Improving management of white mold in **pinto beans**: Optimizing **fungicide timing, interval,** and **frequency**

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Optimizing fungicide application timing, interval and frequency

Research question tested in these studies:
what fungicide application interval and frequency optimizes white mold management in pinto beans when conditions favor white mold for the duration of the bloom period?

Optimizing fungicide application timing, interval and frequency

CHALLENGES:

- White mold management not very good even at optimal application timing.
  - Disease rarely reduced by even 50%
- Applying at the perfect timing is very difficult
  - Dry bean growth & development is variable within most fields
  - Not every day is a suitable day for spraying

Optimizing fungicide application timing, interval and frequency

Can we improve fungicide performance by modifying application interval and/or application frequency?

- Reducing the application interval reduces the amount of unprotected new dry bean growth and should reduce the penalty to applying fungicides applying too early
- … but may require a third fungicide application under high disease pressure

Improving white mold management in dry beans:
Fungicide application timing, interval and frequency – methods

Study location: Carrington

Row spacing = 14 inches

Seeding rate = 90,000 viable seeds/ac

Fungicide spray volume = 15 gal/ac.

Application method: PTO-driven tractor-mounted sprayer; application speed = 6.0 mph.

Fungicide spray droplet size: calibrated relative to canopy density and lodging; all application timings of the single-application treatments and first application of the two- or three-application treatments, medium droplets (TeeJet XR11006 nozzles, 35 psi); all application timings of the second and third applications of the two- and three-application sequences (TeeJet XR11010 nozzles, 30 psi)

Number of experimental replicates = 9

White mold assessment: Assessed at or near dry bean maturity by evaluating every plant individually in minimum half of the rows per plot for percent of the plant impacted by white mold.

Harvest: To ensure that variability in dry bean standability (lodging) across the study did not bias yields, plants were clipped at base concurrent with disease assessments, wind-rowed to dry, and manually lifted into the combine.

Supplemental irrigation: Supplemental overhead irrigation was applied as needed to establish the white mold disease pressure needed to evaluate fungicide performance.

Calibration

Pulse-width calibration was manually conducted in the field (with the fungicide in the tank) **immediately before application.**

Objectives:

1. **Ensure a precise spray volume of 15 gal/ac.** Manual adjustments to pulse width were made as needed.
2. **Confirm that all nozzles are operating correctly** – consistent output across all nozzles; no plugs.

Application methods

Applications were made with a tractor-mounted, PTO-driven spray equipped with a pulse width modulation system

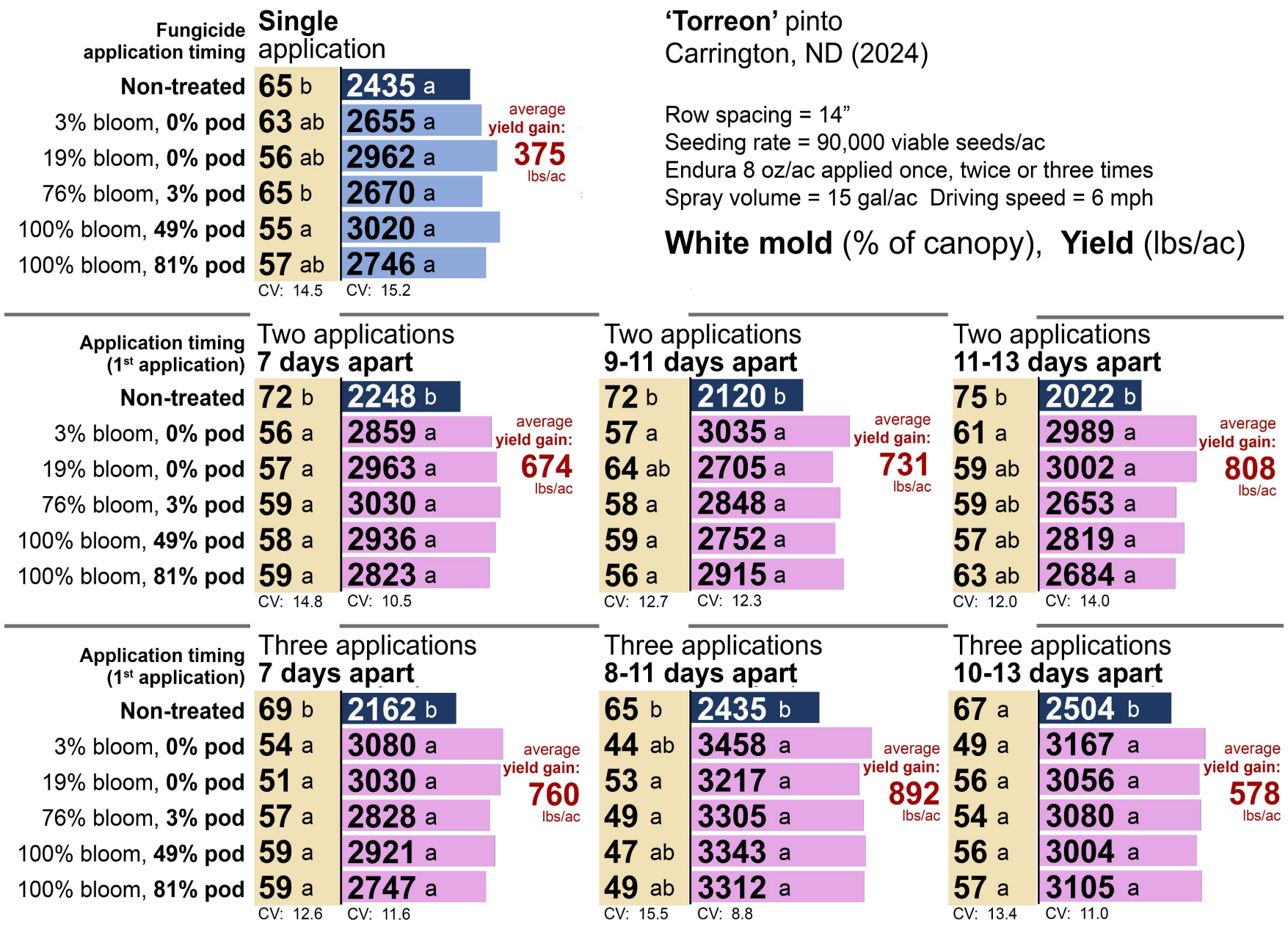
Fungicide application timing, interval & frequency: pinto beans

Numbers with yellow/brown shading: white mold (% of canopy) **Bar graphs:** yield (lbs/ac)

'Torreon' pinto
Carrington, ND (2024)

Row spacing = 14"
Seeding rate = 90,000 viable seeds/ac
Endura 8 oz/ac applied once, twice or three times
Spray volume = 15 gal/ac Driving speed = 6 mph

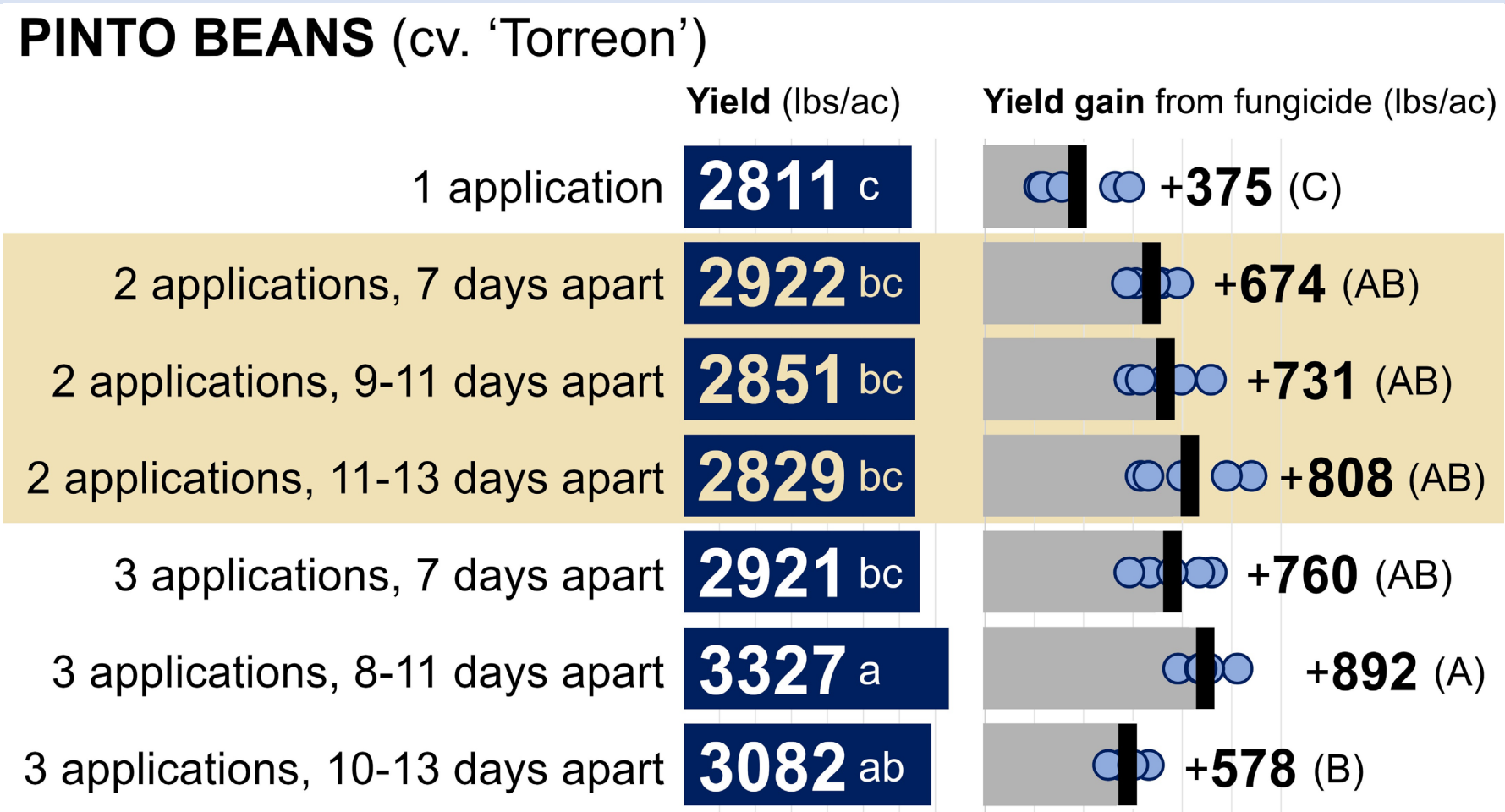
White mold (% of canopy), **Yield** (lbs/ac)



Fungicide application timing, interval & frequency: pinto beans

Pinto beans: White mold management was optimized with 3 applications, each approx. 10 days apart.

When making 2 applications, optimal interval was approx. 12 days.



Bar graph: average yield across all five fungicide application timings

Scatter plots: circles denote yield gain from each fungicide application timing; bars denote averages

Fungicide application timing, interval & frequency: pinto beans

Three applications, 10 days apart, optimized white mold management in pinto beans.

When making two sequential fungicide applications, 12 days between applications was optimal.

These are preliminary results from the first year of testing. Testing must be conducted over multiple years before rigorous recommendations can be developed. Follow-up testing is planned for 2025.

People

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