Evaluating spray equipment for improved fungicide application

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Abstract
Fungicides are the only management tool presently available to manage Asian soybean rust. The fungicides currently registered for use on soybean (Section 3 and Section 18 labels) have little systemic movement, if any, within a leaf, especially when compared with systemic herbicides. Thus, fungicide efficacy depends on application timing, dosage, and perhaps most important, coverage and penetration. Droplet size, volume, and pressure influence coverage and penetration of the fungicide in the soybean canopy.

Keywords
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Evaluating spray equipment for improved fungicide application

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Fungicides are the only management tool presently available to manage Asian soybean rust. The fungicides currently registered for use on soybean (Section 3 and Section 18 labels) have little systemic movement, if any, within a leaf, especially when compared with systemic herbicides. Thus, fungicide efficacy depends on application timing, dosage, and perhaps most important, coverage and penetration. Droplet size, volume, and pressure influence coverage and penetration of the fungicide in the soybean canopy.

The use of fungicides in Iowa soybean production is new. Soybean growers have never needed to spray fungicides in Iowa; thus, they are not familiar with this tool. Prior to the 2005 growing season, there were a lot of questions: Which nozzle should I use? What volume? What droplet size should I aim for? Most of us looked to Brazil for some direction on what to do.

To answer these questions, we initiated a study in 2005 to determine the best means of applying fungicides to ensure penetration of the soybean canopy and successful foliar disease control. One of the treatments included an air-assisted sprayer (Figure 1). These sprayers are new to Iowa but not to other areas. The air assist is meant to drive small droplets into the canopy.

Figure 1. An air-assisted sprayer in action. (Mark Hanna)
In all, we evaluated six treatments:

1. "Brazil" recommendations (Twinjet 8004 tips, 40 psi, fine droplets, 20 gal/acre)
2. Low volume "Brazil" (Twinjet 8003 tips, 30 psi, fine droplets, 12 gal/acre)
3. Herbicide (Turbo Tee Jet 11003 tips, 40 psi, coarse droplets, 18 gal/acre)
4. Air-assisted (Twinjet 8004 tips, 40 psi, fine droplets, 20 gal/acre)
5. Turbo Tee Jet Duo (Turbo Tee Jet 11002 tips, 40 psi, medium droplets)
6. No spray

This study was done at two sites: the Iowa State University Agronomy Farm near Boone (Treatments 1, 2, 3, 4, and 6) and the McNay Research and Demonstration Farm in south central Iowa (Treatments 1, 2, 3, 5, and 6). Droplet coverage in the low, middle, and top canopy was evaluated using spray cards (Figure 2).

Figure 2. Droplet cards were attached with paper clips to leaves in the low, middle, and top canopy. (Orange spray paint was used to mark the plants to which cards were attached.) (Mark Hanna)
Figure 3. An example of droplet cards from the top, middle, and low canopy. (Mark Hanna)

The cards, mailed to Kansas State University, were scanned through a computer and the percent of coverage for each treatment was calculated. Disease severity also was evaluated on leaves of plants in the plots.

Disease pressure in the 2005 growing season was insignificant. Therefore, we found no differences in disease control among the treatments. We also found it challenging to get droplets into middle and lower canopy (Figure 3) as expected. This trial will be repeated in 2006 with a few modifications.

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