Washington Commission on Integrated Pest Management - Application Form

(Assigned by WCIPM) **Project #** 25PN022

PROJECT TITLE: Efficacy of fungicides for management of pink root and Fusarium basal rot of onion

APPLICANT:
User Group: Columbia Basin Onion Res. Committee
Contact: Sheri Nolan, Michael Locati
Phone: 509-585-5460, 509-386-8914
Email: snolan@agmgt.com, info@sweetonions.org

PI/RESEARCHER:
Name: Lindsey du Toit, Tim Waters
Institution: Washington State University
Phone: 360-848-6140, 509-545-3511
Email: dutoit@wsu.edu, twaters@wsu.edu

DETAILS:

Treatment Method *(Select one):* ☒ Pesticides ☐ Alternative to Pesticides

Crop: Onion Pest: *Fusarium oxysporum* f. sp. *cepae*, *Setophoma terrestris*

Registration: 40% Non-Registration: 60%

CATEGORIES:

Good Laboratories Practices Research *(Select all that apply):* ☐ GLP ☒ Not GLP

Impact Categories *(Select all that apply)*:

☐ A1 ☐ A2 ☐ A3 ☐ A4 ☐ A5 ☐ B1 ☐ B2 ☐ B3 ☐ B4 ☐ C1 ☐ C2 ☒ C3 ☒ C4

Project Type *(Select all that apply)*:

☒ Efficacy Trial ☐ Residue Study ☐ Pesticide Resistance Study

☐ Phytotoxicity Study ☐ Integrated Pest Mngmt ☐ Other:

FUNDING: *(Must match budget form)*

Start Date: March 1, 2025 End Date: 12/31/2025

WCIPM Request: $9,526

Fund Contributions Cash: $9,525 *From:* Columbia Basin Onion Res. Comm.

Fund Contributions In-kind: $0 *From:*

Total Project Cost: $19,051

PROJECT SUMMARY: *(≤150 words)* Fusarium basal rot (FBR) and pink root (PR) are priorities in the 2025 Columbia Basin Onion Research Committee (CBORC) RFA. Caused by the soilborne fungi, *Fusarium oxysporum* f. sp. *cepae* and *Setophoma terrestris*, respectively, these diseases are common in the Columbia Basin after decades of onion production. Some onion cultivars are susceptible to one or both diseases. The objectives of this proposal are to evaluate the efficacy of: 1) seed treatment and PPI applications of FRAC group 1 fungicides thiophanate-methyl and thiabendazole for control of FBR, and 2) PPI application of FRAC group 7 fungicides penthiopyrad and fluopyram for control of PR. This project will clarify how much seed or PPI applications of these fungicides provide control of FBR and PR, and economic viability of these applications. If any of the treatments prove efficacious, results could be used by registrant(s) to add FBR and/or PR to the labels.

To the best of my knowledge, my signature certifies that the information in this application is true and correct.

Michael Locati CBORC President

User Group Applicant Name (Print) *User Group Applicant's Title*

User Group Applicant Signature *Date November 11, 2024*

PROBLEM DESCRIPTION:

Approximately 24,000 acres of onion crops are grown in the Columbia Basin of central Washington annually, ranking second only to California for onion production in the USA, with a farmgate value of >$7,000/acre. Fusarium basal rot and pink root were on the list of research priorities in the 2025 RFA of the Columbia Basin Onion Research Committee because these diseases, caused by the soilborne fungi *Fusarium oxysporum* f. sp. *cepae* and *Setophoma terrestris* (formerly *Phoma terrestris*), respectively, are common in fields in the Columbia Basin after decades of onion production. While some onion cultivars have partial resistance to one or both diseases, many cultivars grown widely in the Columbia Basin are susceptible to one or both.

Management of Fusarium basal rot and pink root primarily is based on soil fumigation (metam sodium) in the fall prior to planting, and rotations of 4-5 years between onion crops. However, some strains of *S. terrestris* also infect crops like corn and wheat, requiring even longer rotations, particularly when planting susceptible onion cultivars. Fungicides in FRAC groups 1 and 3 are the most effective against plant pathogenic *Fusarium* spp., including thiophanate methyl (e.g., Topsin formulations) and thiabendazole (e.g., Mertect 340-F). However, Topsin labels do not include Fusarium basal rot of onion (only white rot caused by *Sclerotium cepivorum*), and the Mertect 340-F label only refers to seedling diseases caused by *Fusarium* spp., not Fusarium basal rot which can be problematic at any growth stage and tends to be more severe later in the season and can progress in storage. Several fungicides in FRAC group 7 have proven efficacious when evaluated for control of pink root, i.e., penthiopyrad (e.g., Fontelis Fungicide) and fluopyram (e.g., Velum Prime). In a 2014 grower-cooperator trial in the Columbia Basin, with onion seed planted into a 12-bed-wide strip of soil treated with a PPI application of Fontelis across the diameter of a ~125-acre, center-pivot irrigated field, very little pink root developed on plants in the treated soil compared to plants in the non-treated area of the rest of the field. Plants in the treated soil matured several weeks later than those in the rest of the field because of much healthier roots. Similarly, in 3 years of field trials by Mike Thornton (University of Idaho) in the Treasure Valley, drip chemigation of Fontelis or Velum Prime at the 2- and 4-true-leaf stages reduced pink root and increased bulb yield. These trials demonstrated that Fontelis and Velum Prime are potentially valuable tools to reduce losses to pink root. Pink root is listed on the Velum Prime label, but not on the Fontelis label.

The method and timing of application of fungicides can have a major influence on efficacy of applications, particularly for soilborne pathogens restricted to the roots and/or basal plates of onion plants. The active ingredients in Topsin, Mertect, Fontelis, and Velum Prime are xylem translocated to a limited degree, i.e., they move partially up the plant in the xylem with translocation of water from the roots, not down from treated foliage to the basal plate or roots. Therefore, foliar applications of these fungicides are unlikely to have much efficacy, if any, compared to PPI applications, seed treatments, or drip chemigation.

The objectives of this proposal are to evaluate the efficacy of: 1) seed treatment and pre-plant, incorporated (PPI) applications of the FRAC group 1 fungicides thiophanate-methyl and thiabendazole for control of Fusarium basal rot, and 2) PPI applications of the FRAC group 7 fungicides penthiopyrad and fluopyram for control of pink root in the Columbia Basin. This project should increase our understanding of the degree to which seed treatments or PPI applications of these fungicides can reduce losses to Fusarium basal rot and/or pink root, and whether the applications provide

economically viable management tools for growers. For those treatments that prove efficacious for either disease, the results could be used by registrant(s) to add pink root and/or Fusarium basal rot to the product labels.

PROJECT DESCRIPTION:

For the Fusarium basal rot trials, a PPI application of each of Topsin 4.5FL and Mertect 340-F (at maximum label rates) will be compared to seed treatments with Topsin M WSB and Mertect 340-F, as well as non-treated control plots in each of two grower-cooperator fields with a history of Fusarium basal rot. Fields will be identified in coordination with CBORC members. We will work with the growers to plant a cultivar susceptible to Fusarium basal rot in each trial. Likewise, PPI applications of Fontelis and Velum Prime will be compared with non-treated plots in each of two grower-cooperator fields with a history of severe pink root, with the trials planted to a highly susceptible cultivar (e.g., Calibra). Each trial will be set up as a randomized complete block design with 6 replicate strips per treatment (total of 5 treatments in each Fusarium basal rot trial, and 3 in each pink root trial). Each strip will be 12 beds wide (onion planter width). The length of each strip will depend on the grower-cooperator. Plant evaluations will be done two to three times in each trial: 1) mid- to late-July, 2) mid-August, and 3) late August, depending on maturity of the cultivar in each trial, to assess the incidence and severity of pink root and/or Fusarium basal rot in each plot. Plants in ~10-feet of bed in each replicate plot will be dug up carefully to keep as much of the roots attached as feasible, and the roots washed and rated for severity of pink root. Each bulb will be cut lengthwise from the neck to the basal plate to assess the severity of Fusarium basal rot. For the trials in which the disease pressure seems adequate to impact yield, bulb yield will be determined in each plot at the estimated harvest date for the cultivar, by topping, sizing, and weighing the bulbs in 10-foot sections of each replicate plot of each treatment. Data will be subjected to analyses of variance and means comparisons.

This research will clarify the efficacy of seed treatment with Topsin M WSB or Mertect 340-F, and PPI application of Topsin 4.5FL or Mertect 340-F for controlling Fusarium basal rot; and the efficacy of PPI applications of Fontelis and Velum Prime for controlling pink root in the Columbia Basin. Results could be used by the registrants to add Fusarium basal rot and/or pink root to the onion diseases controlled by these products. Results will be shared with growers and other onion stakeholders through presentations (WSU Onion Field Day, PNVA Annual Convention), websites (Alliumnet.com, PNW VEG), and publications (Onion World, Plant Disease Management Reports, WSU Onion Alerts).

The estimated timeline for the project is as follows:

Late Feb. - early Apr. 2025: Seed treatment and PPI applications completed (dates determined by the grower-cooperators).

Jul. - Aug. 2025: Dig plants from 5- to 10-foot sections of each plot in each trial, and rate pink root and Fusarium basal rot incidence and severity.

Sep. 2025: Yield assessment completed in those trials that have adequate disease pressure.

Oct. - Dec. 2025: Data analyzed, and results presented to CBORC board members in Kennewick and at the 2025 PNVA Annual Convention & Trade Show. Publication

submitted to Plant Disease Management Reports (Plant Health Progress). Results shared on Alliumnet.com, WSU Onion Alert, and PNW Vegetable Extension Group.

SELECT REFERENCES:

de Visser, C., van den Broek, R., van den Brink, L. 2006. Fusarium basal rot in the Netherlands. Vegetable Crops Research Bulletin 65, Research Institute of Vegetable Crops, Skierniewice, Poland.

Hausbeck, M. K., Wiriyajitsonboom, P., and Linderman, S. D. 2016. Greenhouse evaluation of fungicides for control of pink root of onion, 2015. PDMR.

Hoepting, C. A. 2018. Efficacy of Fontelis for control of pink root in onion, 2017. PDMR 12:V145.

Hoepting, C. A., Caldwell S. K., and van der Heide, E. R. 2022. Evaluation of in-furrow drenches for control of pink root and Fusarium basal rot in direct seeded onion, 2020-2021. PDMR 16:V132.

Ozer, N., Köycü, N.D., 1998. Evaluation of seed treatments for controlling *Aspergillus niger* and *Fusarium oxysporum* on onion seed. Phytopath. Medit. 37:33-40.

Patón, L. G., Marrero, M. D. R., and Llamas, D. P. 2017. In vitro and field efficacy of three fungicides against Fusarium bulb rot of garlic. Eur. J. Plant Pathol. 148:321-328.

Schwartz, H. F. 1986. Soil fumigation effects upon onion diseases and onion yields in Colorado, 1985. Fung. & Nemat. Tests 41:57.

Schwartz, H. F., and Mohan, S. K. 2008. Compendium of Onion and Garlic Diseases and Pests, 2nd Edition. American Phytopathological Society, St. Paul.

Sumner, D. R., Gitaitis, R. D., Gay, J. D., Smittle, D. A., Maw, B. W., Tollner, E. W., and Hung, Y. C. 1997. Control of soilborne pathogenic fungi in fields of sweet onion. Plant Dis. 81:885-891.

Swift, C. E. 2001. *Fusarium oxysporum* f. sp. *cepae*, the causal agent of Fusarium basal rot of onion: Biology, epidemiology and management. PhD thesis. Colorado State University, Fort Collins.

Thornton, M., Portenier, R., and Morgan, O. 2023. Suppression of pink root symptoms with drip application of fungicides. Poster presented at National Allium Res. Conf., 30 Nov.-2 Dec. 2023, San Antonio, TX.

United States Department of Agriculture National Agricultural Statistics Service.

Who certified this budget for accuracy?

Name: Susan Kendall Title: WSU CAHNRS Grants & Contracts Lead

Email: susan.kendall@wsu.edu

☒ *Accurate Table 1 Calculations* ☒ *Accurate Table 2 Calculations*

☒ *Table 1 Totals = Table 2 Totals* ☒ *Totals = Funding Totals on Application Form*

TOTAL PROJECTED [ESTIMATED] EXPENDITURES:

TABLE 1	WCIPM Request	FUND CONTRIBUTIONS			TOTAL
		Cash (CBORC)	In-kind	In-kind Time	
Salaries[1]	$7,026	$5,695	$0	$0	$12,721
Benefits	$0	$2,630	$0	$0	$2,630
Temp/Hourly Workers	$0	$0	$0	$0	$0
Travel[2]	$2,500	$500	$0	$0	$3,000
Equipment[3]	$0	$0	$0	$0	$0
Other[4]	$0	$700	$0	$0	$700
TOTAL	$9,526	$9,525	$0	$0	$19,051

[1] WCIPM: 1 month of salary Michael Gordon, Scientific Assistant Sr. for du Toit's program ($7,026). CBORC: 1 month of salary for Ashley Spralding in Waters' program ($3,811) + 0.49 months of salary for Levi Allen in Waters' program ($1,884). Benefits for Spralding (43.8% = $1,669) and Allen (51.0% = $961) covered by CBORC.

[2] WCIPM: 3-4 trips for du Toit's program between Mount Vernon and field trial sites in Columbia Basin (2-4 sites, ~700 miles for each of 4 trips, including an overnight stay each time for 2 people) = $2,500. CBORC: Fuel for Waters' program to travel between Pasco and trial sites = $500.

[3] Not applicable.

[4] General supplies for 4 large field trials (fungicides, stakes, flags, shovels, etc. for setting up plots, digging and rating plants, yield assessment, etc.).

PROJECTED [ESTIMATED] EXPENDITURES BY QUARTER:

TABLE 2	*2025 Q1 (Jan-Mar)*	*2025 Q2 (Apr-Jun)*	*2025 Q3 (Jul-Sep)*	*2025 Q4 (Oct-Dec)*	*2026 Q1 (Jan-Mar)*	*2026 Q2 (Apr-Jun)*
WCIPM Funds	$0	$1,000	$7,526	$1,000	$0	$0
Fund Contributions	$200	$200	$8,125	$1,000	$0	$0
TOTAL	$200	$1,200	$15,651	$2,000	$0	$0

Has this project been funded previously by WCIPM? ☐ YES ☒ NO

↳ **IF YES:** What was the WCIPM Project #:

↳ **IF YES:** For how long and with what progress? *(Summarize in less than 200 words)*