Efficacy and Crop Safety of Cymoxanil for the Control of *Phytophthora* Crown Rot & Leather Rot in Strawberry

Project No. P13256
Date: 04/2023

PROJECT TITLE:

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PROJECT JUSTIFICATION AND OBJECTIVES:

IR-4 received a request for the use of cymoxanil in strawberry for the control *Phytophthora* crown rot and leather rot. The purpose of this research is to collect efficacy and crop safety data to support registration of the proposed use pattern for cymoxanil on this specialty crop.

Adherence to Good Laboratory Practices (GLPs) is not required for trials conducted under this research plan.

IR-4 PERFORMANCE RESEARCH COORDINATOR:

Consult with the Performance Research Coordinator listed below regarding desired changes in this research plan prior to occurrence.

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Signature of IR-4 Research Coordinator
Jaimin Patel

04/12/2023
Date

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MATERIALS & METHODS:

Host plant: Strawberry - Use a locally grown commercial variety that is susceptible to the test pathogen.

Pathogen: *Phytophthora* crown rot and leather rot *(Phytophthora cactorum)*

Test site: A laboratory bioassay will be conducted on the detached fruits against leather rot; a field trial at a research farm will be conducted against crown rot.

Inoculum: Artificial inoculum will be conducted in the laboratory bioassay on harvested fruits 1-2 days prior to treatment application. The field trial will be inoculated 1-2 days before applications start.

Treatments: See Table 1 & 2 below.

Application Timing: Apply products 1-2 days after inoculum.

Test Substances Manipulation & Application: Read product use directions prior to manipulation and application. Applicators and handlers must wear the personal protective equipment listed on the product label. Do not use old/expired products for trials conducted under this research plan. The IR-4 Research Coordinator will arrange for new test substance to be delivered.

Upon receipt of the test substance(s), document the corresponding lot/batch number. Store the test substance in a secure, clean, dry area at temperature ranges noted in the product label. Use application equipment that will provide uniform application of the test substance and simulates the intended commercial application technique. To ensure accurate delivery, calibrate test application equipment prior to application of the test substance(s).

Experimental Design: Each test site should conduct four replicates of each treatment. Arrange plots in a randomized complete block design or other appropriate statistical design. The individual plots should be large enough to permit accurate application of the test substance in a manner that represents the major application technique that will be used commercially.

Supplemental Crop treatments: To protect the integrity of the study, manage pests causing significant damage to the crop other than the target pest. Only EPA-registered maintenance pesticides should be used at labeled rates and applied to all experimental units. Document all supplemental crop treatments.

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Table 1. List of Treatments: Field Trial - Control of *Phytophthora* Crown Rot.

Product	MFG	EPA Reg. #	AI	Appl. Type	Rate	Adjuv.	No. of Applications & RTI*	GPA
UTC – non-inoculated	N/A							
UTC - Inoculated	N/A							
Ridomil [Industry Standard]	Syngenta	100-1202	Mefenoxam	Drip	1 pt/A	NO	Conduct 3 applications. Make the 1st application after transplanting. Make the 2nd application 30 days before the beginning of harvest or at fruit set. Apply the 3rd application during harvest.	≥20 gal/A
Curzate 60DF**	Corteva	352-592	Cymoxanil	Drip Foliar (only for phytotoxicity data)	5 oz/A		Conduct 6 applications at 5 days interval starting at transplant.	

***RTI:** re-treatment interval
****Efficacy will not be assessed following foliar applications of Curzate 60DF at 5 oz/A. This treatment will be used to assess phytotoxicity only.

Table 2. List of Treatments: Laboratory Bioassay - Control of *Phytophthora* Leather Rot.

Product	MFG	EPA Reg. #	AI	Appl. Type	Rate	Adjuv.	No. of Applications & RTI*	GPA
UTC	N/A							
Fosphite [Industry Standard]	JH Biotech Inc	68573-2	Mono and di-potassium salts of phosphorous acid	Foliar Spray	3 qt/A	NO	Apply once on harvested fruits.	≥20 gal/A
Curzate 60DF	Corteva	352-592	Cymoxanil		5 oz/A			

DATA COLLECTION:

Efficacy:

- Crown Rot - Assess disease incidence by evaluating plants in each replicate and calculate the number of infected plants (% of infection).
- Leather rot - Disease incidence and severity should be rated 1-2 days after the first treatment application. Ratings should continue on a daily basis. For incidence, evaluate fruit in each replicate and calculate the number of infected fruit (% of infection). For severity, evaluate each fruit for percent surface infection (% of fruit area infected) using a known scale (e.g. Horsfall-Barratt scale).

Crop Injury:

Assess phytotoxicity in the plot(s) preferably 7-14 days after each application of the test substance, using the damage scale indicated below. If an application interval is less than seven (7) days, then the assessment may be done at the next application date. The untreated plot should be assessed on each date that any treated plot is assessed. If the crop is to be harvested/sampled within 14 days of the last application, then make the assessment on the day of harvest. The rating is an assessment of the damage throughout the entire plot. If a rating of one (1) or higher is given to a plot, a follow up rating is needed 7-14 days after that, even if there is no additional test substance application in the interim, unless this rating is given to the crop at harvest.

Scale:

- 0 = no damage seen in the plot
- 1 = damage in ≤10% of the plot
- 2 = damage in 11-25% of the plot
- 3 = damage in 26-50% of the plot
- 4 = damage in >50% of the plot

STATISTICAL ANALYSIS:

Conduct appropriate statistical analysis to determine if significant differences exist between treatments. Statistical analysis from commonly used agricultural data programs, such as but not limited to Agricultural Research Manager (ARM), SAS, Minitab, etc. is acceptable.

DATA REPORTING:

At trial completion, please submit a final report and the raw data in two separate files to the IR-4 Research Coordinator and the appropriate Regional Field Coordinator (RFC) listed below.

For the sake of consistency and to avoid missing information, IR-4 encourages collaborators to adopt and fill out the Final Report Research Template provided by the Research Coordinator prior to trial conclusion.

The final report and the raw data should be submitted to IR-4 within 60 days of last data collection.

For non-confidential test substances, IR-4 encourages researchers to publish the results obtained from the study. Any publications should acknowledge support by IR-4.

TRIAL SITE INFORMATION

Researcher	Field ID NO.	RFC
Dr. Natalia Peres University of Florida Gulf Coast Research and Education Center 14625 County Road 672 Wimauma, FL 33598 Phone: (813) 419-6602 Email: nperes@ufl.edu	P13256.23-FLP07	SOR
Dr. Gerald Homes (*He will conduct trial in 2024*) California Polytechnic State University Director, Strawberry Center Bldg. 83 (Technology Park) – Ste. 1B & 11-114 San Luis Obispo, California 93407 Phone: (805) 756-2120 gjholmes@calpoly.edu	P13256.23-CAP10	WSR

RESEARCH FIELD COORDINATORS (RFCs)

SOR: Dr. Janine Spies, IR-4 Southern Region Field Coordinator's Office, Univ of Florida, 1642 SW 23rd Drive, Bldg 685, PO Box 110720, Gainesville, FL 32611-0720; Tel: (352) 294-3991, FAX# 352-392-1988; e-mail: jrazze@ufl.edu

WSR: Dr. Kari Arnold, Regional Field Coordinator, Western Region, Western Region IR-4 Project, Cell: (530) 574-9181; email: klarnold@ucdavis.edu