Investigating Precision Spray Technologies for Fungicide Applications in Peanut

Simerjeet Virk, Project# UGA-38-21/23

Objective: (1) To assess spray coverage of fungicide applications with a sprayer equipped with pulse-width modulation (PWM) technology at varying ground speeds, and (2) to evaluate spray coverage and efficacy of fungicide applications with a spray drone and compare it with ground sprayer application.

Methods: For both objectives, field experiments were conducted at the UGA research farms in Tifton. For first objective, spray applications were made with a ground sprayer equipped with a PWM system and spray coverage was measured using water-sensitive paper placed at different locations under the spray boom. The sprayer was calibrated to deliver 20 GPA at 6 mph and then ground speed was varied from 6 mph to 14 mph in increments of 2 mph. Similar data for sprayer rate controller was collected in 2022 peanut studies. For second objective, fungicide applications were made (at 45, 60, 75, 90 and 120 days after planting) with a spray drone and a ground sprayer in plots that measured 6-rows wide (18 ft) and 100 ft in length. Fungicide applications with spray drone were made using 5 GPA carrier volume whereas the nominal spray volume for ground applications was 15 GPA. During each application, water-sensitive paper was placed at the top, middle and bottom of the canopy to assess spray coverage and canopy penetration. Disease ratings for leaf spot were recorded at 90 and 120 DAP while white mold ratings were taken immediately after digging.

Results: Spray coverage was consistent and uniform (20 – 22%) across all ground speeds for the PWM system (left figure below) while the rate controller only maintained consistent coverage until 10 mph and then it reduced considerably as ground speed increased. These results indicate the benefits of new precision technologies such as PWM system which provides greater flexibility than conventional rate control systems and can achieve adequate coverage (and efficacy) even at increased application speeds and higher volumes (>15 GPA). The spray deposition comparison between spray drone and ground sprayer (right figure below) showed that coverage was greater and more uniform for the ground sprayer (30 – 35%) than the spray drone (6 – 14%) within the spray swath. The higher coverage for ground sprayer was mainly due to the higher carrier volume of 15 GPA compared to the 5 GPA used with the spray drone. The coverage for spray drone had greater variability (CV=27%) within the swath than ground sprayer (CV=6%). This deposition behaviour is typical of spray drone applications as coverage is highly concentrated and localized directly under the drone whereas the coverage decreases towards the end of the swath. Despite variability in coverage, fungicide efficacy was comparable between both application methods indicating that spray drones can be another valid application technology for timely and effective fungicide applications in peanut.