Plant Pathology Seminar Series

Seed Transmission of *Pseudomonas syringae* pv. *aptata*, and Efficacy of Bactericides for Control of the Pathogen in Beet and Swiss Chard Seed Production

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M.S. in Agriculture, Exit Seminar

Bacterial leaf spot (BLS), caused by *Pseudomonas syringae* pv. *aptata* (*Psa*), is an economically important disease in beet and Swiss chard production. *Psa* is a splash-dispersed, seedborne, and seed-transmitted pathogen, and BLS is favored by cool and moist conditions. *Psa* can spread quickly, resulting in major crop losses, and can persist on infected host plant residues, volunteer plants, and on some weed hosts[1,2,3,4]. Recent multilocus sequence analysis (MLSA) using four housekeeping genes suggested there may be multiple *P. syringae* pathovars responsible for causing BLS on beet and chard, complicating efforts to control this disease[5]. The economic impact of BLS has increased with expansion of baby leaf beet and chard production because of the use of dense plantings (>7 million seed/ha), overhead irrigation, and sequential plantings. Baby leaf production also has increased the demand for seed. Management practices for BLS are limited, e.g., disinfection of *Psa*-infected seed lots, use of drip irrigation (where feasible, but impractical for baby leaf crops), selection of planting sites, and foliar applications of copper bactericides. Disinfection of seed is costly, and currently there are only proprietary methods of seed treatment. Copper bactericides are not systemic or curative, and have limited efficacy, including a risk of pathogen populations developing tolerance to copper[6,7,8]. More cost-effective and efficacious methods to control this pathogen are desired by seed production companies and growers. This study evaluated: i) thresholds for seedborne *Psa* that result in development of BLS in baby leaf beet and chard crops, ii) the duration of survival of *Psa* in beet and chard seed, and iii) the efficacy of foliar applications of various bactericides for control of BLS in seed crops. Four baby leaf field trials planted with seed naturally infected at a range of concentrations of *Psa* revealed the threshold for seedborne *Psa* that resulted in ≥5% severity of BLS (a threshold commonly used by processors to determine marketability of baby leaf crops) ranged from 0 to ~6 x 10^4 CFU/g seed, depending on environmental conditions. The threshold of 0 CFU/g seed in one trial resulted from rapid secondary spread of the pathogen during windy, wet conditions from plots planted with infected seed. Recovery of seedborne *Psa* in naturally infected beet (n = 3) and chard (n = 3) seed lots tested at 3-month intervals after harvest of the seed crops revealed the amount of seedborne *Psa* (log_{10}CFU)/g seed) declined by 0.07 to 0.19 X (number of months of storage). Therefore, storing seed for 12 to 24 months may be a viable option to reduce *Psa* to negligible levels prior to selling the seed, depending on the infection level at harvest. Of ten bactericides evaluated in five chard seed crop field trials, none reduced severity of BLS symptoms or *Psa* infection levels of the harvested seed, except ManKocide in only one trial with moderate BLS severity. The nature of the field trials, with differences in BLS severity among trials (years), and weather-determined variation in timing of bactericide applications and *Psa* inoculation, may account for some of the lack of efficacy of bactericides that were moderately effective in *in vitro* and greenhouse studies[9,10]. However, the results reflect similar lack of efficacy of most bactericides evaluated in field trials for various bacterial foliar diseases. Further research on seed treatments and bactericides is needed to facilitate effective management of *Psa* in beet and chard seed crop and vegetative crop production.

4:10 pm **| November 13, 2023** | Plant Pathology 515 2023-Fall Seminar Series | **Clark Hall 149**
Zoom Link: https://wsu.zoom.us/j/95102610389?pwd=ZXY3ckVSdlpSb2lvSXJYeGg1akpzZz09
Meeting ID: 951 0261 0389 **Passcode:** 4417 **Call in number:** 1 646 558 8656

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Select References

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