Urban Agroforestry: How can agroforestry support urban agriculture?

NACD Urban and Community Webinar
June 21, 2018
Presentation Outline

What is agroforestry?

What can urban agroforestry look like?

Resources
What is Agroforestry?

The *intentional* integration of agriculture and forestry to create productive and sustainable farms, ranches, and woodlands.
Ecological benefits

- Improve soil health
- Improve water quality
- Improve air quality
- Provide wildlife habitat
- Support pollinators
- Grow renewable energy sources
Economic benefits

• Mitigates risk
• Increases crop yields & livestock production
• “Stacks” income: vertically and over time
• Produces salable products
• Provides value-added opportunities
• Increases property values
Social benefits

- Creates jobs and supports local communities
- Opportunities for learning and teaching
- Development of cooperatives for value added processing
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 Buffers for Urban Ag

- Filter runoff & stabilize streambanks
- Provide landscape and habitat connectivity
- Riparian forest buffers that produce something that can be harvested

Information Sheet: Why add edible and floral plants to riparian forest buffers?

Sprouting Hope Community Garden in Marion, VA
https://www.youtube.com/watch?v=Nq0-zA2tt8E
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.
Windbreaks and Hedgerows for Urban Ag

- Provide visual screen or noise buffer
- Create a Vegetative Environmental Barrier (VEB) to reduce dust, odor from adjacent land uses
- Minimize herbicide or pesticide drift
- Provide pollinator habitat to enhance pollination services
**Windbreaks and Hedgerows for Urban Ag**

- *Enhance crop yield and/or quality*

<table>
<thead>
<tr>
<th>Crop</th>
<th>Field Years</th>
<th>Percent Yield Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter Wheat</td>
<td>131</td>
<td>23</td>
</tr>
<tr>
<td>Barley</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td>Rye</td>
<td>39</td>
<td>19</td>
</tr>
<tr>
<td>Millet</td>
<td>18</td>
<td>44</td>
</tr>
<tr>
<td>Corn</td>
<td>209</td>
<td>12</td>
</tr>
<tr>
<td>Alfalfa</td>
<td>3</td>
<td>99</td>
</tr>
<tr>
<td>Hay (mixed grass &amp; legumes)</td>
<td>14</td>
<td>20</td>
</tr>
<tr>
<td>Soybeans</td>
<td>17</td>
<td>15</td>
</tr>
<tr>
<td>Spring Wheat</td>
<td>190</td>
<td>8</td>
</tr>
<tr>
<td>Crop</td>
<td>Response</td>
<td></td>
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<tr>
<td>-----------</td>
<td>----------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Broccoli</td>
<td>Increased leaf area</td>
<td></td>
</tr>
<tr>
<td>Pepper</td>
<td>Reduced bacterial spot; Improved yield in dry years; Larger plants; Earlier flowers; Greater yields</td>
<td></td>
</tr>
<tr>
<td>Potato</td>
<td>Earlier sprouting and ripening; Increased yield and quality</td>
<td></td>
</tr>
<tr>
<td>Snap bean</td>
<td>Reduced disease; Earlier ripening; Larger leaf area; Increased yield of marketable beans</td>
<td></td>
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<tr>
<td>Tomato</td>
<td>Reduced sandblast injury; less flower abortion; greater fruit set; Increased yield of high quality fruit</td>
<td></td>
</tr>
<tr>
<td>Cabbage</td>
<td>Greater yield and improved tenderness</td>
<td></td>
</tr>
<tr>
<td>Melon</td>
<td>Longer vines; Earlier flowering and fruit maturity; Increased yield</td>
<td></td>
</tr>
<tr>
<td>Carrot</td>
<td>Improved germination; Reduced sandblasting</td>
<td></td>
</tr>
<tr>
<td>Cucumber</td>
<td>Reduced vine damage; Increased yield</td>
<td></td>
</tr>
<tr>
<td>Lettuce</td>
<td>Reduced sandblast injury; Increased yield</td>
<td></td>
</tr>
<tr>
<td>Raspberry</td>
<td>Reduced desiccation of canes; Improved yields and fruit quality</td>
<td></td>
</tr>
<tr>
<td>Strawberry</td>
<td>Increased yields and fruit quality</td>
<td></td>
</tr>
<tr>
<td>Plum</td>
<td>Increased yield and more marketable fruit</td>
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</tr>
<tr>
<td>Anjou pear</td>
<td>Improved quality of fruit</td>
<td></td>
</tr>
<tr>
<td>Grape</td>
<td>Reduced desiccation of young vines; Improved growth rates and yields; Reduced leaf damage and rubbing of grape bunches; Improved quality</td>
<td></td>
</tr>
</tbody>
</table>
Silvopasture

Managing trees, livestock, and forage production on the same acreage.
Silvopasture for Urban Agriculture

- Provide shade to reduce heat stress
- Protect livestock from winter winds

Main Street Project: poultry & hazelnut systems

https://mainstreetproject.org/

Photos by Reginaldo Haslett-Marroquin
Forest Farming – Multistory Cropping

The intentional management of woodlands to produce non-timber products under a managed forest canopy.
Forest Farming for Urban Agriculture

• Use a wooded portion of land for production: fruit trees & shrubs, mushrooms, decorative woody florals, herbs

• Create a food forest: food production systems that use perennial plants combined with annuals in a multi-story cropping design

Photos by Catherine Bukowski [http://communityfoodforests.com/](http://communityfoodforests.com/)
Alley Cropping

Growing an annual or perennial crop simultaneously in the alley ways between rows of a long term tree crop.
Alley Cropping for Urban Agriculture

- *Enhance use of small land areas, using space both horizontally and vertically*
- *Add fruit and nut tree or shrub rows, with annual production in the alley*
- *Provide pollinator habitat among the rows of trees*
Agroforestry Can Enhance Urban Ag

Benefits of trees & shrubs:

• Fruit and nut products
• Food production services
• Air quality
• Extreme weather adaptation
Adapt to Extreme Weather

Image by the Denver Post
Adapt to Extreme Weather

- Deep rooted trees and shrubs offer resilience to droughts and floods.
  Garrett 2009
Mitigate Urban Heat Islands

- Peak air temperatures in tree groves are 9°F (5°C) cooler  
  EPA 2013

- A 1% increase in urban forest canopy can reduce max temps down 0.07-0.36°F  
  Nowak et al. 1996
Mitigate Flooding

- Forest and tree cover can intercept rainfall, increase the amount of that rain that filters into the ground, and reduce the quantity, speed, and peak flows of runoff.
- Tree plantings can have positive effects at a watershed scale, even if trees are established in narrow strips along uplands or riparian areas.

The map shows percent increases in the amount of precipitation falling in very heavy events (defined as the heaviest 1% of all daily events) from 1958 to 2012 for each region of the continental United States.

Source: National Climate Assessment 2014
http://1.usa.gov/2OJ0adv
Resources

- More information on agroforestry
- Free publications for use in workshops
- Webinar library

Questions?

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

To receive quarterly email updates: http://eepurl.com/4HKB1
To join our (paper) mailing list: email kdmacfarland@fs.fed.us

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