



Improving management of white mold in soybeans: Comparative efficacy of registered fungicides

Michael Wunsch

North Dakota State University Carrington Research Extension Center

Comparative efficacy of registered fungicides

Methods:

APPLICATION TIMING: Fungicides were applied at early to full R2 growth stage unless the canopy closed earlier or daytime highs were in the mid/upper 90s (°F).

- If the canopy closed before early to full R2, applications were made at / shortly before canopy closure.
- If daytime highs were in the mid to upper 90s (°F), applications were delayed until daytime highs dropped to the upper 80s to low 90s.

FUNGICIDE SPRAY DROPLET SIZE: Nozzles and application pressures were selected to optimize droplet size relative to canopy closure.

- 110-degree flat-fan nozzles were utilized
- When TeeJet nozzles were utilized, medium droplets were utilized when average canopy closure was 80-90% and coarse droplets were utilized when average canopy closure was >90%.

APPLICATION METHODS:

- Tractor-applied (usually 5.9 to 6.5 mph driving speed) or hand-held boom
- 15 gal/ac spray volume

Comparative efficacy of registered fungicides

Methods:

DATA WERE GENERATED FROM COMPARATIVE EFFICACY STUDIES funded by the North Dakota Soybean Council and by private companies.

- To assess comparative efficacy across multiple studies differing in overall treatment lists, data were analyzed for just the comparisons of interest (for instance, non-treated control vs. Topsin @ 20 fl oz vs. Endura @ 8 oz) for all studies in which these treatments were evaluated.
- Combined analyses were conducted by treating the results from each study as an experimental replicate.
- Analyses were only conducted for fungicides that were evaluated a minimum of 3 times across different studies.

RESULTS ARE PRESENTED ONLY FROM STUDIES IN WHICH FUNGICIDE DROPLET SIZE WAS CALIBRATED RELATIVE TO CANOPY CLOSURE. Calibrating droplet size relative to canopy closure sharply improves the efficacy of fungicides against white mold in soybeans. Starting in 2019, fungicide spray droplet size was calibrated relative to canopy closure in all soybean white mold fungicide efficacy studies conducted in Carrington and Oakes, ND.

IMPROVING WHITE MOLD MANAGEMENT IN SOYBEANS

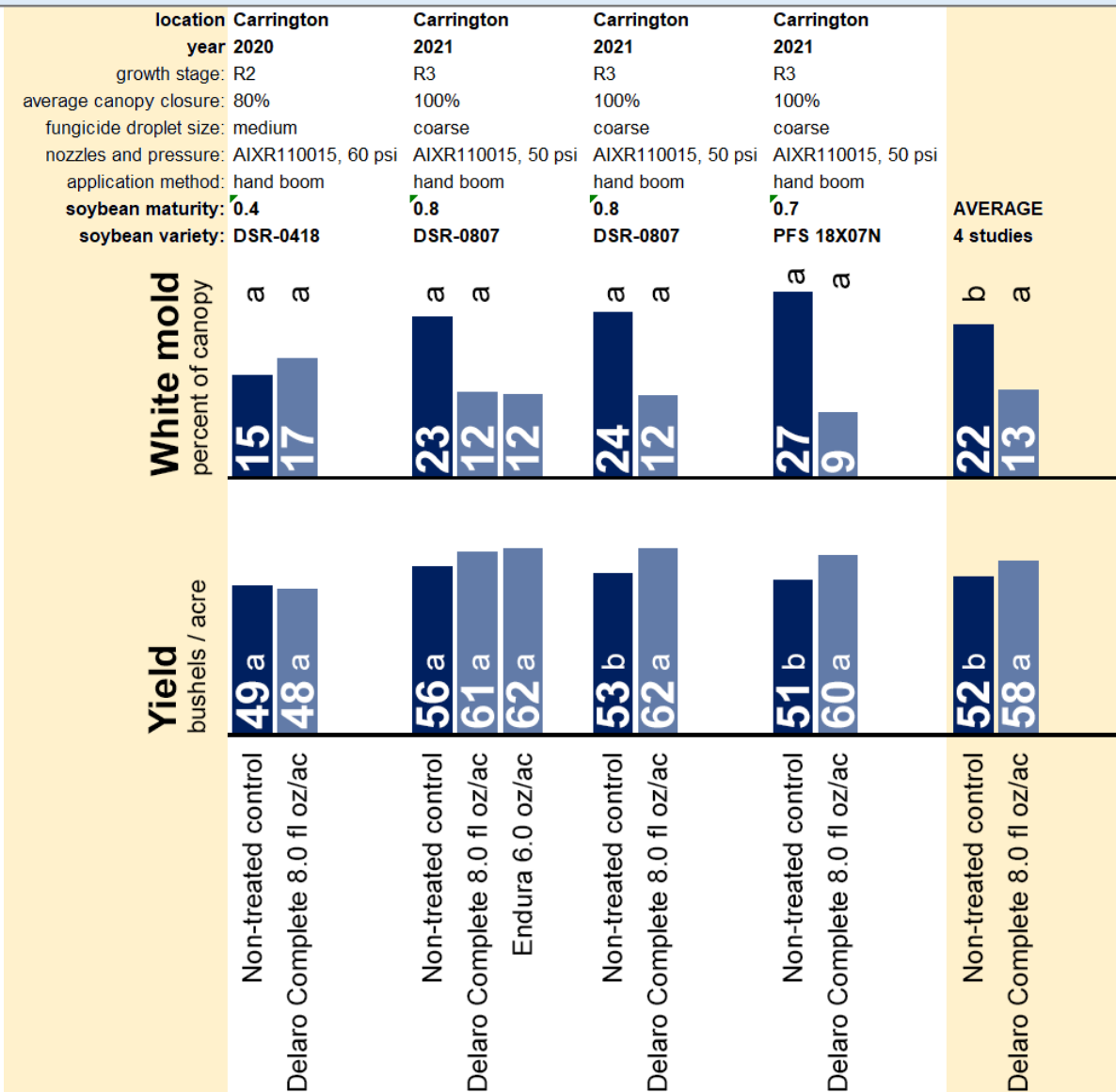
Comparative efficacy of registered fungicides

Delaro Complete (8 fl oz) applied once

Delaro Complete (8 fl oz) showed potential as a white mold fungicide.

Delaro Complete was only tested vs. Endura in one study, an insufficient number of studies for assessing comparative efficacy.

A single application of Delaro Complete @ 8 fl oz/ac conferred a statistically significant ($P < 0.05$) increase in soybean yield under white mold pressure in two of four studies.



IMPROVING WHITE MOLD MANAGEMENT IN SOYBEANS

Comparative efficacy of registered fungicides

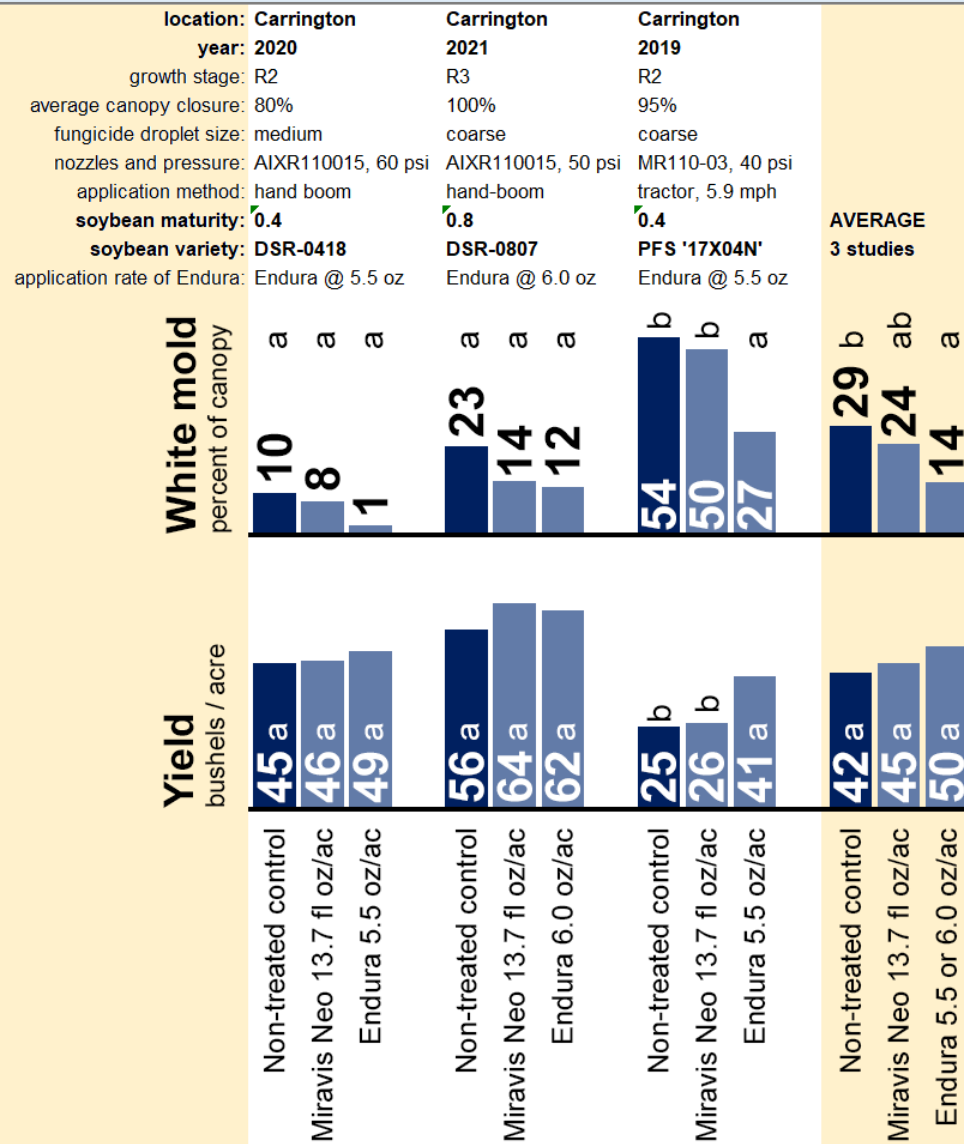
Miravis Neo (13.7 fl oz) vs. Endura (5.5 or 6 oz) applied once

Miravis Neo (13.7 fl oz) was generally less effective than Endura (5.5 or 6 oz) when a single application was made to soybeans under white mold pressure.

Endura (5.5 or 6 oz) conferred a numerical reduction in white mold vs. Miravis Neo (13.7 fl oz) in three of three studies. Statistical separation ($P < 0.05$) was observed in one study.

Endura (5.5 or 6 oz) conferred a numerical increase in yield vs. Miravis Neo (13.7 fl oz) in two of three studies. Statistical separation ($P < 0.05$) was observed in one study.

CAUTION: Statistical separation was not achieved between Miravis Neo and Endura, and additional studies are needed before rigorous conclusions can be drawn.



IMPROVING WHITE MOLD MANAGEMENT IN SOYBEANS

Comparative efficacy of registered fungicides

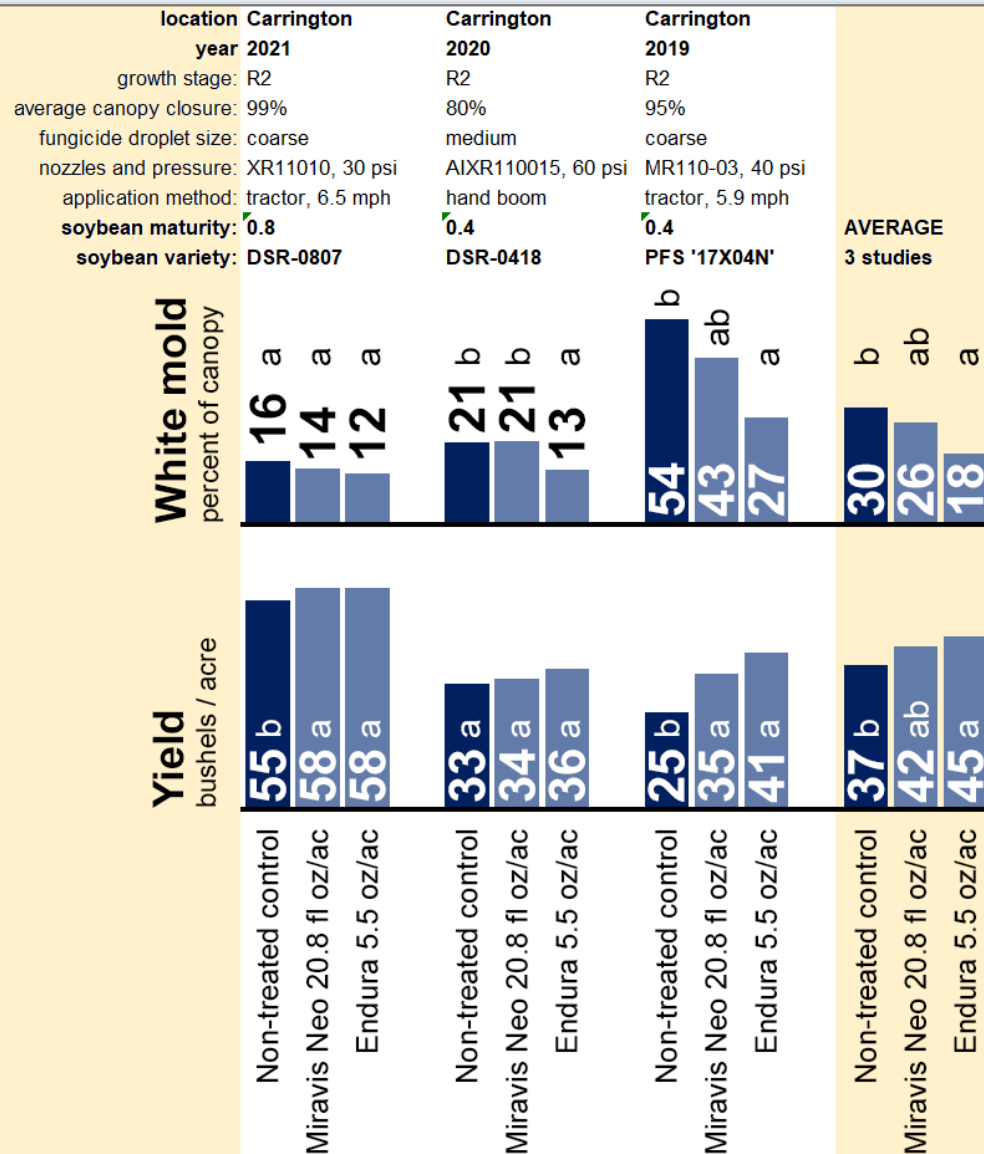
Miravis Neo (20.8 fl oz) vs. Endura (5.5 oz) applied once

Miravis Neo (20.8 fl oz) was generally less effective than Endura (5.5 oz) when a single application was made to soybeans under white mold pressure.

Endura (5.5 oz) conferred a numerical reduction in white mold vs. Miravis Neo (20.8 fl oz) in three of three studies.

Endura (5.5 oz) conferred a numerical increase in yield vs. Miravis Neo (20.8 fl oz) in two of three studies.

CAUTION: Statistical separation was not achieved between Miravis Neo and Endura, and additional studies are needed before rigorous conclusions can be drawn.



IMPROVING WHITE MOLD MANAGEMENT IN SOYBEANS

Comparative efficacy of registered fungicides

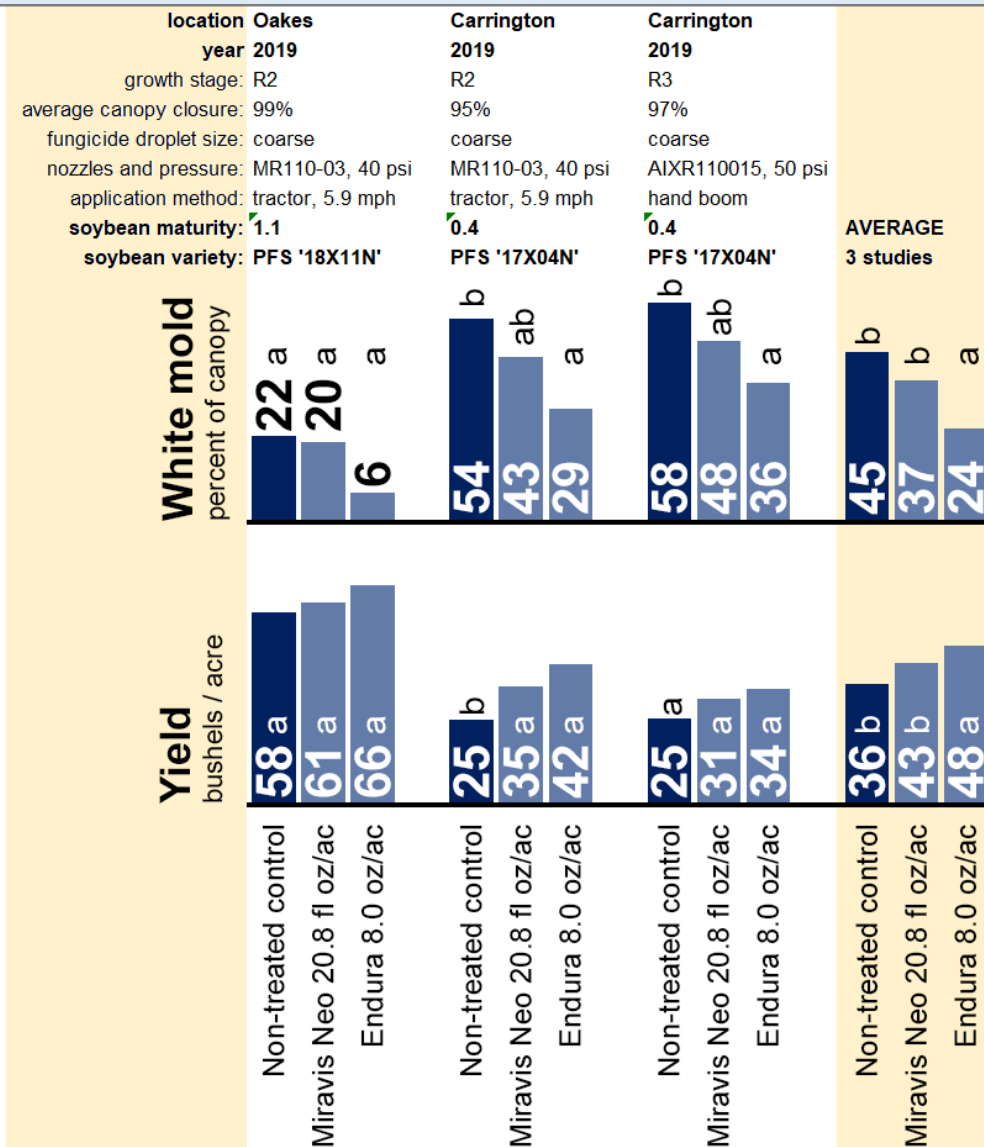
Miravis Neo (20.8 fl oz) vs. Endura (8 oz) applied once

Miravis Neo (20.8 fl oz) was less effective than Endura (8 oz) when a single application was made to soybeans under white mold pressure.

Endura (8 oz) conferred a numerical reduction in white mold vs. Miravis Neo (20.8 fl oz) in three of three studies.

Endura (8 oz) conferred a numerical increase in yield vs. Miravis Neo (20.8 fl oz) in three of three studies.

Statistical separation ($P < 0.05$) was achieved between Miravis Neo and Endura in the combined analysis across studies.



IMPROVING WHITE MOLD MANAGEMENT IN SOYBEANS

Comparative efficacy of registered fungicides

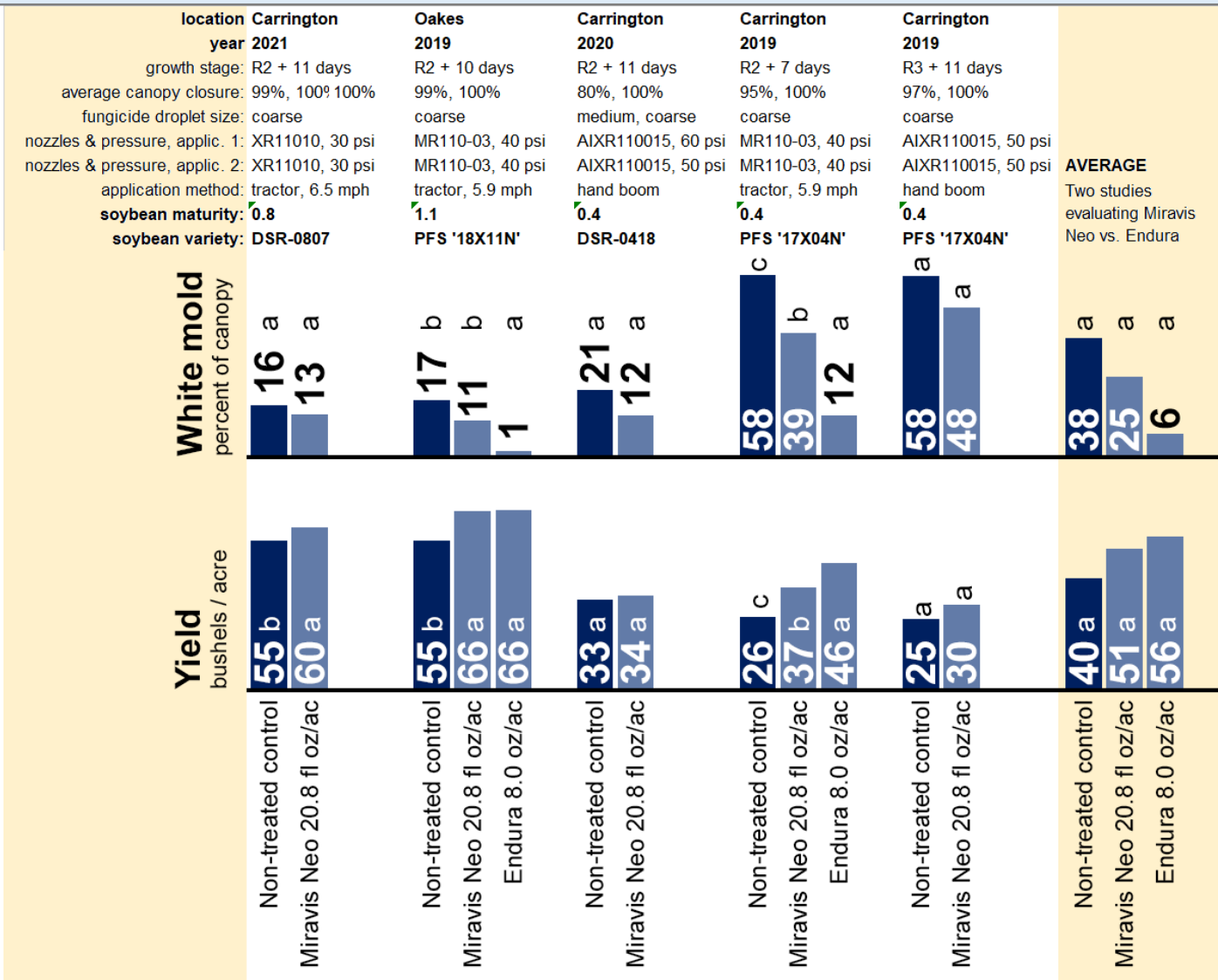
Miravis Neo (20.8 fl oz) vs. Endura (8 oz) applied twice

Miravis Neo (20.8 fl oz) was generally less effective than Endura (8 oz) when two applications 7-11 days apart were made to soybeans under white mold pressure.

Endura (8 oz) conferred a statistically significant reduction ($P < 0.05$) in white mold vs. Miravis Neo (20.8 fl oz) in two of two studies.

Endura (8 oz) conferred a numerical increase in yield vs. Miravis Neo (20.8 fl oz) in one of two studies. Statistical separation ($P < 0.05$) was observed in one study.

CAUTION: Statistical separation was not achieved between Miravis Neo and Endura, and additional studies are needed before rigorous conclusions can be drawn.



IMPROVING WHITE MOLD MANAGEMENT IN SOYBEANS

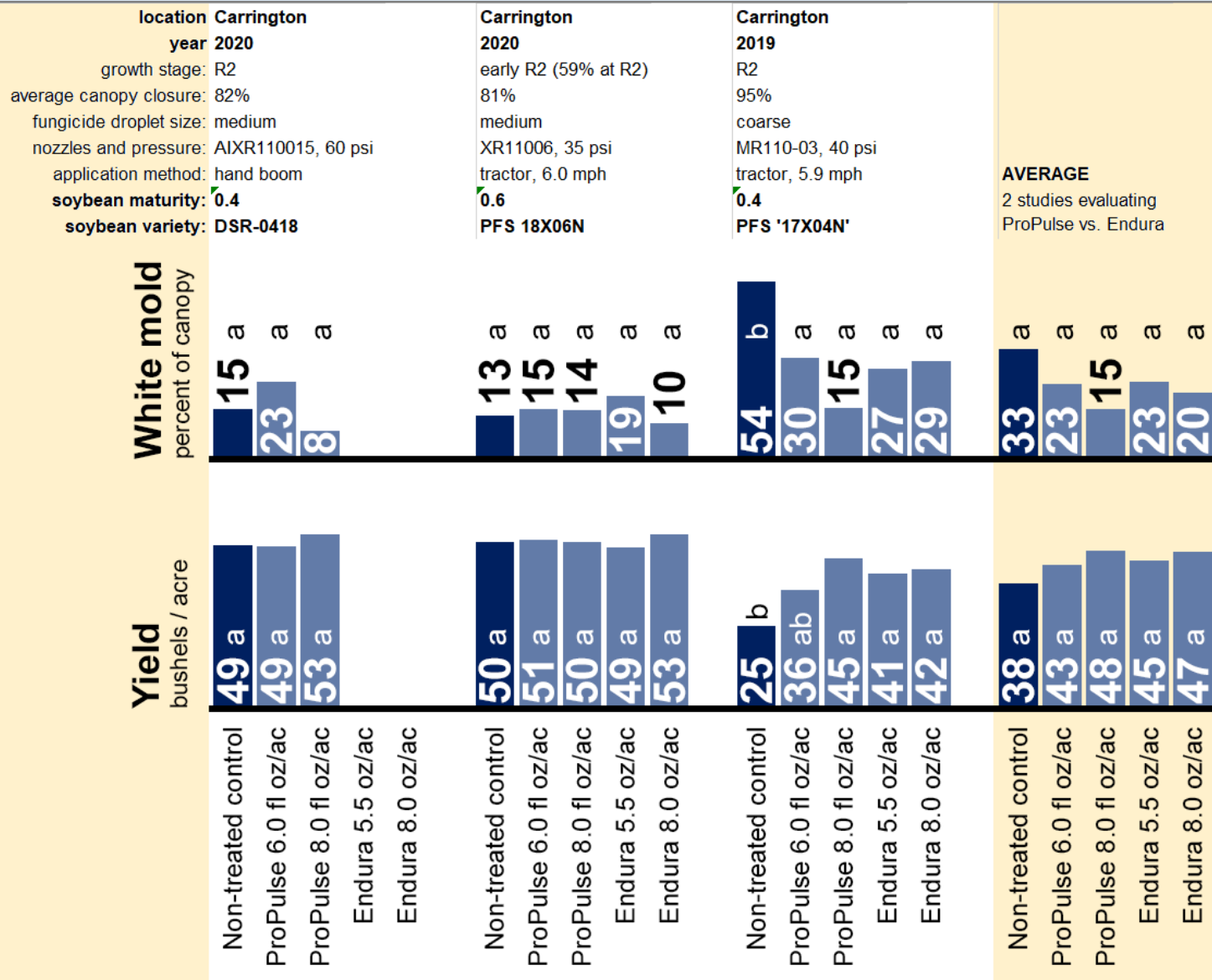
Comparative efficacy of registered fungicides

ProPulse (6 or 8 fl oz) vs. Endura (5.5 or 8 oz) applied once

ProPulse and Endura performed similarly:

Endura @ 5.5 oz performed equivalently to ProPulse @ 6 fl oz

Endura @ 8 oz performed equivalently to ProPulse @ 8 fl oz



IMPROVING WHITE MOLD MANAGEMENT IN SOYBEANS

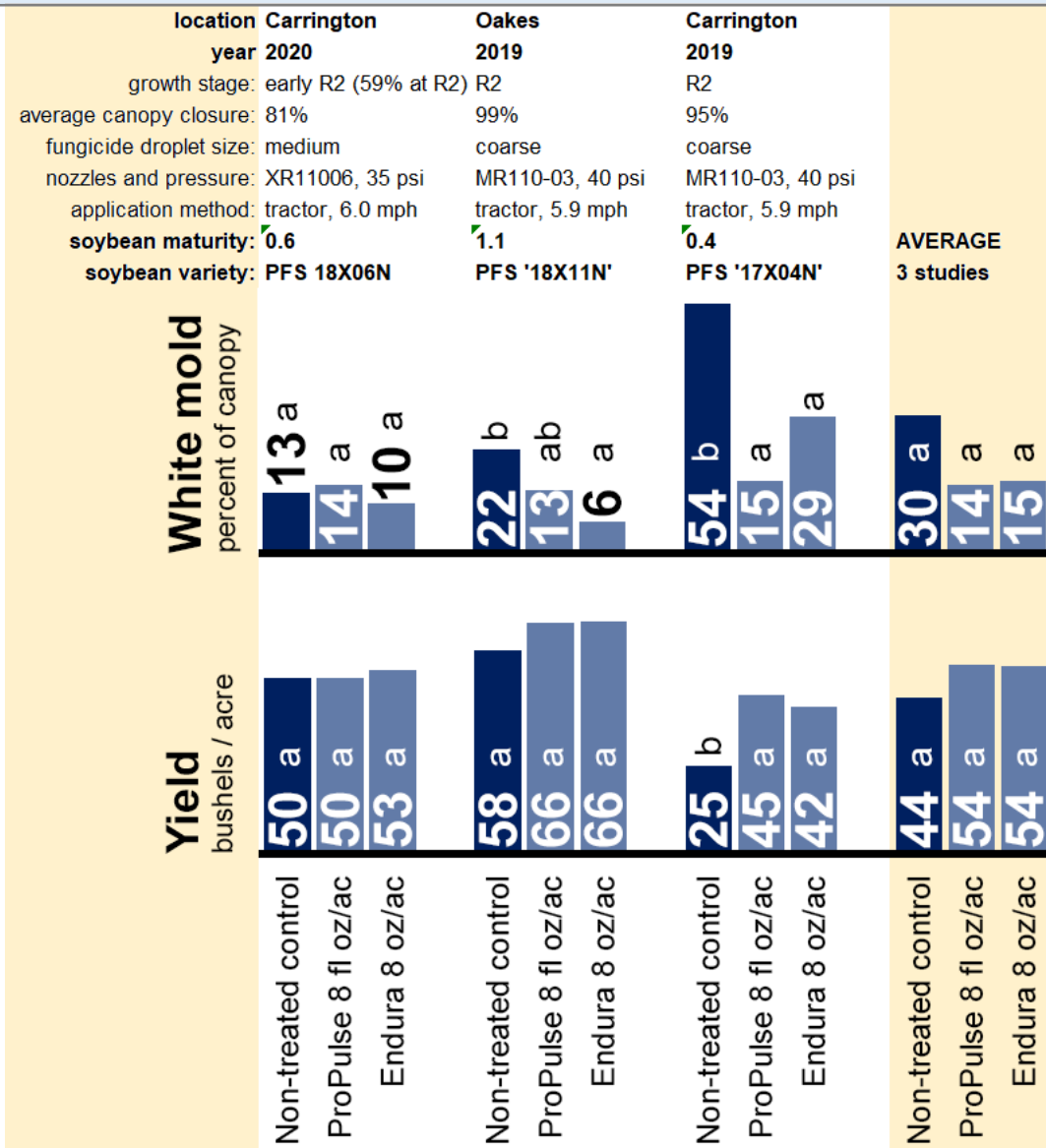
Comparative efficacy of registered fungicides

ProPulse (8 fl oz) vs. Endura (8 oz) applied once

ProPulse (8 fl oz) and Endura (8 oz) performed similarly:

Average yield response and white mold control were equivalent for ProPulse (8 fl oz) and Endura (8 oz)

Yields were numerically higher for Endura @ 8 oz in one of three studies, higher for ProPulse @ 8 fl oz in one of three studies, and equivalent in one study.



IMPROVING WHITE MOLD MANAGEMENT IN SOYBEANS

Comparative efficacy of registered fungicides

ProPulse (8 fl oz) vs. Endura (8 oz) applied twice

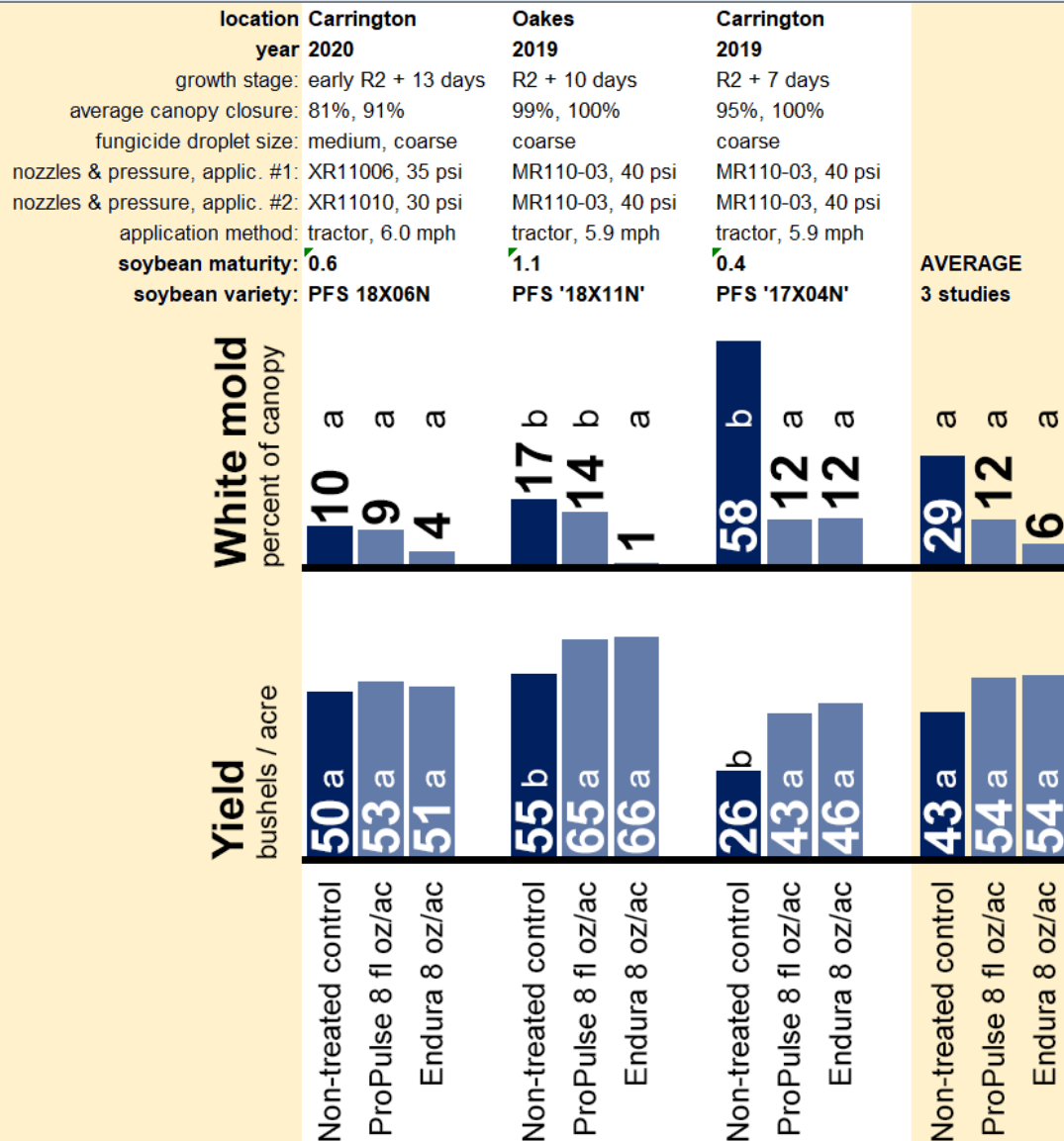
ProPulse (8 fl oz) and Endura (8 oz) performed similarly applied twice 7 to 13 days apart.

ProPulse (8 fl oz) and Endura (8 oz) conferred similar yield gains.

- Endura was associated with numerically higher yields in two of three studies, and ProPulse was associated with higher yield in one study, but statistical separation was not observed between these treatments in any of the studies.
- Average yields for these treatments (across all three studies) were equal.

Endura (8 oz) was sometimes associated with better end-of-season white mold control than ProPulse (8 fl oz).

- Endura was associated with numerical reductions in white mold (vs. ProPulse) in two of three studies, with statistical separation ($P < 0.05$) observed in one study. In the third study, disease control was equivalent for these fungicides.



IMPROVING WHITE MOLD MANAGEMENT IN SOYBEANS

Comparative efficacy of registered fungicides

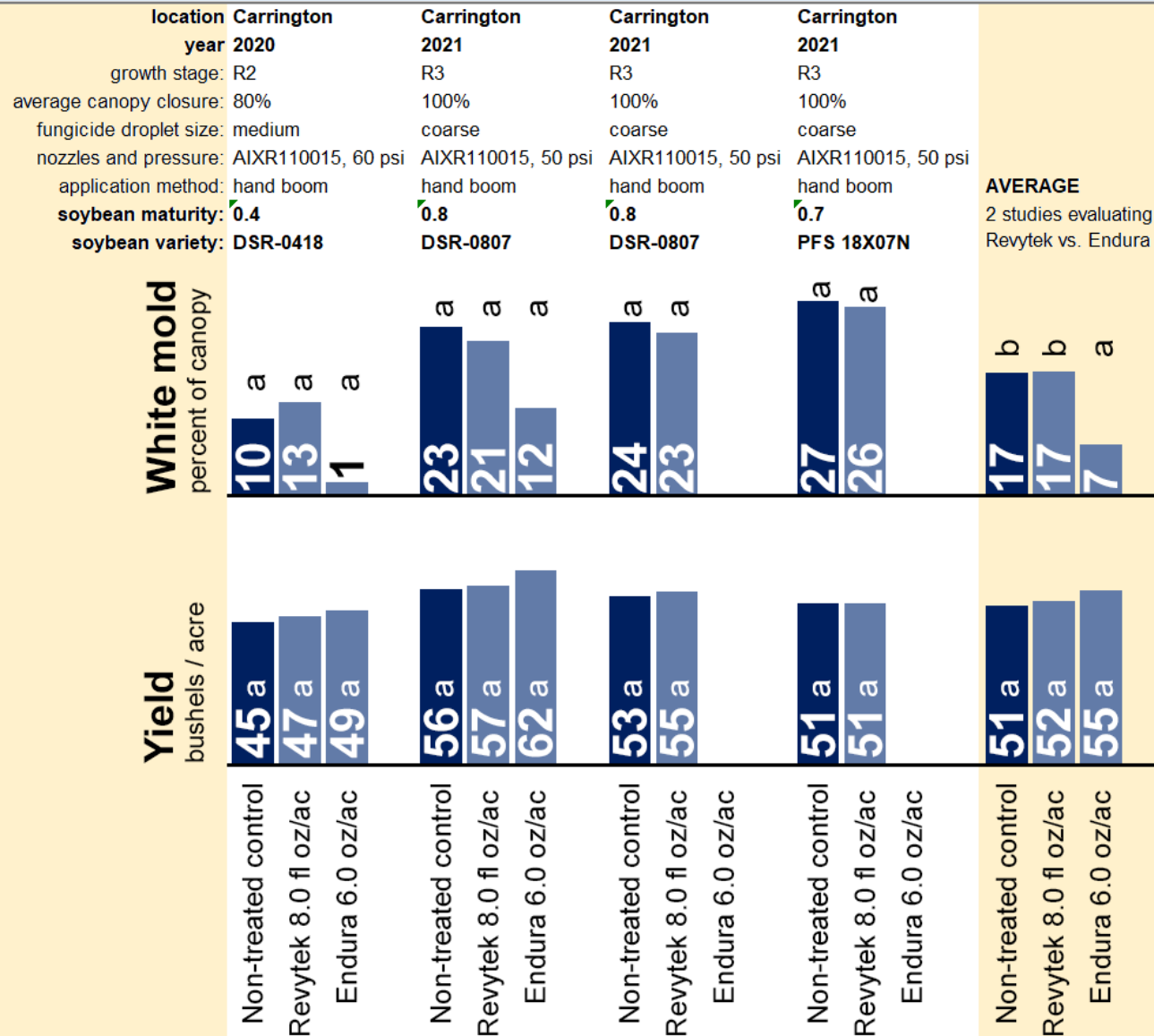
Revytek (8 fl oz) vs. Endura (6 oz) applied once

Revytek (8 fl oz) was less effective than Endura (6 oz) when a single application was made to soybeans under white mold pressure.

Endura (6 oz) conferred a numerical reduction in white mold vs. Revytek (8 fl oz) in two of two studies. Statistical separation ($P < 0.05$) was observed in the combined analysis.

Endura (6 oz) conferred a numerical increase in yield vs. Revytek (8 fl oz) in two of two studies.

CAUTION: Statistical separation for Revytek vs. Endura was only achieved for disease control, not yield, in the combined analysis. Additional studies are needed before rigorous conclusions can be drawn.



IMPROVING WHITE MOLD MANAGEMENT IN SOYBEANS

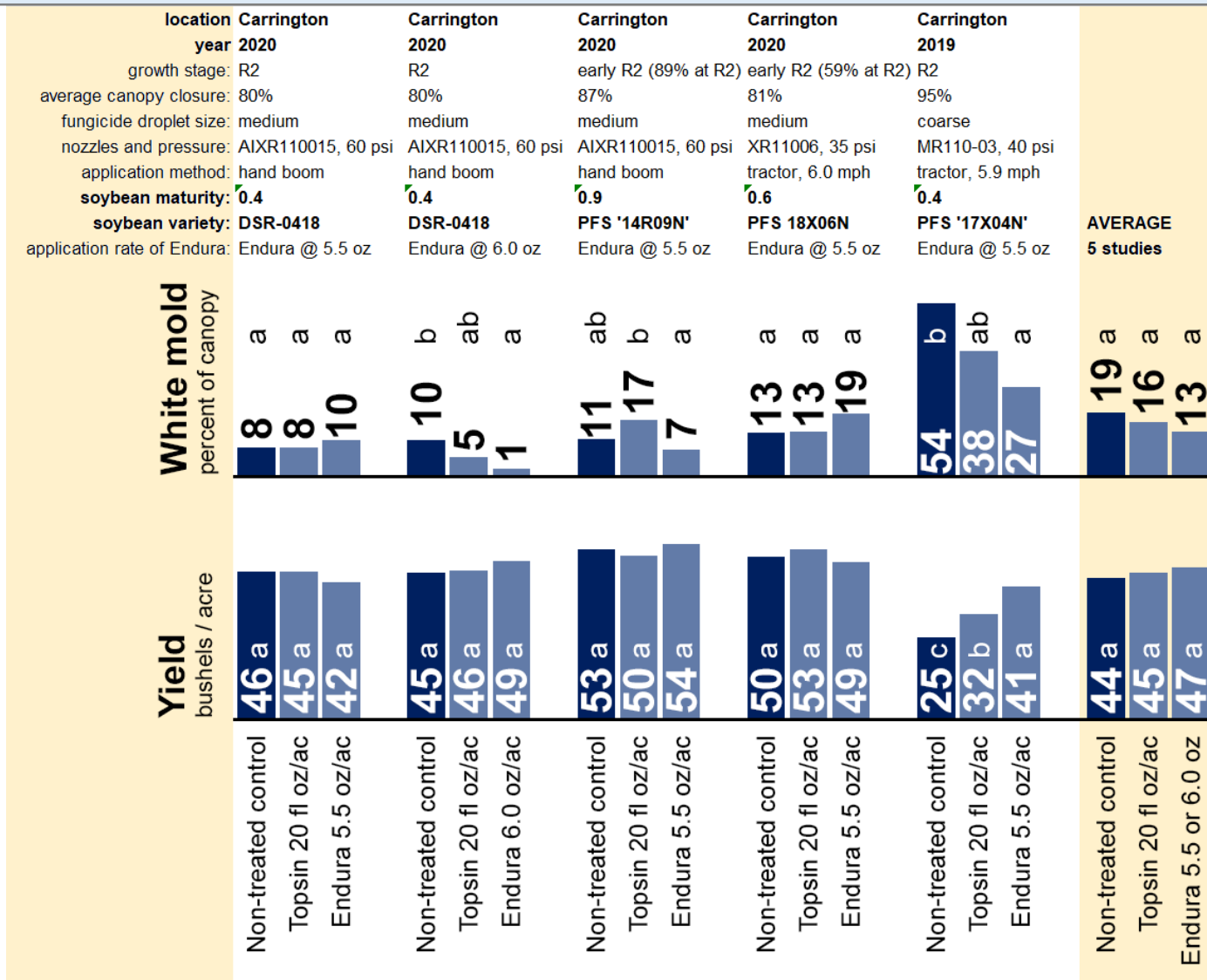
Comparative efficacy of registered fungicides

Topsin (20 fl oz) vs. Endura (5.5 oz) applied once

Endura (5.5 oz) conferred a numerical reduction in white mold vs. Topsin (20 fl oz) in 3 of 5 studies, with statistical separation ($P < 0.05$) observed in one study.

Endura (5.5 oz) conferred a numerical increase in yield vs. Topsin (20 fl oz) in 3 of 5 studies, with statistical separation ($P < 0.05$) observed in one study.

The combined analysis showed a trend of better disease control and increased yield with Endura (5.5 oz) vs. Topsin (20 fl oz), but statistical separation was not achieved.



IMPROVING WHITE MOLD MANAGEMENT IN SOYBEANS

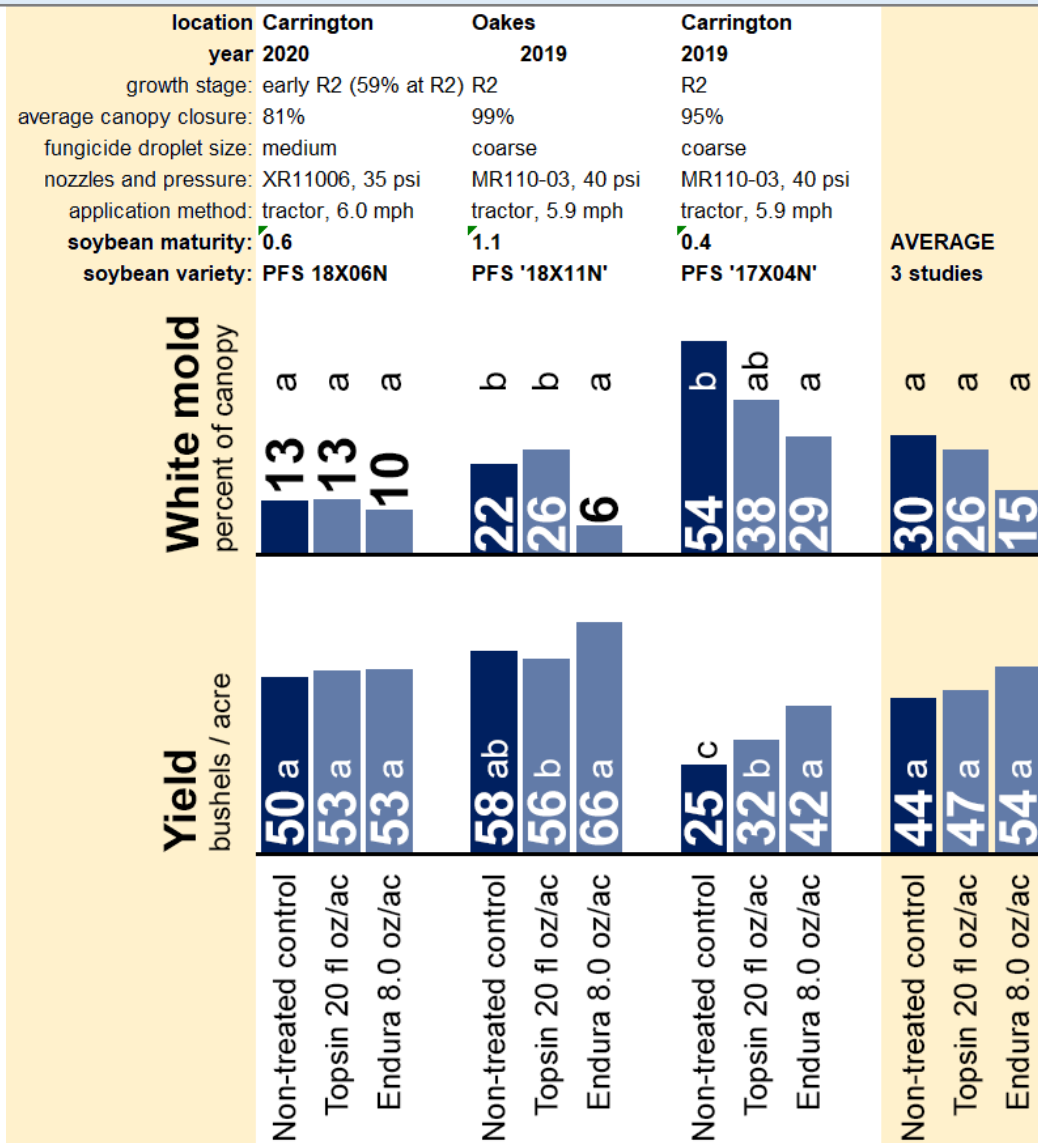
Comparative efficacy of registered fungicides

Topsin (20 fl oz) vs. Endura (8 oz) applied once

Endura (8 oz) conferred a numerical reduction in white mold vs. Topsin (20 fl oz) in three of three studies, with statistical separation ($P < 0.05$) observed in one study.

Endura (8 oz) conferred a statistically significant ($P < 0.05$) increase in yield vs. Topsin (20 fl oz) in two of three studies. In the third study, yields were equivalent across both fungicides.

The combined analysis showed a trend of better disease control and increased yield with Endura (8 oz) vs. Topsin (20 fl oz), but statistical separation was not achieved.



IMPROVING WHITE MOLD MANAGEMENT IN SOYBEANS

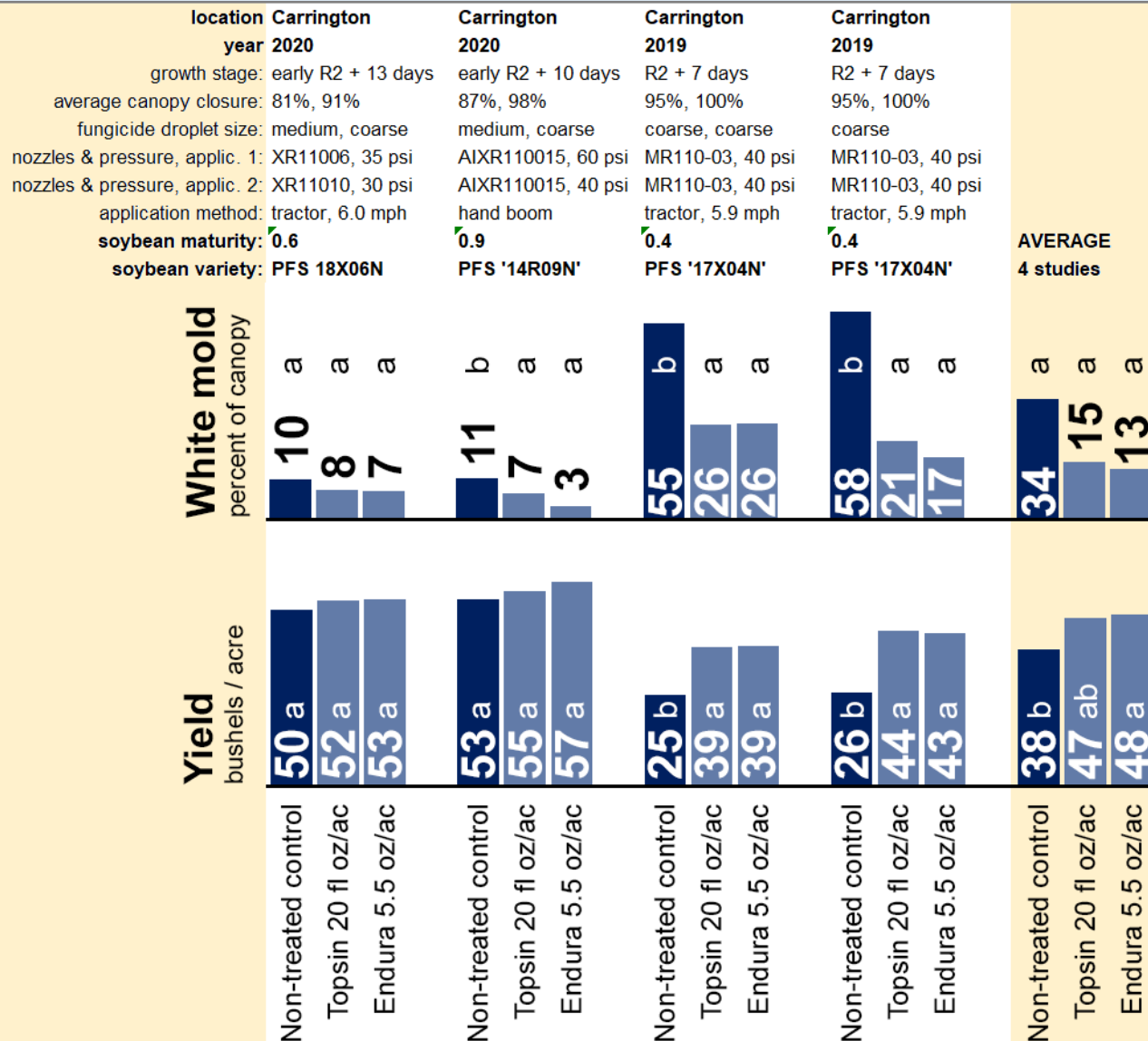
Comparative efficacy of registered fungicides

Topsin (20 fl oz) vs. Endura (5.5 oz) applied twice

Endura (5.5 oz) conferred a numerical reduction in white mold vs. Topsin (20 fl oz) in three of four studies, but statistical separation of these treatments of not observed ($P < 0.05$). Disease control was equivalent in one study.

Endura (5.5 oz) conferred a numerical increase in yield vs. Topsin (20 fl oz) in two of four studies, but statistical separation of these treatments of not observed ($P < 0.05$). Yield response was equivalent in one study.

The combined analysis showed a trend of slightly better disease control and increased yield with Endura (5.5 oz) vs. Topsin (20 fl oz), but statistical separation was not achieved.



IMPROVING WHITE MOLD MANAGEMENT IN SOYBEANS

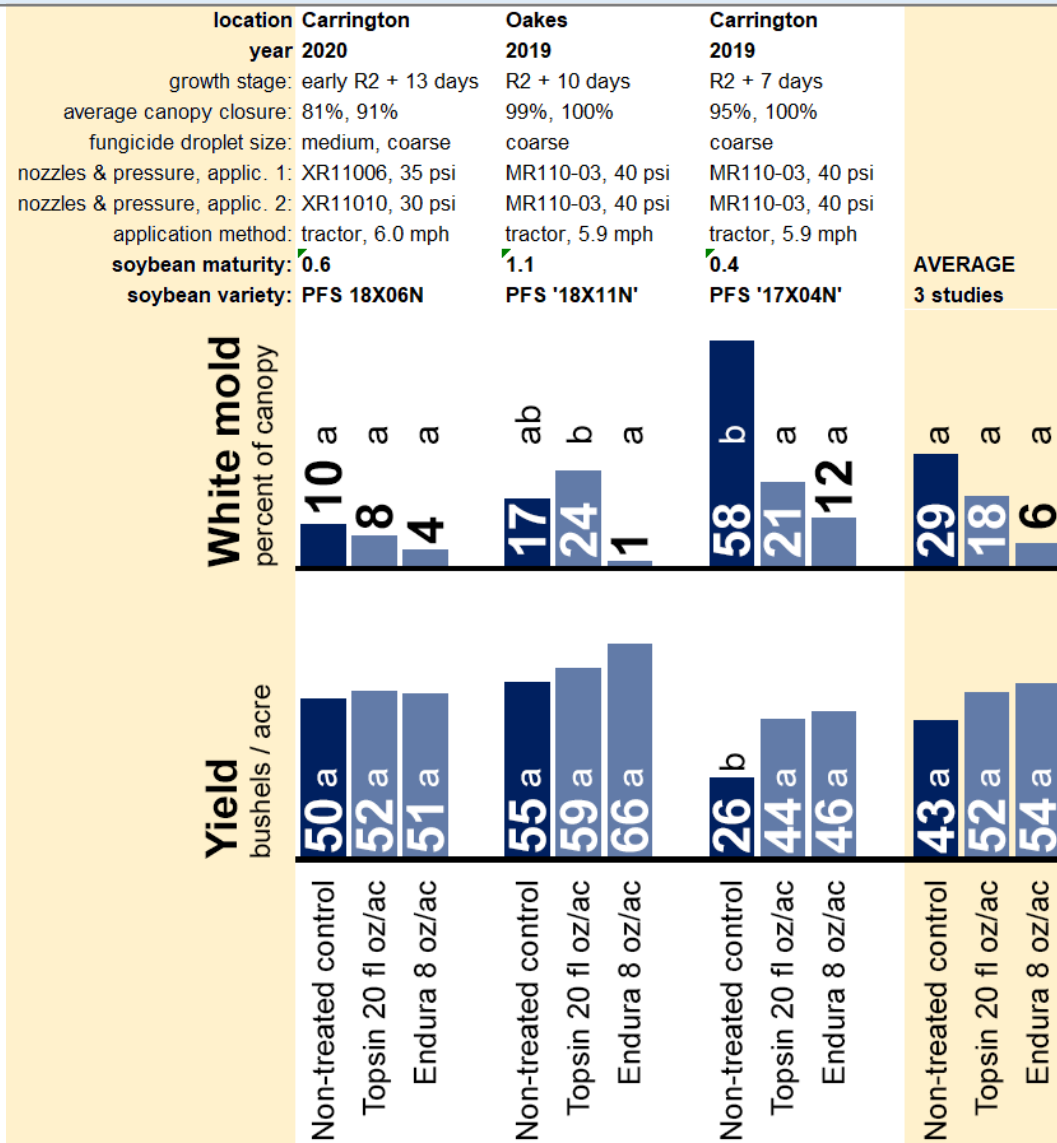
Comparative efficacy of registered fungicides

Topsin (20 fl oz) vs. Endura (8 oz) applied twice

Endura (8 oz) conferred a numerical reduction in white mold vs. Topsin (20 fl oz) in three of three studies, with statistical separation ($P < 0.05$) observed in one study.

Endura (8 oz) conferred a numerical increase in yield vs. Topsin (20 fl oz) in three of three studies, but statistical separation of these treatments was not observed ($P < 0.05$).

The combined analysis showed a trend of better disease control and increased yield with Endura (8 oz) vs. Topsin (20 fl oz), but statistical separation was not achieved.



IMPROVING WHITE MOLD MANAGEMENT IN SOYBEANS

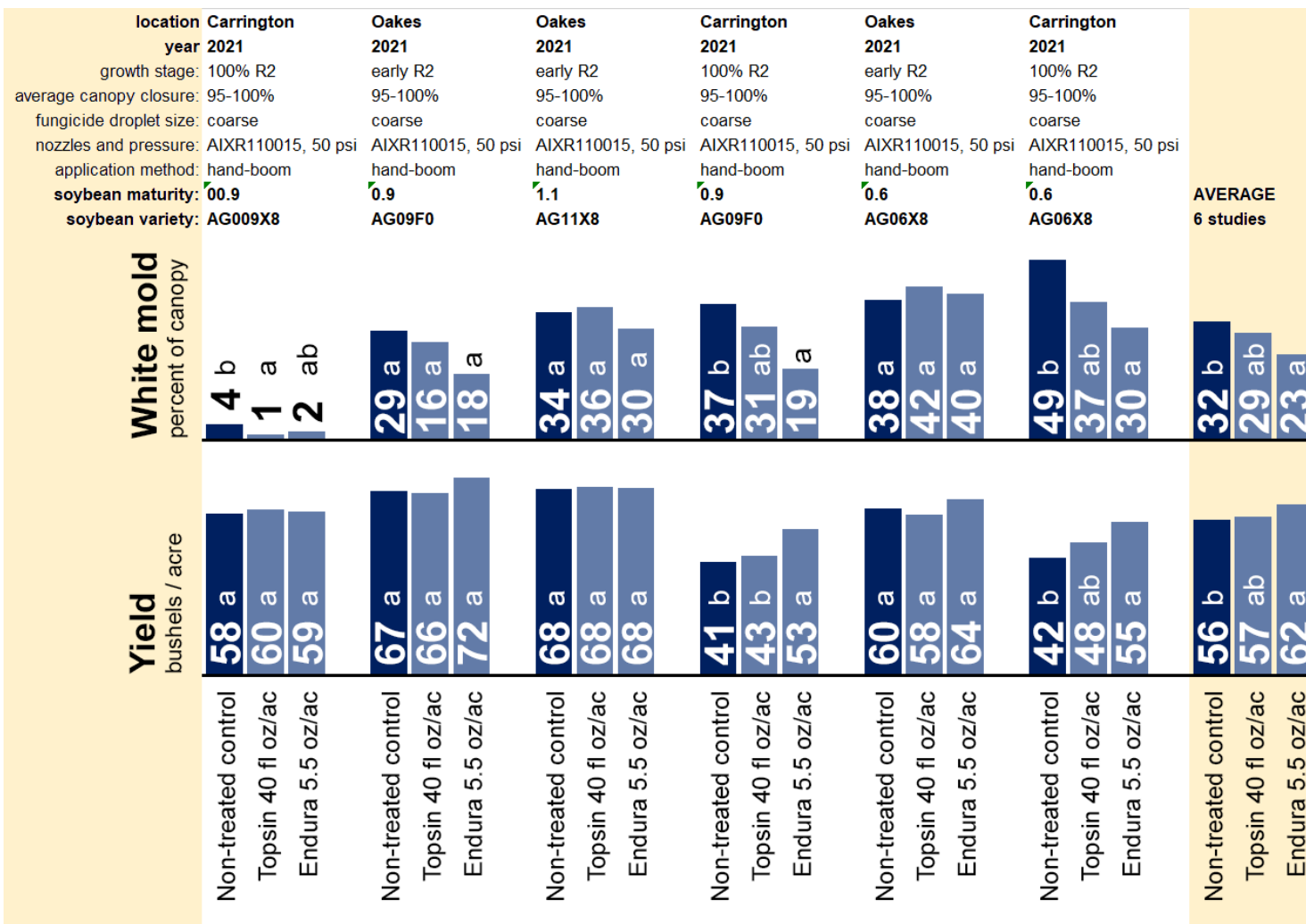
Comparative efficacy of registered fungicides

Topsin (40 fl oz) vs. Endura (5.5 oz) applied once

Endura (5.5 oz) conferred a numerical reduction in white mold vs. Topsin (40 fl oz) in five of six studies, but statistical separation was not observed.

Endura (5.5 oz) conferred a numerical increase in yield vs. Topsin (40 fl oz) in four of six studies, with statistical separation ($P < 0.05$) observed in one study. Yields were equivalent in one study.

The combined analysis showed a trend of better disease control and increased yield with Endura (5.5 oz) vs. Topsin (40 fl oz), but statistical separation between these treatments was not observed.



IMPROVING WHITE MOLD MANAGEMENT IN SOYBEANS

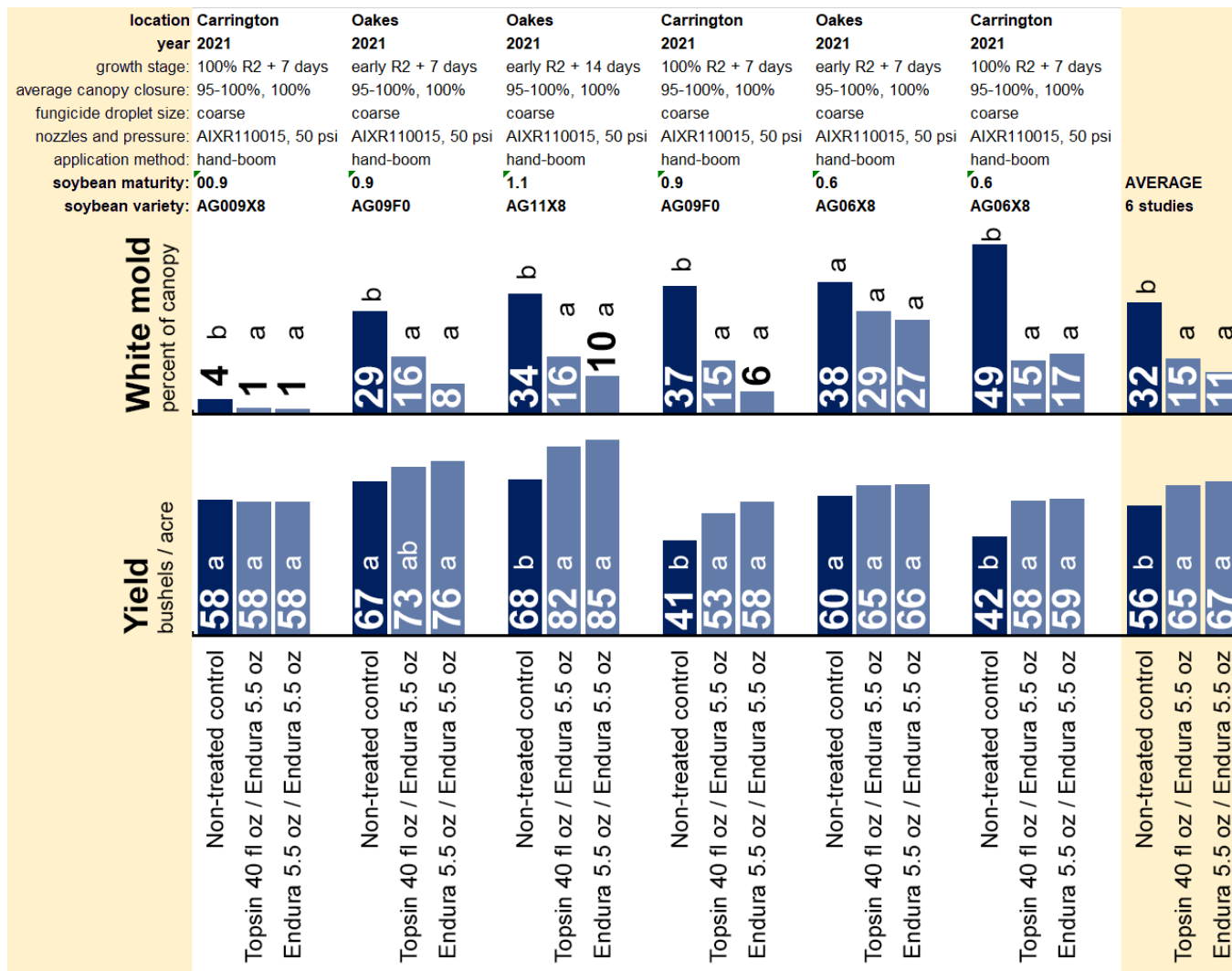
Comparative efficacy of registered fungicides

Topsin (40 fl oz) f.b. Endura (5.5 oz) vs. Endura (5.5 oz) applied twice

Endura (5.5 oz) applied twice conferred a numerical reduction in white mold vs. Topsin (40 fl oz) f.b. Endura in 4 of 6 studies, but statistical separation of these treatments was not observed ($P < 0.05$). Disease control was equivalent in 1 of 6 studies.

Endura applied twice conferred a numerical increase in yield vs. Topsin f.b. Endura in 5 of 6 studies, but statistical separation of these treatments was not observed. Yields were equivalent in 1 of 6 studies.

The combined analysis showed a trend of slightly better disease control and increased yield with Endura (5.5 oz) applied twice vs. Topsin (40 fl oz) followed by Endura, but statistical separation between these treatments was not observed.



Comparative efficacy of registered fungicides

Conclusions:

The comparative efficacy results summarized in this report reflect fungicide performance when application timing and droplet size are optimized.

- If the canopy closed before early to full R2, applications were made at / shortly before canopy closure.
- If daytime highs were in the mid to upper 90s (°F), applications were delayed until daytime highs dropped to the upper 80s to low 90s.
- Nozzles and application pressures were selected to optimize droplet size relative to canopy closure.
- When TeeJet nozzles were utilized, medium droplets were utilized when average canopy closure was 80-90% and coarse droplets were utilized when average canopy closure was >90%.

Previous experience indicates that the fungicides with intermediate efficacy are most impacted when application timing and droplet size are not optimal.



Thank You!

Michael Wunsch, Jesse Hafner, Thomas Miorini, Kaitlyn Thompson, Suanne Kallis, Billy Kraft, Michael Schaefer NDSU Carrington REC
Heidi Eslinger, Leonard Besemann, Kelly Cooper, Seth Nelson, Walt Albus NDSU Robert Titus Research Farm, Oakes

RESEARCH FUNDED BY THE **NORTH DAKOTA SOYBEAN COUNCIL,**
BASF Corp., SYNGENTA, GOWAN Corp., and BAYER CropScience

NDSU NORTH DAKOTA AGRICULTURAL
EXPERIMENT STATION

