Carrot Disease Management Updates



THE UNIVERSITY of WISCONSIN MADISON

Amanda J. Gevens
Stephen A. Jordan
Kenneth Frost
Russell L. Groves

UWEX/WPVGA Grower Ed Conference
February 6, 2013 – 1:30-1:50PM
Holiday Inn, Stevens Point, WI

UW Extension
Learning for life

Rationale for Work

- Wisconsin ranks 2nd (closely behind WA) in acres planted to carrots with 3800 acres
  - -26% of total US planting
- Averaged 24.97 ton/a in 2011
- Average price of $77.2 per ton with an estimated total value of $7.1 million.
- Foliar diseases can impact yield, quality, and harvest-ability
- Identification and appropriate timing of effective fungicides for foliar carrot diseases can help improve disease management, reduced environmental impact, and increase profitability
- Evaluation of efficacy and timing of newly registered fungicides

Alternaria Leaf Blight *Alternaria dauci*

Overwinters – Debris or Weeds, seedborne

Asexual (conidia)

Parasitic/Saprophytic

Polycyclic

Prefers aging or weak foliage

Characteristics: Attacks margins, oblong or irregular lesions (dark brown), chlorosis, necrosis, favors older leaves, wind+splash dispersed

Outbreaks- complete foliage decline

Cercospora Leaf Blight *Cercospora carotae*

Overwinters – Debris, seedborne

Asexual (conidia)

Primarily parasitic

Polycyclic – Annual problem

Earlier than Alternaria blight

Characteristics: Orange to tan, circular or elliptical lesions (pale brown) on petioles and leaflets, favors young leaves, wind+splash dispersed

Petiole collapse = ↓ translocation

Combined Alternaria and Cercospora Leaf Blight

Combined Petiole Symptoms

Evaluation of new fungicides for carrot disease control, 2011

- Compare new fungicides and new pre-mixes with chlorothalonil and azoxystrobin 'standards' to enhance disease management programs

Trade name	a.i.	FRAC class
Bravo, Echo, Equus, Initiate	chlorothalonil	M5
AmTide, Bumper, Propimax, Tilt	propiconazole	3
Cabrio	pyraclostrobin	11
Endura	boscalid	7
Contans	*Coniothyrium minitans*	biological
Flint, Gem	trifloxystrobin	11
Heritage, Quadris	azoxystrobin	11
Quadris Opti	azoxystrobin + chlorothalonil	11+M5
Quadris Top	azoxystrobin+ difenoconazole	11+3
Quilt Excel	azoxystrobin+ propiconazole	11+3
Iprodione, Nevado, Rovral	iprodione	2
Pristine	boscalid + pyraclostrobin	7 + 11

Evaluation of new fungicides for carrot disease control, 2011

- Susceptible 'Fontana' planted on muck soil previously planted to onion in Endeavor, WI
- Evaluated for Alternaria leaf blight, Cercospora leaf spot, and white mold (single rating for group)
- 4 replicated plots arranged in a randomized complete block design
- Each plot consisted of 5-ft-wide beds with four 18-ft-long rows spaced 15 in apart with 8-ft unsprayed buffer alleys between plots

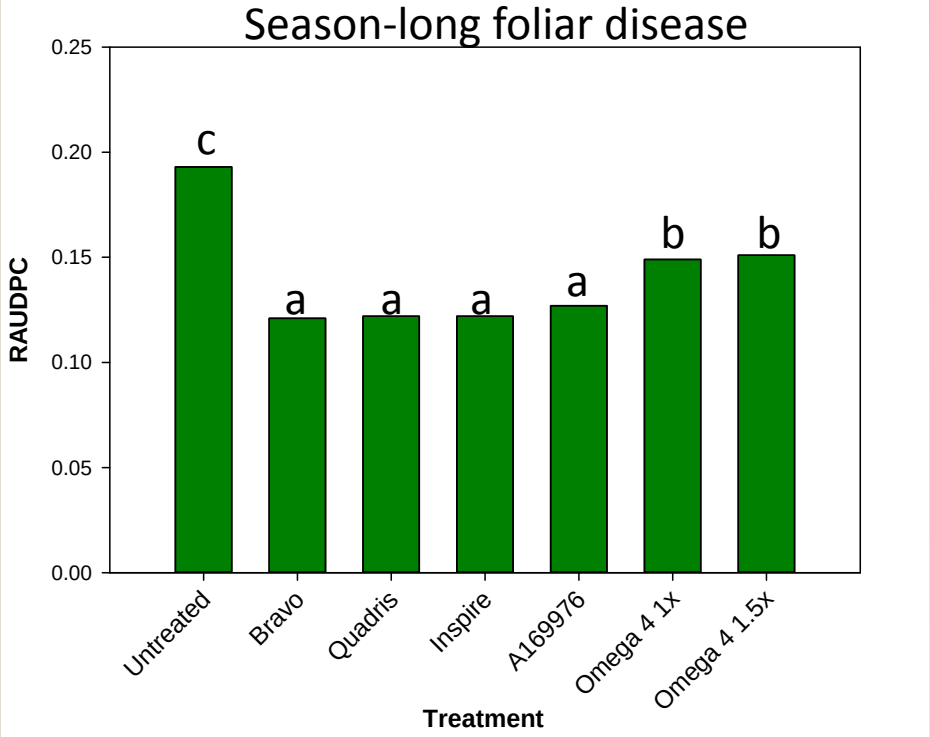
Evaluation of new fungicides for carrot disease control, 2011

	Treatments (Applied at 14-day intervals starting 13 Jul, ending 7 Sep)	Active Ingredient	Rate/A	Application schedule
1	Untreated	NA	--	
2	Bravo Weather Stik 6 SC	chlorothalonil	2.0 pt	1, 2, 3, 4, 5
3	Quadris Top 2.71 SC alt. Bravo Weather Stik 6 SC	azoxystrobin+difeno-conazole alt. chlorothalonil	10.0 fl oz 2.0 pt	1, 2, 4, 5 3
4	Inspire XT 4.17 EC alt. Bravo Weather Stik 6 SC	difenoconazole + propiconazole	7.0 fl oz 2.0 pt	1, 2, 4, 5 3
5	Bravo Top alt. Bravo Weather Stik 6 SC	chlorothalonil + difenoconazole alt. chlorothalonil	1.5 pt 2.0 pt	1, 2, 4, 5 3
6	Omega 4 SC alt. Bravo Weather Stik 6 SC	fluazinam alt. chlorothalonil	1.0 pt 2.0 pt	1, 2, 4, 5 3
7	Omega 4 SC alt. Bravo Weather Stik 720 SC	fluazinam alt. chlorothalonil	1.5 pt 2.0 pt	1, 2, 4, 5 3

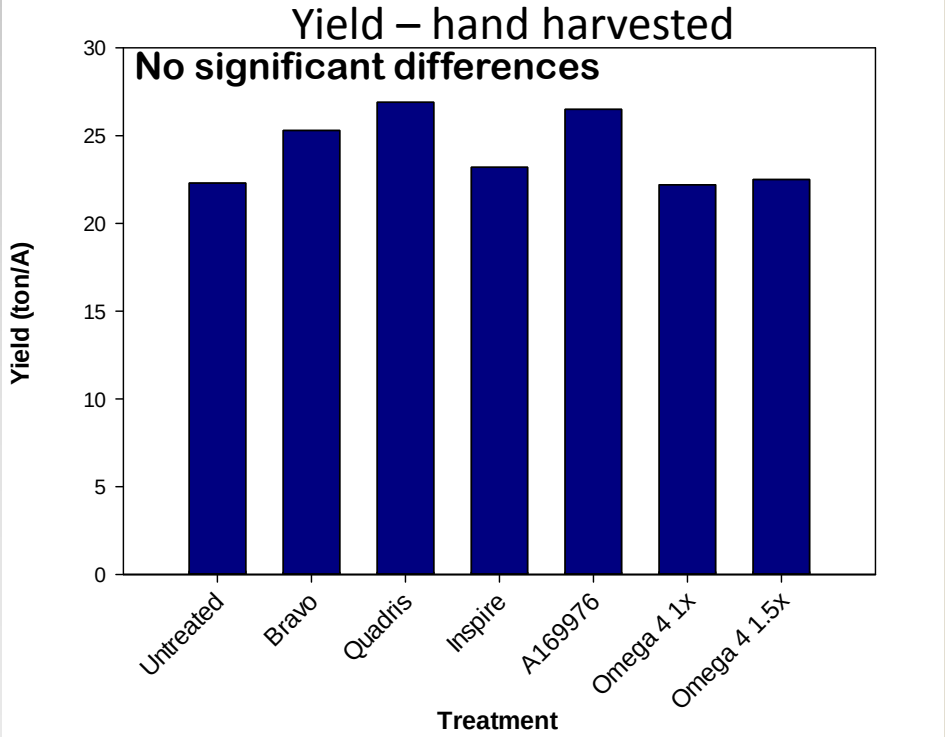
Harvested 28 Sep.; Disease severity measured prior to every fungicide application and at harvest

Evaluation of new fungicides for carrot disease control, 2011

Results



All trts alternated with Bravo



All trts alternated with Bravo

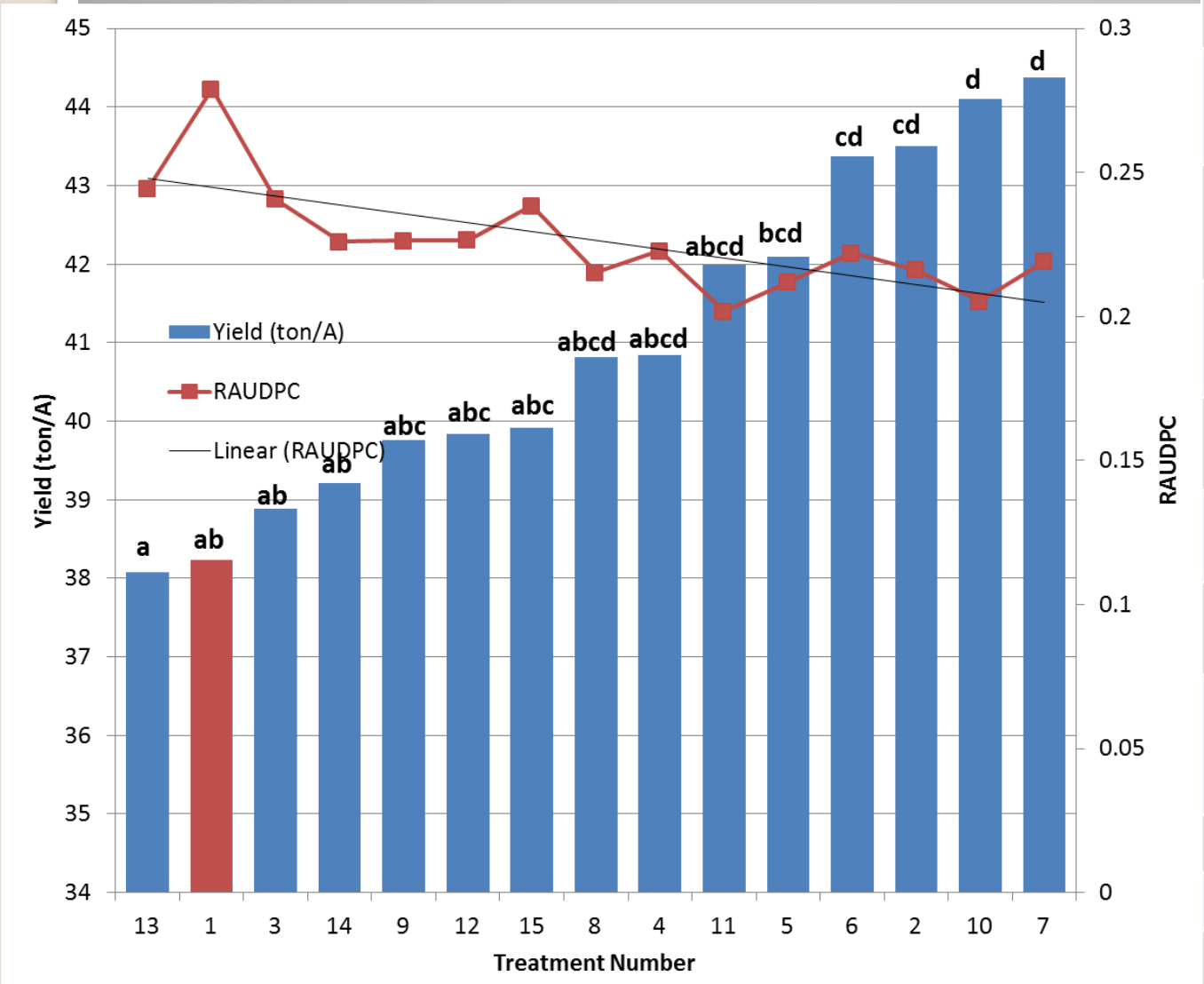
- Bravo, Quadris, Inspire, and Bravo Top (all alt. Bravo) had sig. less disease than control and Omega trts.
- No sig. differences in yield – overall yields were better than avg.

Evaluation of new fungicides for carrot disease control, 2012

- 'Enterprise'planted at Hancock Agricultural Research Station, Hancock, WI
- Evaluated for Alternaria leaf blight (*A. dauci*), Cercospora leaf spot (*C. carotae*), and white mold (*S. sclerotiorum*) - single rating for foliar group
- 4 replicate plots arranged in a RCBD
- Each plot consisted of 5-ft-wide beds with three 18-ft-long rows spaced 20 in apart with 12-ft unsprayed buffer alleys between plots
- Fungicide applications made on 14-day intervals (sprays 1-5) starting at first symptoms of foliar disease (26 Jul 2012)
- Harvest on 5 Oct 2012

Evaluation of new fungicides for carrot disease control, 2012

Treatment List & Results



Trt No.	Product	Rate	Appl.
1	Untreated	NA	NA
2	Bravo WeatherStik	2.0 pt	1,2,3,4,5
3	Bravo WeatherStik	2.0 pt	1,3,5
4	Quadris Flowable	9.0 fl oz	1,2,3,4,5
5	Quadris Flowable	9.0 fl oz	1,3,5
6	Quadris Flowable	9.0 fl oz	1,2,4,5
	Bravo WeatherStik	2.0 pt	3
7	Quadris Top 2.71 SC	10 fl oz	1,2,4,5
	Bravo WeatherStik	2.0 pt	3
8	Inspire XT 4.17 EC	7.0 fl oz	1,2,4,5
	Bravo WeatherStik	2.0 pt	3
9	Omega 4 SC	1.0 pt	1,2,4,5
	Bravo WeatherStik	2.0 pt	3
10	Omega 4 SC	1.5 pt	1,2,4,5
	Bravo WeatherStik	2.0 pt	3
11	Bravo Top	1.5 pt	1,2,4,5
	Bravo WeatherStik	2.0 pt	3
12	Quadris Flowable	9.0 fl oz	3
	Bravo WeatherStik	2.0 pt	1,5
13	Bravo WeatherStik	2.0 pt	1,3
14	Bravo WeatherStik	2.0 pt	2,4
15	Bravo WeatherStik	2.0 pt	3,5

Evaluation of new fungicides for carrot disease control, 2012

Summary of Results

- No sig differences in cumulative disease (RAUDPC)
- Sig differences in yield
- Very high yields overall (2X avg, top performing trts with >40 ton/acre)
- Hot, dry weather suppressed early disease
- Full calendar applications performed better than "skip" applications (spray every 14-days)
- Later season applications (sprays 4, 5) provided better control than earlier applications in "skip" programs
- Alternation of Bravo with lower toxicity, reduced risk fungicide(s) provided excellent disease control (in 2011 and 2012)
- Omega alt. chlorothalonil gave higher yields in 2012 than in 2011

Implementing Pest and Disease Forecasting for Enhanced Management of Vegetable Crops Grown on Muck Soils

FY2012 – Farm Bill: Wisconsin Specialty Crop Block Grant Program

Key Personnel

- Amanda Gevens – Dept. of Plant Pathology
- Russ Groves – Dept. of Entomology
- Ken Frost – Dept. of Plant Pathology

UW Extension

College of Agricultural & Life Sciences
University of Wisconsin-Madison

Project Goals and Objectives

Increasing the sustainability, efficiency and profitability of vegetable crops grown on muck…

Specific Objectives:

I) Advance and integrate weather based disease (risk) forecasting models to advise application of protectant fungicides or insecticides

II) Develop a means to extend the forecasted data to the grower community in a web based or newsletter form

III) Advance our understanding of the variability and effect of the physical environment on disease development

Possible Disease and Pest Targets Addressed

Carrot: TOM-CAST

- Alternaria leaf blight (*Alternaria dauci*)
- Cercospora leaf spot (*Cercospora carotae*)
- Aster leafhopper (*M. quadralineatus*)

Onion: DOWN-CAST, Blight Alert

- Downy mildew (*Peronospora destructor*)
- Botrytis leaf blight (*Botrytis squamosa*)
- Aster leafhopper (*M. quadralineatus*)

Potato: (Future Expansion)

- Early Blight (*Alternaria solani*)
- Late Blight (*P. infestans*)

Disease Forecasting Schematic

Weather Data and Predictions (NOAA):
- National Weather Service (RAP)
- Reanalysis Data

Currently in development

In-house forecasting models:
- TOM-CAST
- DOWN-CAST

Future Outputs

Web based end-user interface:
- Model predictions
- Management recommendations

Research program:
- Disease progression
- Reliability of predictions

Project outputs: Web-based end-user interface

Objective II – To develop a means to extend the forecasted data to the grower community in a web based or newsletter form

Forecast Information:

DSVs - Current, 1 and 3 days out

- Cumulative
- Daily

Graphical Format

- Color coded maps/images

Tabular Format

- DSVs at specific locations

Recommendations – eventually

Project outputs: Research components

Objective III – Advance our understanding of the variability and effect of the physical environment on disease development

Specific Researchables:

I) Compare disease progress curves to accumulated severity values
II) Compare "risk" based on NWS predictions to "risk" calculated using field level weather stations (i.e. WatchDog)
III) Examine the accuracy of 1 and 3 day predictions, post-hoc, by comparing original predictions to observed data
IV) Examine historical weather data to identify locations that are conducive for disease development

Summary

New research project – Wisconsin Specialty Crop Block Grant Program

Implementing Pest and Disease Forecasting for Enhanced Management of Vegetable Crops Grown on Muck Soils

Joint venture between Plant Pathology and Entomology

Keep eyes peeled for newsletter and website updates

Acknowledgements

University of Wisconsin-Plant Pathology
Bryan Webster, Amilcar Sanchez Perez, Anna Seidl, Alex Pfiel, Alejandra Huerta

Roderick & Richard Gumz, Paul Miller Farms

Hancock Agricultural Research Station
Glenn Carlson

Syngenta

University of Wisconsin Vegetable Disease Website (newsletter access)
http://www.plantpath.wisc.edu/wivegdis/