spruce (<i>Picea pungens</i>) White Spruce (<i>Picea glauca</i>) Douglas Fir (<i>Pseudotsuga menziesii</i>) "Glauca" Eastern Red Cedar (<i>Juniperus virginia</i>) Limber Pine (<i>Pinus flexilis</i>) Rocky Mountain Juniper (<i>Juniperus scopulorum</i>) Pine, Austrian (<i>Pinus nigra</i>) Pine, Ponderosa (<i>Pinus ponderosa</i>) Pine, Red (<i>Pinus resinosa</i>) Pine, Scotch (<i>Pinus sylvestris</i>) Pine, White (<i>Pinus strobus</i>) Balsam Fir (<i>Abies balsamea</i>) Concolor Fir (<i>Abies concolor</i>)	Products: Fence posts, specialty wood products for use by artisans, furniture, distilled oils, lumber, Christmas trees, alcohol products, edible pine nuts
Nut Trees and Shrubs	
Black Walnut (<i>Juglans nigra</i>) Butternut or White Walnut (<i>Juglans cinerea</i>) Hybrid Chestnut (<i>Castanea hybrids</i>) Chinese Chestnut (<i>Castanea mollissima</i>) Hybrid Hazelnut (<i>Corylus americana hybrids</i>) Northern Pecan (<i>Carya illinoensis</i>)	Products: Nut meat and shell products

Fruit Trees & Shrubs	
<p>American Cranberrybush or Highbush Cranberry (<i>Viburnum trilobum</i>) "Wentworth," "Redwing," American (wild) Plum (<i>Prunus americana</i>) Black or Clove Currant (<i>Ribes odoratum</i>) many cultivars White Currant (<i>Ribes sativum</i>) many cultivars Red Currant (<i>Ribes rubrum</i>) many cultivars Chokecherry (<i>Prunus virginiana</i>) "Boughens Yellow," "Boughens Chokeless," "Garrington," "Goertz," "Robert," "Lee Red" Crab Apple (<i>Malus</i> species) Elderberry or American Elder (<i>Sambucus canadensis</i>) "Adams," "York" Gooseberry (<i>Ribes uva-crispa</i>, <i>Ribes hirtellum</i>) "Pixwell," "Welcome" Hawthorn (<i>Crataegus</i> species) Juneberry or Saskatoon (<i>Amelanchier alnifolia</i>) "Pembina," "Honeywood," "Northline," "Smokey," "Regent," "Martin," "Thiessen" Nanking Cherry (<i>Prunus tomentosa</i>) Pawpaw (<i>Asimina triloba</i>) many cultivars Red Mulberry (<i>Morus rubra</i>) "Johnson," "Travis," "Wiseman," "Cooke" Western Sand Cherry (<i>Prunus besseyi</i>) "Black Beauty," "Hansen's" White Mulberry (<i>Morus alba</i>) "New American," "Wellington"</p>	<p>Products: Berries and fruits for jellies, jams, syrups, pies, and other food products</p>
Woody Decorative Floral Shrubs	
<p>Cherries, Apples, Plums (<i>Malus and Prunus</i>) Basket Willow (<i>Salix purpurea</i>) Corkscrew Willow (<i>Salix matsudana hybrids</i>) "Tortuosa," "Golden Curls," "Scarlet Curls" Goat or Pussy Willow (<i>Salix caprea</i> or <i>Salix discolor</i>) several cultivars Holly (<i>Ilex opaca</i>) "Winter Red" Red Stemmed Dogwoods (<i>Cornus sericea</i>) "Cardinal," "Bailey" (<i>Cornus coloradensis</i>) "Cheyenne" (<i>Cornus sanguinea</i> var. <i>atrosanguinea</i>) "Bloodtwig"</p>	<p>Products: Woody decorative floral products</p>
Herbs	
<p>Black Cohosh (<i>Cimicifuga racemosa</i>) Blue Cohosh (<i>Caulophyllum thalictroides</i>) Dandelion (root) (<i>Taraxacum officinale</i>) Ginseng (<i>Panax quinquefolius</i>) Goldenseal (<i>Hydrastis canadensis</i>)</p>	<p>Products: Medicinal products, health foods and many others</p>

Getting Started in Agroforestry

1. Identify places on your land where trees and woody crops can be planted.

Think about how each practice described might fit into your overall farming operation, which species might work, and whether the production requirements are appropriate for your climate zone.

2. Visit and learn from farmers using agroforestry techniques.

To help locate farmers, see #5.

3. Learn about the costs, benefits, markets and production requirements of each species and/or cultivar you are considering using (seedlings, equipment, establishment and maintenance concerns, etc.).

Before implementing any of the practices outlined in this publication, investigate the markets that are available to you, keeping in mind geographical location and prices. Remember that income from agroforestry depends on the availability of markets for the products it yields, and on your ability to identify and meet market needs. *No one makes money from growing trees—they make money from selling them.*

4. Visit your local Soil and Water Conservation District, University of Minnesota Extension Service, or Natural Resources Conservation Service office for information on the species that are best suited for your land, and to learn

about agroforestry cost-share and technical assistance programs, such as the:

Conservation Reserve Program (CRP)

Land enrolled in CRP and planted with wind-breaks or riparian forest buffers can receive up to 90% cost-share for establishment, sign-up bonus plus maintenance payments, and earn a 20% bonus on annual land rental payments.

The Forestry Incentive Program (FIP) and Environmental Quality Incentives Program (EQIP) are other programs that support agroforestry efforts.

5. See **Agroforestry in Minnesota: A Guide to Resources and Demonstration Sites**, a statewide directory of resources for people interested in learning more about agroforestry.

This directory provides a comprehensive list of agroforestry resources in Minnesota. It includes demonstration sites (listed by agroforestry practice), individuals with agroforestry knowledge to share, organizations, nurseries that supply planting stock, and agroforestry-related publications. You can find the directory at your local Extension, Soil and Water Conservation District, Natural Resources Conservation Service, or Department of Natural Resources office. Or, you can order your own copy from the University of Minnesota Extension Service Distribution Center. See the Additional Resources section for order information.

Additional Resources

Organizations

Appropriate Technology Transfer for Rural Areas (ATTRA). P.O. Box 3657, Fayetteville, AR 72702. 800-346-9140, Fax 501-442-9842
www.attra.org

Association for Temperate Agroforestry (AFTA). 203 ABNR Bldg., University of Missouri, Columbia, MO 65211.
<http://web.missouri.edu/~afta/>

Center for Integrated Natural Resource and Agricultural Management (CINRAM). 115 Green Hall, 1530 N. Cleveland Ave., St. Paul, MN 55108-1027. 612-624-4296, Fax 612-625-5212
www.cnr.umn.edu/FR/cinram

Minnesota Institute for Sustainable Agriculture (MISA). 411 Borlaug Hall, 1991 Buford Circle, St. Paul, MN 55108-1013. 612-625-8235 or 800-909-MISA, Fax 612-625-1268
misamail@umn.edu, www.misa.umn.edu

Native Fruit Development Program. Dr. Richard St-Pierre, Department of Plant Sciences, University of Saskatchewan, 51 Campus Drive, Saskatoon, Saskatchewan, CANADA, S7N 5A8.
www.ag.usask.ca/departments/plsc/nfdp/index.html

USDA National Agroforestry Center (NAC). East Campus, UNL, Lincoln, NE 68583-0822 402-437-5178. Fax 402-437-5178
nhammond@fs.fed.us, www.unl.edu/nac

Publications

The following publications are from CINRAM and the University of Minnesota Extension Service, and can be ordered by calling 800-876-8636. They can also be ordered or viewed in full text on CINRAM's web site.

Agroforestry in Minnesota: A Guide to Resources and Demonstration Sites. S. Josiah, L. Gordon, E. Streed, J. Joannides. 1999. BU-7275. Provides a detailed look at agroforestry practices around the state and lists demonstration sites for a variety of practices.

Catching the Snow with Living Snow Fences. 1999. MI-7311. A comprehensive national award winning technical resource about living snow fences, produced by Minnesota's Interagency Task Force on Living Snow Fences.

Commercial Hazelnuts in Minnesota. S. Josiah. 1998. FO-7280. A summary of the potential to produce hybrid hazels in the Midwest. Provides a review of planting and maintenance information.

Hybrid Poplar Profits. E. Streed. 1998. FO-7279. Detailed information on the financial aspects of growing hybrid poplar as a crop in Minnesota.

Living Snow Fences. S. Josiah, M. Majeski. 1999. FO-7277. Discusses the benefits and the technical aspects of establishing living snow fences.

Marketing Specialty Forest Products. C. Vollmers, E. Streed. 1999. FO-7278. Discusses products that can be grown in a forest farming system, the role of value added processing, and recommendations for marketing plans.

The following publications are available directly from CINRAM (see Organizations for contact information).

Agroforestry Advantage Newsletter. Free quarterly newsletter. (Subscribe/view on web site).

Growing Trees as a Crop. Spring, 1999. Agroforestry Advantage Newsletter, Vol. 2 No. 1. Presents the "how to" of growing hybrid poplar. (Available on web site).

Proceedings from the 1998 Specialty Forest Products/Forest Farming Conference. A complete collection of papers presented at the 1998 conference held in Minneapolis, MN. A terrific source of up-to-date research information on specialty forest products (medicinals, foods, decorative florals, handicrafts). (Table of Contents available on CINRAM's web site).

The following publications can be obtained from the USDA National Agroforestry Center (NAC) (see Organizations for contact information). The publications are also available in full text on their web page.

NAC Brochures:

Working Trees for Agriculture. Undated. Explains rural agroforestry practices and benefits.

Working Trees for Carbon Cycle Balance. Undated. Using trees and shrubs to produce social, economic, and conservation benefits.

Working Trees for Communities. Undated. The application of agroforestry technologies in community conservation.

Working Trees for Livestock. Undated. The application of agroforestry technologies for livestock protection and silvopasture operations.

Working Trees for Wildlife. Undated. The application of agroforestry technologies designed specifically for wildlife habitat.

Working Trees for Treating Waste. A natural alternative for using nutrients from livestock and farm operations, municipalities, and industries.

NAC Agroforestry Notes:

These brochures provide agroforestry information in a useful "how-to" format:

Agroforestry in the United States. B. Rietveld, K. Irwin. 1996. AF Note-1.

Alley Cropping: An Agroforestry Practice. S. Hodge, H. Garrett, J. Bratton. 1999. AF Note-12.

American Ginseng Production in Woodlots. R. Beyfuss. 1999. AF Note-14.

The Biology of Silvopastoralism. S. Sharrow. 1997. AF Note-9.

Economics and Marketing of Ginseng. R. Beyfuss. 1999. AF Note-15.

Establishment and Cultural Guidelines for Using Hybrid Tree Species in Agroforestry Plantings. G. Kuhn, W. Rietveld, D. Riemenschneider. 1998. AF Note-11.

Farming Exotic Mushrooms in the Forest. D. Hill. 1999. AF Note-13.

Forest Farming: An Agroforestry Practice. M. Dix, D. Hill, L. Buck, W. Rietveld. 1997. AF Note-7.

Forest Production of Goldenseal. J. Davis. 1999. AF Note-16.

From Pine Forest to a Silvopasture System. T. Clason, J. Robinson. 2000. AF Note-18.

- Guide to a Successful Agroforestry Demonstration Project.** K. Irwin. 1997. AF Note-6.
- How to Design a Riparian Buffer for Agricultural Land.** M. Dosskey, D. Schultz, T. Isenhardt. 1997. AF Note-4.
- Opportunities for Growing Short-Rotation Woody Crops in Agroforestry Practices.** G. Kuhn, W. Rietveld. 1998. AF Note-10.
- Outdoor Living Barn: A Specialized Windbreak.** K. Irwin, J. Bratton. 1996. AF Note-2.
- Riparian Buffer Design for Cropland.** M. Dosskey, D. Schultz, T. Isenhardt. 1997. AF Note-5.
- Riparian Buffers for an Agricultural Land.** M. Dosskey, D. Schultz, T. Isenhardt. 1997. AF Note-3.
- Silvopasture: An Agroforestry Practice.** N. Klopfenstein, W. Rietveld, R. Carman, T. Clason, S. Sharrow, G. Garrett, B. Anderson. 1997. AF Note-8.
- Wastewater Management Using Hybrid Poplar.** G. Kuhn, J. Nuss. 2000. AF Note-17.
- Waterbreaks: Managed Trees for the Floodplain.** D. Wallace, W. Geyer, J. Dwyer. 2000. AF Note-19.

The following materials can be obtained from ATTRA (see organizations for contact information). The publications are available in full text on their web page.

- Agroforestry Overview.** A. Beetz. 1999.
- Black Walnut Agroforestry.** A. Beetz. 1999. ATTRA. Not available on web site—call 800 number for copy.
- Ginseng, Goldenseal & Other Native Roots.** K. Adams. 1998.
- Mushroom Cultivation & Marketing.** A. Beetz, L. Greer. 1997.

The following materials can be found at your local library or can be ordered or accessed from their respective sources

- Badgersett Research Farm Web Site.** Phil Rutter. RR 1, Box 141, Canton MN 55922, 507-743-8570, www.badgersett.com

- Conservation Trees for Your Farm, Family, and Future.** Undated. National Arbor Day Foundation. Nebraska City, NE.
- Forest Farming: Towards a Solution to Problems of World Hunger and Conservation.** 1984. J. Sholto Douglas and Robert A de J. Hart. 207 pages. Intermediary Technology Publications. 103-105 Southampton Row, London WC1B4HH, United Kingdom.
- Growing Hybrid Poplars as a Crop.** Agricultural Utilization Research Institution (AURI). 2000. www.auri.org/poplars/poplars.htm. Information on hybrid poplar production and contacts for more information and sources of nursery stock. Ed Wene; Agricultural Utilization Research Institute, PO Box 599, Owen Hall Annex, University of Minnesota-Crookston, Crookston, MN 56716, ewene@auri.org. 218-281-9014. Fax: 218-281-3759.
- Heavenly Hazelnuts.** Craig Cramer. Feb. 1994. The New Farm. Rodale Institute. Emmaus, Pennsylvania. pp. 36-39. Check your local library or contact the MISA office to borrow a copy.
- Income Opportunities in Special Forest Products: Self-Help Suggestions for Rural Entrepreneurs.** USDA Forest Service, Agricultural Information Bulletin 666, May 1993. USFS, Washington, DC.
- Minnesota-Grown Opportunities: Hybrid Poplar.** E. Streed. 2000. Center for Alternative Plant and Animal Products (CAPAP-U of MN). 352 Alderman Hall, St. Paul, MN 55108.
- Minnesota-Grown Opportunities: Hazel.** S. Josiah & E. Streed. 2000. Center for Alternative Plant and Animal Products (CAPAP-U of MN). 352 Alderman Hall, St. Paul, MN 55108.
- Permaculture: A Practical Guide to a Sustainable Future.** B. Mollison. 1997. Ten Speed Press, Berkeley, CA.
- Tree Crops: A Permanent Agriculture.** R.J. Smith. 1950. Island Press, Washington, DC.
- Windbreak Technology: Economics of Windbreaks.** 1997. Natural Resources Conservation Service, USDA. Suite 600, 375 Jackson Street, St. Paul, MN 55101. 651-602-7900.

The Sustainable Agriculture Information Exchange

This publication is part of a series developed through the Sustainable Agriculture Information Exchange, a clearinghouse of sustainable agriculture information and materials in Minnesota. These informational materials are accessible to the public by phone (toll-free), fax, e-mail, or World Wide Web.

The Information Exchange works to bridge the gap between the need for timely, practical information about sustainable agriculture and existing resources and information; to identify gaps in research and education and direct funding and support to address them; and to promote education and discussion of issues relevant to the sustainability of agriculture.

To ensure that all of the Information Exchange's publications are applicable and user-friendly, they are developed by teams and reviewed by individuals who will use the material, including farmers, researchers, extension educators, and other agricultural community members. The publications are developed in cooperation with the Minnesota Department of Agriculture-Energy and Sustainable Agriculture Program and the University of Minnesota Extension Service.

Other publications in this series, all of which are available through the University of Minnesota Extension Service Distribution Center, include:

- **Collaborative Marketing: A Roadmap and Resource Guide for Farmers** (BU-7539)
- **Organic Certification of Crop Production in Minnesota** (BU-7202)
- **Minnesota Soil Management Series** (PC-7398)
- **Whole Farm Planning: Combining Family, Profit, and Environment** (BU-6985)

New topics in the series are continually in development, including hog production systems, business planning, management of solid swine manure, and resources for beginning farmers.

For more information on this series, the Information Exchange, MISA, or to request individualized information on questions related to sustainable agriculture, please contact:

Minnesota Institute for Sustainable Agriculture

411 Borlaug Hall

1991 Buford Circle

St. Paul, MN 55108-1013

612-625-8235, or 800-909-MISA (6472), or fax 612-625-1268

misamail@umn.edu

www.misa.umn.edu

UNIVERSITY OF MINNESOTA

Extension
SERVICE



MISA is a partnership between the University of Minnesota's College of Agricultural, Food, and Environmental Sciences and the Sustainers' Coalition, a group of individuals and community-based, non-profit organizations. MISA's purpose is to bring together the agricultural community and the University community in a cooperative effort to develop and promote sustainable agriculture in Minnesota and beyond.



CINRAM is a joint venture of the University of Minnesota College of Natural Resources and College of Agricultural, Food, and Environmental Sciences.

Find more University of Minnesota Extension Service educational information at www.extension.umn.edu on the World Wide Web.

Copyright © 2000, Regents of the University of Minnesota. All rights reserved excluding those for artwork on pages 11-13. Send copyright permission inquiries to: Copyright Coordinator, University of Minnesota Extension Service, 405 Coffey Hall, St. Paul, MN 55108-6068. E-mail to copyright@extension.umn.edu or fax to: (612) 625-2207.

Additional copies of this item can be ordered from the University of Minnesota Extension Service Distribution Center, 405 Coffey Hall, 1420 Eckles Avenue, St. Paul, MN 55108-6068, e-mail: order@extension.umn.edu or credit card orders at (800) 876-8636.

Produced by Communication and Educational Technology Services, University of Minnesota Extension Service.

In accordance with the Americans with Disabilities Act, this material is available in alternative formats upon request. Please contact your University of Minnesota Extension Service county office or, outside of Minnesota, contact the Distribution Center at (800) 876-8636.

The University of Minnesota Extension Service is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, veteran status, or sexual orientation.

Printed on recycled paper with minimum 10% postconsumer waste.

BU-7407-S
2000