

USING SPORE TRAPS FOR *CERCOSPORA BETICOLA* IN SUGARBEET

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INTRODUCTION AND OBJECTIVE

Cercospora leaf spot, caused by *Cercospora beticola* Sacc., is one of the most damaging foliar diseases of sugarbeet worldwide (Karaoglanidis et al., 2001). The pathogen is disseminated mainly by wind and rain splash. Dispersal of conidia with disease development is favored by temperature of 25 to 35°C and prolonged periods of high relative humidity or free moisture on leaves (Windels et al., 1998). Due to limited levels of resistance in commercial sugarbeet varieties grown in North Dakota and Minnesota, numerous fungicide applications are necessary to obtain acceptable levels of protection against *Cercospora* leaf spot. In order to assist growers in making economic fungicide applications, Shane and Teng (1984) developed the *Cercospora* prediction model. The model is comprised of percent disease severity based on field monitoring, and *Cercospora* advisory (a daily infection value based on weather conditions) (Shane and Teng, 1984, Windels et al., 1998).

Since disease monitoring is a laborious process and requires a trained person, most growers rely on the *Cercospora* advisory component of the model to determine timing of fungicide application once symptoms are observed in the field. Since *Cercospora* leaf spot is a polycyclic disease, timely application of the first fungicide application is crucial in reducing the rate of infection, and contributes to effective season long disease control.

Spore traps can be used to determine the timing of spore dispersal, and the number of spores dispersed. The information could be most useful for advising growers to apply the first fungicide application when *Cercospora* conidia are first dispersed, rather than the current practice of applying the first application when symptoms are present. The use of protectant fungicides preventatively would provide better disease control and result in less selection pressure for the development of resistant *C. beticola* isolates.

MATERIALS AND METHOD

Seven-day volumetric spore trap (available commercially) and spore traps made of coffee cans, referred to hereafter as the "hand made trap" were used in this study. Hand made traps were constructed using an empty 1.1 kg 'coffee can' (Fig. 1) with the lid and bottom removed and attached to a 0.8 m long metal rod. A cut out portion of a hollow door handle was attached by a binder clip to the 'coffee can' and used to hold a wooden clothes pin for mounting a glass slide. A thin layer of petroleum jelly was placed in 2.5mm² area on one side at the end of a microscope slide (7.5 x 2.5 cm). The coated side of the slide was positioned so that it was exposed to the prevailing winds. All traps were positioned 0.6 m above ground. All trap samples were recovered every 7 d and examined microscopically after staining with cotton blue for the number of characteristic needle shaped, multi-celled conidia of *C. beticola*. In 2002, spore traps were set in August in sugarbeet field at Breckenridge, MN, and in *Cercospora* leaf spot of sugarbeet

nursery at Crookston, MN. In 2003, the traps were set in sugarbeet fields at Breckenridge, MN and St. Thomas, ND from June through September. Sugarbeet plants were rated every 7 days for *Cercospora* leaf spot severity using KWS rating scale from 1 to 9 in which 1= symptomless and 9= dead leaves.

RESULTS AND DISCUSSION

According to preliminary results in 2002, the seven-day volumetric trap was found more efficient in trapping *Cercospora* spores than the hand made ones and differences in numbers of spores trapped were statistically significant at $P=0.05$. A significantly higher spores were trapped in the *Cercospora* disease nursery than in the sugarbeet field at $P=0.05$. No correlation was found between the disease severity and number of spores trapped weekly. This might be because the experiment started very late in the season (mid August). In 2003, as the experiment continued for the whole growing season, a highly significant difference ($P=0.05$) in the efficiency of the traps was determined in both locations. Seven-day volumetric spore trap was proved to be more effective in trapping average number of 187.4 spores per week than hand made one, which trapped an average of 30.5 spores per week. A highly significant correlation ($P=0.05$) between the disease severity and the number of spores trapped was found in both Breckenridge and St. Thomas.

Compared to the expensive 7-day volumetric traps (\$250 to 4000), hand made traps are inexpensive (less than \$15), easy to make and use, and do not require a power source. This is the first report describing how *C. beticola* spores could be successfully trapped using different types of spore traps.

Table 1. Number of *C. beticola* spores collected in untreated area in sugarbeet field sprayed four times with fungicides at Breckenridge, MN and in a *Cercospora* disease nursery at Crookston, MN, 2002.

Date of slide or tape collection	Breckenridge			Crookston		
	Burkard volumetric trap	'Coffee can' trap	Disease severity	Burkard volumetric trap	'Coffee can' trap	Disease severity
Aug 23	50	2	3.0	1895	-	7.0
Aug 30	194	17	4.0	880	242	8.0
Sep 6	134	1	4.5	6039	736	8.5
Sep 13	106	20	5.0	5663	235	9.0
	Trap type			Location		
	Burkard volumetric trap	'Coffee can' trap		Breckenridge	Crookston	
Mean number of <i>C. beticola</i> spores trapped	1870.1	156.6		65.5	1961.3	
t grouping	A	B		B	A	
LSD ($P=0.05$)	1434.5					

Means with the same letter are not significantly different.

Table 2. Number of *C. beticola* spores collected in untreated areas in sugarbeet fields sprayed four times with fungicides at Breckenridge, MN and in St. Thomas, ND, 2003.

Date of slide or tape collection	Breckenridge			St. Thomas		
	Osborne volumetric trap	'Coffee can' trap	Disease severity	Osborne volumetric trap	'Coffee can' trap	Disease severity
Jul 4	0	0	1.0	1	0	1.0
Jul 11	45	1	1.0	16	1	1.0
Jul 18	17	2	1.0	18	2	1.0
Jul 25	15	2	2.0	28	1	1.0
Aug 1	62	5	2.0	49	2	2.0
Aug 8	340	31	2.5	147	3	2.0
Aug 15	289	15	3.0	571	26	3.2
Aug 22	429	20	5.0	255	10	4.0
Aug 29	845	165	7.0	405	264	5.0
Sep 5	67	31	7.5	236	30	6.0
Sep 12	121	31	8.0	167	28	7.0
	Trap type			Location		
	Osborne volumetric trap	'Coffee can' trap		Breckenridge	St. Thomas	
Mean number of <i>C. beticola</i> spores trapped	187.41	30.45		115.14	102.73	
t grouping	A	B		A	A	
LSD (P=0.05)	100.65					

Means with the same letter are not significantly different.

Literature Cited:

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