

Academic Large-Scale Off-Target Movement Assessment of Dicamba

This trial is designed to evaluate and demonstrate off-target movement (OTM) via physical drift and volatility when applied to large areas (10 – 40 acres). Applications will be made under conditions consistent with the current XtendiMax label. A tank mixture of XtendiMax + PowerMax + Intact will be applied in an application volume of 15 GPA from a commercial sized sprayer traveling no more than 15 MPH. The treatment should be applied with a TTI 11004 spray nozzle from with sprayer traveling approximately 10 MPH. Applications will be made between sunrise and sunset while winds are blowing between 3 and 10 MPH. Off-target movement will be assessed via air samplers, horizontal Mylar sample collectors (or as designated by Greg Kruger), and a bio-indicator crop of non-Xtend soybean.

The treated area is to be planted to Roundup Xtend soybeans while the surrounding area is to be planted to a non-Xtend soybean of a similar maturity group. The application will target the largest soybean possible before reaching a flowering stage. In the South, this would approximate a soybean application at V5 to V6 and approximately 10 to 12 inch tall soybean. A treated area of 10 acres is the absolute minimum that should be considered while the larger acreages are preferable. The treated area should be surrounded by non-Xtend soybean such that samples can be taken for a minimum of 300 foot but greater distances would be preferable.

SPRAY PARTICLE DRIFT EVALUATION

Horizontal sample collectors will be collected and placed in uniquely labeled containers following application of the test substances. Samples will be sent to Mississippi State University for analysis.

Downwind Samples

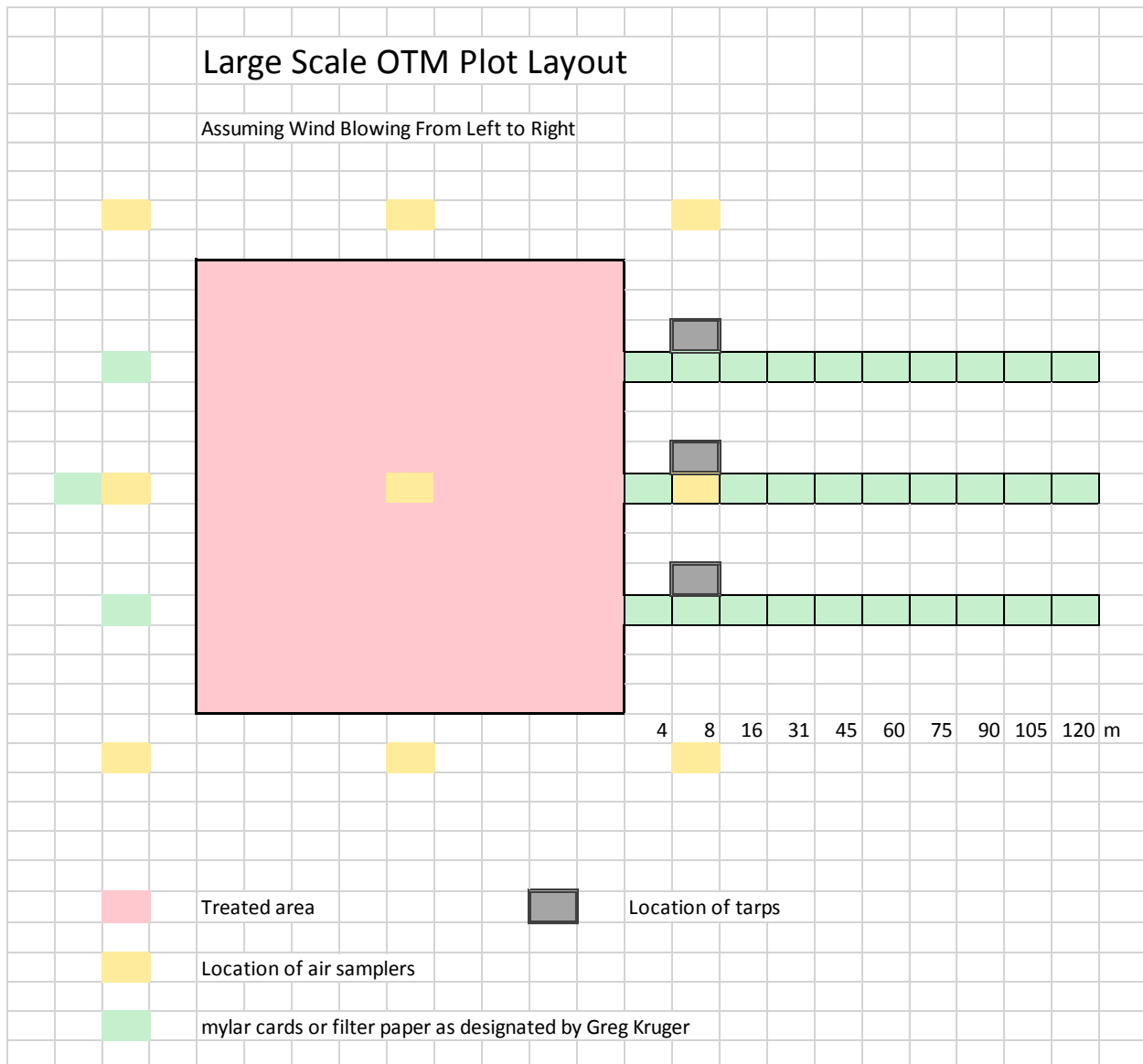
Sample stations will be located at various distances downwind of the application, determined by the available site and wind direction at the time of the study but at the approximate following distances: 4, 8, 16, 30.5, 45, 60, 75, 90, 105, 120 m downwind of the field line. The field line will be defined as the edge of the spray from the furthest downwind nozzle on the boom. Three such lines of sample collectors will be used for each treatment, spaced a minimum of 15 m apart, as appropriate for the test site and local landscape, with the center line located from the midpoint of the spray swath length, as appropriate for the site being used. A Mylar collector (or sampler as designated by Greg Kruger) will be placed at each location for collecting samples of the test substance. Each sample station will use a horizontal structure to mount these collectors and will be at crop height. Downwind sample collectors will be collected 30 minutes after the spray application concludes.

Downwind samples will be collected in a manner that reduces the potential for cross contamination. Specifically, teams of two will be assigned to collect samples from designated downwind distances to limit movement up and down transects and potentially disturb or cross-contaminate sample collectors at other distances. The most downwind sample collectors will be collected prior to the collection of sample collectors at other distances. The exact sampling scheme will be determined by the Study Director and documented in the field notebook.

Upwind Samples

Additionally, three upwind sample collectors will be collected. Each will be located on the depositional sample transects at 30 m from the upwind edge of the application area. Upwind samples will be collected by a person that did not previously collect samples from the downwind deposition area.

Protocol template developed in collaboration with Monsanto. Original protocol developed by Dr. Dan Reynolds, Mississippi State University and Dr. Greg Kruger, University of Nebraska, for 2018 university field testing.



FIELD VOLATILITY

Samples will be collected and placed in uniquely labeled containers. PUF samples will be analyzed by the Mississippi Department of Agriculture State Chemical Laboratory

Note: Cooperators should use a weather station that will collect wind speeds at 4 heights.

Pre-application Samples

Two pre-application (Sample ID – Pre-application) air samples will be collected using air sampling equipment placed near the in-field air monitoring location (center of plot) of the test plot. The samples will be collected 24 to 48 hours prior to the start of the application. The pre-application air monitoring event will last for approximately 6 hours. These samples will be used to determine the level of background dicamba within the application area. Pre-application samples will then be stored and shipped in coolers containing dry ice until transfer to storage at -20°C prior to analysis.

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Post-application Samples

The in-field air samplers will be placed in the approximate center of the treated area and in each of 8 directions from the treated area. Samplers will be turned on 30 minutes after completion of the application to the entire plot. The in-field air profile monitoring station in the plot will consist of an air samplers mounted on a sampling mast located at the approximate center of the plot. The samplers located outside the treated area will be located at a distance of 15 meters. All air samplers will be located on the sample mast at approximately 0.33 m above the crop canopy.

After application, PUFs will be collected from the sample mast. The PUFs will be collected approximately 6, 12, 24, 36, 48, 60, and 72 hours following completion of the application to the entire plot. A target hour or interval will be established to represent each interval described above and samples will be collected to the nearest hour. Post-application samples will then be stored and shipped in coolers containing dry ice until transfer to storage freezers at -20°C prior to analysis. Coolers and storage areas should have never been used to store samples containing dicamba.

PLANT EFFECTS

Spray drift following the application of dicamba to soybeans that are not tolerant to dicamba, will be assessed by comparing plant heights, and visual plant response along transects perpendicular to the edges of to a distance of 50 ft. Plant effects from volatility will be assessed by covering a portion of the soybean crop during the application period to prevent exposure to spray drift. The cover will be removed post-application. The crops that were covered during the application will be used to assess effects to plant height and visual symptomology from dicamba volatility.

Plant height

Plant heights will be measured approximately 14 and 21 days post-application on ten plants at each distance along each transect. Plants will be selected non-systematically and without measuring the same plant more than once. Height will be measured by holding a plant upright and measuring the distance between the ground and the tip of the most recently emerged apical bud. Where multiple shoots are present, measurements along the main shoot will be taken. Measurements will be made to the nearest one-half cm using a standard ruler.

Plant heights will be aggregated into means and standard deviations for each measurement point for comparison across treatments and transects. Control (untreated) plants will be measured just prior to the application at each site as a measure of inherent variability in the plant sizes across the field. Control measurements prior to application will be taken non-systematically across the field in areas where spray treatments were to be made as well as upwind and downwind areas. In addition, upwind plant height measurements will be taken on the day assessments will be made. These measurements will be taken at least 50 to 100 m upwind of the “upwind edge” of each sprayed area and in areas where there no visual dicamba symptomology is expected.

Visual symptomology

Visual plant response will be assessed on a scale of 0 to 100 with 0 representing no visible plant response and 100 representing complete plant death. This plant response rating scale will be conducted consistent with visual plant response ratings described in Frans (Frans, 1977), Behrens and Lueschen (Behrens, 1979), and Sciumbato et al. (Sciumbato et al., 2004). For selected plots and timings, photographs were made to document the visual plant response symptoms, and severity at specified distances.

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ITEMS PROVIDED BY MONSANTO

In addition to direct financial support to the University for conducting this trial, Monsanto will provide the following equipment, supplies and services.

- Air Samplers which the cooperator will keep to use in other studies they might design
- Disposables – Filter paper, PUFs, Vials and Boxes for collection and shipping of the PUFs
- Soybean seed necessary to plant the 80 acre study field
- Herbicides and adjuvants needed for study
- Analytical costs – paid to the Mississippi State University