POTENTIAL USEFULNESS OF CLIMATE FORECASTS AND AGRO-CLIMATE FOR AGRICULTURE IN SOUTH CAROLINA

Michael S. Perkins, Clemson University
Scott R. Templeton, Clemson University
Heather A. Dinon, North Carolina State University
Bridget R. Lassiter, North Carolina State University
Jessica Whitehead, South and North Carolina Sea Grant

Presentation
Session 1: Managing Risks to Agriculture – A World Perspective
Local to Regional Adaptation and Mitigation Strategies
Climate Information for Managing Risks
May 26, 2011
INTRODUCTION

- Simulations indicate that seasonal climate forecasts can be beneficial to farmers in the southeastern U.S.
- Farmers and extension agents in the Southeast are interested in information about climate variability.
- The Southeast Climate Consortium (SECC) has developed online decision-support tools that incorporate seasonal climate information to reduce risks of climate variability for farmers and others.
  - The tools are available in Agro-Climate.
- Two decision-support tools became operational for South Carolina by Sept. 2010.
**Climate Risk**

### Average and Deviation

<table>
<thead>
<tr>
<th></th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>1.6</td>
<td>1.5</td>
<td>2</td>
<td>2</td>
<td>3.5</td>
<td>6.1</td>
<td>7.1</td>
<td>6</td>
<td>5.3</td>
<td>3.4</td>
<td>1.6</td>
<td>1.5</td>
<td>41.6</td>
</tr>
<tr>
<td>Deviation</td>
<td>-0.6</td>
<td>-1.2</td>
<td>-1.4</td>
<td>-0.2</td>
<td>0</td>
<td>-1.2</td>
<td>-0.3</td>
<td>-0.6</td>
<td>-0.5</td>
<td>0.2</td>
<td>-0.4</td>
<td>-0.8</td>
<td>-7</td>
</tr>
</tbody>
</table>

### Total Rainfall

![Total Rainfall Chart](chart.png)

- **Graph All**
**County Yield Database**

**USDA-NASS(lbs/acre) for selected County(ies).**

<table>
<thead>
<tr>
<th></th>
<th>Neutral</th>
<th>El Niño</th>
<th>La Niña</th>
<th>All Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>679.4</td>
<td>526.6</td>
<td>550.3</td>
<td>616.2</td>
</tr>
<tr>
<td>St.Dev.</td>
<td>183.1</td>
<td>132.1</td>
<td>163.4</td>
<td>181.5</td>
</tr>
<tr>
<td>Minimum</td>
<td>334</td>
<td>278</td>
<td>383</td>
<td>278</td>
</tr>
<tr>
<td>Maximum</td>
<td>1016</td>
<td>726</td>
<td>823</td>
<td>1016</td>
</tr>
<tr>
<td>Median</td>
<td>733</td>
<td>541</td>
<td>691</td>
<td>595</td>
</tr>
</tbody>
</table>

Click on graphs or table to see details.
EIGHT NEW DECISION-SUPPORT TOOLS IN AGRO-CLIMATE FOR SOUTH CAROLINA

• Four other decision-support tools became operational before Jan. 14, 2011, when the first workshop in SC on Agro-Climate was held.
  • Regional Yield Maps
  • Lawn and Garden Moisture Index – Monitoring
  • Lawn and Garden Moisture Index – Forecast
  • Chill Accumulation

• Four additional decision-support tools were implemented after Jan. 14 but before April 2011:
  • Heating degree days
  • Cooling degree days
  • Agricultural reference index for drought
  • Keetch-Byram drought index maps.
RESEARCH QUESTIONS

Given the recent availability of these decision-support tools in SC, we asked the following questions:

1) Which of the tools are most useful for extension agents in South Carolina?
2) Which tools are most useful for farmers in South Carolina?
3) What new decision-support tool would be useful for extension agents or farmers in South Carolina?
4) To what extent do extension agents distinguish weather forecasts from climate forecasts?
5) To what extent are farmers interested in climate forecasts?

6) To what extent do extension personnel want to provide climate forecasts to growers?

7) Which type of forecast could be useful for extension personnel?

8) Which agricultural activities could farmers improve through the use of climate forecasts?

9) For which economic consequence of farm management are climate forecasts most useful?
METHODS: FOCUS GROUP RECRUITMENT

• Focus group participants were recruited from people who attended the first workshop in South Carolina on Agro-Climate.
• Workshop was held on Jan. 14, 2011 at Clemson University’s Pee Dee Research and Education Center.
• Each workshop attendee was provided a free lunch.
• Each workshop attendee had the opportunity to earn, free of charge, four Certified Crop Advisor (CCA) Continuing Education Units (CEUs) for the workshop. Seven did.
• Twenty two workshop attendees received
  • 50 min. of instruction about climate in South Carolina from State Climatologist Hope Mizzell and then
  • 75 min. of instruction from Florida’s Climate Extension Specialist Clyde Fraisse about Agro-Climate and its decision-support tools.
• The workshop’s agenda clearly indicated a focus group activity after the pre-lunch instruction.
• Workshop attendees were not required to participate in focus group.
METHODS: FOCUS GROUP ACTIVITIES

- Two focus groups were conducted for 60 min.
- Each focus group had nine pre-assigned participants:
  - three extension agents,
  - two experiment-station or ARS, USDA researchers,
  - one farmer,
  - one private crop consultant, and
  - two others, such as, a crop loan specialist or another private consultant, extension agent, or researcher.

- Participants were asked to discuss these questions:
  1. How useful is the information in Agro-Climate?
  2. Which three decision-support tools in Agro-Climate would be most useful to extension agents?
  3. Which three decision-support tools in Agro-Climate would be most useful to farmers?
  4. What is missing? What new decision-support tool should be developed?
METHODS: SURVEY CONTENTS, ENDORSEMENT, AND POPULATION

- Survey from North Carolina State University was adapted for conditions in South Carolina, simplified, and reorganized.
- Experiment Station and Extension Directors endorsed the survey and provided contact information about extension personnel.
- Survey population consisted of 159 permanent and 14 temporary employees who were extension associates, agents, or specialists for Clemson University.
METHODS: SURVEY ADMINISTRATION

• A preview of the upcoming survey was sent through email two weeks before the invitation to participate.
• An invitation to participate in the survey was sent by the survey director through email one week before the Agro-Climate workshop.
• A follow-up request to complete the survey was sent by the Experiment Station and Extension Directors three weeks after the initial invitation to all who had not attended the workshop.
• A final request to complete the survey was sent by the survey director four weeks after the initial invitation to all who had not attended the workshop.
• 50 people, or 29 percent of the survey population, provided responses.
FOCUS GROUP RESULTS
Which tools are most useful for extension agents in South Carolina?

1) County Yield Database
2) Climate Risk
3) Agricultural Reference Index for Drought
Which tools are most useful for farmers in South Carolina?

1) Climate Risk
2) Yield Risk Forecast
3) County Yield Database
What new decision-support tool would be useful for extension agents or farmers in South Carolina?

1) Irrigation Scheduler
2) Advisories as Smart Phone Applications
To what extent do extension personnel distinguish weather forecasts from climate forecasts?

In my opinion, a weather forecast is for...

26% of the reported time periods to which weather forecasts apply exceed 2 weeks.
To what extent do extension personnel distinguish weather forecasts from climate forecasts?

In my opinion, a climate forecast is for...

- 20% of the reported time periods to which climate forecasts apply are less than 2 weeks.
To what extent are farmers interested in climate forecasts?

In my opinion, growers and producers (including forest owners, livestock producers, etc.) in my region are interested in using climate forecasts.

- 6% Strongly Agree
- 24% Agree
- 20% Neither agree nor disagree
- 50% Disagree
- 6% Strongly Disagree
To what extent do extension personnel want to provide climate forecasts to growers?

I would like to be able to provide climate forecasts to growers in my area of responsibility.

- Strongly Agree: 20%
- Agree: 49%
- Neither agree nor disagree: 29%
- Disagree: 2%
- Strongly Disagree: 2%
Which type of forecast could be useful for extension personnel?

5 Most Frequently Mentioned:
1. Freeze Alert
2. Plant Moisture Stress
3. El Niño/La Niña Nina Phase
4. Growing Degree Days
5. Chill Hours Accumulation
Which agricultural activities could farmers improve through the use of climate forecasts?

- Irrigation management: 70%
- Planting schedules: 60%
- Harvest planning: 60%
- Allocation of land to crops or activities: 50%
- Variety or crop selection: 50%

People I work with can use climate forecasts to improve…
Which agricultural activities could farmers improve through the use of climate forecasts?

If they had better climate forecast information, crop growers could improve...

- Irrigation planning
- Planting dates
- Variety selection
- Land allocation
- Purchases
For which economic consequence of farm management are climate forecasts most useful?

People I work with would be able to use climate forecasts to...

- Reduce the risk of economic losses: 80%
- Increase their profitability: 50%
- Reduce expenditures: 40%
- Modify insurance coverage: 40%
- Take greater advantage of market changes: 40%
Discussion

- Focus group feedback and survey responses were complementary.
- The first two tools that became available were, in retrospect, also among the most useful.
- Education about differences between weather and climate forecasts would be useful.
- Most extension personnel indicate that farmers in South Carolina are interested in climate forecasts.
- Most extension personnel are interested in providing climate forecasts to growers.
Discussion, cont.

• Most useful tools for farmers are economically most valuable. The valuable tools will tend to
  • increase mean yield,
  • reduce variance of yields, or
  • reduce farmer’s input use and time.

• Stated usefulness probably depends on the season when focus groups and survey were conducted: winter.

• Tools that reduce downside risk will probably be more valuable to farmers than tools that increase profitability.
RECOMMENDATIONS

• Implement and extend Yield Risk Forecast for South Carolina crops.
  • Use maturity groups for soybeans.

• Develop and extend a decision-support tool for irrigation scheduling.

• Develop and extend a freeze-risk tool for South Carolina.

• Build a capability within Agro-Climate to ‘turn-off’ other states.
Thanks for your attention.
Questions?
REFERENCES


REFERENCES, CONT.


