

OPTIMIZING FUNGICIDE DEPOSITION WITHIN SOYBEAN CANOPIES

Impact of spray droplet size – SOYBEANS (2018)

Carrington, ND

variety (maturity rating): ProSeed 'XT60-40' (0.4)

fungicide application date, growth stage: July 13 100% R2

Carrington, ND

Peterson '18X06N' (0.6)

July 16 80% R2, 20% R3

Carrington, ND

Dairyland 'DSR-0904' (0.9)

July 13 100% R2

Carrington, ND

Peterson '17X09N' (0.9)

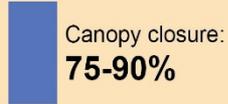
July 13 100% R2

Oakes, ND

Pioneer 'P11A95X' (1.1)

July 12 80% R2, 20% R3

Canopy closure
at fungicide application:



White mold severity index (% of canopy diseased)

disease assessment: October 28 (R9)

October 6-7 (R9)

October 21-22 (R9)

October 18-20 (R9)

October 2-5 (R9)

Non-treated control



Fine droplets

XR8003, 50 psi



Medium-fine droplets

XR8004, 40 psi



Medium droplets

XR8006, 40 psi



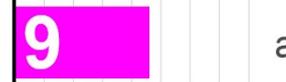
Medium-coarse droplets

XR8008, 35 psi



Coarse droplets

XR8010, 30 psi



CV: 21.8

CV: 52.1

CV: 39.5

CV: 28.1

CV: 21.6

Fungicide: Endura at 5.5 oz/ac

Spray volume: 15 gal/ac

Driving speed: 6.7 mph

Soybean row spacing: 21 inches



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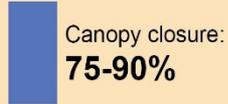
July 13 100% R2

Oakes, ND

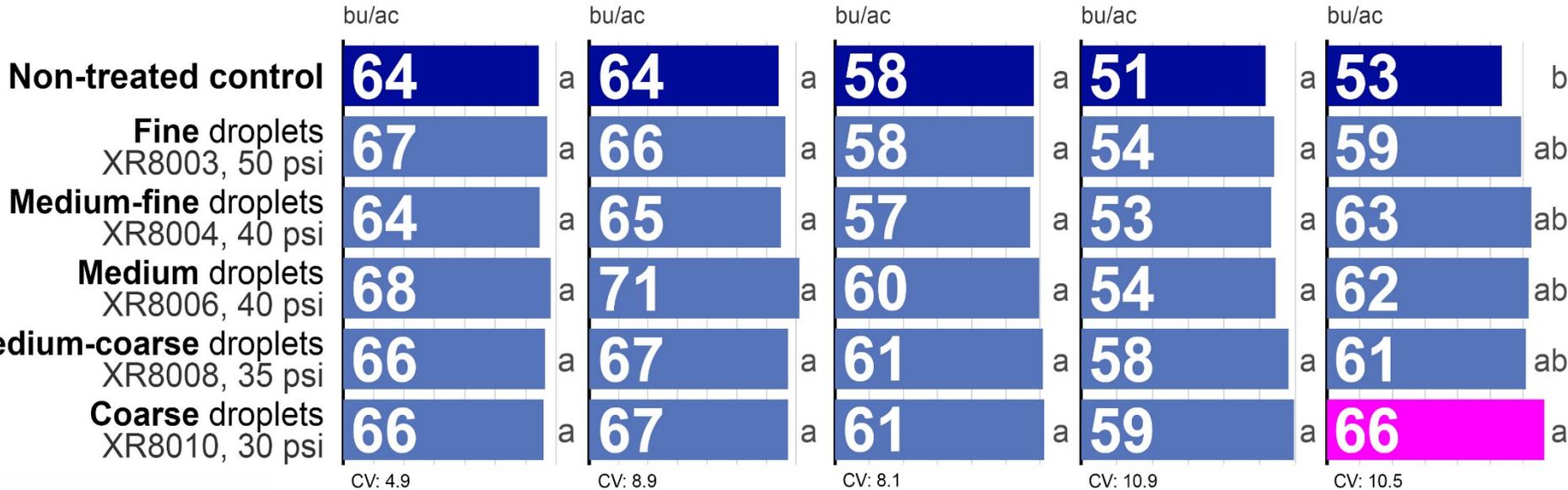
Pioneer 'P11A95X' (1.1)

July 12 80% R2, 20% R3

Canopy closure
at fungicide application:



Soybean yield (13% moisture)



Fungicide: Endura at 5.5 oz/ac

Spray volume: 15 gal/ac

Driving speed: 6.7 mph

Soybean row spacing: 21 inches

OPTIMIZING FUNGICIDE DEPOSITION WITHIN DRY BEAN CANOPIES

Impact of spray droplet size – NAVY BEANS

Carrington, ND (2018)

'Avalanche' navy beans

21-inch row spacing

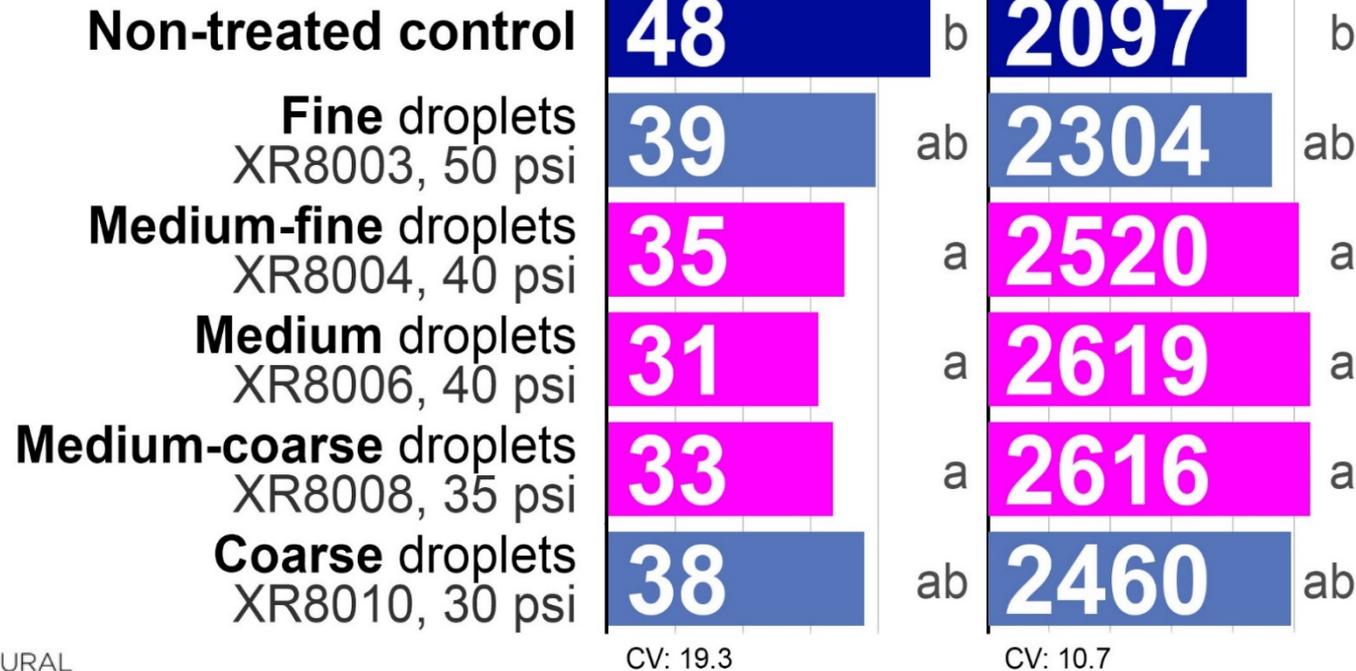
TWO FUNGICIDE APPLICATIONS

White Mold

Yield (lbs/ac)

% canopy diseased

13.5% moisture



NDSU NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION



Spray volume: 15 gal/ac **Driving speed:** 6.7 mph

First fungicide application (July 18):
Endura 70WG 8 oz/ac

Full bloom, average pod length 2 in. (max. 3.5 in.)
canopy closure = 90-98%, canopy height = 19-24 in.
73-80°F, 4-7 mph wind, 55-64% relative humidity

Second fungicide application (Aug. 1):
Topsin 4.5FL 40 fl oz/ac

Full bloom, average 21 full-length pods/plant
canopy closure = 100%, canopy height = 13-19 inches
60-63°F, 8-10 mph wind, 58-70% relative humidity

OPTIMIZING FUNGICIDE DEPOSITION WITHIN DRY BEAN CANOPIES

Impact of spray droplet size – BLACK BEANS

Carrington, ND (2018)

'Eclipse' black beans

21-inch row spacing

TWO FUNGICIDE APPLICATIONS

Non-treated control

Fine droplets

XR8003, 50 psi

Medium droplets

XR8006, 40 psi

Coarse droplets

XR8010, 30 psi

White Mold

% canopy diseased

44

32

27

29

CV: 15.4

Yield (lbs/ac)

13.5% moisture

2051

2541

2641

2570

CV: 10.2

NDSU NORTH DAKOTA AGRICULTURAL
EXPERIMENT STATION

Spray volume: 15 gal/ac

Driving speed: 6.7 mph

First fungicide application (July 18):

Endura 70WG 8 oz/ac

Full bloom, average pod length 2.5 in. (max. 4.0 in.)
canopy closure = 75-85%, canopy height = 16-23 in.
73-80°F, 4-7 mph wind, 55-64% relative humidity

Second fungicide application (Aug. 1):

Topsin 4.5FL 40 fl oz/ac

Full bloom, average 13 full-length pods/plant
canopy closure = 100%, canopy height = 17-20 inches
60-63°F, 8-10 mph wind, 58-70% relative humidity



OPTIMIZING WHITE MOLD MANAGEMENT IN DRY BEANS

Impact of row spacing and seeding rate

Black, navy beans:
90,000 & 120,000 pls/ac

Kidney, pinto beans:
70,000 & 90,000 pls/ac

Oakes, ND

Carrington, ND

'Palomino'
pinto beans

'Rosie'
kidney beans

'Eclipse'
black beans

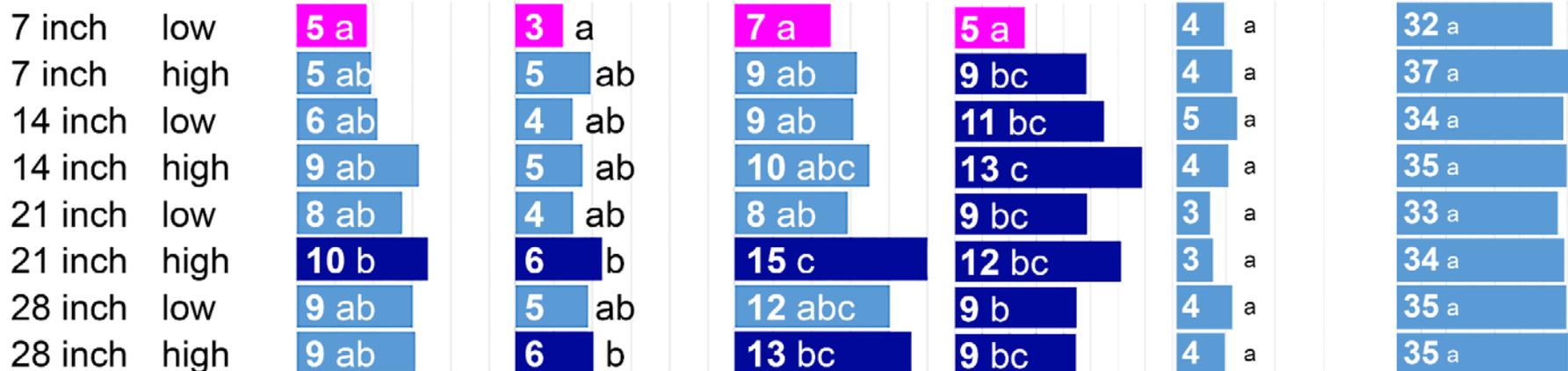
'Avalanche'
navy beans

'Palomino'
pinto beans

'Rosie'
kidney beans

Row spacing
Seeding rate

White mold severity (% of canopy)



Row spacing
Seeding rate

Dry bean yield (lbs/ac; 13.5% moisture)



OPTIMIZING WHITE MOLD MANAGEMENT IN SOYBEANS

Impact of application method on fungicide efficacy

Carrington, ND (2018)

Peterson Farms '17X09N' (0.9 maturity)

Oakes, ND (2018)

Pioneer 'P11A95X' (1.1 maturity)

BOOM-MOUNTED NOZZLES One fungicide application

R2 growth stage

XR8006 flat-fan nozzles, 40 psi
medium droplets

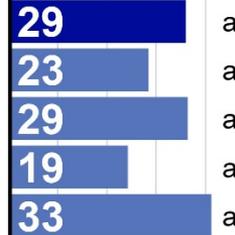
Non-treated control
Omega 16 fl oz/ac
Topsin 20 fl oz/ac
Endura 8 oz/ac
Proline 5 fl oz/ac

White mold
(% of canopy)

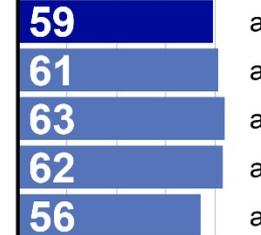
Yield
(bushels/acre)

White mold
(% of canopy)

Yield
(bushels/acre)



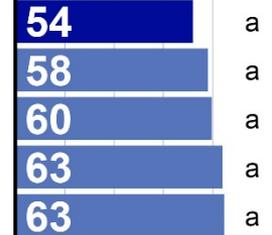
CV: 36.7



CV: 11.0



CV: 17.7



CV: 15.6

BOOM-MOUNTED NOZZLES Two fungicide applications

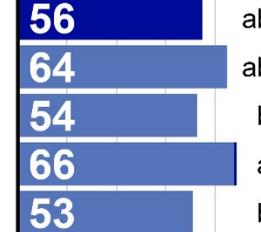
R2 + R3 growth stage, 11 days apart

XR8006 flat-fan nozzles, 40 psi
medium droplets

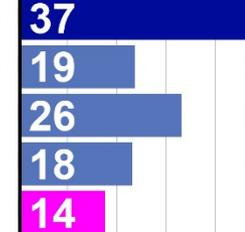
Non-treated control
Omega 16 fl oz/ac
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Endura 8 oz/ac
Proline 5 fl oz/ac



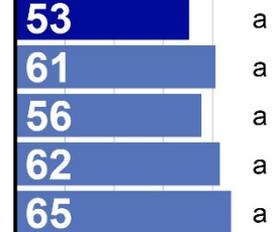
CV: 33.2



CV: 10.7



CV: 44.9



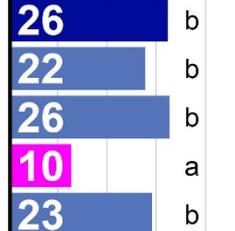
CV: 11.2

'UNDERCOVER 360' DROP NOZZLES One fungicide application

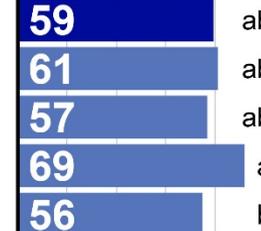
R2 growth stage

XR11001 flat-fan nozzles (side ports)
TX-VK3 hollow-cone nozzle (rear port)
40 psi droplet size = fine, very fine

Non-treated control
Omega 16 fl oz/ac
Topsin 20 fl oz/ac
Endura 8 oz/ac
Proline 5 fl oz/ac



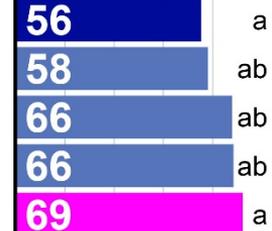
CV: 14.2



CV: 11.8



CV: 53.0



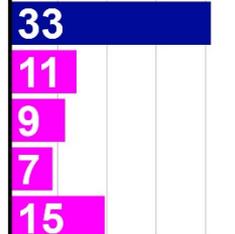
CV: 9.9

'UNDERCOVER 360' DROP NOZZLES Two fungicide applications

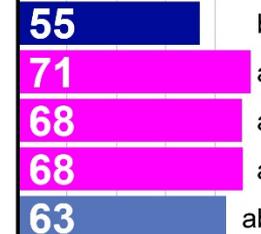
R2 + R3 growth stage, 11 days apart

XR11001 flat-fan nozzles (side ports)
TX-VK3 hollow-cone nozzle (rear port)
40 psi droplet size = fine, very fine

Non-treated control
Omega 16 fl oz/ac
Topsin 20 fl oz/ac
Endura 8 oz/ac
Proline 5 fl oz/ac



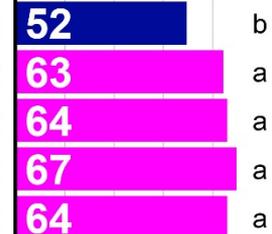
CV: 61.7



CV: 10.5



CV: 54.6



CV: 7.9

OPTIMIZING WHITE MOLD MANAGEMENT IN SOYBEANS

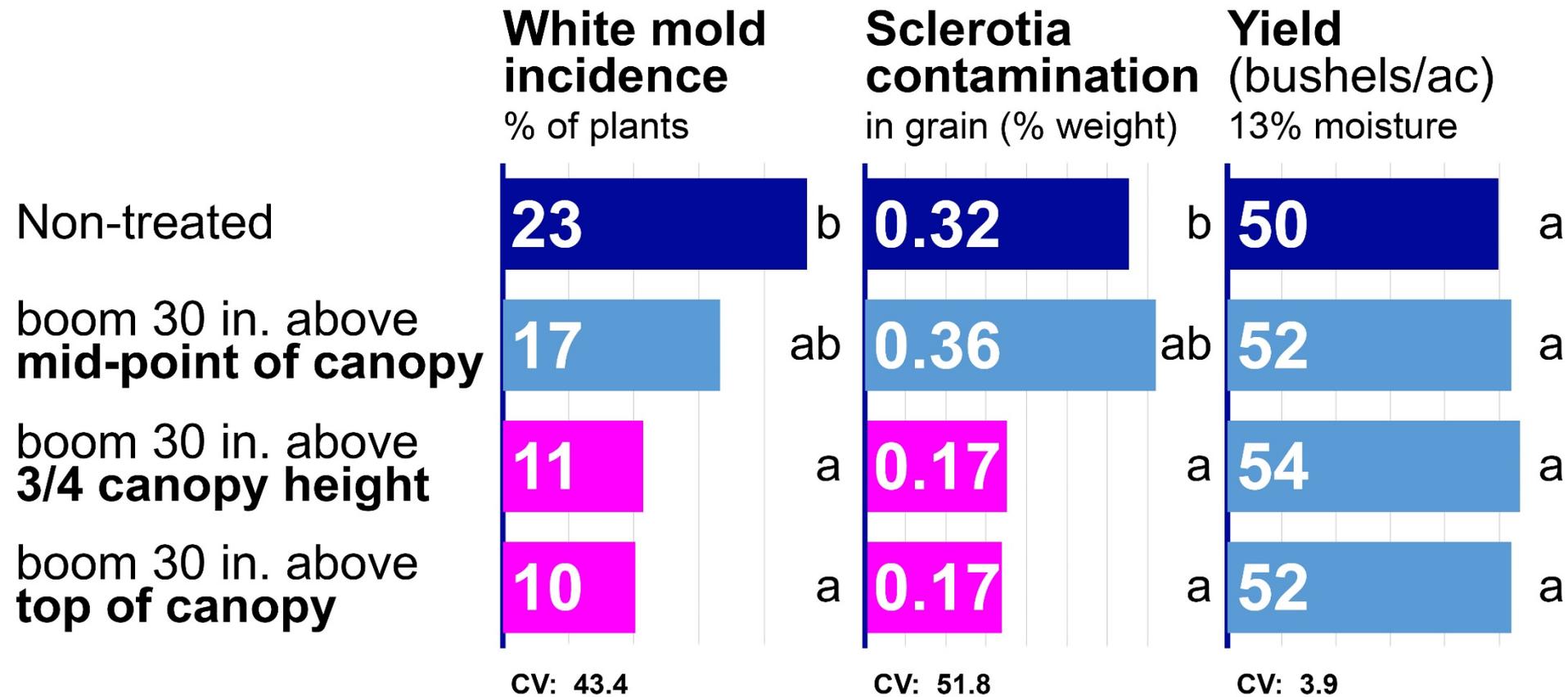
Impact of boom height on fungicide efficacy

XR8004 flat-fan nozzles

40 psi (medium droplets), 4 mph driving speed

Endura 5.5 oz/ac applied at the late R2 growth stage, average 92% canopy closure

Carrington, ND (2017)



OPTIMIZING WHITE MOLD MANAGEMENT IN SOYBEANS

Returns to one versus two fungicide applications

Carrington, ND
(2018)

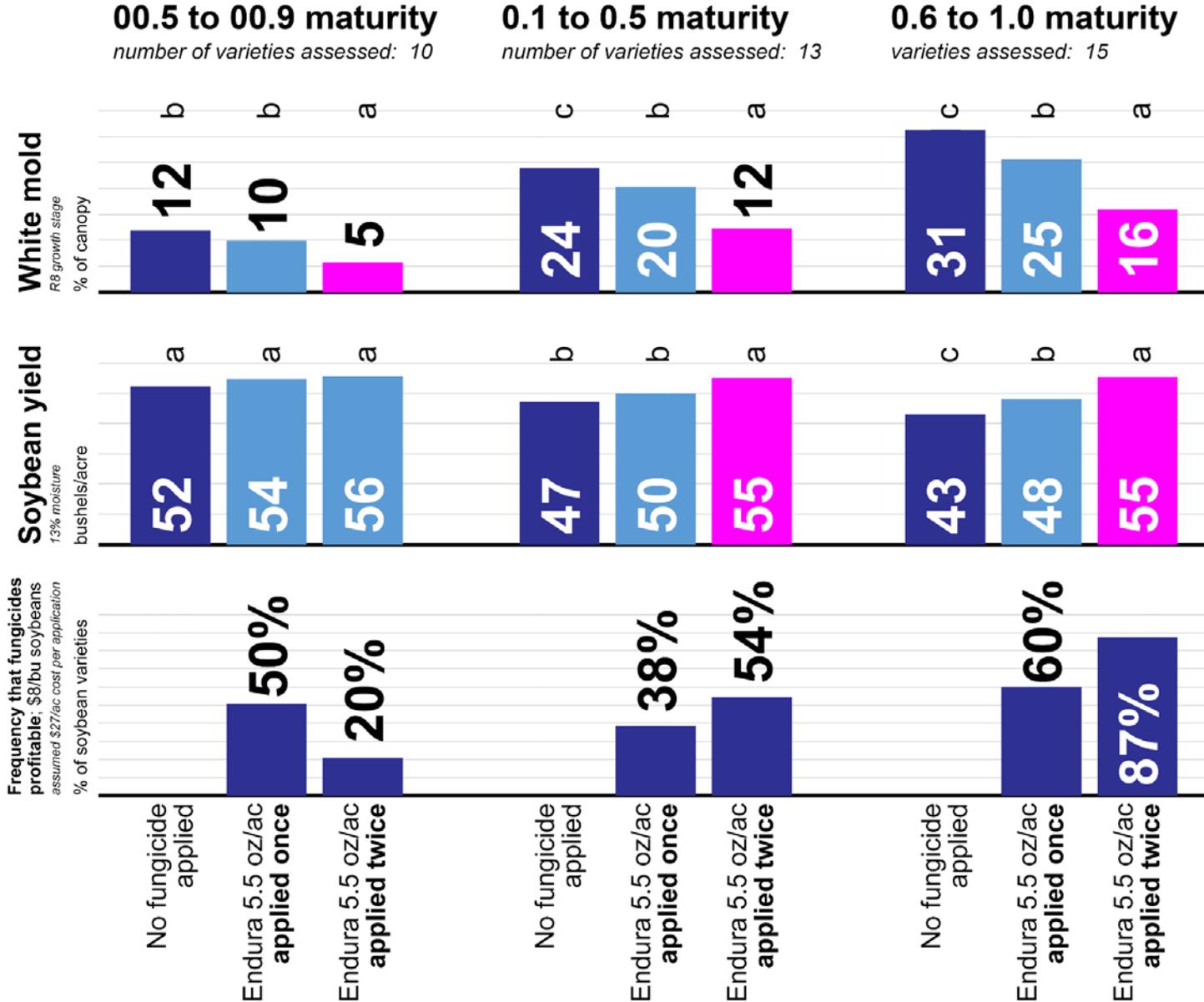
Seeding rate:
165,000 pls/ac

Row spacing: 14
inches

**Fungicide applied
once:**
Late R1/early R2
growth stage

**Fungicide applied
twice:**
Late R1/early R2
growth stage + 10-
12 days later

XR110015 flat-fan
nozzles
40 psi
15 gallons water/ac



OPTIMIZING WHITE MOLD MANAGEMENT IN SOYBEANS

Returns to one versus two fungicide applications

Oakes, ND
(2018)

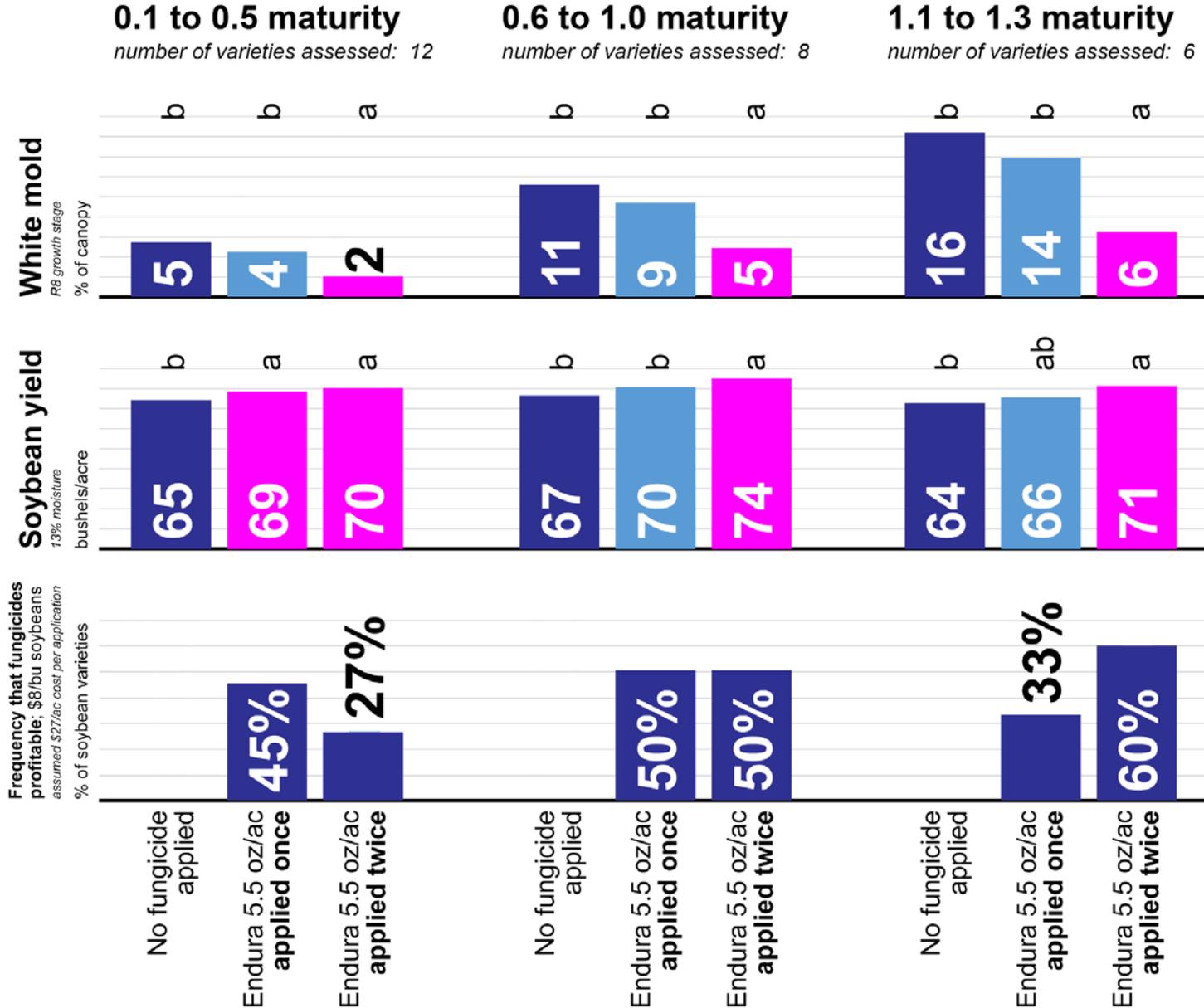
Seeding rate:
165,000 pls/ac

Row spacing: 14
inches

**Fungicide applied
once:**
Late R1/early R2
growth stage

**Fungicide applied
twice:**
Late R1/early R2
growth stage + 10-
12 days later

XR110015 flat-fan
nozzles
40 psi
15 gallons water/ac



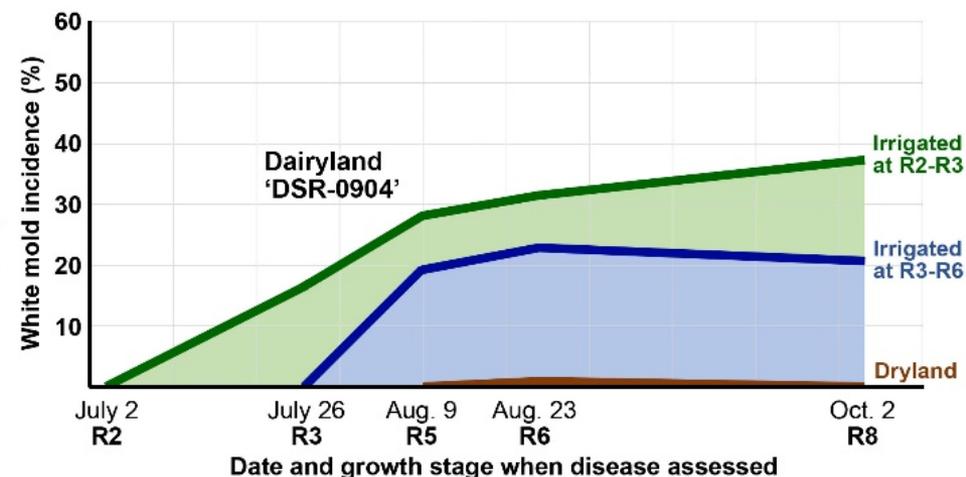
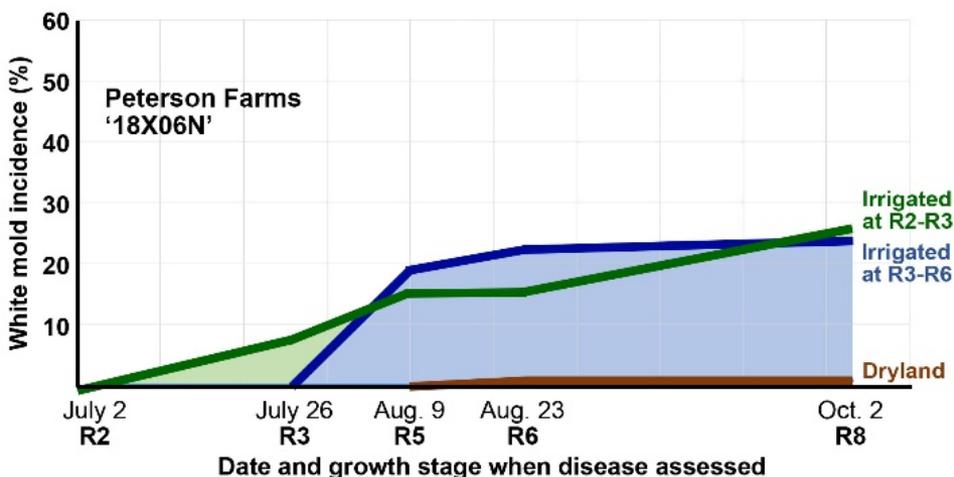
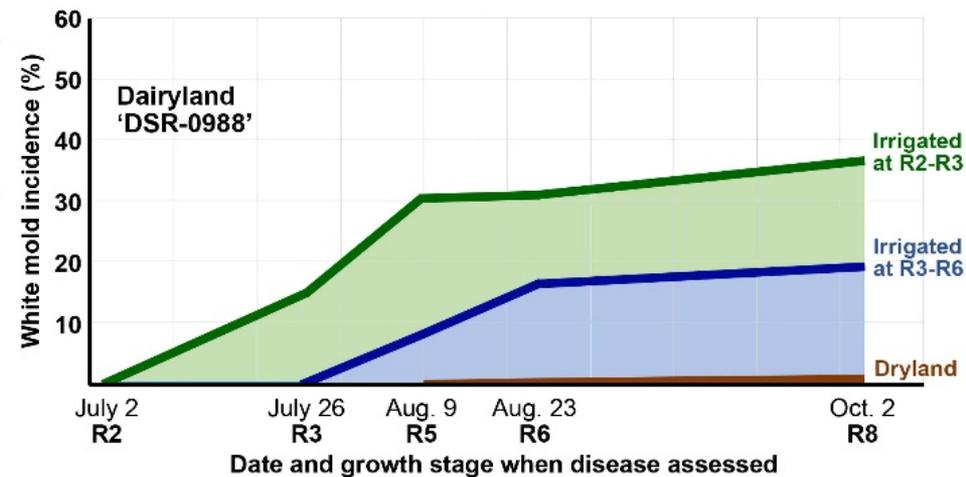
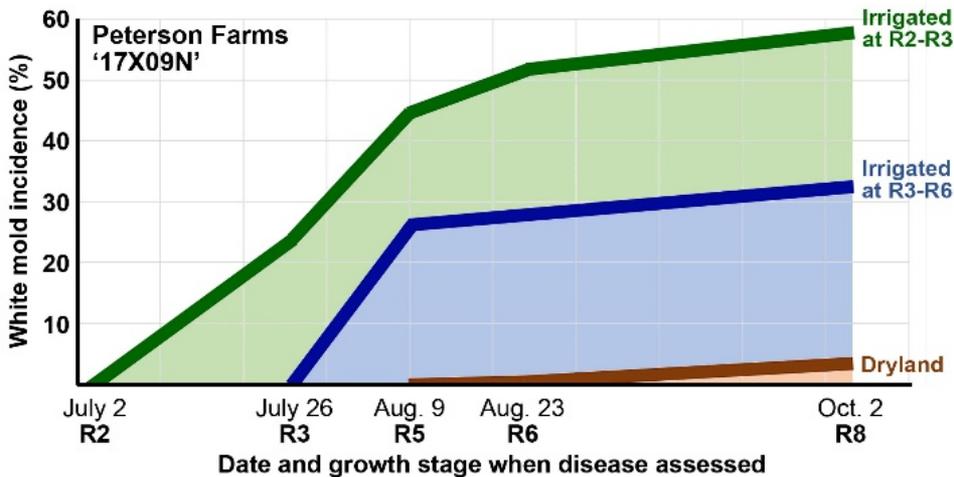
OPTIMIZING WHITE MOLD MANAGEMENT IN SOYBEANS

Returns to one versus two fungicide applications

DIFFERENTIAL IRRIGATION UTILIZED TO FACILITATE EARLY VS. LATE SCLEROTINIA INFECTION

Early irrigation: July 3 to July 23 (early R2 to late R3 growth stage)

Late irrigation: July 24 to Aug. 13 (late R3 to early R6 growth stage)



OPTIMIZING WHITE MOLD MANAGEMENT IN SOYBEANS

Returns to one versus two fungicide applications - *early vs. late Sclerotinia infection*

Carrington, ND (2018)

Four varieties, 0.6 to 0.9 maturity

Seeding rate: 165,000 pls/ac

Row spacing: 14 inches

Fungicide applied once: July 2

25-85% of plants at R2 growth stage

Fungicide applied twice: July 2, 12

25-85% of plants at R2 growth stage

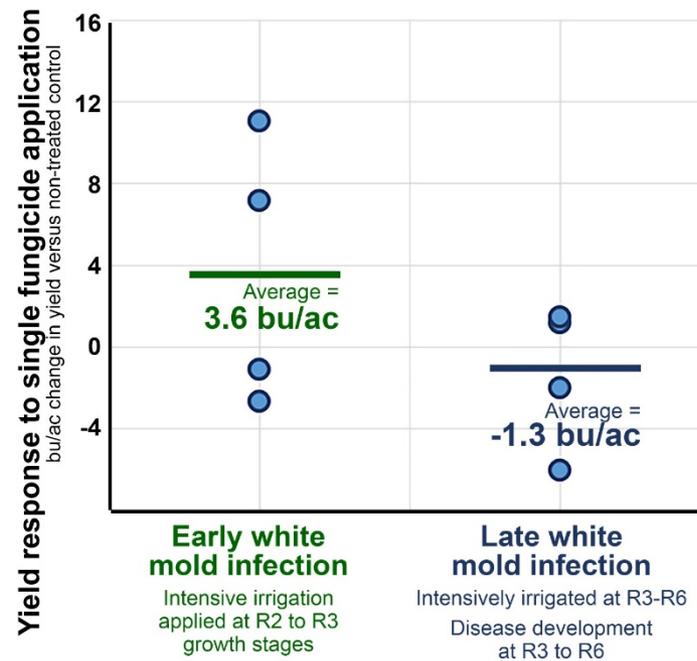
XR110015 flat-fan nozzles, 40 psi, 15 gal/ac

Early irrigation: July 3 to July 23

early R2 to late R3 growth stage

Late irrigation: July 24 to Aug. 13

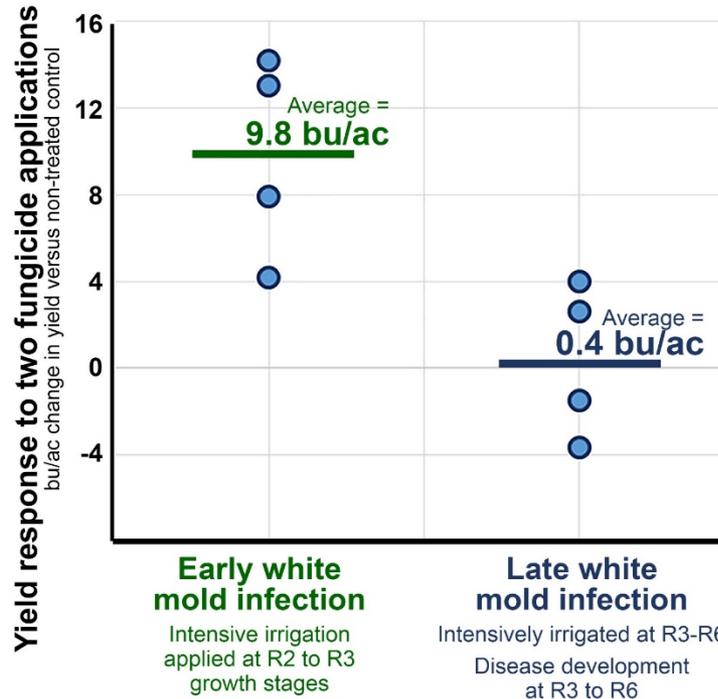
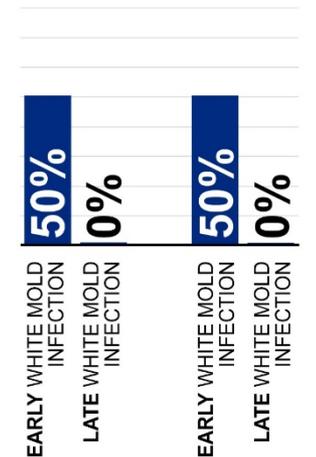
late R3 to early R6 growth stage



Frequency that fungicides were profitable

Percent of varieties assuming total cost of \$27/ac (product + application) for one fungicide application

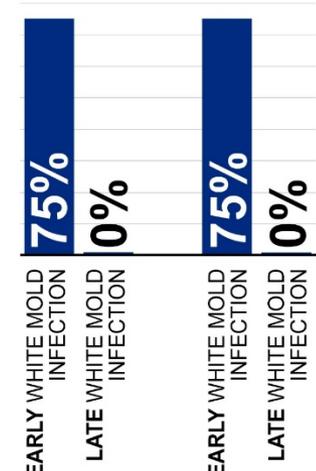
\$8/bu soybeans **\$10/bu soybeans**



Frequency that fungicides were profitable

Percent of varieties assuming total cost of \$54/ac (product + application) for two fungicide applications

\$8/bu soybeans **\$10/bu soybeans**



OPTIMIZING WHITE MOLD MANAGEMENT IN SOYBEANS

Returns to one versus two fungicide applications

Carrington, ND (2018)

Seeding rate:
165,000 pls/ac

Row spacing:
14 inches

Fungicide applied once: July 2
25-85% of plants at R2 growth stage

Fungicide applied twice: July 2, 12
25-85% of plants at R2 growth stage

XR110015 flat-fan nozzles
40 psi
15 gallons water/ac

