



This presentation is part of an educational modular program designed to provide new and beginning farmers and ranchers with relevant information to initiate, improve and run their agricultural operations



United States Department of Agriculture  
National Institute of Food and Agriculture

**This program is funded by the  
Beginning Farmer and Rancher  
Development Program (BFRDP)**

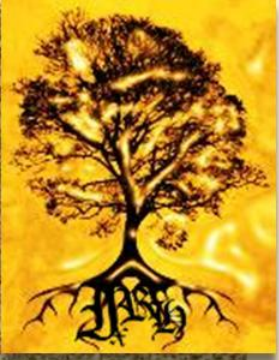
**USDA-NIFA-BFRDP 2010-03143**



# AGROFORESTRY



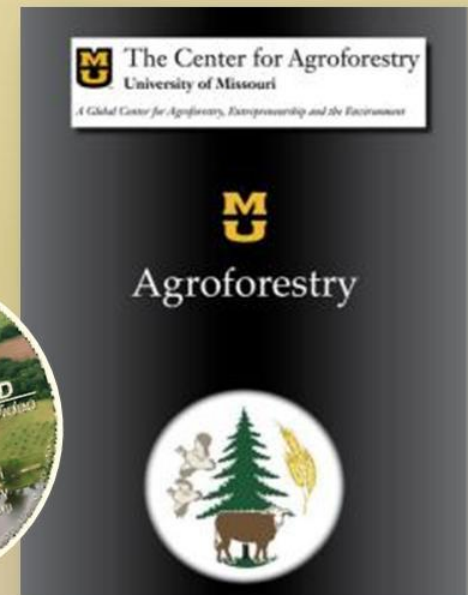
This project is partly sponsored by USDA-NIFA-  
BFRDP 2010-03143.



We want to thank the Center for Agroforestry at the University of Missouri for their permission to use their materials to prepare this presentation

# Training manual for Applied Agroforestry Practices

- University of Missouri
  - The Center for Agroforestry (UMCA)
  - 2006 Edition

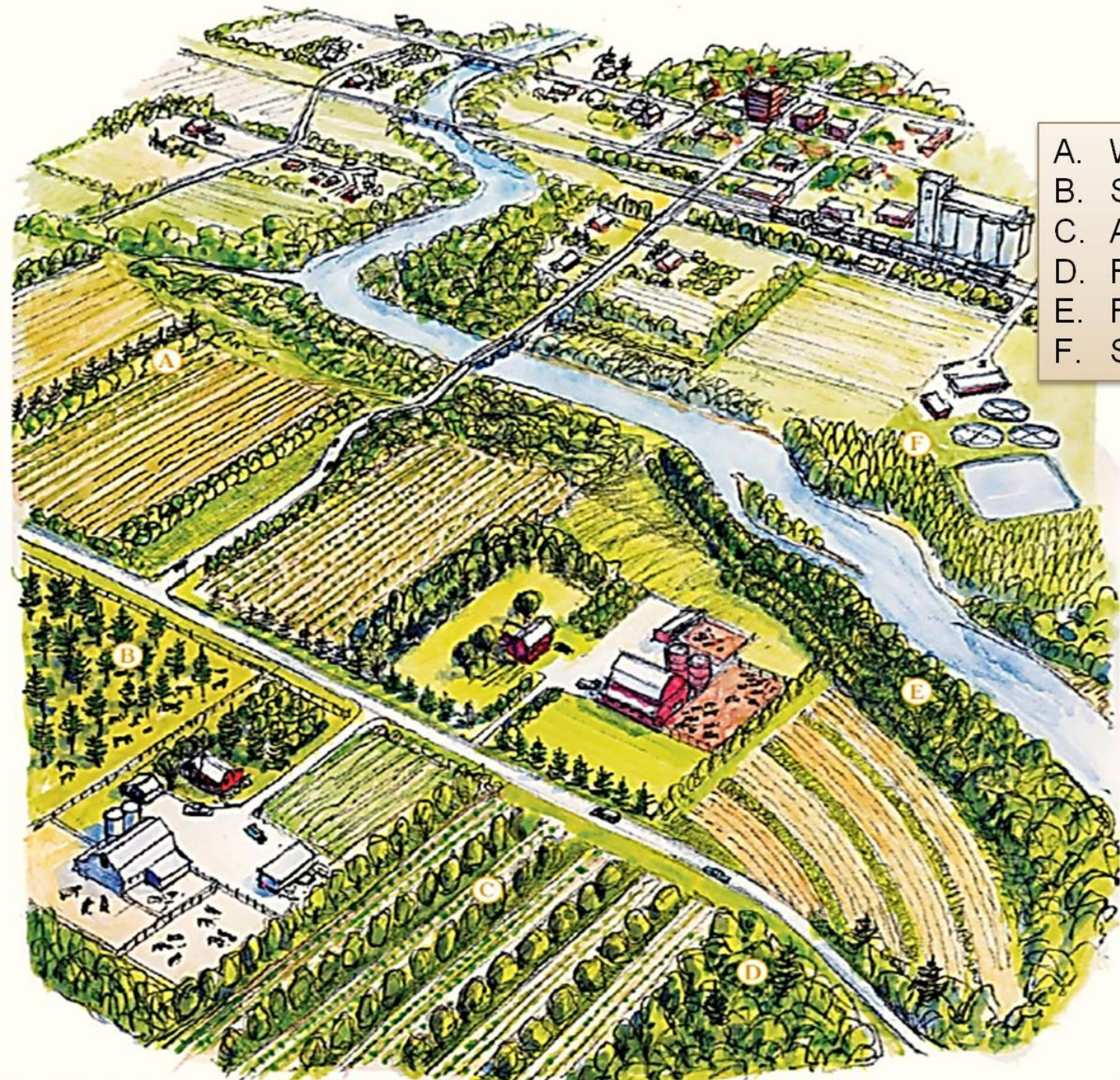


# What is Agroforestry?

Agroforestry is an intensively managed farming system that uses productive trees and or shrubs together with crops, livestock or both using an integrated approach



- A. Windbreaks
- B. Silvopasture
- C. Alley cropping
- D. Forest farming
- E. Riparian forest buffers
- F. Special applications





Some of the most common types of agroforestry are:

**Alley cropping**



**Silvopasture**



**Riparian buffers**



**Forest farming**



**Windbreaks and  
shelterbelts**



# FOREST FARMING



<http://www.glatfelter.com/forestry/default.aspx>



# Forest Farming

- Forest farming is defined as:  
“the intentional manipulation, integration, and intensive management of forested lands that capitalize on specific plant interactions to produce specific non-timber products”

Berries



<http://masteringhorticulture.blogspot.com/2010/09/wild-blackberries-aggregate-fruit.html>

Shiitake mushrooms



[http://www.thosemushrooms.com/Mushroom\\_Varieties/Shiitake.html](http://www.thosemushrooms.com/Mushroom_Varieties/Shiitake.html)

# Forest Farming

- Forest farming is different from other types of agroforestry in that crops are introduced into an area that is already forested instead of trees being introduced to crops

Medicinal herbs can be easily grown in forested areas



American Ginseng



<http://www.centerforagroforestry.org/practices/ff.php>

# Forest Farming

- Forest farming crops can be divided into four categories:
  - Medicinal and botanicals
  - Forest-based food production
  - Woody decorative florals
  - Handicraft and specialty woods



[http://naturehills.com/gardening/blogs/tree\\_sense/archive/2010/08/20/conservation-trees-for-profit.aspx](http://naturehills.com/gardening/blogs/tree_sense/archive/2010/08/20/conservation-trees-for-profit.aspx)

<http://blogs.kqed.org/bayareabites/2010/11/14/chestnut-soup-for-the-holidays/>

# Forest Farming

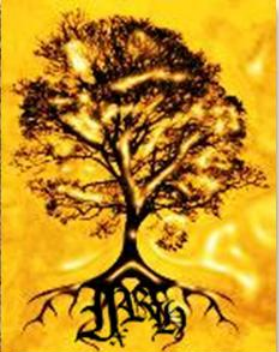
- Forest farming can diversify farm income while at the same time improving the health of the forest
- By understanding the interaction of the trees and the understory environment shade-loving crops can be profitably grown



<http://www.forestnursery.com/pricelist.html>



<http://www.avrdc.org/index.php?id=658>



## Some Market Opportunities from Forest Farming

<b>Floral and craft products</b>	Grape vine wreaths, colorful and twisted stems, twigs and branches, small wood products for carving burls, carving bark, dried and mounted fall color leaves, ferns and cuttings from conifers
<b>Food products: mushrooms, berries and nuts</b>	Pecans, black walnuts, gooseberries, blackberries, mushrooms (shiitake and oyster mushrooms), fiddlehead ferns, persimmons, elderberries
<b>Landscape plants</b>	Ferns, jack-in-the-pulpit, hostas, dogwood and azaleas; pine straw
<b>Herbal plants</b>	Ginseng, goldenseal and black cohosh
<b>Biomass and small wood</b>	Thinned smaller sized trees, used as chip wood, fire wood, craft wood and fence post
<b>Timber trees</b>	High quality timber, veneer and saw log or other mature tree products



# Example of forest farming

Mushrooms are grown on fresh cut pole-sized logs which may be obtained from thinning as part of sustainable forest management. Shiitake mushrooms start producing after one year and continue producing for up to 5 years.



Oyster mushrooms

[http://botit.botany.wisc.edu/toms\\_fungi/oct98.html](http://botit.botany.wisc.edu/toms_fungi/oct98.html)



Shiitake mushrooms



[http://www.thosemushrooms.com/Mushroom\\_Varieties/Shiitake.html](http://www.thosemushrooms.com/Mushroom_Varieties/Shiitake.html)

# ALLEY CROPPING



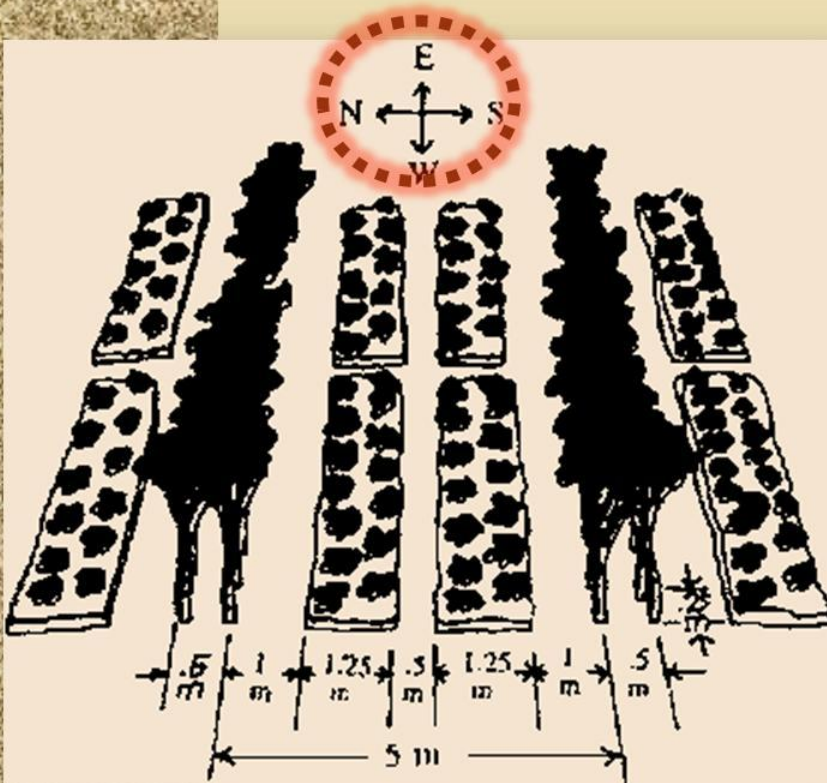
<http://www.4bm.ca/services/agroforestry.cfm>



IITA Image Library Photostream- Flickr

# Alley Cropping

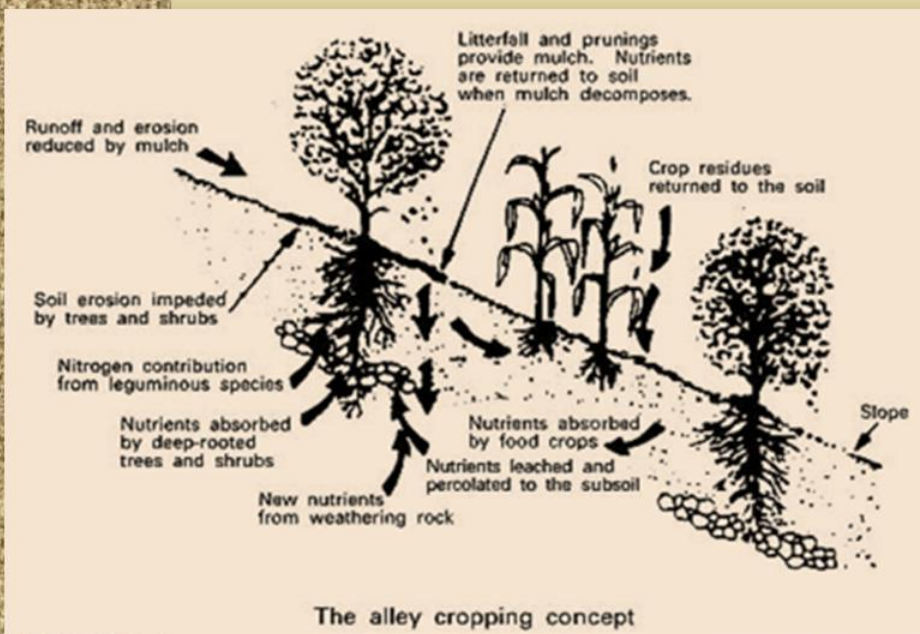
Planting rows of trees at wide spaces and leaving "alleyways" where other crops are grown protected by the trees



- Trees can produce high value timber, nuts or fruit
- Trees provide a microclimate to grow horticultural or agricultural crops
- Crops or forages are grown in the alley to provide an annual income while the trees mature
- Crops can provide nitrogen and protect moisture for the tree crop

# Alley Cropping

- It can be used in areas that are susceptible to erosion
- Helps to control erosion and prevent run-off of nutrients, sediments and chemicals resulting in improved water quality



Trees can be planted in rows on the contour of the slope

- Slows runoff water
- Root network helps stabilize the soil

# Alley cropping

## Some considerations

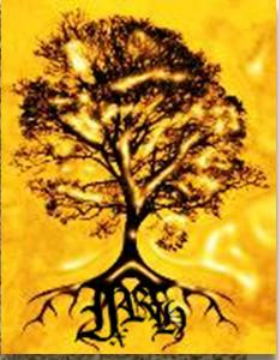
1. Select fast-growing and nitrogen-fixing trees/shrubs that can withstand frequent pruning
2. Orient the rows in an east-west direction to avoid shading of the crops by the hedgerows
3. Rows of trees/shrubs should have a minimum space of 5 m to allow more space for vegetable crops
4. Soil should be dug and loosened to a minimum depth of 30 cm
5. Pruning is first done after the trees are 9-12 months old. Trees are cut 0.5 m above ground level
6. Rows of trees/shrubs can be composed of different vegetative species



<http://forestry.ky.gov/LandownerServices/Pages/Agroforestry.aspx>



<http://www.fao.org/docrep/009/a0100e/a0100e07.htm>

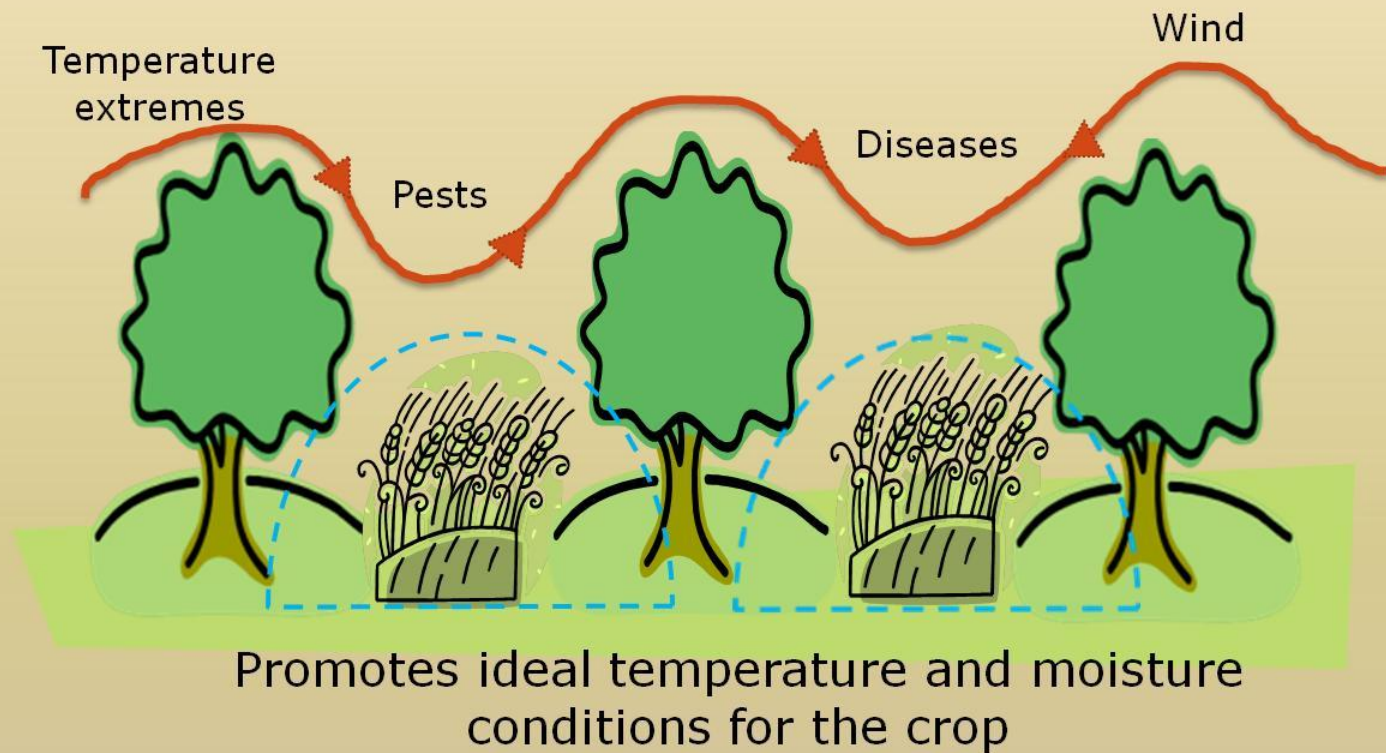


Tilling okay for annual crops

**No tillage**  
**Protect shallow tree roots**

# Alley Cropping

- Alley cropping creates a protected environment for the crops



# Allelopathy

- Allelopathy is the negative chemical interactions between plants

**Manzanita tree**



**Pine needles  
are very acid**



**The roots of black  
walnuts produce  
juglone**

# Alley cropping

## Trees

- Produce a commercially valuable product
- Fast growing
- Deep rooted
- No allelochemicals
- Growing season that complements the crop
- Produces wildlife benefits

## Crops

- Row/cereal and forage crops
- Fruits and other specialty crops
- Biomass producing crops



# Alley Cropping

<b>Plants for alley cropping</b>	<b>Main markets</b>
Black walnut	Wood, sometimes nuts
Pecan	Wood, nuts
Oaks	Wood, acorns for wildlife
Chestnuts	Nuts, blight resistant
Ash	Wood
Nut or fruit bearing shrubs	Hazelnut, pawpaw, blueberries



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# Want more information?

- Visit the Center for Agroforestry
  - University of Missouri

<http://www.centerforagroforestry.org/>



**THE CENTER FOR AGROFORESTRY**  
UNIVERSITY OF MISSOURI  
*A Global Center for Agroforestry, Entrepreneurship and the Environment*  
School of Natural Resources  
College of Agriculture, Food and Natural Resources

**Agroforestry  
Silvopasture**

**NEW & NOW**

- New UMCA Media Release: The Online Master's Program in Agroforestry**
- 3rd Annual Agroforestry Symposium is January 11, 2012**
- CSA News: Agroforestry, A Growing Science seeks to boost its practice**
- New Agroforestry in Action guide: Black Truffle Cultivation**
- New! Information about online graduate program**
- In the News: UMCA director discusses agroforestry**

The Center for Agroforestry at the University of Missouri, established in 1998, is one of the world's leading centers contributing to the science underlying agroforestry, the science and practice of intensive land-use management combining trees and/or shrubs with crops and/or livestock.

Agroforestry practices help landowners to diversify products, markets and farm income; improve soil and water quality; sequester carbon, and reduce erosion, non-point source pollution and damage due to flooding; and mitigate climate change.

The five integrated practices of agroforestry - forest farming, alley cropping, silvopasture, forest farming and windbreaks - enhance land and aquatic habitats for fish and wildlife and improve biodiversity while sustaining land resources for generations to come.

**Message from the Director**



Greetings from The Center for Agroforestry at the University of Missouri! As many of you know, the Center has...  
[Read full message >>](#)

# Want more information?

USDA-National Agroforestry Center	<a href="http://www.unl.edu/nac">http://www.unl.edu/nac</a>
USDA-Natural Resources Conservation Service	<a href="http://www.nrcs.usda.gov/">http://www.nrcs.usda.gov/</a>
US-Forest Service	<a href="http://www.fs.fed.us/">http://www.fs.fed.us/</a>
ATTRA	<a href="https://attra.ncat.org/attra-pub/summaries/summary.php?pub=62">https://attra.ncat.org/attra-pub/summaries/summary.php?pub=62</a>
Agricultural Marketing Resource Center (Ag MRC)	<a href="http://www.agmrc.org/commodities_products/forestry/">http://www.agmrc.org/commodities_products/forestry/</a>