FIELD-BASED EVALUATION OF PST INTERACTIONS WITH CANADA THISTLE IN NON-DISTURBED SITES. Ryan P. Tichich and Jerry D. Doll, Graduate Research Assistant and Professor, Department of Agronomy, University of Wisconsin, 1575 Linden Drive, Madison, WI 53706.

Canada thistle's perennial membership on the noxious weed lists of many states testifies to it's resilience against conventional control tactics. This holds especially true in non-disturbed sites, where there are limited management tools. In addition, few of these tools are effective in the long run and those that are have a high cost and are often not justifiable in these systems. However, non-disturbed sites are more suitable for biological control agents than annual cropping systems as complete control is not required in the short term and if the agent can curtail the spread of the pest it can be considered successful.

PST (*Pseudomonas syringae* pv. *tagetis*), a bacterium that infects many plants in the *Asteraceae,* is pathogenic to C. thistle. Research has demonstrated the higher the PST population on the leaf surface, the higher the infection probability. Multiple applications at high bacterial concentrations control C. thistle because the PST population is kept artificially high for an extended period of time. As these treatments are costly, this strategy has not been developed commercially. Our research explores a new technique to spread the bacterium by harvesting naturally infected thistles, extracting their sap, and mixing it into a spray solution with an organosilicone surfactant. Specifically, 65 grams of naturally infected C. thistle shoots were blended into a liter of water, the solution was filtered, Silwet (L-77) was added at 0.3% v/v, and the solution was applied via a backpack sprayer fitted with extended range flat fan nozzles. A preliminary study with this method suggested that the spreading of the whole "system" instead of just the bacteria favors the infection process. Field trials were conducted in 2001 and 2002 to further test this strategy by evaluating the concentration of sap, spray volume, number and timing of the applications into the PST/C. thistle system. We measured disease incidence, disease severity, and growth inhibition of treated plants.

PST concentration and spray volume did not significantly impact the level of disease observed. This suggests that PST applications could be practical at the field scale, as a single application can cause infection. However, multiple applications proved to be beneficial as four consecutive weekly applications provided more infection than one or two applications. Applications in mid July achieved optimal infection (versus mid June or mid August)

Research by microbial ecologists on a different P. *syringae*S pathovar (pv. *syringae*) demonstrated that raindrop momentum was correlated with population explosions. It is seems reasonable to apply this concept to the PST/C. thistle system. Correlating results of these experiments to rainfall events during the 2001 and 2002 growing seasons reveals that treatments which were successful (July 15 and four applications) applications were followed by a rain within 10 days. Less successful applications occurred during extended dry periods.

For PST to become a more effective biocontrol agent, levels of disease incidence must be increased. Manipulating inputs into the PST/C. thistle system seems to have limited effects success in achieving this output. We need an increased understanding of the "black box" of the interaction between PST and the C. thistle leaf surface to increase disease incidence. Specifically, we need to identify additional PST population promoting factors (such as rain events). We also need to determine what factors constrain the PST population on the leaf surface, and to develop methods to manipulate them to support a higher population.

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