

# Plant Pathology Seminar Series

## ***Rpt5*, *Rpg1*, and *rpg4/5*: Characterizing Broad Resistance against Important Necrotrophic and Biotrophic Fungal Pathogens of Barley**

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### **Abstract**

Two pathogens that threaten barley production worldwide are the necrotrophic fungal pathogen *Pyrenophora teres* f. *teres* (the causal agent of net form net blotch) and the biotrophic fungal pathogen *Puccinia graminis* f. sp. *tritici* (the cause agent of wheat stem rust). Net form net blotch resistance/susceptibility is complex, but the broadest and most effective resistance is provided by the *Rpt5* gene which has been deployed in important barley producing regions worldwide. *Rpt5* was effective against all known isolates of *P. teres* f. *teres* until the recent emergence of Moroccan and Canadian isolates with virulence on *Rpt5*. Stem rust resistance in North American barley has primarily relied on a single source of resistance, but *rpg4/5* has recently been deployed to address North American isolates with virulence on *Rpg1*. Alarming, the recent characterization of stem rust populations from Washington determined that 99% of the isolates were virulent on *Rpg1*, 16% were virulent on *rpg4/5*, and 10% were virulent on both genes when stacked together. This was the first report of *P. graminis* f. sp. *tritici* races or isolates that were virulent on both *R*-genes when stacked together, representing the most virulent *Pgt* population on barley from across the globe. In this talk I will present our research to identify and characterize these important barley resistance genes and the pathogen effectors that interact with them. An interesting point of discussion is how and why these virulent pathogen populations arose. It is understandable for *Rpt5* virulence as the gene was deployed over large acreage under heavy disease pressure. However, for the PNW *Rpg1-rpg4/5* virulence it is a mystery as neither gene was deployed in PNW barley varieties.

