


Improving management of white mold in soybeans: Comparative fungicide efficacy – Endura

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Improving white mold management in soybeans:

Comparative fungicide efficacy – fundamental concepts

This is an abbreviated summary of comparative fungicide efficacy in field trials conducted from 2019-2024.

Included are all studies conducted 2019 to 2024. Starting in 2019, fungicide spray droplet size was calibrated relative to soybean canopy closure in all soybean white mold fungicide efficacy testing in Carrington and Oakes, ND.

Full results are available in the accompanying PDF fungicide efficacy testing results posted online at https://www.ndsu.edu/agriculture/ag-hub/research-extension-centers-recs/carrington-rec/research/plant-pathology (or search for 'NDSU Carrington plant pathology').

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Calibrating fungicide droplet size relative to soybean canopy closure is critical.

Calibrating fungicide droplet size relative to canopy closure sharply improves the performance of all fungicides for white mold management in soybeans and is particularly important for fungicides with intermediate efficacy.

The magnitude of the difference between the most effective fungicides and fungicides with intermediate efficacy is reduced when spray droplet size is optimized relative to soybean canopy closure.

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Improving white mold management in soybeans:

Comparative fungicide efficacy – methods

Soybean row spacing = 14”.

Seeding rate = 140,000 or 165,000 viable seeds/ac.

Spray volume = 15 gal/ac.

Fungicides applied with a hand-held boom pressurized by CO_2.

Spray droplet size: Fungicides applied with TeeJet nozzles emitting fine droplets when average canopy closure < 80%, medium droplets when average canopy closure was between 80 and 90%, medium-coarse or coarse droplets when average canopy closure was between 90 and 97%, and coarse droplets when canopy closure average 97-100%.

Number of experimental replicates = 6

White mold assessment: Assessed at soybean maturity by evaluating every plant individually in 1 or 2 rows/plot (entire length of row) for the percent of the plant impacted by white mold.

Application timing: when conditions favor white mold as soybeans enter bloom, 100% R2 or canopy closure, whichever occurred first; when conditions did not favor white mold as soybeans entered bloom, early/full R3; second application (when made) 7 to 14 days later.

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

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Improving white mold management in soybeans:

Comparative fungicide efficacy – Endura

TWO FUNGICIDE APPLICATIONS

Endura 8 oz/ac **> Endura** 6 oz/ac

COMBINED ANALYSIS, 7 STUDIES
Carrington, ND (2023, 2024)
Endura: boscalid (FRAC 7)

Two sequential fungicide applications 7 or 9 or 11 days apart

	White mold Incidence **% plants**	**White mold** Severity Index **% canopy**	**Soybean Yield** bu/ac
Non-treated control	**60** b	**43** b	**43** b
Endura 6 oz/ac	**34** a	**23** a	**52** a
Endura 8 oz/ac	**31** a	**21** a	**55** a
CV:	11	19.1	9.3

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TWO FUNGICIDE APPLICATIONS

Delaro Complete 8 fl oz/ac **> Endura** 6 oz/ac

COMBINED ANALYSIS ACROSS 6 STUDIES
Carrington, ND (2021, 2022, 2023, 2024)

Two sequential fungicide applications 7 or 9 or 11 days apart

Endura: boscalid (FRAC 7)

Delaro Complete: fluopyram (FRAC 7), prothioconazole (FRAC 3), trifloxystrobin (FRAC 11)

	White mold Incidence **% plants**	**White mold** Severity Index **% canopy**	**Soybean Yield** bu/ac
Non-treated control	**50** b	**32** b	**50** b
Endura 6 oz/ac	**28** a	**16** a	**55** ab
Delaro Complete 8 fl oz/ac	**25** a	**14** a	**58** a
CV:	20.6	29.2	6.8

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Improving white mold management in soybeans:

Comparative fungicide efficacy – Endura

TWO FUNGICIDE APPLICATIONS

Endura 8 oz/ac > **Delaro Complete** 8 fl oz/ac

COMBINED ANALYSIS ACROSS 5 STUDIES
Carrington, ND (2023, 2024)

Two sequential fungicide applications
7 or 9 or 11 days apart

Endura: boscalid (FRAC 7)

Delaro Complete: fluopyram (FRAC 7), prothioconazole (FRAC 3), trifloxystrobin (FRAC 11)

	White mold Incidence **% plants**	**White mold** Severity Index **% canopy**	**Soybean Yield** bu/ac
Non-treated control	**55** c	**30** b	**52** b
Endura 8 oz/ac	**21** a	**9** a	**62** a
Delaro Complete 8 fl oz/ac	**29** b	**14** a	**59** a
CV:	13.1	20.2	6.1

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Comparative fungicide efficacy – Endura

TWO FUNGICIDE APPLICATIONS

Endura 6 oz/ac > **ProPulse** 6 fl oz/ac

COMBINED ANALYSIS, 6 STUDIES
Carrington, ND (2022, 2023, 2024)

Two sequential fungicide applications
7 or 9 or 11 days apart

Endura: boscalid (FRAC 7)

Delaro Complete: fluopyram (FRAC 7), prothioconazole (FRAC 3), trifloxystrobin (FRAC 11)

	White mold Incidence **% plants**	**White mold** Severity Index **% canopy**	**Soybean Yield** bu/ac
Non-treated control	**74** b	**57** b	**33** b
Endura 6 oz/ac	**47** a	**33** a	**45** a
ProPulse 6 fl oz/ac	**52** a	**38** a	**44** a
CV:	8.4	13.9	10.3

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Comparative fungicide efficacy – Endura

TWO FUNGICIDE APPLICATIONS

Endura 5.5 oz/ac > **Topsin/T-methyl** 40 fl oz/ac

COMBINED ANALYSIS ACROSS 9 STUDIES
Carrington and Oakes, ND (2021, 2022)

HIGH DISEASE PRESSURE

Topsin/T-methyl: thiophanate-methyl (FRAC 1)
Endura: boscalid (FRAC 7)

Two fungicide applications 14 days apart

	White mold Incidence **% plants**	**White mold** Severity Index **% canopy**	**Soybean Yield** bu/ac
Non-treated control	**70** b	**55** b	**42** b
Endura 5.5 oz f.b. **Endura** 5.5 oz/ac	**43** a	**31** a	**57** a
Topsin 40 fl oz f.b. **Endura** 5.5 oz/ac	**48** a	**34** a	**54** a
CV:	13.8	15.5	6.8

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TWO FUNGICIDE APPLICATIONS

Endura 5.5 oz/ac > **Topsin/T-methyl** 40 fl oz/ac

COMBINED ANALYSIS ACROSS 4 STUDIES
Carrington and Oakes, ND (2021, 2022)

LOW DISEASE PRESSURE

Topsin/T-methyl: thiophanate-methyl (FRAC 1)
Endura: boscalid (FRAC 7)

Two fungicide applications 7, 10, or 12 days apart

	White mold Incidence **% plants**	**White mold** Severity Index **% canopy**	**Soybean Yield** bu/ac
Non-treated control	**8** b	**3** b	**67** b
Endura 5.5 oz f.b. **Endura** 5.5 oz/ac	**3** a	**1** a	**68** a
Topsin 40 fl oz f.b. **Endura** 5.5 oz/ac	**2** a	**1** a	**68** a
CV:	40.5	24.5	2.4

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Comparative fungicide efficacy – Endura

TWO FUNGICIDE APPLICATIONS

Endura 5.5 oz/ac > **Topsin/T-methyl** 20 fl oz/ac

COMBINED ANALYSIS ACROSS 4 STUDIES
Carrington and Oakes, ND (2021, 2022)

Two sequential fungicide applications

Topsin/T-methyl: thiophanate-methyl (FRAC 1)
Endura: boscalid (FRAC 7)

7 or 10 days apart

	White mold Incidence **% plants**	**White mold** Severity Index **% canopy**	**Soybean Yield** bu/ac
Non-treated control	**18** b	**19** b	**58** b
Endura 5.5 or 6.0 oz/ac	**6** a	**2** a	**68** a
Topsin/T-methyl 20 fl oz/ac	**12** b	**14** b	**62** b
CV:	9.1	14.5	2.2

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Comparative fungicide efficacy – Endura

TWO FUNGICIDE APPLICATIONS

Endura 6 oz/ac **> Miravis Neo** 13.7 fl oz/ac

COMBINED ANALYSIS, 3 STUDIES
Carrington, ND (2021, 2022, 2024)

Two sequential fungicide applications 7 or 9 or 11 days apart

Endura: boscalid (FRAC 7)

Miravis Neo: pydiflumetofen (FRAC 7), azoxystrobin (FRAC 11), propiconazole (FRAC 3)

Revytek: mefentrifluconazole (FRAC 3)

Delaro Complete: fluopyram (FRAC 7), trifloxystrobin (FRAC 11), prothioconazole (FRAC 3)

	White mold Incidence **% plants**	**White mold** Severity Index **% canopy**	**Soybean Yield** bu/ac
Non-treated control	**54** c	**38** b	**45** b
Revytek 8 fl oz/ac	**50** bc	**33** ab	**48** ab
Miravis Neo 13.7 fl oz/ac	**47** abc	**30** ab	**51** ab
Endura 6 oz/ac	**30** ab	**19** a	**54** ab
Delaro Complete 8 fl oz/ac	**28** a	**17** a	**56** a
CV:	19	23.9	6.6

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TWO FUNGICIDE APPLICATIONS

Endura 6 or 8 oz/ac **> Viatude** 16 fl oz/ac

COMBINED ANALYSIS, 4 STUDIES
Carrington, ND (2024)

Endura: boscalid (FRAC 7)

Viatude: picoxystrobin (FRAC 11) + prothioconazole (FRAC 3)

Two sequential fungicide applications 7 or 9 days apart

	White mold Incidence **% plants**	**White mold** Severity Index **% canopy**	**Soybean Yield** bu/ac
Non-treated control	**70** b	**58** b	**34** b
Endura 6 oz/ac	**46** a	**34** a	**47** a
Endura 8 oz/ac	**44** a	**33** a	**49** a
Viatude 16 fl oz/ac	**48** a	**35** a	**46** a

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TWO FUNGICIDE APPLICATIONS

Endura 6 oz/ac **> Aproach** 8.5 fl oz/ac

COMBINED ANALYSIS ACROSS 2 STUDIES
Carrington, ND (2023, 2024)

Two sequential fungicide applications 7 or 11 days apart

Aproach: picoxystrobin (FRAC 11)
Endura: boscalid (FRAC 7)
Delaro Complete: fluopyram (FRAC 7), prothioconazole (FRAC 3), trifloxystrobin (FRAC 11)

	White mold Incidence **% plants**	**White mold** Severity Index **% canopy**	**Soybean Yield** bu/ac
Non-treated control	**68** b	**39** c	**47** a
Delaro Complete 8 fl oz/ac	**39** a	**20** ab	**57** a
Aproach 8.5 fl oz/ac	**54** b	**27** b	**53** a
Endura 6 oz/ac	**30** a	**12** a	**60** a
CV:	6.6	7.8	7.6

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TWO FUNGICIDE APPLICATIONS

Endura 6 oz/ac **> Aproach** 12 or 13.7 fl oz/ac

COMBINED ANALYSIS ACROSS 2 STUDIES
Carrington, ND (2023, 2024)

Aproach: picoxystrobin (FRAC 11)

Endura: boscalid (FRAC 7)

Two sequential fungicide applications 7 or 11 days apart

	White mold Incidence **% plants**	**White mold** Severity Index **% canopy**	**Soybean Yield** bu/ac
Non-treated control	**70** c	**51** b	**39** a
Aproach 12 or 13.7 fl oz/ac	**50** b	**34** ab	**48** a
Endura 6 oz/ac	**44** a	**27** a	**55** a
CV:	0.6	9.5	9.8

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TWO FUNGICIDE APPLICATIONS

Endura 6 oz/ac **> Revytek** 8 fl oz/ac

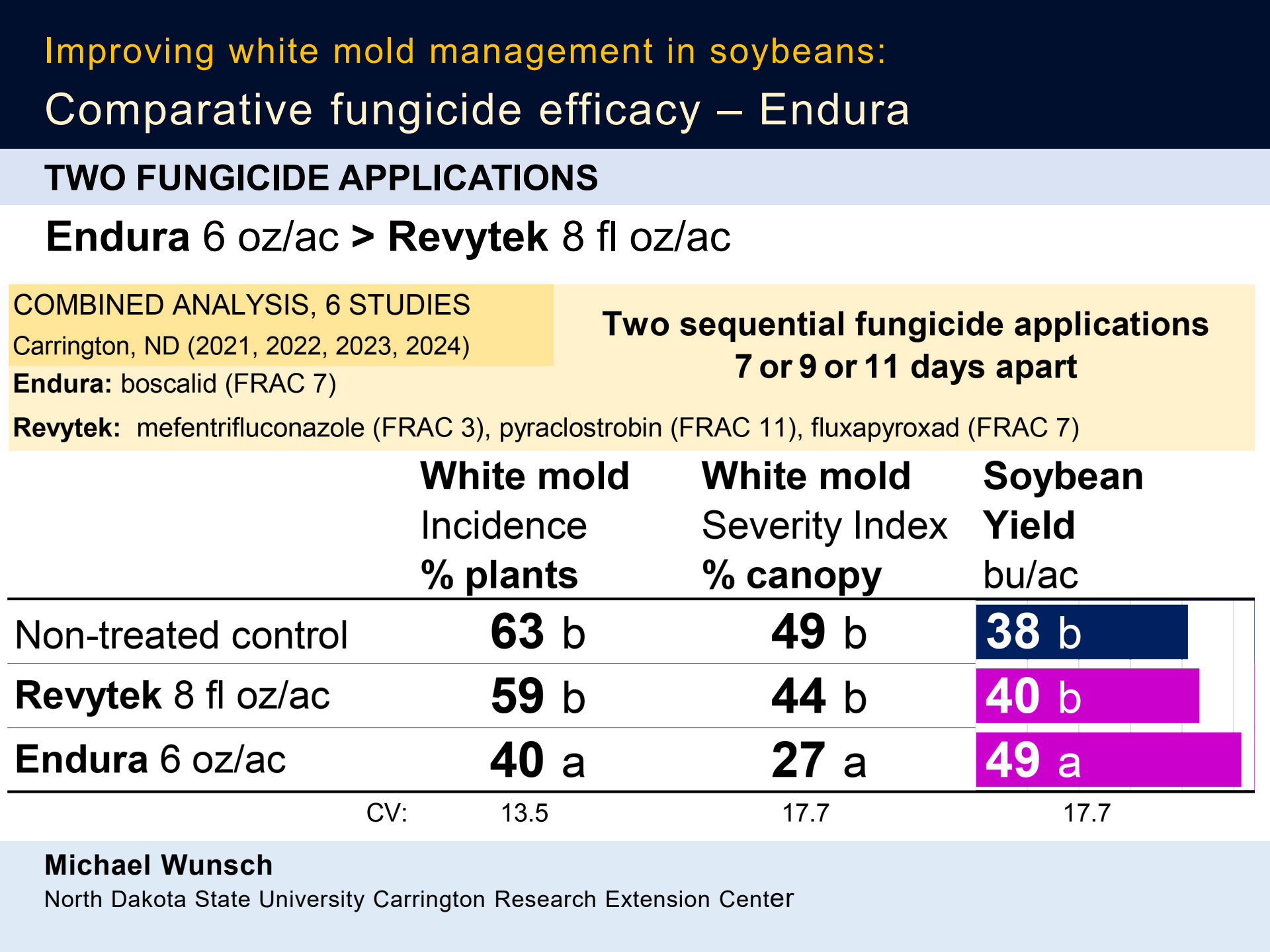
COMBINED ANALYSIS, 6 STUDIES
Carrington, ND (2021, 2022, 2023, 2024)

Endura: boscalid (FRAC 7)

Revytek: mefentrifluconazole (FRAC 3), pyraclostrobin (FRAC 11), fluxapyroxad (FRAC 7)

Two sequential fungicide applications 7 or 9 or 11 days apart

	White mold Incidence **% plants**	**White mold** Severity Index **% canopy**	**Soybean Yield** bu/ac
Non-treated control	**63** b	**49** b	**38** b
Revytek 8 fl oz/ac	**59** b	**44** b	**40** b
Endura 6 oz/ac	**40** a	**27** a	**49** a
CV:	13.5	17.7	17.7



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TWO FUNGICIDE APPLICATIONS

Adding Headline to Endura does not improve white mold management in soybeans.

COMBINED ANALYSIS, 4 STUDIES
Carrington, ND (2021, 2022, 2024)
Endura: boscalid (FRAC 7)
Headline: pyraclostrobin (FRAC 11)

Two sequential fungicide applications 7 or 9 or 11 days apart

	White mold Incidence **% plants**	**White mold** Severity Index **% canopy**	**Soybean Yield** bu/ac
Non-treated control	**62** b	**46** b	**41** b
Endura 6 oz + **Headline** 6 fl oz/ac	**42** a	**28** a	**52** a
Endura 6 oz/ac	**39** a	**26** a	**52** a
CV:	8.8	14.8	7.3

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SINGLE FUNGICIDE APPLICATION

Delaro Complete 8 fl oz/ac **> Endura** 5.5 oz/ac

COMBINED ANALYSIS ACROSS 3 STUDIES
Carrington, ND (2022, 2023 2024)

Single fungicide application

Delaro Complete: fluopyram (FRAC 7), trifloxystrobin (FRAC 11), prothioconazole (FRAC 3)
Endura: boscalid (FRAC 7)

	White mold Incidence **% plants**	**White mold** Severity Index **% canopy**	**Soybean Yield** bu/ac
Non-treated control	**75** b	**61** b	**32** b
Delaro Complete 8 fl oz/ac	**56** a	**39** a	**44** a
Endura 5.5 oz/ac	**61** ab	**43** a	**42** a
CV:	9	9.8	6.1

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SINGLE FUNGICIDE APPLICATION

ProPulse 8 fl oz/ac **> Endura** 5.5 oz/ac **> ProPulse** 6 fl oz/ac

COMBINED ANALYSIS ACROSS 3 STUDIES
Carrington, ND (2022, 2023 2024)

Single fungicide application

ProPulse: fluopyram (FRAC 7), prothioconazole (FRAC 3)
Endura: boscalid (FRAC 7)

	White mold Incidence **% plants**	**White mold** Severity Index **% canopy**	**Soybean Yield** bu/ac
Non-treated control	**75** b	**61** b	**32** b
ProPulse 6 fl oz/ac	**63** ab	**46** ab	**40** a
ProPulse 8 fl oz/ac	**55** a	**39** a	**43** a
Endura 5.5 oz/ac	**61** ab	**43** a	**42** a
CV:	9.5	12.5	6.3

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Improving white mold management in soybeans:

Comparative fungicide efficacy – Endura

SINGLE FUNGICIDE APPLICATION

Under high white mold disease pressure,

Endura 5.5 oz/ac **> Topsin/T-methyl** 40 fl oz/ac

COMBINED ANALYSIS ACROSS 9 STUDIES
Carrington and Oakes, ND (2021, 2022)

Topsin/T-methyl: thiophanate-methyl (FRAC 1)
Endura: boscalid (FRAC 7)

HIGH DISEASE PRESSURE

Single fungicide application

	White mold Incidence **% plants**	**White mold** Severity Index **% canopy**	**Soybean Yield** bu/ac
Non-treated control	**70** b	**55** b	**42** b
Endura 5.5 oz/ac	**56** a	**42** a	**51** a
Topsin/T-methyl 40 fl oz/ac	**62** a	**46** a	**47** a
CV:	7.9	10.3	7.4

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Improving white mold management in soybeans:

Comparative fungicide efficacy – Endura

SINGLE FUNGICIDE APPLICATION

Under low white mold disease pressure,

Endura 5.5 oz/ac **> Topsin/T-methyl** 40 fl oz/ac

COMBINED ANALYSIS ACROSS 4 STUDIES
Carrington and Oakes, ND (2021, 2022)

Topsin/T-methyl: thiophanate-methyl (FRAC 1)
Endura: boscalid (FRAC 7)

LOW DISEASE PRESSURE

Single fungicide application

	White mold Incidence **% plants**	**White mold** Severity Index **% canopy**	**Soybean Yield** bu/ac
Non-treated control	**8** b	**3** b	**67** b
Endura 5.5 oz/ac	**3** a	**1** a	**69** a
Topsin/T-methyl 40 fl oz/ac	**3** a	**1** a	**68** a
CV:	18.7	23	1.3

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Improving white mold management in soybeans:

Comparative fungicide efficacy – Endura

SINGLE FUNGICIDE APPLICATION

Endura 6 oz/ac **>** **Revytek** 8 fl oz/ac

COMBINED ANALYSIS ACROSS 2 STUDIES
Carrington, ND (2020, 2021)

Single fungicide application

Revytek: mefentrifluconazole (FRAC 3), pyraclostrobin (FRAC 11), fluxapyroxad (FRAC 7)

Endura: boscalid (FRAC 7)

	White mold Incidence **% plants**	**White mold** Severity Index **% canopy**	**Soybean Yield** bu/ac
Non-treated control	**30** a	**17** b	**51** b
Endura 6 oz/ac	**12** a	**7** a	**55** a
Revytek 8 fl oz/ac	**31** a	**17** b	**52** b
CV:	20.9	11.3	2.3

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Comparative fungicide efficacy – Endura

Approximate comparative efficacy ranking among those fungicides assessed relative to Endura:

1. Endura, 8 oz/ac
2. ProPulse, 8 fl oz/ac
3. Delaro Complete, 8 fl oz/ac
4. Endura, 6 oz/ac
5. Viatude, 16 fl oz/ac
6. ProPulse, 6 fl oz/ac
7. Topsin/T-methyl, 40 fl oz/ac
8. Miravis Neo, 13.7 fl oz/ac; Aproach 12-13.7 fl oz/ac
9. Aproach, 8.5 fl oz/ac
10. Topsin/T-methyl, 20 fl oz/ac
11. Revytek, 8 fl oz/ac




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