MISSISSIPPI SOYBEAN PROMOTION BOARD
PROJECT 47-2015 (YEAR 1)
2015 Annual Report

TITLE: Web-Based Interface for Atmospheric Stability and Spray Timing Recommendations
PROJECT NO. 47-2015

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BACKGROUND AND OBJECTIVES

It is essential that the aerial applicator avoid application under 'stable' atmospheric conditions when a temperature inversion is likely to occur. Under those conditions, a parcel of air cannot rise and disperse, and the spray layer is "ready to move" off target when the wind speed increases, sometimes for miles. These conditions are frequently associated with calm wind, and it is during those periods when the danger of stable atmosphere is the greatest. Progress on previously funded MSPB grants (for 2014-2015, "Optimal Timing of Aerial Spray Application to Avoid Inversion-Induced Far-Field Movement of Spray)," has yielded several outcomes based on our measurements and use of atmospheric stability relationships.

Objectives

1. To build formal flow logic into a prototype web-based system that is easily usable by pilots and farm managers. The system will use data transmitted directly by our own temperature and wind sensing systems and provide indications of whether conditions are OK to spray.
2. Expand the web-based system to include recommendations based on temperature rise and fall, similar to a rule illustrated by the Arkansas State Plant Board [ASPB, (http://170.94.200.136/weather/Inversion.aspx)].

REPORT OF PROGRESS

Objective 1. Flow logic was developed for data acquisition, and recommendations on how to use simple weather instruments for stability determinations were presented at the National Agricultural Aviation Association Conference Dec 7, 2015 in Savannah, GA. This presentation also indicated recommendations on spray timing and decision rules for the proposed web-based system.

Our on-site weather station uses temperature data obtained at multiple heights for input to the Atmospheric Stability Equation. A goal will be to further evaluate simplified rules using data from Mississippi State University (expanded on those rules used by ASPB) with rules derived using a full set of field sensors.

Objective 2. Rules as presented on the web for Arkansas were appended to include a wind-based decision function. Wind speed was measured in the field and is translated to the correct height for correct applicability of the stability equation.

The Arkansas inversions web page uses local weather station data, and Mississippi will benefit from the same. Patrick English and Mark Silva, at Mississippi State University (MSU), are developing a weather data network with several remote stations. Rules from Arkansas that depend on change in a single air temperature have been evaluated for Mississippi from previous funding, and this was found to work well with appropriate caveats. Development of the prototype web-based system is ongoing.

IMPACTS AND BENEFITS TO MISSISSIPPI SOYBEAN PRODUCERS

We have been able to quantify when aerial applicators should avoid spraying under certain weather conditions to mitigate the effects of far-field spray drift. Aerial applicators have expressed concern that they are sometimes pressured to spray very early in the morning. There is also a perception that optimal time for spraying is when the wind is calm. This is not the case and our data used with the simplified atmospheric stability relationships have proven this.

Thus far, this work has been promoted and presented to aerial applicators. It has become clear, however, that more producers need to see results from our study as they are the ones making field decisions.

Development of the web-based system is essential for accessibility by both producers and aerial applicators.

END PRODUCTS

An easy-to-use web-based system that can give the applicator and producer valid recommendations on atmospheric stability to determine if it is safe to spray.