

Introduction to Agroforestry Systems



USDA National Agroforestry Center (NAC)



USDA National Agroforestry Center
Lincoln, Nebraska 68583

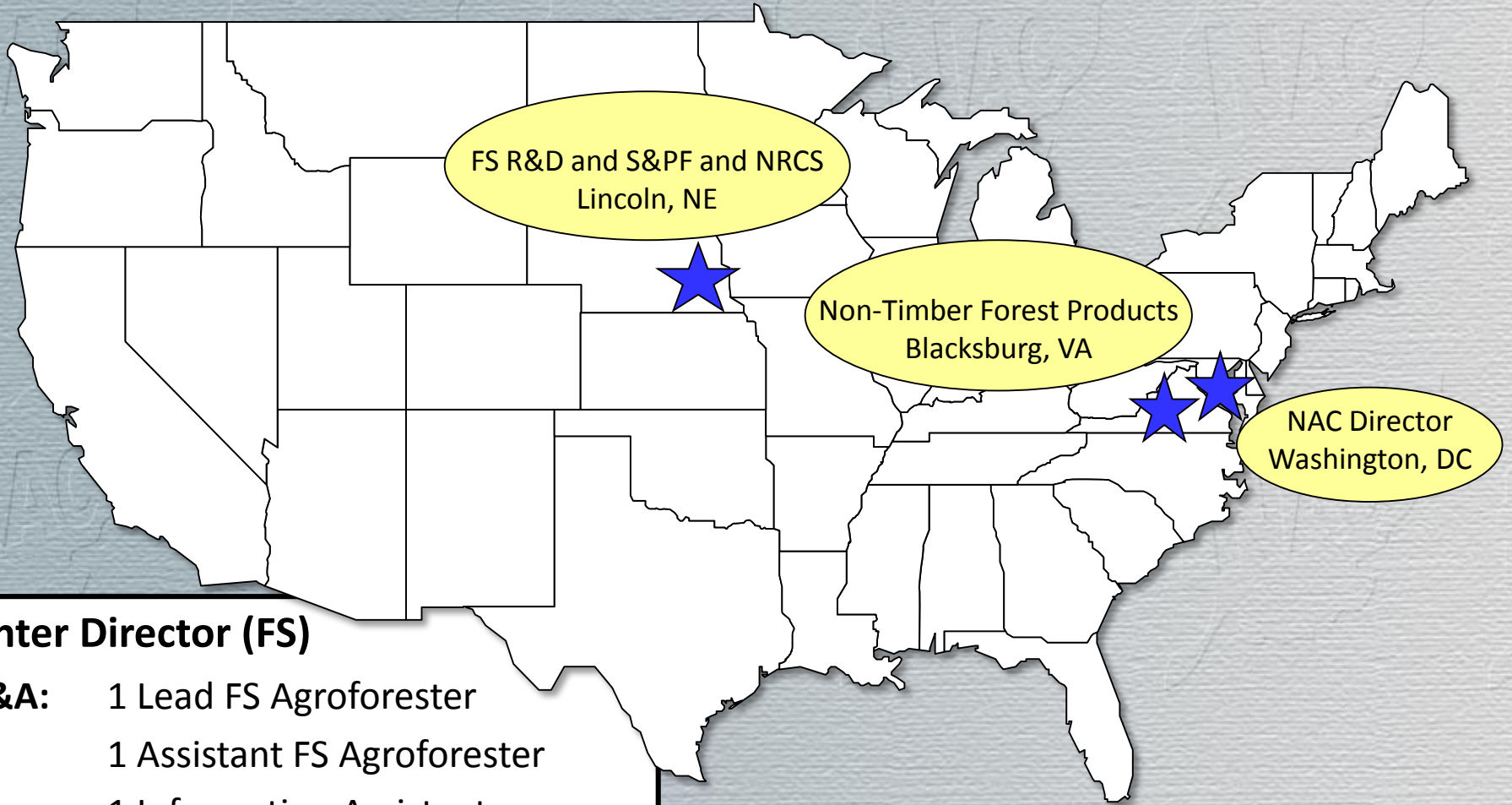
<http://nac.unl.edu/>

USFS and NRCS partnership

Mission: *accelerate the application of agroforestry through a national network of partners*

Origin: 1990 Farm Bill

NAC Network



Center Director (FS)

TT&A: 1 Lead FS Agroforester
1 Assistant FS Agroforester
1 Information Assistant

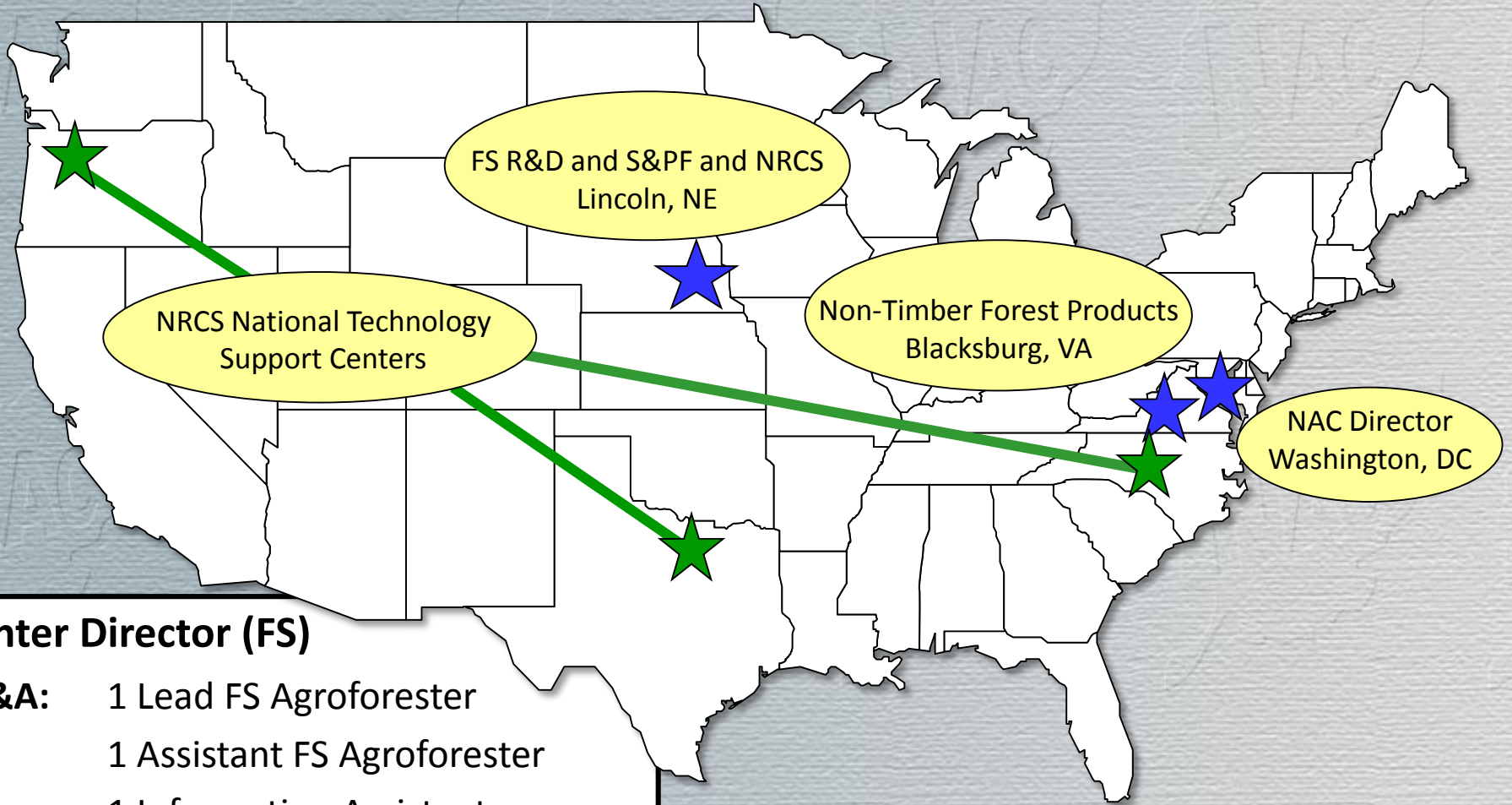
R&D: 3.75 FT Scientists (FS)
1 GIS Specialist
1 Technician

Admin: 2 Admin Professionals

A partnership of



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What is agroforestry?

....the *intentional* combining of agriculture and working trees to create sustainable farming and ranching systems



Silvopasture



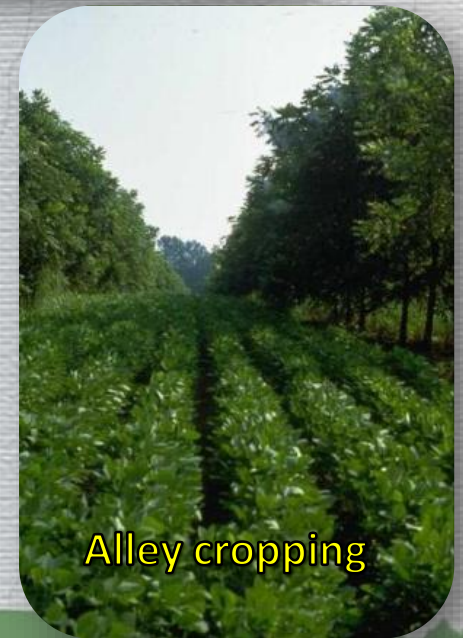
Windbreaks



Riparian buffers



Forest farming



Alley cropping

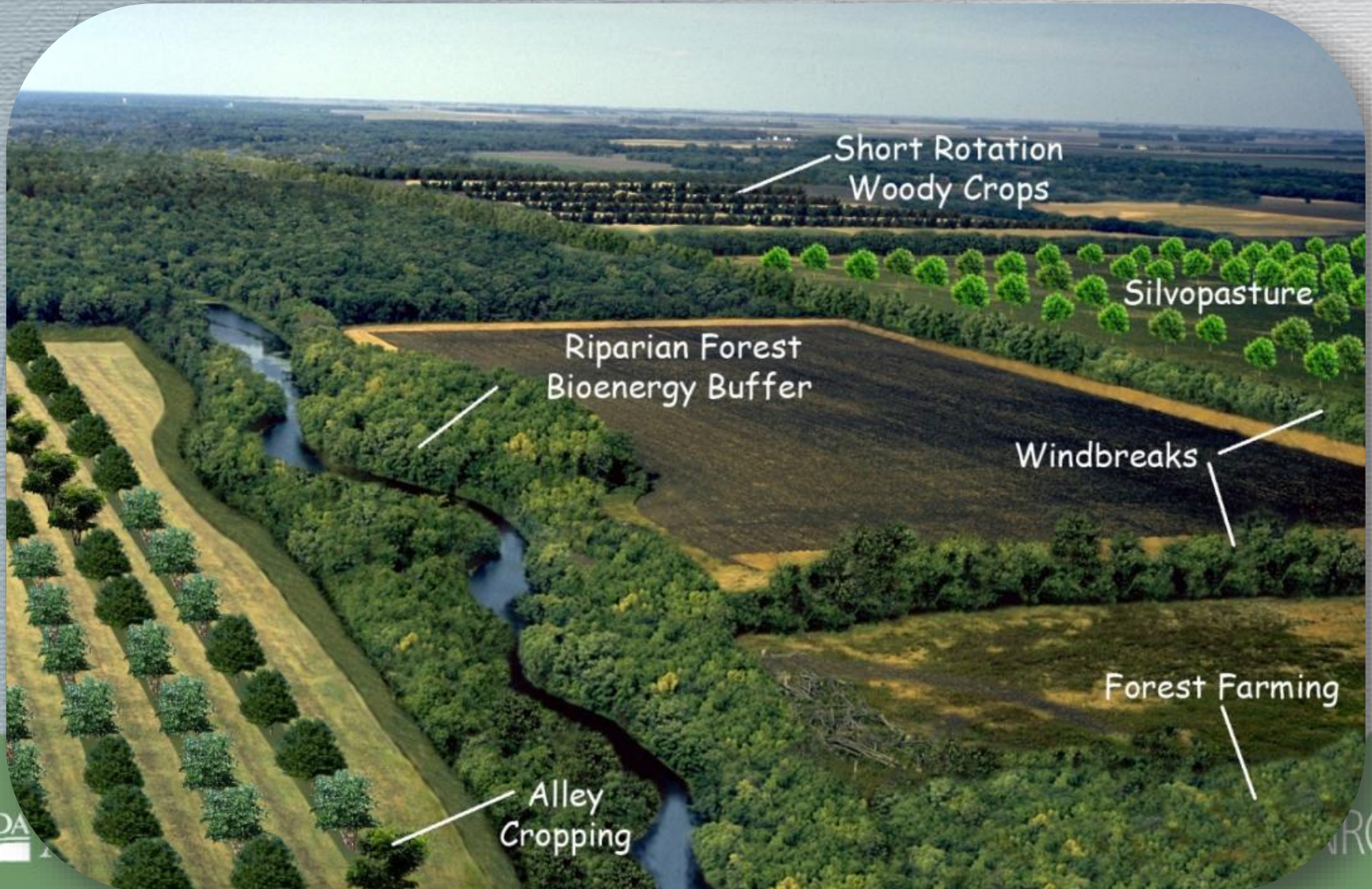
Agroforestry is not:

conversion of agricultural lands to forests, rather it leaves them in production agriculture

Agroforestry is:

- suite of productive conservation practices that can help provide profits and other benefits at the *farm-scale*
- means to address environmental issues at the *landscape/watershed-scale*

Agroforestry as part of a larger agricultural and forested landscape



Silvopasture



Combines timber, livestock and forage production on the same acreage. Trees provide longer-term returns, while livestock generate an annual income.

Silvopasture Benefits

- *Improved plant vigor*
- *Lower animal stress*
- *Reduced wildfire risk*
- *Improved wildlife habitat*
- *Annual income (e.g. grazing, hay, pine straw, hunting)*
- *Long-term income (timber)*



Silvopasture

Mack Evans, M. A. Evans Enterprise, Georgia



- 2003 – Started with pine stands in need of thinning and cleanup**
- **Cow-calf operation in longleaf and loblolly silvopastures**
 - **Uses rotational grazing**
 - **Growing longleaf pine for pulp & saw logs**
- 2008 – Added contract pine straw operation**

Questions?

Silvopasture publications available at:

<http://nac.unl.edu/practices/silvopasture.htm>

Windbreaks



Plantings of single or multiple rows of trees or shrubs that redirect or modify the wind and are established for one or more environmental purposes.

Tree row



Fabric & Gates



Shrub barrier



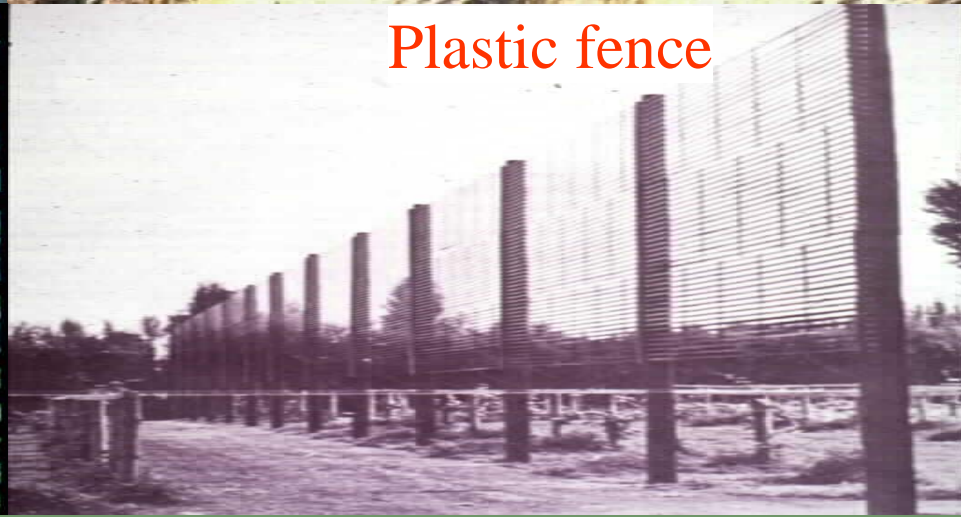
Grass barrier



Slat fence



Plastic fence



Windbreak Benefits

- *Reduce energy costs*
- *Screen unsightly areas*
- *Reduce erosion and pesticide drift*
- *Protect plants*
- *Manage snow*
- *Improve irrigation use*
- *Increase crop yields*
- *Shelter livestock*
- *Mitigate odors and dust*
- *Provide wildlife habitat*
- *Enhance aesthetics*
- *Sequester carbon*



Types of Windbreaks



Questions?

Windbreak publications available at:

<http://nac.unl.edu/practices/windbreaks.htm>

Alley Cropping



Growing an annual or perennial crop simultaneously in the alley ways between rows of a long term tree crop. The agricultural crop generates annual income while the longer-term tree crop matures.

Alley Cropping Benefits

- *Diversify farm enterprise*
- *Reduce erosion*
- *Improve water quality*
- *Protect crops*
- *Improve utilization of nutrients*
- *Enhance wildlife habitat*
- *Improve aesthetics*
- *Store carbon*



Alley Cropping

Dan Shepherd, Clifton Hill, MO



- Planted first pecans in 1969
- 270 acres of pecans
- Originally corn and soybeans in the alleyways
- Hay Crop



Questions?

Alley Cropping publications available at:

<http://nac.unl.edu/practices/alleycropping.htm>

Forest Farming



*The **intentional** manipulation, **integration**, and **intensive** management of woodlands under a managed forest canopy to produce non-timber products.*

Forest Farming Benefits

- *Improve economic value of existing forests*
- *Diversify income*
- *Increase cash flow*



Forest Farming

Nicola Macpherson

Ozark Forest Mushrooms, Missouri



1990 – established shiitake mushroom operation on woodland

- 20,000 shiitake logs currently in production

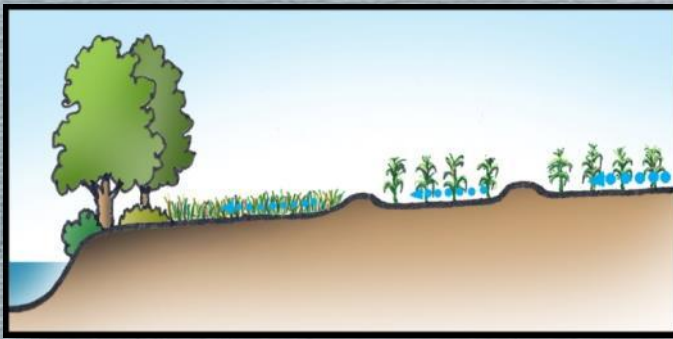
Markets - restaurant owners/chefs, organic food stores, internet

Questions?

Forest Farming publications available at:

<http://nac.unl.edu/practices/forestfarming.htm>

Riparian Forest Buffers



Riparian forest buffers are natural or planted woodlands adjacent to water bodies. They are designed with trees, shrubs, and grasses to protect water resources from non-point source pollution.

Riparian Forest Buffer Benefits

- *Clean water*
- *Protect aquatic habitat*
- *Enhance wildlife habitat*
- *Protect stream banks*
- *Income source (timber and specialty products)*
- *Flood protection*



Riparian Buffers

Rob Miller, Mt. Jefferson Farms Inc. , Salem, Oregon



1970s – First riparian buffers

- Planted cottonwood trees
- “Working” buffers provides:
 - ✓ Income from wood products
 - ✓ Protect farmland from erosion and flooding
 - ✓ Trap nutrients from fields

TODAY – “Systems approach”

- Integrates understory plants into buffers
- Vegetables for local food markets (~200 varieties)

Questions?

Riparian Forest Buffer publications available at:

<http://nac.unl.edu/practices/riparianforestbuffers.htm>

Working Trees – Putting it all Together!

Tom Wahl & Kathy Dice, Red Fern Farm, Wapello, IA

1986 – established on cropland,
degraded woodlands, now has 86 acres:

- **Windbreaks** – fruit & nut-bearing trees (e.g. chestnuts, persimmons)
- **Silvopasture** – nut trees provide shade for Cornish rock hens; hens provide enhanced fertility and biocontrol of insect tree pests
- **Forest Farming** – ginseng and goldenseal in the woods
- **Alley Cropping** – herbs with trees



Agroforestry: the **'Leatherman'** within the 'Climate Change -Integrated' Toolbox for Agriculture

MITIGATION

1. Sequester (& conserve) carbon
2. Reduce greenhouse gas emissions

ADAPTATION

3. Reduce threats & enhance resilience
4. Allow species migration to more favorable environments



....All while doing their other jobs

Why is Agroforestry Important?

Large Farms: help meet demands:

- Increased production of food, feed, fiber, bioenergy
- Protecting water, air, soil, and....
 - ✓ Odor abatement
 - ✓ Loss of biodiversity
 - ✓ Reduce/sequester greenhouse gases
 - ✓ Adapt to a changing climate

Why is Agroforestry Important?

Small Farms: increases profitability

- Cannot compete in large commodity markets
- Need specialty crops to make a profit
- Agroforestry systems can produce high value foods, medicinal, decorative products
- Markets may need to be developed

TT&A Products

Brochures

Technical Notes

Information Sheets

Newsletters

Agroforestry

Working Trees for Water Quality

Working Trees: a partner in watershed management.

Agroforestry helps to protect water quality while achieving both landowner and community objectives.



When a perennial stream flows through a watershed, the quality of the water is the result of the land use, the vegetation, and the soil. Agroforestry practices can help to improve water quality by planting trees along streams and riparian areas. Trees can help to filter out sediment and nutrients, reduce erosion, and provide shade to cool the water. This helps to improve the health of the stream and the wildlife that depend on it.

Each surface and subsurface flowing water system is being impacted by human activities. When water is the result of the watershed, the quality of the water is the result of the land use, the vegetation, and the soil. Agroforestry practices can help to improve water quality by planting trees along streams and riparian areas. Trees can help to filter out sediment and nutrients, reduce erosion, and provide shade to cool the water. This helps to improve the health of the stream and the wildlife that depend on it.

The National Agroforestry Center is a leading national organization that provides information and technical assistance to landowners and managers interested in agroforestry. For more information, visit our website at nac.unl.edu.

USDA National Agroforestry Center

AGROFORESTRY NOTES

Issue 7

Improving Forage For Native Bee Crop Pollinators

Introduction

Agroforestry practices can provide essential habitat for bees, and most require very little space. The National Agroforestry Center has developed a series of technical notes to help landowners and managers improve forage for native bee crop pollinators. This note is the first in the series and focuses on the use of agroforestry to improve forage for native bee crop pollinators. The note discusses the importance of forage for native bee crop pollinators and provides information on how to improve forage for native bee crop pollinators using agroforestry practices.

In order to support the native bee crop pollinators, a variety of forage is necessary. Unfortunately, heavily managed lands throughout the United States often lack the diversity and abundance of forage that native bees require. By providing shelter and diverse pollen and nectar sources, a diverse community of native bee species will increase, which can improve pollination, increase crop yields, and improve ecosystem health.

The agroforestry practices that can be used to improve forage for native bee crop pollinators include: planting native bee forage plants, planting cover crops, and planting agroforestry trees. Each of these practices can be used to improve forage for native bee crop pollinators and to improve the health of the ecosystem.

Step 1: Identify and protect bee forage already in place.

Existing pollen and nectar sources can often be found near riparian areas, agroforestry, riparian buffers, or other areas, or in places on the land where a variety of plants (weeds or wildflowers) grow. To identify good forage plants, observe flowers early in the morning and in the middle of the day to see how various native species are visited by bees and other insects. Note flower and seed characteristics, such as color, shape, and size, and the time of day when the flowers are open. Try to protect these areas and their flowering plants as much as possible.

Step 2: Ensure that flowers are present throughout the growing season.


Bees are most active from February to November, though in some climates, the total window is also some six to eight months, whereas the emergence and flight time is four weeks or less. A lot of early spring flowering plants, such as wildflowers, are important for bees. Therefore, a sequence of plants that provide a diversity of flowers throughout the growing season is necessary to support a diverse community of native bee species.

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Info

Can windbreaks help with organic farming?

Working Trees



This hedge-row protects the adjacent crop from dust and reduces the risk of soil erosion. (Photo by Bob Hobbins, National Center for Agroforestry, University of Nebraska-Lincoln)

Agroforestry buffers can be used to help organic farmers maintain the integrity of their products. If there is a risk of crop or grazing land contamination from substances not allowed under organic regulations, whether it is a risk of pesticide drift or gene flow, organic producers must have buffers. According to USDA National Organic Program (NOP) regulations, these buffers will likely be required by the certifier in the following situations:

- The organic field borders a conventional field on which prohibited substances are used.
- The organic field borders a roadway in which prohibited substances are applied routinely to control weeds.
- The organic field borders residential housing in which prohibited substances are applied.
- The organic field has, or is immediately adjacent to, fencing that uses hardware treated with prohibited substances.

Fortunately, these buffers can be created with USDA assistance. To reduce chemical drift, landowners can work with USDA's National Resources Conservation Service (NRCS) to establish agroforestry conservation practices such as Field Borders (336), Hedgerow Planting (432), Hedgerow Wind Barriers (603), Windbreak/Grassbelt Establishments (386), Riparian Forest Buffers (394), Conservation Cover (327), and others. (Reference materials of NRCS Conservation Practices are in parentheses.)

Inside Agroforestry

... Including The Carbon Sink



Trees, shrubs, grasses, and other plants can store carbon in their leaves, stems, roots, and soil. This carbon storage is known as a carbon sink. Agroforestry practices help increase the carbon sink in agricultural lands, which can help to reduce greenhouse gas emissions and combat climate change.

Working Trees: Windbreaks for Carbon in the U.S.

Working Trees: Windbreaks for Carbon in the U.S. is a report that provides information on how to create and maintain windbreaks that can store carbon in the soil and in the trees themselves. The report includes information on the benefits of windbreaks, the types of trees that are best for carbon storage, and the steps that can be taken to create and maintain windbreaks. The report is available for download at nac.unl.edu.

Presentations

Tools

Displays

Agroforestry

Enriching our lives with trees that work



This presentation was developed by the USDA National Agroforestry Center



CanVis



Existing Groups in the Northeast

Chesapeake Bay Agroforestry
Working Group



Silvopasture.ning.com

Forest Farming to the Forefront –
Northeast Working Groups



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Questions?

Publications available at:
<http://nac.unl.edu/>

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