Title: Identification of Viruses in Blackberry Yellow Vein Disease Complex

Progress Report

SRSFC Project #2010-03

Research Proposal

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Objectives:

The objectives of this project are: (1) Conduct field surveys with extension agents to collect plant material with virus symptoms; (2) Test plant material at NC State University by RT-PCR and dsRNA using primers and protocols developed at the University of Arkansas and USDA-ARS, Corvallis to determine virus combinations in blackberry yellow vein disease (BYVD) complex in blackberry plantings; and (3) Communicate results to researchers, extension agents, growers and others through publications, workshops, presentations and field days.

Justification:

Virus and virus-like diseases have an enormous impact on blackberry production throughout the world. Virus complexes have emerged in blackberry in southeastern U.S. in recent years and have led to reduced yield, poor fruit quality and reduced lifespan of blackberry plantings. In recent years more than half a dozen new viruses have been characterized and the majority have been found in blackberry in association with Blackberry Yellow Vein Disease (BYVD) and in mixed infections with Blackberry yellow vein associated virus. Viruses are responsible for many of the special management methods used by nurseries to provide growers with planting stocks from virus-tested sources. However, fast spread of viruses from wild blackberries and other

hosts into new plantings established with virus-tested stocks has raised multiple questions including what viruses and virus complexes are infecting plants in different regions, what are the vectors and alternate hosts, and what cultural practices should be applied to reduce virus spread, and extend lifespan and productivity of plantings. In order to determine the most common viruses and combinations in North Carolina, surveys were conducted in 2010 in blackberry plantings at the Cunningham Research Station in Kinston (Lenoir County), and with extension agents Kevin Starr in Lincoln County (5 growers), and Sue Colucci and Marvin Owings in Henderson County (8 growers).

Methodologies:

In each blackberry planting leaves with virus-like symptoms were collected from individual plants, placed in Ziplock bags and kept in the cooler. Plants from which leaves were collected were marked with flags and numbered. The next day bags with samples were placed in the freezer at -80 C in the lab at NCSU. Total number of samples collected per location: 10 in Lenoir County, 29 in Lincoln County, and 33 in Henderson County. These samples are currently being tested for viruses by reverse transcription-polymerase chain reaction (RT-PCR) and ELISA. Tests are performed for BYVaV, Tobacco ringspot virus (TRSV), Beet pseudo-yellows virus (BPYV), Blackberry virus Y (BVY), Blackberry virus X (BVX), Blackberry chlorotic ringspot virus (BCRV), and Impatiens necrotic spot virus (INSV). Protocol for RNA extraction and virus primers were developed at the University of Arkansas and USDA-ARS, Corvallis.

Results:

Samples from all three locations are being processed in the laboratory at NCSU, and examples of viruses and virus complexes detected in various blackberry cultivars and symptoms associated with these viruses are shown in Fig. 1-7.

Conclusions:

Testing of all samples needs to be completed to meet the goals of this project.

Impact Statement:

The impact to date is small and we will know more over the next year about viruses involved in BYVD complex as we continue to test plant material and identify viruses.

Fig 1. Arapaho infected with BYVaV, BCRV, BVX and TRSV.

Fig. 2. Chickasaw infected with BYVaV.

Fig. 3. Kiowa infected with BCRV and INSV.

Fig. 4. Kiowa infected with TRSV.

Fig. 5. Triple Crown infected with TRSV.

Fig. 6. Ouachita infected with TRSV.

Fig. 7. Natchez infected with BCRV.