

# Alley Cropping

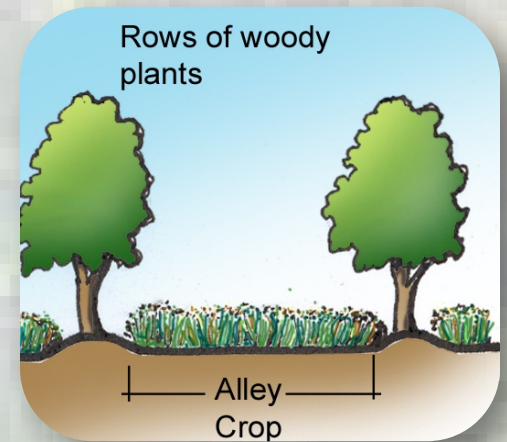
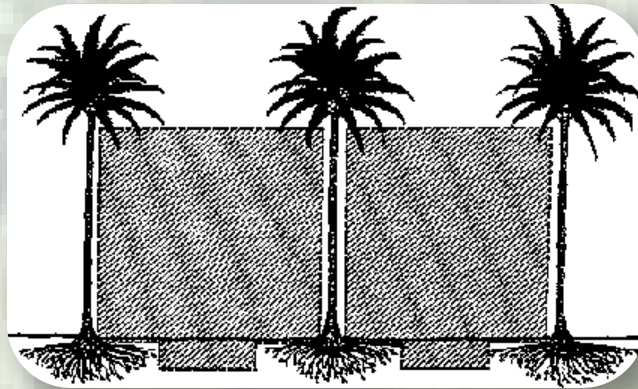
Agroforestry Workshop

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Corvallis, OR

# Presentation Objective

- Define Alley Cropping
- Describe the Benefits
- Explain the Basic Design Considerations
- Identify Potential Crops and Species



# Definition

Alley Cropping –

The planting of two or more sets of single or multiple rows of trees or shrubs at wide spacings, creating alleys within which agricultural, horticultural, or forage crops are cultivated.



# Benefits

- Diversify Farm Enterprise
- Reduce Erosion\*
- Improve Water Quality\*
- Protect Crops
- Enhance Wildlife
- Improve Aesthetics



# Benefits-Crop Diversity



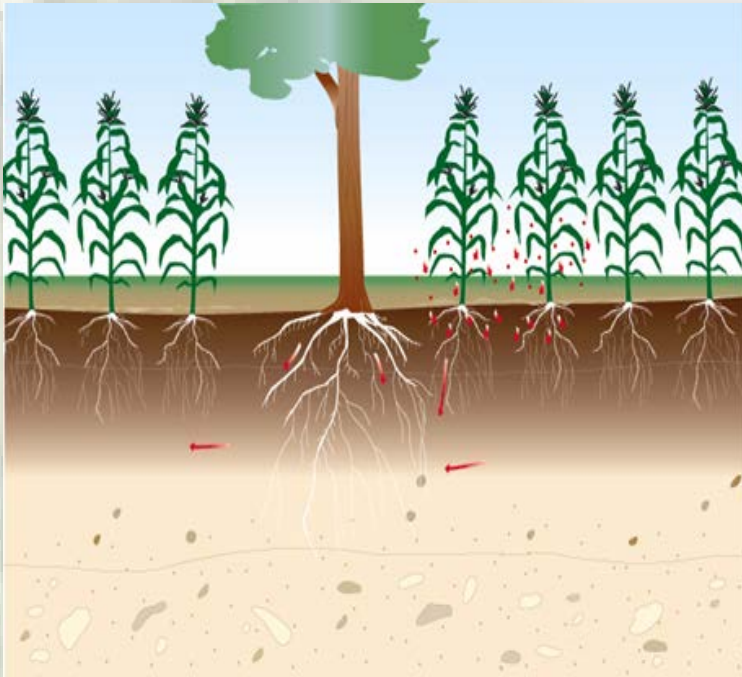
- Allows production of annual crops for needed cash flow while at the same time growing longer term woody investments
- Allows two annual crops to be grown on the same acreage such as a forage or row crop and nuts, fruits or wood
- Allows crop diversity which reduces risk

# Benefits-Microclimate Effect

- Improves the microenvironment to increase crop yields
- Protects alleyway crops from physical damage from winds or from soil particles blown into the plant tissue which bruises or degrades quality
- Reduces Evapo-transpiration



# Benefits-Improve Water Quality

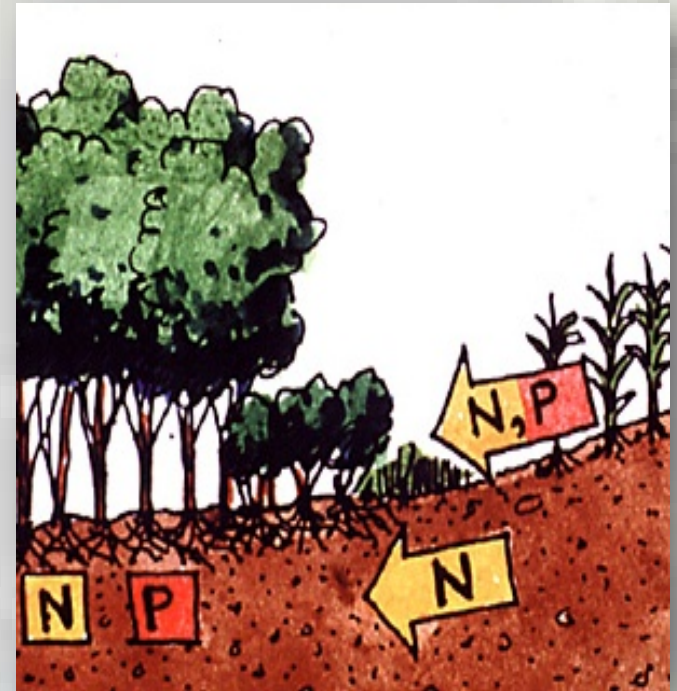


- Tree roots are generally deeper than crop roots
- Nutrients and chemicals that pass through crop root zone are intercepted by trees
- Nutrients are utilized by the trees and recycled back to the soil surface by leaf drop



# Benefits-Reduce Erosion & Improve Water Quality

- Trees planted on contour trap sediment and residue along with attached nutrients and chemicals
- Infiltration increases in tree rows decreasing overland flow and associated movement of soluble nutrients and chemicals off site
- Tree roots are generally deeper than crop roots
- Nutrients and chemicals that pass through crop root zone are intercepted by the woody plants
- Nutrients are utilized by the woody plants and recycled back to the soil surface





# Some Limitations

- Specialized equipment and skills for tree management
- Land removed from annual cropping
- Marketing infrastructure for tree product(s)
- Trees may be an obstacle to crop cultivation
- Trees may compete with crops
- Herbicide drift from crops to trees

# Functions

- Water Management
- Nutrient Cycling
- Soil Quality
- Microclimate Modification
- Pest Management

# Design Considerations

- Light requirement for the crop or forage to be grown in the alley way
- Root Competition between crops
- Type and size of the equipment being used
- Allelopathy

Tree Species	Shade Produced	Root Competition
Black walnut	Low	Low
Pecan	Medium	Medium
Oak	High	Medium
Pine	High	Medium-high



# Plant Selection

- Marketable
- Yields annual or periodic commercial product (wood, nuts or fruit)
- Appropriate shade for the alley crop
- Minimal roots at soil surface
- Adapted to site and soils
- Foliage residue does not interfere with alley crop
- Growth requirements complement alley crop



# Plant Selection - Trees

- Walnut
- Pecan
- Chestnut
- Pine
- Poplar
- Hazelnut/  
Filbert



# Plant Selection - Shrubs

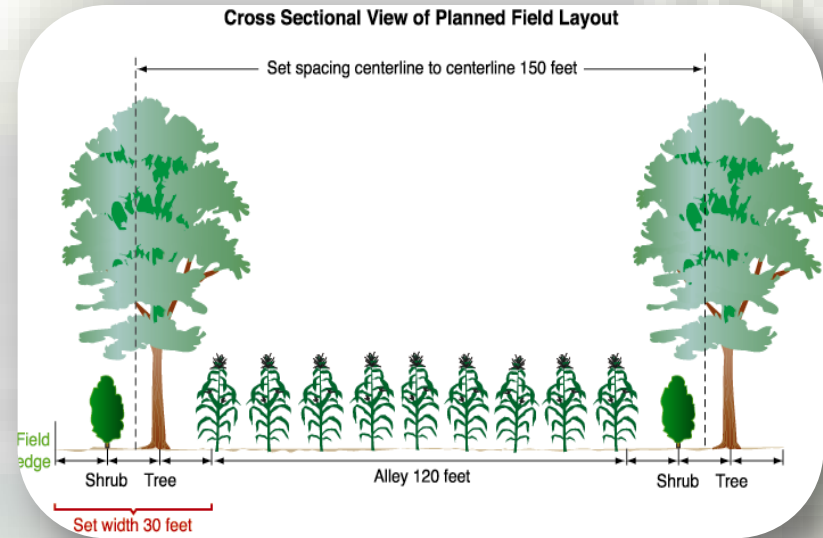
- Willow, dogwood (decorative florals)
- Chokecherry, highbush cranberry, currant, elderberry, saskatoon, gooseberry, sugar apple, pomegranate (fruits)





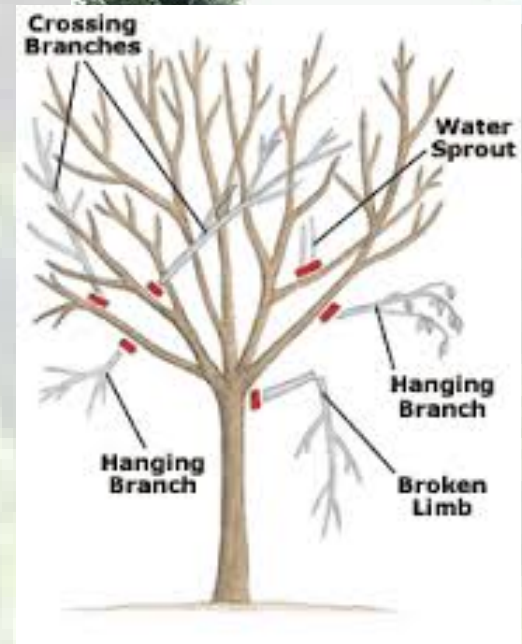
# Plant Selection – Alley Crops

- Row/cereal crops (corn, soybeans, milo, wheat)
- Forage crops (legumes, grasses)
- Specialty crops (vegetables, fruits, flowers, oregon grape, medicinals)
- Biomass (energy, feedstock)



# Operation & Maintenance

- Pest Management
- Nutrient Management
- Tree Canopy Management
- Periodic Tree Root Pruning
- Weed Control






# Economic Incentives

Hal Gordon will discuss this topic in detail

- NRCS financial assistance programs
- USFS programs
- SARE program





# Success Stories

<http://www.youtube.com/watch?v=b8Kwb5yInPM>

# Summary

- Alley Cropping needs to be part of an overall management system that may include one or more of the following:
  - Crop Rotation
  - Residue & Tillage Management
  - Integrated Pest Management
  - Nutrient Management
  - Buffer Practice(s)



# Summary

- Alley Cropping can help diversify the farm enterprise and beautify the landscape along with:
  - Protect the Soil Resource
  - Improve Air Quality
  - Improve/Protect Water Quality
  - Enhance Fish & Wildlife Habitat
  - Converse biodiversity





# Additional Resources

**National Agroforestry Center:**

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

**The Center for Agroforestry at the University of Missouri:**

<http://www.centerforagroforestry.org>

Alley Cropping: <http://www.centerforagroforestry.org/practices/ac.php>

**Alley Cropping video:**

<http://www.youtube.com/watch?v=b8Kwb5yInPM>

**Association for Temperate Agroforestry:**

<http://www.aftaweb.org/about/what-is-agroforestry/alley-cropping.html>

**Journal - The Overstory:**

<http://agroforestry.net/the-overstory>

**In Print:**

Garrett, H.E. (editor) 2009. North American Agroforestry: An Integrated Science and Practice (2<sup>nd</sup> Edition). American Society of Agronomy. pp. 133-162. (Chapter 7)

**From the United Kingdom:**

<http://www.agroforestry.co.uk/silvoar.html>

Manage Insects on Your Farm. <http://www.sare.org/publications/insect.htm>

**For additional information on the characteristics of individual forage species:**

Forages Vol. 1: An Introduction to Grassland Agriculture by Barnes, Miller, & Nelson, 1995, Iowa State University Press

Southern Forages by Ball, Hoveland, & Lacefield, 1991, Potash and Phosphate Institute Pasture

Management Guide for Northern Missouri by USDA NRCS, Ingalls, John J., 1998. From USDA SARE