

## CORN and GRAIN SORGHUM BOARD – Progress Report December 2008

**Title:** Remote Sensing of Stress Areas in Corn Fields to Prevent Aflatoxin  
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**Crop:** Corn

**Objectives:** To determine the ability of remote sensing technology to detect and allow mapping and inspection of stressed areas in commercial corn fields under different production systems

To determine the level of aflatoxin and fumonisin contamination, as well as yield potential, of remote-sensed and GPS-mapped stressed corn areas, compared to non-stressed areas of commercial corn fields

Five corn fields were randomly selected in 2008 to determine the usefulness of remote sensing technology for predicting high risk areas for aflatoxin development in commercial corn fields. Multi-spectral imagery was acquired in late June and early July on these five fields to determine the usefulness of the imagery as a scouting tool for predicting high risk areas for aflatoxins and fumonisin development. Field images were enhanced through a classified, normalized difference vegetative index (NDVI) to better illustrate variability in crop canopy and or plant vigor. The field images were then classified into three biomass zones: Zone 1 represented the lowest level of plant biomass and Zone 3 represented the highest biomass zone. These classifications and zones were performed in the commercial GIS software package ARC GIS version 9.2 (ESRI, Redlands, California). Maps for scouting and sampling were then created and used to determine if actual plant biomass matched up to the zones created from the images from each field. These maps were loaded on to a hand held computer equipped with a GPS receiver and Farm Site Mate software (Farm Works, Hamilton, IN) to pinpoint the exact location in the field. About two weeks prior to harvest, corn samples were collected from each zone per field. Each zones were divided into 3 subzones (A, B, and C) to represent 3 replications. Then, 20 ears were taken out of each subzone. The corn was then shelled and sent to the University of Arkansas in Fayetteville to be tested for of Aflatoxin.

Three out of the five fields that were selected for this study tested positive for aflatoxin. The results of the Aflatoxin varied from none detected (n.d.) to over 400 ppb (See Table Below). As you can see from the table, Mississippi County had higher amounts aflatoxin in zone one. When the field was ground truth during sampling, the biomass followed the imagery well. Visually there was a noticeable different in biomass between each zone based on plant vigor and plant height. When the results were evaluated, the lower biomass zones (Zone 1) did show the trend of has higher aflatoxin levels.

Field Names	Zone 1A	Zone 1B	Zone 1C	Zone 2A	Zone 2B	Zone 2C	Zone 3A	Zone 3B	Zone 3C
Mississippi	389.5 ppb	n.d	404 ppb	n.d.	n.d.	n.d.	n.d.	n.d	n.d.
Lonoke	n.d.	n.d.	n.d.	n.d	n.d.	n.d.	n.d.	n.d.	n.d.
Ashley	18.9 ppb	33 ppb	n.d.	n.d.	n.d.	n.d.	n.d.	19.5 ppb	n.d.
Jefferson 1	29.3 ppb	n.d.	225.9 ppb	8.1 ppb	n.d	n.d	n.d	n.d.	n.d.
Jefferson 2	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d

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