Value of Environmental Monitoring Information in Oklahoma Agriculture: A Research Perspective

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BACKGROUND

- Agricultural production covers around 78% of Oklahoma’s total state area
- The 2006 drought cost the state’s economy over $500 million from lost crop production alone (Sutherland & Crawford 2006), while the 2011 drought caused an additional loss of $1.6 billion (Stotts 2011)
- With the anticipated population growth in Oklahoma, extreme weather events will be more important to address and monitor
- The statewide weather monitoring network - Oklahoma Mesonet is a valuable tool for obtaining accurate and comprehensive environmental monitoring information
- Impacts of Mesonet information on farming decision and economic and environmental savings (and prevented losses) in agriculture generated by Oklahoma Mesonet has not been studied enough
- Comprehensive quantitative evaluations on the value of information towards agriculture are missing

RESEARCH OBJECTIVE

The main research objective is to provide a quantitative evaluation of environmental monitoring information generated by Oklahoma Mesonet to farmers in the state

The following sub-objects will help us achieve this goal:
- Define cognitive-motivational variables determining planting, growing, harvesting, and management decisions
- Provide a quantifiable measurement of benefits resulting from the application of environmental monitoring information generated by the Oklahoma Mesonet
- Analyze possible trends and differences and/or similarities in farmers’ willingness to pay for environmental monitoring information on staple and specialty crop farms

OKLAHOMA MESONET

- The Oklahoma Mesonet consists of 120 automated stations across the state (with at least one Mesonet station in each of Oklahoma’s 77 counties)
- Information provided through Mesonet observations is used by farmers to improve their decision making and generate economic benefits resulting from optimized application of production/input factors and resource conservation
- Oklahoma is the ideal location for evaluating benefits of a mesoscale network because of variability in weather and agricultural enterprises (Kenkel & Norris 1995)

COMMODITY HARVESTED ACRES PRODUCTION VALUE

<table>
<thead>
<tr>
<th>COMMODITY</th>
<th>HARVESTED ACRES</th>
<th>PRODUCTION VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hay</td>
<td>3,590,000</td>
<td>$629,125,000</td>
</tr>
<tr>
<td>Wheat</td>
<td>5,300,000</td>
<td>$307,020,000</td>
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<tr>
<td>Corn</td>
<td>320,000</td>
<td>$174,783,000</td>
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<tr>
<td>Soybeans</td>
<td>365,000</td>
<td>$201,921,000</td>
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<tr>
<td>Cotton</td>
<td>240,000</td>
<td>$73,649,000</td>
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<tr>
<td>Sorghum</td>
<td>370,000</td>
<td>$64,649,000</td>
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<tr>
<td>Canola</td>
<td>270,000</td>
<td>$14,415,000</td>
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<tr>
<td>Pecans</td>
<td>12,000</td>
<td>$11,660,000</td>
</tr>
<tr>
<td>Rye</td>
<td>240,000</td>
<td>$5,841,000</td>
</tr>
<tr>
<td>Peanuts</td>
<td>12,000</td>
<td>$13,904,000</td>
</tr>
</tbody>
</table>

EXPECTED RESULTS

- Farmers use Mesonet to optimize application of fertilizers, pesticides, water resources and other production input factors, as well as planting and harvesting times
- The application of Mesonet information can boost farmers economic and environmental cost savings and prevent potential losses/expenses
- A strong correlation between farmers’ WTP and production outcomes, farm revenue, and production expenses can be expected
- Variations in WTP will result from the type of the specific Mesonet Agricultural Advisor Tool applied on farms, farm size, crop type, irrigation system, weather changes, socio-economic conditions in different Oklahoma regions, and demographics
- The value of Mesonet information is anticipated to be higher, the higher the reliance on the environmental monitoring information

METHODS

- Surveys with farmers of conventional crops (wheat, corn, soybeans) and specialized crops (pecans, peanuts, peaches, watermelons) will be conducted
- Crops budgets and statistical data from NASS and USDA will be used to quantify the value of Mesonet information with a time series analysis for 2004-2014
- A multivariate statistical analysis will be conducted to determine causal effects and relationships between the input and output variables
- Contingent valuation method (CVM) will be applied to estimate the willingness to pay (WTP) for the information generated by the Mesonet network

REFERENCES

- Stotts D. 2011. Oklahoma gricultural losses from drought more than $1.6 billion. Oklahoma Water Resources Center. OSU
- Sutherland A.; Crawford K. 2006. Drought severe in NW Oklahoma. Agweather Connection 18(3)

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