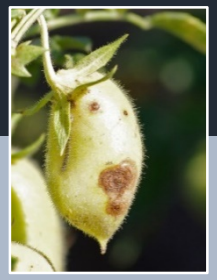
Optimizing fungicide spray volume for improved management of Ascochyta blight of chickpeas



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Northern Pulse Growers Association

Spray volume

Modern systemic fungicides exhibit only limited systemic movement – limited upward movement from the point where the fungicide was deposited and movement from the upper to the lower surface of the leaf. Older contact fungicide have no systemic movement.

Increased spray volume improves fungicide coverage. Due to the limited systemic movement by fungicides within plants, high spray volumes are routinely recommended for fungicides.

... But increased spray volume carries significant extra cost, and the economic return to increasing spray volume is poorly documented and largely unknown for most crops and diseases.

In the absence of data that would permit rigorous assessment of the return on investment associated with the additional cost of applying a fungicide at a higher spray volume, practical considerations and expediency typically drive spray volume decisions for fungicides.

Methods

Applications were made with a tractor-mounted sprayer equipped with a pulse-width modulation system from Capstan AG.

Nozzles and pressure: TeeJet XR11004 flat-fan, 50 psi (fine droplets)
Pulse width manually calibrated to achieve desired spray volumes.

Driving speed: 8.9 mph in all studies conducted in Carrington in 2019.

Methods

The initial calibration was conducted with water.

Objectives:

1. **Nozzle selection:** Tips with output deviating from advertised specifications discarded
2. **Initial identification of pulse width** needed to deliver the target spray volume at 8.9 mph driving speed

Spot-On sprayer calibrator model SC-1
(Innoquest, Inc.; Woodstock, IL)

The final calibration was conducted with fungicide in the field immediately before application.

Objectives:

1. **Ensure the precise targeted spray volume.** Manual adjustments to pulse width were made as needed.
2. **Confirm that all nozzles are operating correctly** – consistent output across all nozzles; no plugs.

Methods

To ensure rigorous results, a large number of experimental replicates was utilized.

Studies were conducted with seven replicates.

Row spacing: 7.5 inches (seven rows per plot)

Seeding rate: 4.5 pure live seed/square foot

Plot size: Fungicide treatments were applied to 60-foot-long plots consisting of 30-foot lengths of each of two varieties ('CDC Leader' and 'CDC Frontier').

Experimental design: Randomized complete block with split-plot arrangement (main factor = fungicide, sub-factor = droplet size).

Disease assessments:

- Initial disease assessments (during mid-bloom) were conducted by estimating the percent of the canopy diseased in each of four locations per variety per plot.
- Final disease assessments (when chickpeas were senescing) were conducted by assessing the incidence of pods with Ascochyta lesions. In each of four locations per variety per plot, all of the pods on 2 to 4 plants were evaluated for Ascochyta lesions (average 348 pods evaluated per plot).

OPTIMIZING FUNGICIDE PERFORMANCE

Spray Volume

Increased spray volume sharply improved Ascochyta management and chickpea yield.

The impact of spray volume was similar across both chickpea varieties and both fungicides evaluated.

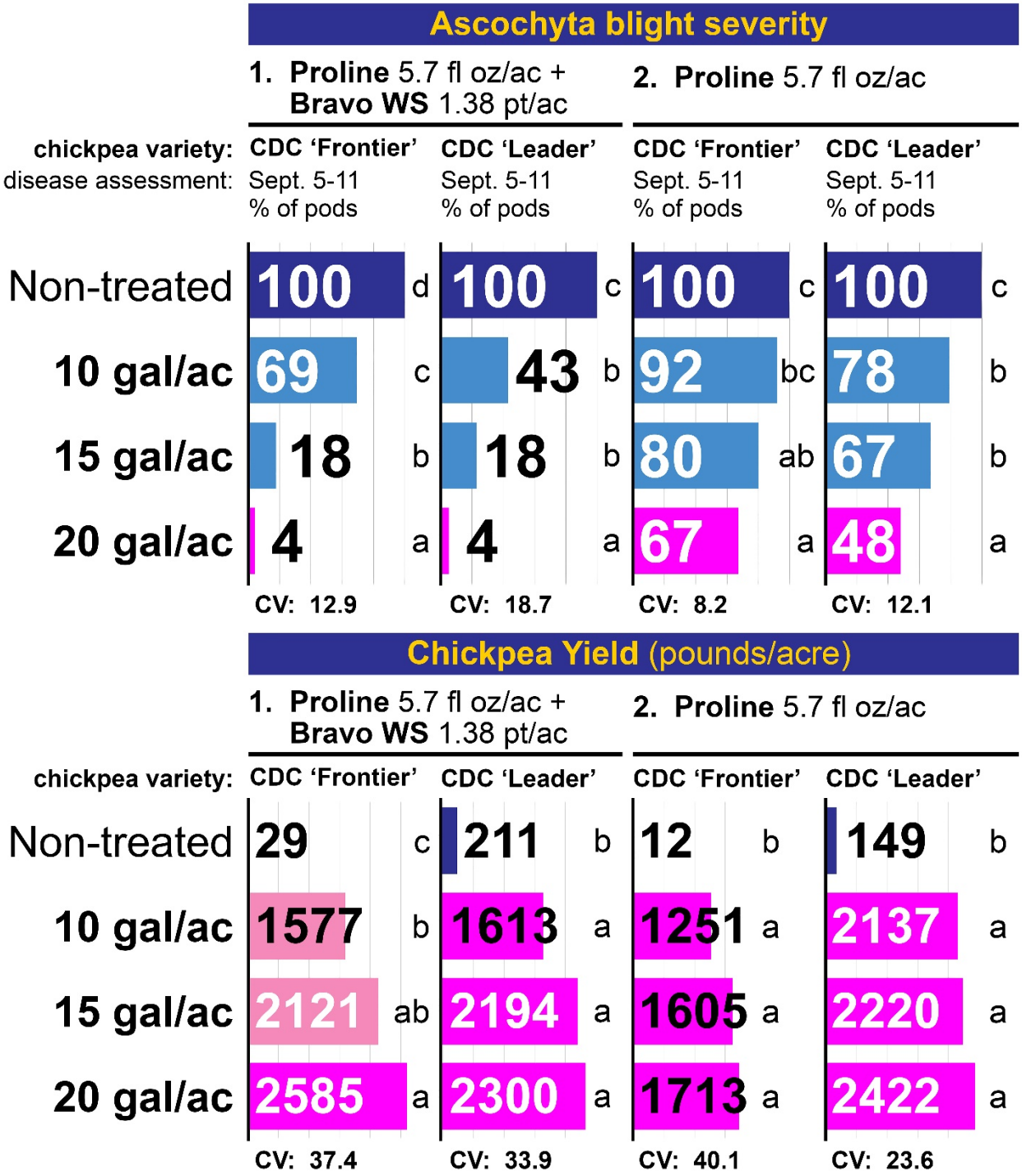
Carrington, ND (2019)

Fungicides were applied with a tractor-mounted R&D sprayer equipped with a pulse-width modulation system. Driving speed = 8.9 mph. Applications were made with TeeJet extended-range flat-fan XR11004 nozzles, 50 psi (fine droplets), with pulse width modified as needed to achieve the desired spray volume.

Five fungicide applications were made 10-14 days apart from the first appearance of disease symptoms at late vegetative growth until early senescence. The last fungicide application was conducted on August 8.

Within-column means followed by different letters are significantly different (P < 0.05; Tukey multiple comparison procedure).

The non-ionic surfactant 'Preference' (alkylphenol ethoxylate, sodium salts of soya fatty acids, isopropyl alcohol, 89.5%; Winfield United, River Falls, WI) was applied at 0.25% (v/v) with all fungicide applications.



Conclusions

Preliminary results from an ongoing research project

Increased spray volume sharply improved Ascochyta management and chickpea yield.

The response to spray volume was proportional to efficacy of the fungicide utilized, with a stronger response observed to Proline tank-mixed with Bravo WS than Proline applied alone.

Increasing spray volume from 10 to 15 gal/ac improved chickpea yield by an average of 219 lbs/ac for Proline and 563 lbs/ac for Proline + Bravo WeatherStik.

Increasing spray volume from 10 to 20 gal/ac improved chickpea yield by an average of 374 lbs/ac for Proline and 848 lbs/ac for Proline + Bravo WeatherStik.

Thank you!

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