

CROP: Broccoli (*Brassica oleracea* var. *italica*), cv. Eastern Crown

PEST: Alternaria leaf spot (*Alternaria brassicicola*)

NAME AND AGENCY:

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TITLE: EVALUATION OF FUNGICIDES FOR ALTERNARIA CONTROL ON BROCCOLI, 2024.

MATERIALS: BRAVO ZN (chlorothalonil), FOLPAN 500SC (folpet), ALLEGRO (fluazinam), FONTELIS (penthiopyrad), CEVYA (mefentrifluconazole), QUADRIS FLOWABLE (azoxystrobin), SERCADIS (fluxapyroxad)

METHODS: Broccoli, cv. 'Eastern Crown', was grown as transplants and transplanted ~4 weeks after seeding at a 45 cm in-row spacing on 16 May into organic soil (organic matter 60.4%, soil pH = 7.3) near the University of Guelph Ontario Crops Research Centre – Bradford (Muck Crops Research Station), Holland Marsh, Ontario. Four replicates per treatment within a randomized complete block design was used. Each plot consisted of two, 5 m long rows spaced 65 cm apart. Treatments were applied as a foliar spray using a CO₂ backpack sprayer equipment with two TeeJet Air Induction XR11005 fan nozzles 50cm apart, calibrated to deliver 400 L/ha. Treatments consisted of BRAVO ZN at 4.8 L/ha, FOLPAN 500SC at 2 L/ha, ALLEGRO at 1.16 L/ha, FONTELIS at 1.75 L/ha, CEVYA at 375 mL/ha, QUADRIS FLOWABLE at 1.12 L/ha. and SERCADIS at 333 mL/ha. An untreated check sprayed with water was also included. Treatments were applied 12, 20, and 26 June and 3, 12, and 19 July. Eight *Alternaria brassicicola* isolates collected from Ontario broccoli fields in 2022 were used to infest barley. Inoculum bags were mixed together just prior to being spread in the field and were scattered by hand between rows and around the perimeter of the trial on 20 and 26 June at a total rate of 6 g/m² to allow for a passive inoculation to occur. Insects were managed using a standard broccoli insecticide program. Plants were visually examined for the presence of Alternaria lesions on leaves on 3, 12, 19, and 24 July and broccoli heads once they were formed on 19 and 24 of July. Data were analyzed using SAS version 9.3 (SAS Institute, Cary NC). Means were separated using Tukey-Kramer multiple mean comparison test (P=0.05).

RESULTS: As outlined in Tables 1 & 2 and Figure 1.

CONCLUSIONS: All fungicide treatments reduced the number of lesions on leaves and improved the marketability of the heads compared to the untreated control. ALLEGRO and SERCADIS were similar not significantly different to the untreated control for marketable heads. On 12 Jul, BRAVO ZN had significantly less lesions than SERCADIS, all treatments were better than the untreated control. On 24 Jul, FONTELIS had significantly more lesions than QUADRIS, BRAVO ZN and FOLPAN; all treatments reduced the number of lesions compared to the untreated control.

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Table 1. Average percent marketable heads which had no *Alternaria* leaf spot lesions present at harvest.

Treatment	FRAC ¹	Product rate (per ha)	% Marketable Heads ² 24 July
Untreated check	--	--	20.0 b ³
BRAVO ZN	M5	4.8 L/ha	92.5 a
FOLPAN 500SC	M4	2 L/ha	82.5 a
ALLEGRO	29	1.16 L/ha	67.5 ab
FONTELIS	7	1.75 L/ha	77.5 a
CEVYA	3	375 mL/ha	82.5 a
QUADRIS FLOWABLE	11	1.12 L/ha	97.5 a
SERCADIS	7	333 mL/ha	67.5 ab

¹ Designated mode of action group by the Fungicide Resistance Action Committee.

² Percentage of heads marketable which had no *Alternaria* lesions present at harvest 24 July, 2024.

³ Treatment means that share a letter are not statistically significant. Means were separated using Tukey-Kramer multiple mean comparison test (P = 0.05).

Table 2. Average lesions per plant, the top 10 newest leaves and average number of lesions per broccoli head assessed 3 to 24 July, 2024.

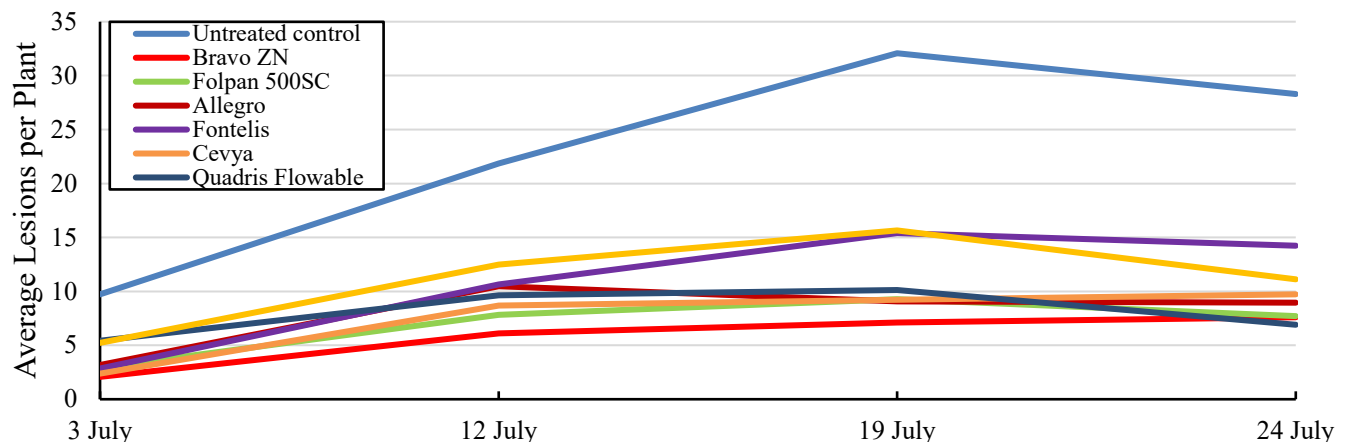
Treatment	Lesions per plant ¹				Top 10 Leaves ²	Head damage ³	
	3 July	12 July	19 July	24 July	24 July	19 July	24 July
Untreated check	9.7 a ⁴	21.9 a	32.1 a	28.3 a	3.5 a	1.13 a	2.10 a
BRAVO ZN	2.1 b	6.1 c	7.1 b	7.6 c	0.3 b	0.00 b	0.13 b
FOLPAN 500SC	2.9 b	7.8 bc	9.3 b	7.7 c	0.3 b	0.28 b	0.30 b
ALLEGRO	3.2 b	10.5 bc	9.1 b	9.0 bc	0.4 b	0.03 b	0.55 b
FONTELIS	2.9 b	10.7 bc	15.4 b	14.2 b	1.5 b	0.15 b	0.40 b
CEVYA	2.4 b	8.7 bc	9.2 b	9.7 bc	0.5 b	0.08 b	0.20 b
QUADRIS FLOWABLE	5.4 b	9.6 bc	10.1 b	6.9 c	0.4 b	0.00 b	0.03 b
SERCADIS	5.2 b	12.5 b	15.7 b	11.1 bc	0.7 b	0.20 b	0.43 b

¹ Average number of lesions on leaves per plant; some lower leaves assessed 3 July fell off and were not counted in later assessments.

² Average number of lesions on the top 10 newest leaves.

³ Average number of lesions on broccoli heads.

⁴ Treatment means that share a letter are not statistically significant. Means were separated using Tukey-Kramer multiple mean comparison test (P = 0.05).

**Figure 1.** Average number of lesions per plant counted on all leaves assessed 3 to 24 July, 2024.