

### **Evaluation of registered and non-registered fungicides to control *Alternaria panax* on three-year-old ginseng, 2021.**

This study was conducted at a grower cooperator's farm in Marathon County, WI on three-year-old ginseng plants grown under 80% shade-cloth. Beds were 4 ft wide with 1 ft between beds. Treatment blocks consisted of a 10-ft bed with a 2-ft buffer on each end. Treatments were replicated four times in a randomized complete block design. Weed control and fertilization were made according to commercial production standards. Phytophthora blight caused by *Phytophthora cactorum* was controlled with bi-weekly applications of Presidio (4 fl oz/100 gal) or Orondis Ultra (8 fl oz/100 gal). Fungicides were applied with a CO<sub>2</sub> backpack boom sprayer equipped with four TeeJet 8004VS flat fan nozzles, spaced 18 in. apart, operating at 35 psi, and delivering 50 gal/A. All treatments were initiated on 4 Jun and reapplied at 7-day intervals until 19 Aug. The incidence (%) of plants with *A. panax* lesions was estimated and disease severity (0-10; see below table) was collected on 26 Jul, and 2 and 19 Aug. Data was analyzed using SAS PROC GLIMMIX. The standard error and degrees of freedom correction were predicted using the Kenward-Roger option unless data accounted for unequal variances using Levene's test ( $P < 0.05$ ), then the Satterth option was used. The normality assumption of each data set was investigated by observing studentized residuals plots, residuals versus predicted means plots, and percentage of residual distribution histogram. Homogeneity assumption was checked using Levene's test ( $P < 0.05$ ). Data were transformed using square root following the lambda value 0.5 derived from a Box-Cox analysis and back transformed using  $n^2$  formula. The least-square means comparison was performed using Fisher's protected least significant difference (LSD) at ( $P < 0.05$ ).

Disease incidence differed significantly between the treatments and the untreated control with the exception of Switch 62.5WDG (applied 26 Jul, 2 Aug, and 19 Aug) and Prophyte (applied 19 Aug). Disease severity of plants treated with Switch 62.5WDG and Bravo WeatherStik SC was similar to the untreated control on 26 Jul and 2 Aug. All other treatments were significantly more effective. On the final rating (19 Aug), the untreated control reached 40% disease incidence. All treatments developed a lower disease incidence ( $\leq 10.8\%$ ) than the untreated control except for treatments of ProPhyte (20%) and Switch 62.5WDG (27.5%). The untreated control developed the highest disease severity (5.5); all other treatments developed significantly less disease (disease severity  $\leq 4.3$ ). The AUDPC data for disease incidence indicated that all treatments significantly limited disease incidence compared to the untreated control except for applications of ProPhyte and Switch 62.5WDG. According to the AUDPC data for disease severity, all treatments limited disease compared to the untreated control except for Bravo WeatherStik SC, ProPhyte, and Switch 62.5WDG.

Treatment and rate/50 gal. applied at 7-day intervals	Disease incidence (%)				Disease severity <sup>y</sup>			
	26 Jul	2 Aug	19 Aug	AUDPC	26 Jul	2 Aug	19 Aug	AUDPC
Untreated control	10.0 a <sup>z</sup>	16.8 a	40.0 a	640.6 a	2.8 a	3.3 a	5.5 a	116.0 a
Delaro SC 8 fl oz	1.0 e	1.0 b	1.0 d	35.0 b	0.8 bc	1.0 ed	1.0 e	30.0 ef
Aprovia Top EC 13.5 fl oz	1.0 e	1.3 b	2.5 cd	40.1 b	0.8 bc	0.8 e	0.8 e	23.5 f
Elatus 7.3 fl oz	1.3 de	1.3 b	1.3 cd	43.8 b	0.5 c	0.8 e	0.8 e	21.3 f
Luna Sensation SC 7.6 fl oz	1.3 de	1.5 b	1.5 cd	48.9 b	0.8 bc	0.8 e	0.8 e	24.9 f
Roper DF Rainshield 2 lb	1.5 c-e	1.5 b	2.5 cd	58.3 b	1.0 bc	1.0 de	1.0 e	35.0 c-f
XDE-659 20.6 fl oz	2.0 c-e	2.0 b	2.3 cd	68.0 b	0.8 bc	0.8 e	0.8 e	26.3 f
Prosaro SC 8.2 fl oz	1.8 c-e	2.0 b	2.5 cd	69.3 b	1.0 bc	1.0 de	1.3 e	34.4 d-f
Luna Experience SC 17 fl oz	2.0 c-e	2.0 b	3.3 cd	80.6 b	1.0 bc	1.3 c-e	1.5 de	40.9 c-f
Tanos DF 8 oz	2.0 c-e	2.0 b	4.5 b-d	85.8 b	1.0 bc	1.3 c-e	1.8 c-e	43.0 c-f
Tilt EC 4 fl oz	1.3 de	1.5 b	3.8 b-d	66.6 b	0.5 c	1.0 de	1.5 de	29.3 e-f
Miravis Prime 6.8 fl oz	4.3 b-d	5.3 b	10.8 bc	200.9 b	1.5 bc	1.5 c-e	2.5 cd	55.5 b-e
Bravo WeatherStik SC 2 pt	4.0 bc	6.0 b	8.0 bc	191.1 b	1.8 ab	2.3 a-c	2.8 c	73.0 a-d
ProPhyte 2 pt	3.5 c-e	6.0 b	20.0 ab	280.4 ab	1.3 bc	2.0 b-d	4.3 b	75.5 a-c
Switch 62.5WDG 14 oz	9.8 ab	14.8 a	27.5 ab	521.9 ab	2.8 a	2.8 ab	4.0 b	97.3 ab
<i>P</i> -value	0.0004	0.0001	0.0005	0.0015	<.0001	<.0001	<.0001	<.0001

<sup>y</sup>Disease severity was rated on a 0-10 scale; 0=no disease, 1-9=increased levels of infection observed, 10=100% plant defoliation.

<sup>z</sup>Column means with a letter in common are not statistically different (LSD; *P*=0.05).