Alley Cropping & Intercropping

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Presentation Outline

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

Alley Cropping

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

Alley Cropping Benefits

- Diversify Farm Enterprise
- Reduce Erosion
- Improve Water Quality
- Protect Crops
- Enhance Wildlife
- Improve Aesthetics
- Sequester Carbon

Intercropping

- Intercropping is a farming method that involves planting or growing more than one crop at the same time and on the same piece of land.

- It means having more than one type of crop growing in the same space at the same time.

Benefits of Intercropping

- Diversity and stability of fields.
- Reduction in chemical/fertilizer application.
- A complementary sharing of plant resources, such as Nitrogen from N fixing plants.
- Weed suppression, and a reduction in susceptibility to insects and disease.

Benefits of Crop Diversity in Alley Cropping

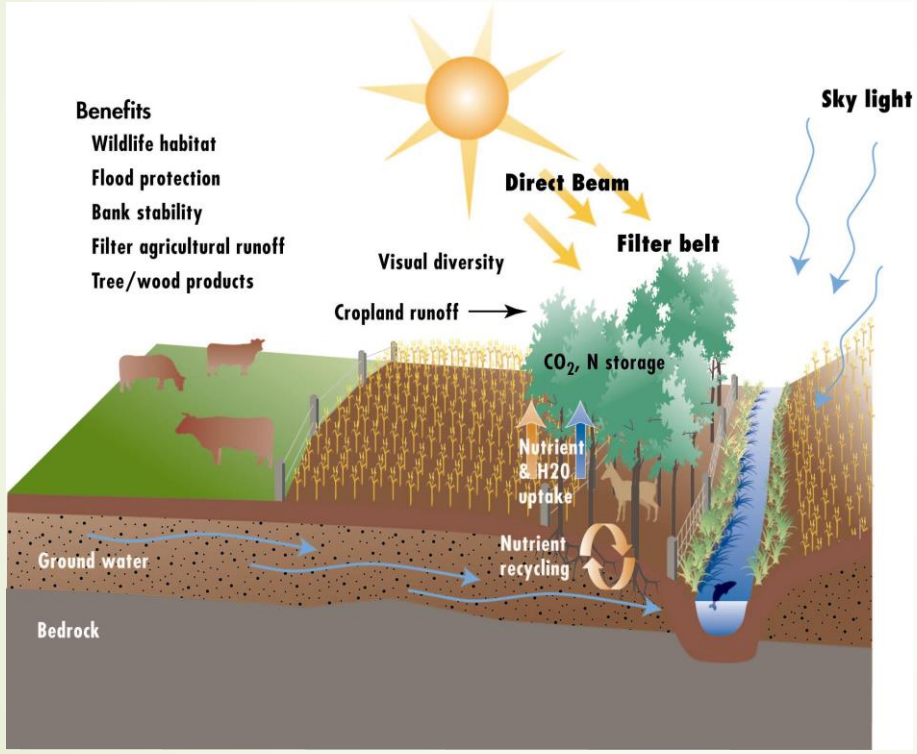
- Allows production of annual crops for needed cash flow while at the same time growing longer term woody investments
- Allows two annual crops to be grown on the same acreage such as a forage or row crop and nuts, fruits or wood
- Allows crop diversity which reduces risk

Benefits – Microclimate effects

- Improves the microenvironment to increase crop yields or forage quality and quantity
- 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

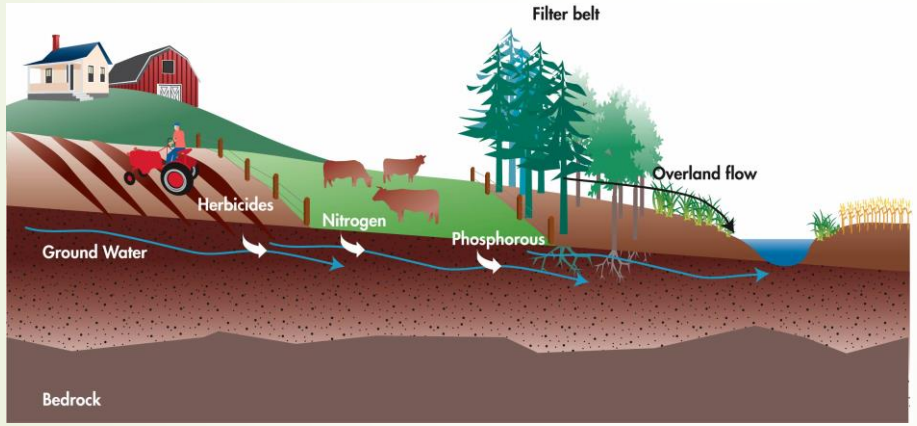
Black walnut with hay

Benefits Improving 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
- 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

Increases net carbon storage in the soil and vegetation

- Roots, crop residue, leaves and forage add to soil carbon
- Tree component adds to total potential carbon stored on site through long term sequestration in the above ground and below ground biomass

Provides or enhances wildlife habitat

- Provides food and cover through a diversity of plants
- Creates vertical habitat structure
- Improves pollinator foraging and nesting habitat
- Builds travel corridors for wildlife movement to connect to other food, cover, or water resources

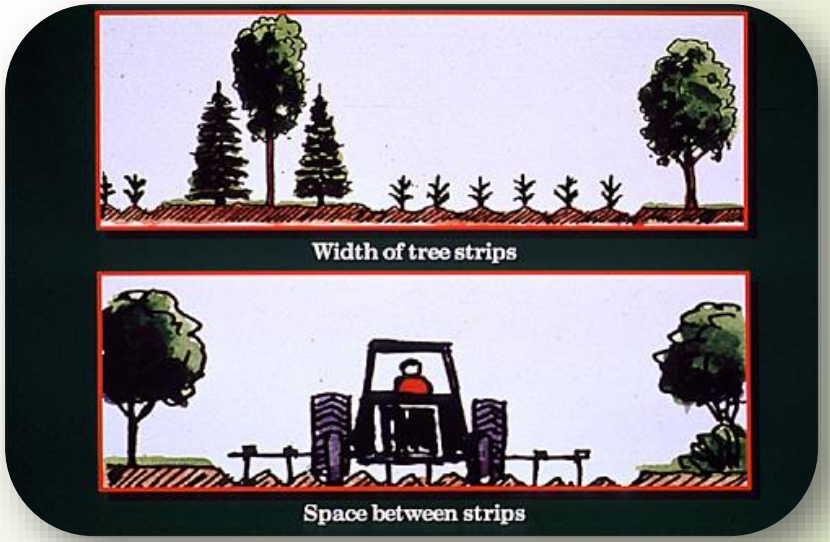
Some Limitations of Alley Cropping

- 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

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

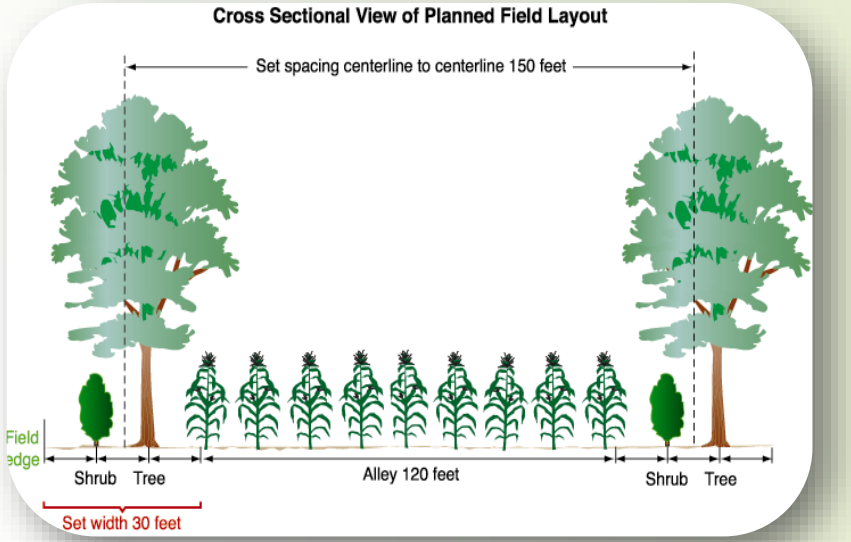
- Walnut
- Pecan
- Chestnut
- Pine
- Poplar
- Hazelnut/Filbert

Plant Selection - Shrubs

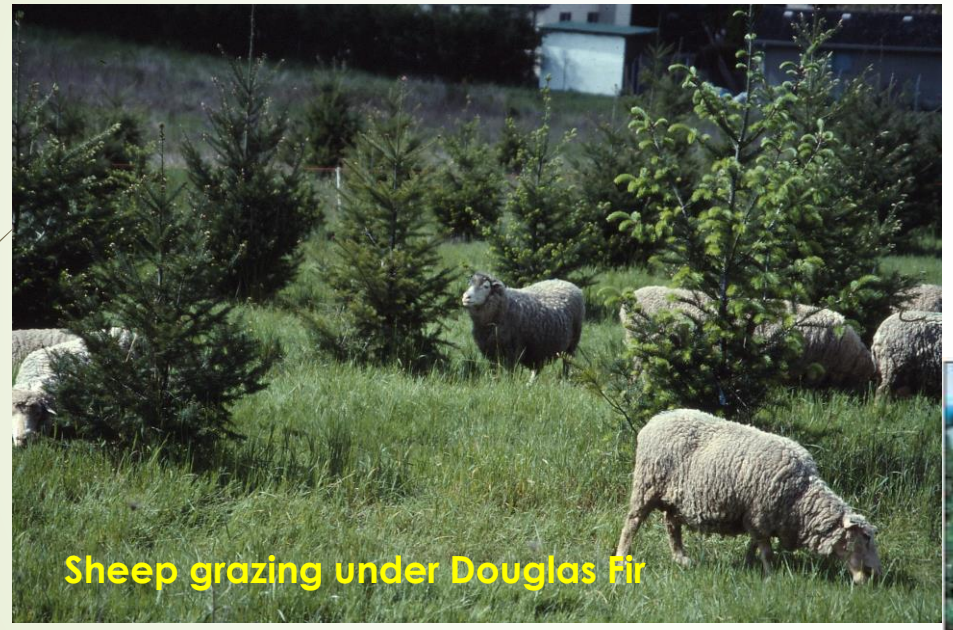
- Willow, dogwood (decorative florals)
- Chokecherry, highbush cranberry, currant, elderberry, saskatoon, gooseberry, sugar apple, pomegranate (fruits)

Plant Selection – Alley Crops

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



Plant Selection – Alley Crops


Sheep grazing under Douglas Fir


Weed control along tree rows

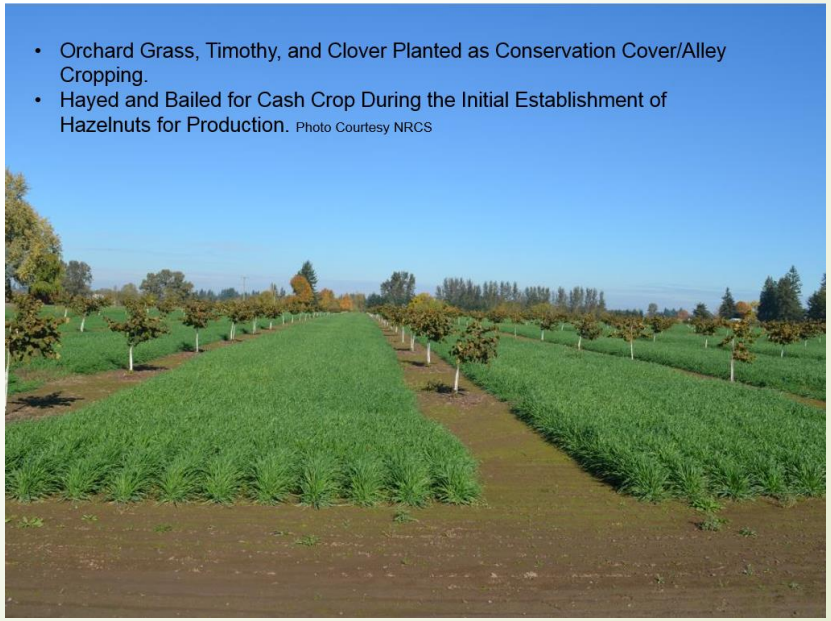
Oregon Hazelnuts

Raking fallen hazelnuts into rows under hundred-year-old trees at the Dorris Ranch, where Oregon's hazelnut industry began.

Hazelnut Maize Alley Cropping

Hazelnut Strawberry Alley Cropping

Hazelnut with Cover Crops

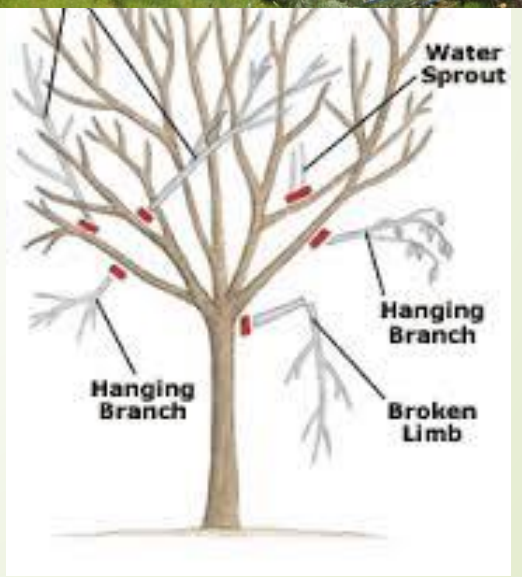


(Photo courtesy NRCS)

Pine-Grape Alley Cropping

Operation & Maintenance

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



Success Stories

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

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
  - Carbon sequestration


Pine and cotton


Lettuce intercrop followed with pumpkins

Acknowledgement

- Some of the materials for this presentation were taken from the following sources:
  - USDA National Agroforestry Center
  - USDA Natural Resources Conservation Service
  - University of Missouri, Center for Agroforestry

Additional Resources

National Agroforestry Center:

https://www.fs.usda.gov/nac/

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-croping.html

Journal - The Overstory:

http://agroforestry.net/the-overstory

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