Afforestation Adoption by Eastern U.S. Cattle Producers

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Afforestation Adoption by Eastern U.S. Cattlers

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Background

- Agriculture is responsible for about 8% of total US GHG emissions and is the largest contributor to US nitrous oxide and methane emissions.
- Livestock are the largest source of methane emissions in the agricultural sector.
- Cattle account for about 75% of these emissions.
- Beef cattle production is responsible for approximately 2.2% of all US GHG emissions.

One means by which GHG emissions from farmlands can be reduced is through the conversion of bare or cultivated land into forest. Research suggests that afforestation can be an important component of a broader portfolio designed to offset carbon emissions from agriculture. In some agroecosystems, afforestation has the potential to sequester more carbon than other pastures and range/management practices.

What is afforestation?

Afforestation is the conversion of bare or cultivated land into forest. For example, afforestation can occur by converting marginal pasture or cropland to fast growing trees or to native species. There are a variety of programs that pay landowners to convert pasture or cropland to forest to remove carbon, a greenhouse gas, from the atmosphere. These programs typically prohibit landowners from harvesting the trees, including thinning, for a certain period of time. While these programs allow trees to be sustainably harvested at the end of the program period, they may discourage the forest product that is harvested from being burned or turned into fuel to prevent the release of the carbon stored in trees back into the environment.

How might afforestation benefit landowners?

- By enhancing potential wildlife habitat which could provide hunting and wildlife viewing opportunities,
- Providing a buffer from surrounding landscapes,
- Producing fast-growing trees on marginal lands.

What would landowners need to do to afforest their land?

Before afforestation: Propose the idea (remove competing vegetation, prepare seedbed-mowing, till, and apply herbicide application).
- Plant (a) tree species (plains, labor for plant, shelves and mats, shipping and handling, hand planting vs. mechanical planting).

Afforestation maintenance:
- Maintain the stand (weeding, mowing, herbicide application, fertilizing, hedge control).
- Resist tree losses (account for minimum survival rate in trees per area).
- Have tree growth monitored periodically.
- Keep records of forest maintenance.
- At the end of the program, either maintain the stand or limit harvest to sustainable methods.

Study Objectives

This research examines the factors, including an annual incentive, that influence the adoption or expansion of afforestation on beef cattle farms east of the 100th meridian. The research also examines differences in attitudes and expectations about afforestation across respondents’ interest in adopting an afforestation program.

The hypothetical afforestation program examined here requires stand maintenance, replanting, periodic monitoring by a third party, record keeping, and the use of sustainable harvest methods at the end of the proposed program. Land owners are offered an afforestation plan to cover establishment costs (72%), as well as annual payments ($60, $90, $120, $150, or $180 per acre) over 10 years.

Research Methods

- 2013 mail survey of cattle farmers east of the 100th meridian.
- A total of 8,873 farmers were randomly surveyed
- Response rate was 28%.

Results

A triple hurdle model linking INTEREST, ACCEPT, and ACS is estimated using the CMP program in STATA.

Figure 1. Area Surveyed East of the 100th Meridian

Costs Estimates (by region) for the Establishment and Maintenance of Afforested Land

<table>
<thead>
<tr>
<th>Region</th>
<th>Establishment Costs/Acre</th>
<th>Maintenance Costs/Acre</th>
<th>Maintenance Costs/Acre (Eng. or Farm 3-10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appalachia</td>
<td>$300</td>
<td>84</td>
<td>49</td>
</tr>
<tr>
<td>Corn Belt</td>
<td>$304</td>
<td>87</td>
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<tr>
<td>Ohio</td>
<td>$305</td>
<td>84</td>
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<tr>
<td>Lake</td>
<td>$303</td>
<td>87</td>
<td>49</td>
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<tr>
<td>Northeast</td>
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<td>Northern Plains</td>
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<tr>
<td>Southeast</td>
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<td>116</td>
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</tr>
<tr>
<td>Southern Plains</td>
<td>$302</td>
<td>82</td>
<td>49</td>
</tr>
</tbody>
</table>

*The example fast growing woody crop is hybrid poplar for all regions but the Southwest which is pine. Based on US Billion Tree Fund (Oak Ridge National Laboratory 2008).
- Forest establishment costs include cuttings, plantings, machinery, fertilizer, and chemicals. Maintenance costs in year 2 include cultivation, fertilize, and herbicide. Maintenance costs in years 3 to 10 include cultivation and fertilize.

Conclusions

Findings suggest that just under 16% of farmers would be interested in adopting afforestation and enrolling an average of about 80 acres per farm. Respondents operating larger farms tended to be more interested in adoption and were more willing to accept the incentive offered than those with smaller farms. Acceptance rates also varied across geographic regions. An incentive would have a positive influence on likelihood of participating and a positive influence on acreage converted among smaller farms. Interestingly, farmers planning to pass the farm on to family members or others were more likely to adopt. This finding could indicate that farmers may view placing land in an afforestation program as a way to increase the value of land over time for the next generation.

Expected outcomes from afforestation included:
- Improved wildlife habitat
- Improved water quality
- Reduced soil erosion
- Increased supplemental feed costs.

For each outcome those who were interested in adopting afforestation believed the outcome to be more likely than those not willing to adopt.

Attitudes About Afforestation

- Most important influences on decision to participate:
  - Investment cost
  - Paperwork
  - Per acre payment
  - Labor time
  - Limitations on end use of timber harvested

In each case those interested in an afforestation program had a statistically higher importance rating on each factor than those not interested, except for attitudes of friends/farmers toward afforestation.

Farms that were interested in adopting and would accept the incentive offer, would convert, on average, 60.29 acres (N=229). The median acres to be converted is 32 acres.

Figure 1. Area Surveyed East of the 100th Meridian

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