Management of mefenoxam-resistant isolates of *Pythium ultimum* causing pythium leak on potato in the Pacific Northwest.

Phillip S. Wharton¹, Isela Carrillo, Lyndon Porter², Kenneth Frost³ and Phil Hamm²

¹University of Idaho, Aberdeen, ID, ²USDA-ARS, Prosser, WA, ³Oregon State University, Hermiston, OR.

Introduction

Mefenoxam is a highly effective, systemic fungicide used to manage oomycete pathogens on potato such as *Phytophthora infestans* (late blight), *P. erythroseptica* (pink rot) and *Pythium ultimum* (pythium leak). Resistance to mefenoxam has developed in *P. infestans* in all potato growing regions of the U.S., and is becoming more common in *P. erythroseptica*. In a 2006 survey, many fields in the Columbia Basin region of Oregon and Washington were found to have mefenoxam-resistant isolates of *P. ultimum*. The percentage of resistant isolates to sensitive isolates for these fields ranged from 0 to 92.5%. Despite the risk of resistance and the cost of mefenoxam, it is still widely used in potato production in the Pacific Northwest (PNW) due to its efficacy in managing pythium leak and the lack of alternative compounds that are as effective. In the PNW, pythium leak is most often seen at harvest or during storage. However, in recent years, particularly in fields with high levels of resistance, extensive damage has been found weeks ahead of harvest, suggesting a higher disease risk for resistant isolates than sensitive *P. ultimum* isolates. In this study, a field survey was undertaken to evaluate the extent and persistence of mefenoxam resistance in populations of *Pythium* in the PNW and determine potential alternative fungicides that can be used for the control of mefenoxam resistant *P. ultimum* isolates.

Materials and Methods

- Replicated field trials with cv. Ranger Russet were established at Aberdeen R&E Center, ID and Paterson, WA.
- Potato foliage was treated with fungicides commonly used to control Pythium leak and pink rot, along with several new chemistries (Fig. 3).
- At grading, tubers were rated for the presence of Pythium leak in the harvested potatoes.
- A subsample of tubers from each treatment was challenge inoculated with isolates of Pythium and placed in storage at 12 °C for two weeks. Tubers were then rated for Pythium leak incidence and severity (Fig. 3).
- For challenge inoculation studies at Aberdeen, tubers were inoculated by immersion in a *P. ultimum* suspension (Fig. 2). For challenge inoculation studies at Hermiston, tubers were infected by wound-inoculation.
- Soil was collected from 100 fields across the PNW, and tested for the presence of mefenoxam-resistant *P. ultimum* isolates using the poison agar method and 5 ppm of Ridomil. In Oregon, the 23 fields that were found to be infested with mefenoxam-resistant *P. ultimum* isolates in 2006 were selected plus 23 new fields. In Washington and ID, 35 and 20 fields respectively, were sampled.

Results and Conclusions

- In Oregon, 18 of the 23 potato fields that tested positive for mefenoxam-resistant *P. ultimum* in the 2006 study were negative for mefenoxam resistance in this study.
- However, 9 of the 23 fields that were negative for mefenoxam resistance in 2006 tested positive in this study.
- Not all soil samples from Idaho and Washington have been tested yet. However, of the 9 out of 20 Idaho fields so far tested, none have had mefenoxam-resistant isolates.
- These results show that development of mefenoxam-resistant Pythium populations in potato fields in Oregon continues to be a problem.
- However, it also shows that with the correct management it is possible to reduce or eliminate mefenoxam-resistant populations of *P. ultimum* from potato fields.

Results and Conclusions

- In the field trial at Paterson, WA, a tuber rot rating for *P. ultimum* was not carried out at grading. Tubers were rated after challenge inoculation only. None of the treatments significantly reduced the incidence of infection or disease severity compared to the control (Fig. 4).
- Wound inoculation may be too severe for these products to be successful.