EFFECT OF DROPLET SIZE ON INSECTICIDE EFFICACY OF THRIPS

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Abstract

In 2016, thrips (*Frankliniella sp.*) were ranked as the number three pest in cotton across the cotton belt with 9,477,763 acres infested and 120,286 bales lost. Cotton has the potential to compensate for early season thrips damage; however, high levels of thrips damage can cause yield loss. Historically, thrips control was attained using a variety of in-furrow treatments, as well as through the use of aldicarb. However, aldicarb production was stopped in 2010 and since that time neonicotinoid seed treatments have become commonplace for thrips control. However, a loss of thrips control with these seed treatments has been observed since 2012. In 2012, 80 % of the acres in Mississippi requiring at least two supplemental applications for thrips control. Previous research suggests that smaller droplet sizes are more efficacious for insect control. It has also been noted that droplets can become too small to deliver an effective dose and when a pest comes in to contact with smaller droplets, that pest tended to live longer which allowed greater damage. Differences in weed control due to spray droplet size have been widely documented. However, little data exist regarding the effects of droplet size on insecticide efficacy of thrips. Given the status of thrips across the cotton belt and the lack of control present from seed treatments, a more efficient application could be beneficial to growers across the cotton belt.

Experiments were conducted in 2016 and 2017 at the R. R. Foil Plant Science Research Center located in Starkville, MS and the Black Belt Branch Experiment Station at Brooksville, MS. Experiments were set up in a randomized complete block design. Plots consisted of 4-38" spaced rows 40' in length. All plots were replicated four times. The variety used in testing was Deltapine 1518 B2XF (Black Seed). All droplet size treatments were defined prior to the initiation of the experiment courtesy of the Pesticide Application Technology Laboratory at the University of Nebraska-Lincoln, North Platte, NE. Droplet sizes were defined using a low speed wind tunnel. Droplet size treatments were 150µm tip: Wilger ER 110015 @ 75 psi; 200 µm tip: Wilger ER 11002 @ 36 psi; 300 µm tip: Wilger MR 110015 @ 59psi; 400 µm tip: Wilger MR 11003 @ 48 psi; and 500 µm @ 28 psi. Acephate was applied at 0.25 lb ai ac^{-1} using a tractor mounted pulse width modulating sprayer. Data collection in-season included stand counts, pre application thrips samples, post application thrips samples, cotton height at first bloom, mainstem node counts at first bloom, and nodes above the white flower at first bloom. Data collection at the end of the growing season included cotton height, total mainstem nodes, and nodes above the uppermost cracked boll. Thrips counts were subjected to analysis of covariance (ANCOVA) and all other data were subjected to anlaysis of variance (ANOVA) PROC GLIMMIX procedure in SAS 9.4. Means were separated using Fishers Protected LSD at α=0.1.

Prior to application there were no significant differences with respect to mean number of thrips. Based on ANCOVA there was a mean of 10 thrips per 5 plants in each treatment. Thrips control was maximized 3 days after application (DAA) from acephate applied at a droplet size of 400 µm. Data would suggest that smaller droplets are not always better with respect to thrips control in early season cotton. Acephate applied at 150 µm, 200 µm, and 500 µm did not differ from the untreated control. There were no significant differences observed at first bloom or at the end of the year with any of the growth and development parameters measured in this study. Yields were maximized from acephate applied with 400 and 500 µm droplets when compared to the untreated check. Yields from plots treated with

acephate with 150, 200 and 300 µm droplets were not significantly different than that of the untreated control. Data suggest that thrips control with acephate and cotton lint yield are both maximized when acephate is applied with 400 µm droplets.