

PROGRESS REPORT TO THE SOUTHERN REGION SMALL FRUIT CONSORTIUM 2003

On research titled:

The abatement of emerging epidemic in cultivated blackberry Phase 2: refinement of virus detection protocol, development of protocols for propagation of clean nursery plants and establishment of field trials for evaluation of alternate cultural, biological or chemical systems for control of virus infection and spread.

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Objectives: This project is part of a multi-institutional project, involving North Carolina State University (NCSU), University of Arkansas, Clemson University, USDA-ARS Corvallis, Oregon, and the USDA-ARS at Poplarville, Mississippi. Funding was requested from the SRSFC to help achieve the following objectives to be carried out at NCSU: 1) to determine seasonal distribution of *Tobacco Ringspot Virus* (TRSV), *Tomato Ringspot Virus* (ToRSV), and *Impatiens Necrotic Spot Virus* (INSV) in blackberry plant tissues; 2) to develop protocols for production of micropropagated virus-tested and disease- and pest-free certified planting stocks and; 3) to evaluate the feasibility of alternate pesticides, cultural and biological practices for the management of virus vectors (i.e. thrips, nematodes).

Justification and Description

See proposal.

Methodologies and Results

Objective 1. Methods: Seasonal and spatial distribution of viruses. During the 2003 growing season we collected tissue samples from 14 symptomatic blackberry plants at the Cunningham Research Station in Kinston, NC. Samples were collected approximately every two weeks from April until August from Arapaho, Apache, Chickasaw, Chesapeake, Triple Crown and Navaho cultivars. Roots, most recent fully expanded primocane leaves, and leaves from the top, middle and bottom portion of the floricanes were collected and taken back to the lab for ELISA tests. We tested all samples for TRSV, ToRSV, TSV, RBDV, INSV and TSWV. We hypothesized that virus titre was highest in the spring before the plant began to fruit and temperatures were still moderate. We also thought that root tissues may be best for sampling because of their perennial nature. *Results:* Although no clear patterns have emerged, this is what we have found out so far: 1) All 14 plants had 2 or more viruses. Six plants had 2 viruses, three plants had 3 viruses and 5 plants had 4 viruses, 2) INSV and ToRSV were present in all the plants, TRSV was in 7 plants and RBDV was in 5 plants, 3) the viruses were detected in 8/14, 5/14, 9/14, 6/14, 12/14, 11/14, 9/14, 3/14 and 7/14 plants on the 1st through 9th sampling dates, respectively, and 4) virus was detected in roots of all 14 plants, in primocane leaves of 8/14 plants, in the upper third, middle and lower portion of floricanes in 11/14, 13/14 and 10/14 plants. Perhaps, the most perplexing finding is for each virus and cultivar, the date and plant

part with the highest level of detectable virus varied. This test needs to be repeated to verify these initial findings.

Objective 2. Protocols for micropropagation of blackberry plants. Protocols have been established and a written copy of them is available through the NCSU MPU. These protocols were developed as a part of the M.S. requirements for Tania Guzman, former graduate student of G. Fernandez. An operations manual for the production of micropropagated-certified planting stock is being developed as well by MPU personnel. Certification standards were developed by NC Crop Improvement Association, Inc. As a result, one certified nursery was established in North Carolina in 2003. They sell plants produced strictly in greenhouse and screenhouse to avoid transmission of viruses to these clean plants by vectors in the field.

Objective 3. Establishment of test plantings for present and future tests. A trial of NC certified plants was established for cultural trials at the Cunningham Research Station in Kinston, NC. Ground was fumigated with 67:33 methyl bromide chloropicrin, and covered with plastic to minimize nematode, disease and weeds. Trellis material was purchased and trellises will be complete by March 2004 when plants will be set. This trial will serve several purposes. One will be to observe trueness-to-type of material from the NCSU MPU. In addition we will be surveying this and an adjacent planting for thrips incidence in the 2004 growing season. Thrips are thought to be the major vector of INSV. We will also test the long term efficacy of the product NoGall on newly set planting stock in this trial. Crown gall has been a major problem at this site in the past. Finally, a portion of this trial will be available for research needs in the future.

Conclusions and Impacts

We continue to build our knowledge on aspects of blackberry production for the region. Virus seasonal and spatial distribution of viruses appears to be highly variable. This will continue to make identification of viruses difficult. In collaboration with the USDA, we have identified a new blackberry virus Blackberry Yellow Vein Virus (BYVV) (Tzanetakis et al. 2003). This was detected in blackberry plantings in NC, SC and Arkansas. This new virus may be contributing to the quagmire that currently exists in ID of viruses in blackberry. In 2003, the first commercial certified nursery was established in N.C. To our knowledge NC is the only state with a certification program for blackberry nurseries and this is the only nursery in the SEUS that sells certified virus indexed plant material. This certification program should help to ensure the long term viability of the blackberry industry in the SEUS.

Publications relating to this funding

Guzman, T.L. 2003. Incidence, Distribution, and Symptom Description of Viruses in Cultivated Blackberry (*Rubus* subgenus *Eubatus*) in the Southeastern United States. M.S. Thesis. North Carolina State University.

Pesic-VanEsbroeck, Z. 2003. Virus diseases of blackberry and strategies for their control. North American Bramble Growers Annual Proceedings, 18th Annual Conference. Feb 7-8 Leesburg, VA.

Tzanetakis I.E., R. Gergerich, G. Fernandez, Z. Pesic, and R. R. Martin. 2003. A crinivirus associated with a chlorotic line pattern in blackberry. *Phytopathology*. 93:S85.