

## Growing Healthy Crops and Healthy Profits

December 6-8, 2005  
Grand Rapids, Michigan



### Celery

Wednesday afternoon 2:00 pm

**Moderator:** Amy Irish-Brown, MSU Extension Fruit & Vegetable

2:00 p.m.      New Products for Foliar Blights

Ryan Bounds, Plant Pathology Dept., MSU

2:30 p.m.      Insect Management in Celery

Beth Bishop, Entomology Dept., MSU

3:00 p.m.      Fusarium Resistance in Celery

Rebecca Grumet, Horticulture Dept., MSU

## New Products for Foliar Blights

R.S. Bounds (Graduate Student) and Dr. M.K. Hausbeck (517-355-4534)  
Michigan State University, Department of Plant Pathology

Foliar diseases of celery may reduce quality and yield if not properly managed. Late blight is a fungal disease caused by *Septoria apiicola*. It is identified by the presence of small, black pycnidia embedded in irregularly-shaped lesions on leaves or scattered throughout discolored tissue on petioles. Spores of the fungus are spread by splashing water and require free water to infect plants. Bacterial leaf spot of celery is caused by *Pseudomonas syringae* pv. *apii*. The disease was previously known as northern bacterial blight. The lesions only appear on leaves and are initially water-soaked around the margin. Lesions of bacterial leaf spot may resemble those of late blight but can easily be distinguished by the presence or absence of pycnidia.

### Testing Products for Control of Late Blight

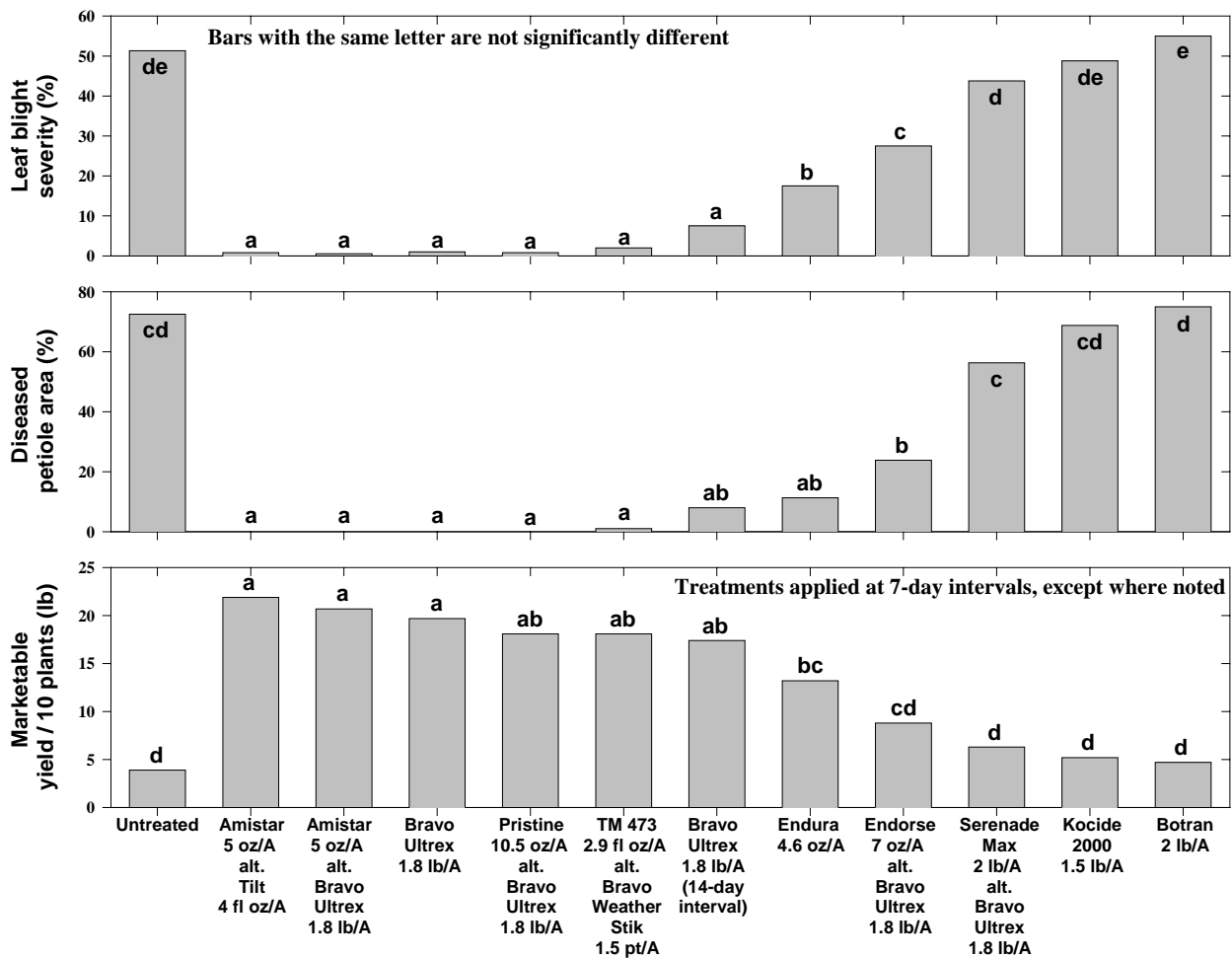
Fungicides were evaluated at the MSU Muck Soils Research Farm in 2005 (Table 1). Seven-week old celery 'Dutchess' transplants were planted 7 in. apart in rows spaced 32 in. apart on 25 May. Treatment plots consisted of one row 20 ft long with 5 ft of unsprayed buffer between plots in the same row. Twelve treatments were replicated four times in a randomized complete block design. Inoculum was applied with a hand-pump backpack sprayer to all plants in the trial several hours after treatments were applied on 6 and 13 Jul using one hollow cone nozzle that delivered approximately 12 gal/A. Fungicides were applied with a CO<sub>2</sub> backpack boom sprayer equipped with three XR8003 flat fan nozzles spaced 18 in. apart and calibrated to deliver 50 gal/A at a boom pressure of 52 psi. Six applications were made at weekly intervals on 6, 13, 21, and 27 Jul; and 3 and 11 Aug, except for the biweekly treatment of Bravo Ultrex 82.5WDG which received three applications on alternate dates. Leaf blight severity was evaluated on 11 and 16 Aug, and ten plants from the middle of each treatment row were hand-harvested and trimmed to fresh market specifications (14 in. length) on 17 Aug. Petiole disease incidence and severity were assessed, diseased petioles were removed from the plants, and yields were recorded.

**Table 1.** Products tested for control of late blight of celery, 2005.

Product	Active ingredient(s)	Manufacturer	Registered
Amistar 80WG	azoxystrobin	Syngenta	yes
Botran 75-W	dicloran	Gowan	yes
Bravo Ultrex 82.5WDG	chlorothalonil	Syngenta	yes
Bravo Weather Stik 6SC	chlorothalonil	Syngenta	yes
Endorse 11.3DF	polyoxin D zinc salt	Arvesta	no
Endura 70WG	boscalid	BASF	no
Kocide 2000 53.8DF	copper hydroxide	DuPont	yes
Pristine 38WG	boscalid + pyraclostrobin	BASF	no
Serenade Max 20WP	<i>Bacillus subtilis</i>	AgraQuest	yes
Tilt 3.6EC	propiconazole	Syngenta	yes
TM 473	experimental	--	no

Disease symptoms appeared on leaves throughout the plot on 18 Jul. Untreated plants were severely diseased at harvest which resulted in extensive trimming and low yield (Fig. 1). Four fungicide programs provided season-long disease prevention on petioles and included Amistar 80WG alternated with Tilt 3.6EC, Amistar 80WG alternated with Bravo Ultrex 82.5WDG, Pristine 38WG alternated with Bravo Ultrex 82.5WDG, and Bravo Ultrex 82.5WDG applied weekly. Trimmed yields of the TM 473 4F alternated with Bravo Ultrex 82.5WDG and biweekly Bravo Ultrex 82.5WDG programs did not differ from the programs that prevented petiole disease. Treatments that included Endura 70WG or Endorse 11.3DF offered limited protection and were generally inferior to the standard Bravo Ultrex 82.5WDG weekly treatment. Applications of Serenade Max 20WP alternated with Bravo Ultrex 82.5WDG, Kocide 2000 53.8DF, and Botran 75-W were ineffective in limiting late blight and resulted in similar disease levels and yields when compared to the untreated control. No phytotoxicity was observed.

**Figure 1.** Efficacy of products tested for controlling late blight of celery, 2005.



### Testing Products for Control of Bacterial Leaf Spot

Products were evaluated at the MSU Muck Soils Research Farm in 2005 (Table 3). Eight treatments were replicated four times in a randomized complete block design. Eleven applications were made at weekly intervals on 1, 8, 16, 22, and 29 Jun; 6, 13, 21, and 27 Jul; and 3 and 11 Aug. Disease developed from naturally-occurring inoculum on transplants. Ten plants from the middle of each treatment row were hand-harvested, trimmed to fresh market specifications (outer petioles removed and plants cut to 14-in. length), and weighed on 17 Aug. Since little difference in disease levels were detected among treatments on 17 Aug (*data not shown*), four additional plants were hand-harvested from each treatment row and evaluated for disease on 30 Aug. Outer petioles were removed, similar to the procedure for trimming plants to fresh market specifications, but the upper foliage was not removed. Disease incidence was determined by counting the total number of marketable petioles (those where the first node measured  $\geq 9$  in. above the base of the plant) and the number of marketable petioles with disease symptoms on the leaves. Disease severity was visually assessed by estimating the percentage of leaf area with bacterial leaf spot symptoms on plants that were not harvested.

**Table 3.** Products tested for control of bacterial leaf spot of celery, 2005.

Product	Active ingredient(s)	Manufacturer	Registered
Actigard 50WG	acibenzolar-S-methyl	Syngenta	no
Citraplex 20% Copper	copper sulfate	Loveland	yes – EPA exempt
Kocide 2000 53.8DF	copper hydroxide	DuPont	yes*
Messenger STS 3WDG	harpin protein	Eden Bioscience	yes*
Serenade Max 20WP	<i>Bacillus subtilis</i>	AgraQuest	yes*
Tanos 50DF	famoxadone + cymoxanil	DuPont	no

\* Products labeled for greenhouse and field use.

Disease symptoms appeared on newly expanded leaves on 8 Jun. The causal agent was confirmed as *Pseudomonas syringae* pv. *apii* by a BIOLOG analysis conducted by Diagnostic Services at Michigan State University. All product treatments, except those that included Serenade Max 20WP or Citraplex 20% Copper, reduced leaf spot severity relative to the untreated control (Fig. 2). Applications of Actigard 50WG + Kocide 2000 53.8DF resulted in the lowest leaf spot severity but did not differ from the standard treatment of Kocide 2000 53.8DF applied alone. No significant rate response was observed when Kocide 2000 53.8DF was applied at 1 lb or 1.5 lb/A. Only Serenade Max 20WP + Kocide 2000 53.8DF significantly reduced disease incidence relative to the untreated control, yet the treatment was not superior when compared with other product treatments. No phytotoxicity was observed.

**Figure 2. Efficacy of products tested for controlling bacterial leaf spot of celery, 2005.**

