TEXAS A&M AGRILIFE RESEARCH

INSECT VECTOR BIOLOGY RESEARCH PROGRAM

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RESEARCH

POTATO PSYLLID MONITORING PROGRAM

Figure 1. Zebra chip disease symptoms in tubers

Zebra chip (ZC) has been the most economically damaging disease for potato producers in Texas since 2000 (**Fig. 1**). ZC is caused by the fastidious bacterium "*Candidatus* Liberibacter solanacearum" (Lso) which is vectored by the potato psyllid, *Bactericera cockerelli*. A statewide potato psyllid–monitoring survey was established in the mid-2000s to quantify the numbers of psyllids that were present in potato farmers' fields, and the percentage that were carrying the pathogen. In 2013, a ZC diagnostic lab was established in Amarillo, Texas, to monitor incidence of Lso in psyllid populations and to determine haplotype of Lso from positive psyllids and also psyllid haplotype. The potato psyllid–monitoring program continues in Texas, as does research activities associated with psyllid and pathogen haplotyping.

SCREENING OF NEW AND CURRENT INSECTICIDE CHEMISTRIES FOR EFFICACY AGAINST THE POTATO PSYLLID

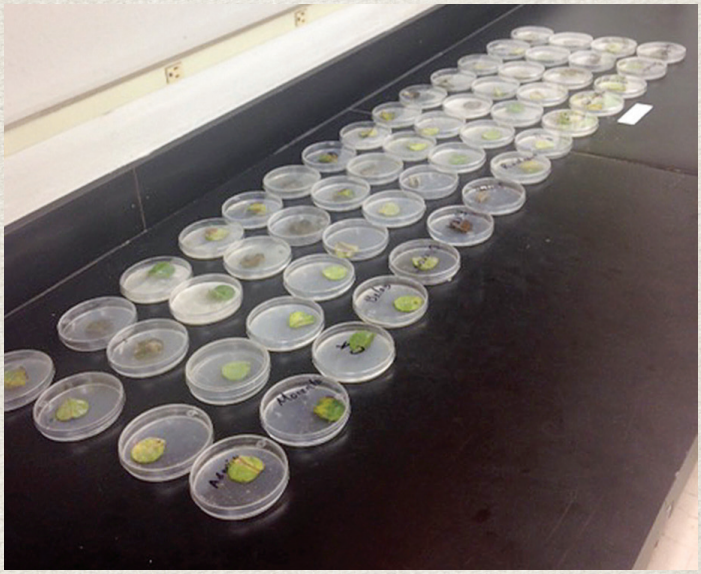

Figure 2. Laboratory screening assays

ZC disease has been very costly to manage in potato crops and has caused millions of dollars in losses to the potato industry, particularly in Texas. It is critical for growers to know which insecticides are more effective in controlling the insect vector, *B. cockerelli*, and which insecticide rotations manage insect resistance and reduce total applications per season. Furthermore, it is essential for growers to have access to an insecticide guide to assist them in making timely decisions and to prevent economic losses. Our research focuses on the following:

1. Evaluating the knock-out effect and longevity of currently used and new commercially available insecticides against *B. cockerelli* under laboratory conditions.
2. Utilizing the most promising insecticides from laboratory studies (**Fig. 2**) to determine the most effective combinations in field trials.
3. Preparing a Texas potato insecticide guide from results obtained from these trials.

DEVELOPMENT AND EVALUATION OF INTEGRATED INSECT VECTOR DISEASE MANAGEMENT STRATEGIES TO IMPROVE VEGETABLE PRODUCTION IN SOUTH TEXAS

Figure 3. Insect pest monitoring in three different production systems: open field (A), net-house (B), and greenhouse (C)

Our research team is part of an interdisciplinary research group that focuses on the evaluation of covered structures as physical and seasonal barriers against insect-transmitted diseases in tomato production. Our main goal is to monitor for pests in three production systems: greenhouse, net-house, and open field (**Fig. 3**). An additional study to evaluate planting dates and mulch cover to extend the tomato production season in South Texas is being carried out, where our team is also monitoring for pests in these fields.

Figure 4. *Aedes aegypti* mosquito, which transmits Zika, Dengue, and Chikungunya

MOSQUITO RESEARCH

Collaboration between private and public organizations has been established to conduct an integrated vector-human biosurveillance of high-consequence transboundary infectious diseases transmitted by mosquitoes, including the arboviruses: Zika, Dengue, Chikungunya, and West Nile. Our research team is directly involved in setting mosquito traps, sorting through the mosquito specimens, and identifying vector species that will be used for molecular tests by our collaborators to determine the presence of arboviruses in these mosquitoes collected in the United States.

INSECTICIDE EFFICACY TRIALS

Figure 5. Tomato efficacy trial in the greenhouse

Our research team conducts efficacy evaluation experiments of current, improved, and experimental active ingredients of chemical and organic insecticides sponsored by agrochemical companies. The experiments are conducted in laboratory, greenhouse, and field conditions for vegetable (**Fig. 5**) and row crops.

EXTENDING CURRENT CAPABILITIES AND EXPERTISE TO DEVELOP NOVEL STRATEGIES TO CONTROL INSECT-TRANSMITTED DISEASES

Genomics, transcriptomics, proteomics, and functional genomics tools will be used to better understand the intrinsic interactions between insect vectors and the pathogens they transmit. This basic knowledge is expected to aid in the development of novel strategies to control insect-transmitted diseases in the Lower Rio Grande Valley in Texas.

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