EFFICACY OF PESTICIDES USED IN COTTON WHEN APPLIED AT SPECIFIC DROPLET SIZES

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Abstract

Over the last several decades, application technologies (sprayers) have improved across farms allowing growers the ability to apply pesticides to row crops with precision and in a timely manner. With fewer agrichemical compounds and molecules being discovered by private industry, new innovative ways of using current modes of action and application equipment are not only necessary, but imperative to maintain and improve our pest management strategies in South Carolina. Research on optimizing application technologies to improve product efficacy is needed to assist growers throughout the Southeast on their farming operations.

This research was conducted in 2019 at the Edisto Research and Education Center in Blackville, SC to determine if the effect of sprayer droplet size (150-900 µm) has an impact on the efficacy of insecticides used to control tobacco thrips, *Frankliniella fusca* (Hinds) or stink bugs in cotton. Two separate fields were utilized for this test where applications targeting thrips and stink bugs were applied at 150, 300, 450, 600, 750, and 900µm droplets. The thrips application was applied at 1-2 leaf cotton and consisted of Orthene 97SG (Acephate) at 210 g/ha or product and the stink bug application was during bloom when economic threshold had been met and consisted of Bidrin 8 EC (Dicrotophos) at 0.58 L/ha of product. All applications were made at 93.5 L/ha carrier volume. A Mudmaster plot sprayer equipped with Capstan Ag Pinpoint II blended pulse width modulation was used to spray all treatments. Prior to all applications, specific nozzle types and pressure settings were determined for each product at the University of Nebraska PAT Lab in North Platte, NE. For the thrips trial, plots were sampled and rated at 3, 6, 9, and 12 days after treatment (DAT) for thrips counts and injury ratings. For the stink bug trial, bolls were removed and evaluated for injury 5, 12, and 21 DAT. Droplet size and spray coverage data were also collected using water sensitive paper in both trials. Droplet data were analyzed using a program developed at Clemson University to quantify spray coverage and actual mean droplet size from images of the paper. All data were subjected to analysis of variance using PROC Glimmix procedure in SAS 9.4 and means separated using multiple pairwise t-tests at $\alpha = 0.05$.

In 2019, thrips pressure was seemingly high due to the prolonged dry weather and high temperatures experienced in May. Even with the high thrips pressure that was experienced, this research resulted in no yield difference between any of the droplet size treatments or between the untreated check. Acephate applied at a droplet size of 450 microns did result in the greatest number of thrips on cotton 3 DAT when compared to all other droplet sizes. Visual injury ratings 3 DAT was greater on cotton where Acephate was applied at 300-micron droplets when compared to other droplet sizes. No differences were observed in thrips counts or injury ratings that were collected at the 6, 9, or 12 DAT samplings. Similarly, to the thrips trial no differences in cotton lint yield between droplet size treatments or the untreated check were observed in the stinkbug trial. Additionally, no significant differences in the number of stink bug injured bolls were observed regardless of droplet size or treatment. These results may have been a result of low stink bug pressure in 2019, therefore, it is hypothesized that these results may have varied in a year where stinkbug pressure was average or high. Overall, spray coverage decreased as droplet size increased from 150 to 900 microns. Furthermore, as droplet size treatment increased, droplets measured on the target surface (water sensitive paper) increased as well. Continued research on application technologies, droplet size, and the efficacy of products is needed in cotton growing regions of the United States.