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Control of Anthracnose of Watermelon with Fungicide Sprays Timed According to the MelcastWarning System

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Abstract
Watermelon anthracnose, caused by the fungus *Colletotrichum obriculare*, is one of the most significant diseases of cucurbits in the U.S. Melcast is a disease-warning system that uses hourly leaf wetness and temperature data to help melon growers schedule fungicide applications for managing fungal diseases. Melcast translates hourly temperature and leaf wetness duration data into environmental favorability index (EFI) values. Fungicide applications are advised at intervals defined by epidemiological risk rating (EFI values) rather than time (days or weeks).

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Introduction

Watermelon anthracnose, caused by the fungus *Colletotrichum obriculare,* is one of the most significant diseases of cucurbits in the U.S. Melcast is a disease-warning system that uses hourly leaf wetness and temperature data to help melon growers schedule fungicide applications for managing fungal diseases. Melcast translates hourly temperature and leaf wetness duration data into environmental favorability index (EFI) values. Fungicide applications are advised at intervals defined by epidemiological risk rating (EFI values) rather than time (days or weeks).

Materials and Methods

Watermelon transplants *cvs.* Sangria (guard rows) and Crimson Tide (treatment rows) were planted in black plastic-covered beds in a drip-irrigated field at Iowa State University Horticultural Station, Ames, IA. The planting pattern consisted of plants spaced 3 ft apart on plant beds spaced 8 ft from center to center. Standard practices for management of fertility, weeds, and insects followed Iowa State University Extension recommendations. The experiment was arranged as a randomized complete block design with four replications and nine treatments. Each treatment consisted of 10 plants. Treatment plots were 25 ft long and alternated with guard rows. There was also an 8-ft buffer between plot ends. Bravo Ultrex 82.5 WDG, (1.6 lb/acre) was applied with backpack sprayers to all plots, except the non-treated control, when vines first touched within rows.

Subsequent treatments were applied either on a calendar-based schedule or using Melcast model for anthracnose leaf blight using a threshold of 35 EFI to trigger fungicide applications. Treatment and guard rows were inoculated with *Colletotrichum orbiculare*.

Weather data input for Melcast was obtained with either on-site equipment (Model CR10, Campbell Scientific) (Treatment 9) or remotely estimated (ZedX, Inc.) with a combination of timeframe estimations and model corrections (Treatments 1 to 6) (Table 1). Treatment 8, a negative control, did not receive fungicides and Treatment 7 received fungicide applications on a calendar-based schedule.

Foliar disease severity was evaluated weekly, beginning 15 days after inoculation evaluations. Each subplot was rated separately and then the results were averaged and used for Area Under Disease Progress Curve (AUDPC) analysis.

Results and Discussion

The wet summer provided heavy disease pressure for the study. Our results show that the highest severity (73%) was in Treatment 8, unsprayed control. The least severity was observed in Treatment 2 and 6, the corrected remote estimated hindcast and 72-h forecast, respectively, and saved two fungicide applications compared with the calendar-based treatment. Corrected versions of the disease-forecasting model provided better disease control than uncorrected or on-site weather measurements.

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Table 1. Severity of anthracnose damage to foliage of watermelon (cv. Crimson Tide) at the ISU Horticulture Station.

Trt	Weather data source	Time frame of data input	Model correction[a]	No. fungicide applications	Anthracnose severity[b]	
8	--	Unsprayed	-	0	73.4	A
5	ZedX, Inc.	72-h forecast	-	1	47.1	B
7	--	Calendar-based	-	3	29.6	B
3	ZedX, Inc.	24-h forecast	-	1	29.6	C
9	On-site	Hindcast	corrected	1	29.6	C
4	ZedX, Inc.	24-h forecast	corrected	1	33.9	D
1	ZedX, Inc.	Hindcast	-	2	24.6	F
2	ZedX, Inc.	Hindcast	corrected	1	24.6	F
6	ZedX, Inc.	72-h forecast	corrected	1	24.6	F

[a]Kim et al. 2002, 2004.
[b]Means followed by the same letter are not statistically different ($P < 0.05$).