

Tip Flow Uniformity When Using Different Automatic Section Control Technologies During Field Operations

Ajay Sharda, J.D. Luck, J.P. Fulton, S.A. Shearer, T.P. McDonald and D. Mullenix

Automatic section control (ASC) technology provides a means to reduce double-coverage and application in unwanted areas thereby leading to input savings and improved environmental stewardship. However, the impact of ASC on spray boom dynamics and tip flow uniformity are unknown. Therefore, a study was conducted to evaluate tip flow rate uniformity and control system response in maintaining target application rates during field operation. Field experiments were conducted using two self-propelled sprayers equipped with commercially available spray controllers with ASC capabilities. High frequency pressure sensors were mounted across the spray boom to record tip and system pressure during field application. This data along with GPS location, time, and ground speed were also recorded simultaneously and written to a text file. Results indicated tip-to-tip uniformity or CVs in the range of 10% to 40% consistently occurred during ASC engagement or ground speed changes. A variation between actual and target tip flow rates (off-rate) was from 1.5% to 15%. Off-rate and uniformity maps suggested that these application variations were primarily due to required system flow rate changes by the control system to maintain the set target rate as spray width and/or machine acceleration occurred. Further, differences existed between auto-boom and auto-nozzle level control during these field tests with each generating unique application errors.

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