Opportunities and challenges to the adoption and expansion of silvopasturing in the Northeast

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Agroforestry simply stated is:
The incorporation of trees with other plants or livestock to achieve *economic benefits* and *environmental services*

It's been around a long time:

*TREE CROPS: A PERMANENT AGRICULTURE* (1929)

*by J. Russell Smith*

Faidherbia spp intercropping in Africa

Improved fallows

Non timber forest products
The landscape continuum

- Short Rotation Woody Crops
- Riparian Forest Bioenergy Buffer
- Windbreaks
- Silvopasture
- Forest Farming
- Alley Cropping
Agroforestry is happening out there!

- FY2008-2010 - $27 million obligated for agroforestry

NRCS Reported Practices for All Plans, Land Uses, and Programs

<table>
<thead>
<tr>
<th>NRCS Conservation Practices</th>
<th>Applied</th>
<th>Number</th>
<th>%CSP</th>
<th>%EQIP</th>
<th>%CRP</th>
<th>%WHIP</th>
<th>%OTHER</th>
<th>%CTA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alley Cropping (ac)</td>
<td>553</td>
<td>132</td>
<td>0.0</td>
<td>65.9</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>34.1</td>
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<td>Multi-Story Cropping (ac)</td>
<td>228</td>
<td>49</td>
<td>0.0</td>
<td>87.8</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
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</tr>
<tr>
<td>Riparian Forest Buffer (ac)</td>
<td>124,748</td>
<td>13,036</td>
<td>0.0</td>
<td>6.2</td>
<td>69.3</td>
<td>1.3</td>
<td>3.7</td>
<td>19.5</td>
</tr>
<tr>
<td>Silvopasture Establishment (ac)</td>
<td>1,377</td>
<td>44</td>
<td>2.3</td>
<td>80.0</td>
<td>0.0</td>
<td>0.0</td>
<td>9.1</td>
<td>15.9</td>
</tr>
<tr>
<td>Windbreak/Shelterbelt Establishment (ft)</td>
<td>21,811,497</td>
<td>10,867</td>
<td>2.3</td>
<td>29.4</td>
<td>42.2</td>
<td>3.5</td>
<td>2.3</td>
<td>22.6</td>
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</tbody>
</table>

Source: Performance Results System (PRS) NRCS Summary of Conservation Practice (Applied and reported practices)
Opportunities for Agroforestry

• *Small farms and forests* need agroforestry specialty crops as a source of income -- it is difficult for them to compete in the commodity markets.

• *Large farms* need agroforestry technologies developed to provide environmental services that complement economic returns - commodity farming is challenged by the agriculture/community interface.
Small Farms Opportunities
Agroforestry Specialty Crops

But does it pay?
Agroforestry for large farms

Buffers

• Odor abatement
• Energy savings

Windbreaks
Different intercropping systems

Timber and hay
Production

Timber and switchgrass

Timber and willow
Silvopasture for large and small landholdings
Does silvopasture pay?

• Need to show complementarity
  – Complementarity rather than compete for resources already been used

• Interactions of trees/livestock elements critical

• More complicated than annual crops
  – Comparison and field trials hard to devise
  – Time period to measure results
    • More than one production period
Costs and benefits of agroforestry

In all cases:

• Costs:
  – Lost growing area (opportunity cost of land)
  – Opportunity costs of labor
  – Capital investments
  – Time value of money
  – Lack of experience

• Benefits:
  – Income, product diversification,
  – Environmental services, e.g., carbon, water and biodiversity

• Risks (given by discount rate)
Silvopasture benefits

- Dropping “nutrients”
- Extended cool season
- Cow comfort “shade”
- Improved forage
- Improved cattle performance
- Reduced fire hazards
- Control understory vegetation

More products (diversity):

- Multiple wood products, Non timber forest products, hunting leases, forage, meat, dairy, carbon

Lots of idle marginal land
Issues to consider

• Two options:
  – Trees on pasture
    • Establishment costs (fencing) and maintenance
  – Thinning forests
    • Long term forest management/regeneration
• Tree density and timber rotation
• Incentive payments
• What about sustainability?
• Additional benefits
<table>
<thead>
<tr>
<th>Year</th>
<th>Activity</th>
<th>Cost  $/acre</th>
<th>Revenue $/acre</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>Establishment</td>
<td>77.73</td>
<td></td>
</tr>
<tr>
<td>0 to 30</td>
<td>Land Rent</td>
<td>52.50</td>
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<tr>
<td>1 to 30</td>
<td>Management</td>
<td>159.19</td>
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<tr>
<td>2, 12, 22</td>
<td>Cow Purchase</td>
<td>179.46</td>
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<tr>
<td>12, 22</td>
<td>Cow Sales</td>
<td></td>
<td>134.59</td>
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<tr>
<td>2 to 30</td>
<td>Supplemental Feed</td>
<td>21.60</td>
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</tr>
<tr>
<td>2 to 30</td>
<td>Animal Maintenance</td>
<td>5.40</td>
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<tr>
<td>3 to 30</td>
<td>Steer/Heifer Sales</td>
<td></td>
<td>234.75</td>
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<tr>
<td>4 to 30</td>
<td>Prescribed Burning</td>
<td>13.25</td>
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<tr>
<td>4 to 30</td>
<td>Hunting Leases</td>
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<td>4.89</td>
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<tr>
<td>Every 5 Years</td>
<td>Bull Purchase</td>
<td>12.29</td>
<td></td>
</tr>
<tr>
<td>Every 5 Years</td>
<td>Bull Sales</td>
<td></td>
<td>7.12</td>
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<tr>
<td>10, 14, 18, 22, 26, 30</td>
<td>Pine Straw</td>
<td>1.50</td>
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<tr>
<td>15</td>
<td>Thinning</td>
<td></td>
<td>152.28</td>
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<tr>
<td>15</td>
<td>Pruning</td>
<td></td>
<td>38.08</td>
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<tr>
<td>20</td>
<td>Thinning</td>
<td></td>
<td>66.42</td>
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<tr>
<td>20</td>
<td>Pruning</td>
<td></td>
<td>23.63</td>
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<tr>
<td>25</td>
<td>Thinning</td>
<td></td>
<td>501.65</td>
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<tr>
<td>25</td>
<td>Pruning</td>
<td></td>
<td>16.15</td>
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<tr>
<td>30</td>
<td>Harvest</td>
<td></td>
<td>2,352.23</td>
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</table>

Grado and Husak 2004
Financial analysis
- Equal Annual Income (EAI)

<table>
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<tr>
<th></th>
<th>EAI</th>
<th>EAI</th>
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<tbody>
<tr>
<td></td>
<td>$/acre at 5%</td>
<td>$/acre at 9%</td>
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<tr>
<td>Silvopasture</td>
<td>62.66</td>
<td>37.06</td>
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<tr>
<td>Soybeans</td>
<td>52.50</td>
<td>50.58</td>
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<tr>
<td>Rice</td>
<td>47.60</td>
<td>45.85</td>
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<tr>
<td>Cattle</td>
<td>56.35</td>
<td>55.76</td>
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<tr>
<td>Pine Plantation</td>
<td>64.22</td>
<td>29.90</td>
</tr>
</tbody>
</table>

Grado and Husak 2004

- Didn’t account for pine straw, hunting leases, and other environmental benefits like carbon
- Periodic income and output diversity
Factors affecting awareness and adoption

- Early innovators
- Acceptability
  - Status in society, fear, stigma, conformity
  - Livelihood perspective - risk aversion
- Learning/knowledge
  - Information transfer (extension, trust)
  - Let other make mistakes
- Feasibility (investment capability, legal)
- Economic incentives (profitability)
Agroforestry Extension Programming

Cluster Size

Non-Adopters

Specialty Crop Production

Timber-Related Practices

Livestock-Related Practices

Strong and Jacobson 2005
Cluster 2: Progressive Livestock Manager

Interest in Agroforestry

- Silvopasture
- Windbreaks, Riparian Buffers
- NTFP, CTM

Benefits

- Environmental (Production and Conservation)

Obstacles

- Access to Information (Technical, Marketing)
- Economic Compatibility
Extension and outreach

• Three Potential Scenarios
  – Timber-Related Practices
  – Livestock-Related Practices
  – Specialty Crop, Small-Scale Intensive Practices

• Each one reaches a different audience and requires different collaborators
Demonstrations and research

“Need to see it done”
How can we make these systems work?

- Supportive policies
- Extension Outreach
- Biophysical Research
- Sustainable Productive Landscapes
- Landowner adoption
There is momentum!

USDA
- All lands
- Interagency team

2012 Farm Bill

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