USE OF TOM-CAST DISEASE FORECASTER IN MICHIGAN CARROTS

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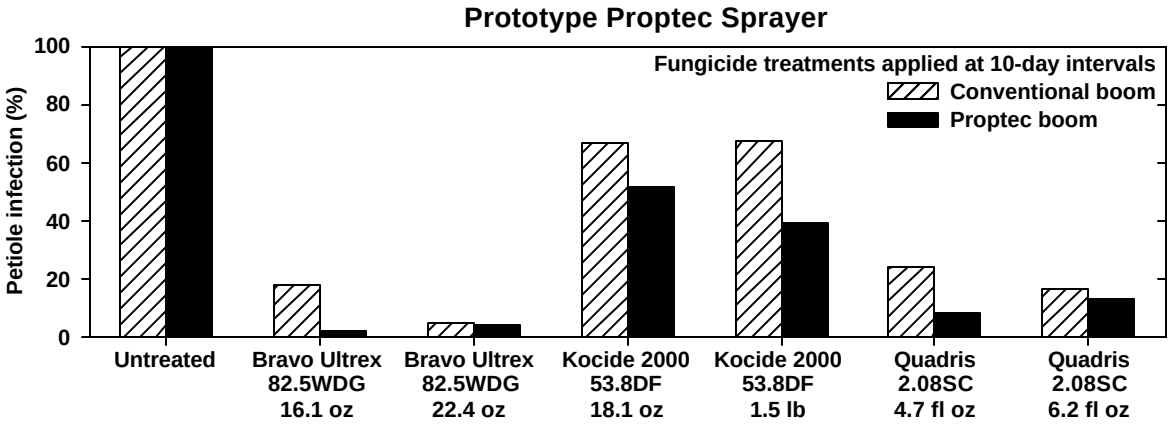
Proptec versus Conventional Spray Technology

A prototype Proptec carrot sprayer was developed and built by MSU Ag Engineering in 2000 and used in small research plots. This sprayer combines high speed props and low volumes of water resulting in more thorough spray coverage with minimal drift. This study was conducted in a commercial carrot field planted to 'Goliath' and utilized three row beds planted on 64 inch bed centers. Rows in the bed were spaced 18 inches apart with an inrow plant spacing of 1.6 inch. Individual treatment plots were 7 beds wide and 40 feet long with a buffer of 10 feet between spray blocks. The center bed of the plot was used as an untreated drive row and the three beds on the left were sprayed with a conventional boom mounted with twelve 8003 flat fan nozzles. The remaining three beds on the right side of the drive row were sprayed with a boom with three Proptec nozzles spaced 64 inches apart. The conventional boom was calibrated to deliver 20 gallons per acre at nozzle pressure of 20 psi and a speed of 3.0 mph. Proptec treated rows were sprayed at the same time as the conventional treated rows with 10 gallons per acre at 3.0 mph. Pressure for the spray solution for the conventional boom was supplied by a CO_2 charged 5 gallon tank. Proptec solutions were mixed in a poly 30 gallon tank and pumped through a hydraulic roller pump to the nozzles. Both booms were mounted on a trailer spray rig that was pulled by a small 40 hp high clearance tractor that straddled on bed of carrots. Ground speed and spray volume were monitored by an electronic spray controller mounted on the tractor. Treatments were applied seven times on a 10 day spray schedule starting on 12 Jul and finishing on 13 Sep. Foliar ratings, petiole health, and incidence of infected petioles were taken from the center ten feet of the center row of the center spray bed for each treatment and boom type on five different dates throughout the spray season (see graph, below). Yields were taken from the same ten feet as the ratings and carrots were handharvested, topped, and weighed on 9 October.

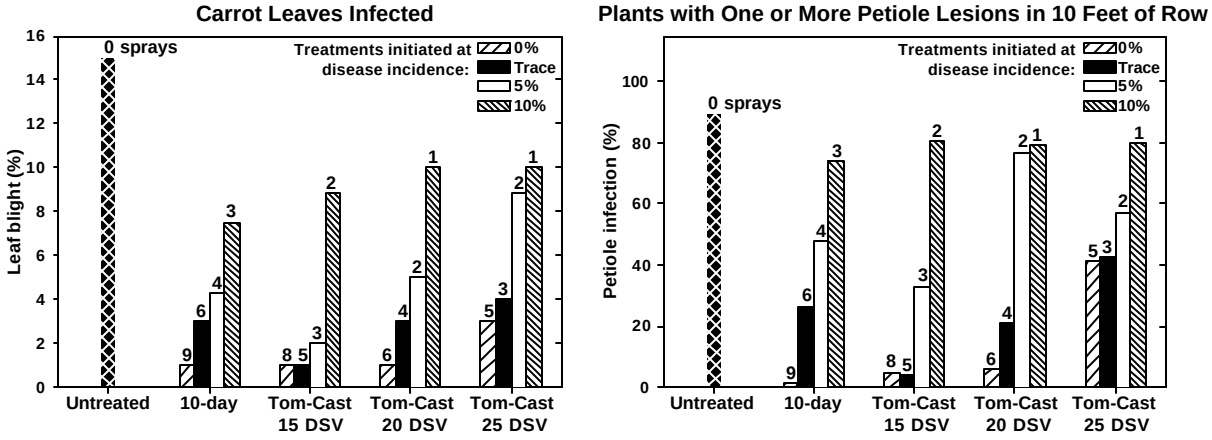


TomCast Disease Forecaster versus Calendar Sprays

Minimizing fungicide use is a goal of growers, processors, and consumers. Disease management programs that reduce the number of fungicide applications also reduce grower costs, potential residues on the produce, and risk of development of fungicide resistance in the pathogens. One way to reduce the number of necessary fungicide applications without compromising disease control is through the use of diseasewarning systems that predict potential outbreaks or increases in disease severity based on the weather.

Studies have been initiated at MSU to test the disease forecasting system, TomCast, for use in managing foliar blights on carrot. TomCast is derived from the disease forecasting system (FAST) originally developed to help time fungicide sprays for early blight (*Alternaria solani*) on tomato. TomCast has been used commercially in tomato production, and has recently been adapted for use in disease management of asparagus. The TomCast program uses the duration of leaf wetness and the average air temperature during the wetness period for each 24hour period (11:00 AM to 11:00 AM) to determine a disease severity value (DSV) of 0 to 4, corresponding to an environment unfavorable to highly favorable for disease development.

Processing carrots 'Early Gold' were planted with a precision vacuum seeder at the MSU Muck Soils Research Farm in three rows 18 inches apart on a raised bed that was 50 feet long. Carrot beds were spaced on 64 inch centers and inrow seed spacing was 1 inch. Each of the four replications of the experiment were located in separate blocks of carrots that consisted of 36 beds. Seventeen treatment beds 20 feet long were randomly placed in a checkerboard pattern in each replication. Treatments were applied with a CO_2 backpack sprayer that was calibrated to deliver 50 gallons per acre of spray solution using 8002 flat fan nozzles. Treatments consisted of an untreated and different schedule applications of Bravo Ultrex 82.5WDG (22.4 oz/A) alternated with Quadris 2.08SC (6.2 fl oz/A). The chemical program



was applied on a 10 day calendar program as well as when predicted by the TomCast disease forecaster. Three different prediction thresholds of 15, 20, and 25 DSVs were used to time fungicide applications. When the cumulative daily DSV values reached the determined threshold a spray would be applied. Each treatment regime was initiated at four different levels of disease pressure (0%, trace, 5%, and 10% foliar blight). The first treatments were applied on 2 July and the last application of any treatment was made on

21 September. Ten feet of each center row of the spray blocks were marked before the first application and were used for weekly disease ratings (see graphs, below). Yields were taken from the same ten feet section of row by handharvesting the carrots and topping and weighing.

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