



## Management of Virus Diseases of Fruit and Vegetable Crops

### **Program Leader:**

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### **Program Objectives:**

Devise and improve virus disease management strategies in fruit and vegetable crops by:

- identifying and characterizing emerging viruses
- assisting growers in the diagnosis of virus diseases
- contributing to eradication and certification programs

Extend information on virus disease identification and management to extension educators, growers, students, service providers, and regulators

Assist the adoption of efficient, environmentally friendly, and economically sound crop protection approaches



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### **Program Summary:**

Viruses can seriously impact the production of fruits and vegetables by affecting vigor, reducing yield, and altering quality. The extension component of the Fuchs' program is designed to support the thriving fruit and vegetable industries in New York by increasing the abilities of producers to protect their crop and manage virus diseases that limit profitability and preclude sustainable production.

The program focuses on 1) the diagnostics of virus diseases with a major emphasis on emerging viruses, 2) eradication and certification programs in conjunction with the New York State Department of Agriculture and Markets and USDA-APHIS, 3) the development and implementation of innovative management strategies, and 4) the education and training of extension personnel, growers, students, agriculture service providers, and regulators. Applied research is carried out to provide information that will serve as a solid foundation for the identification of the causal agents of new diseases, the development of improved diagnostic methodologies, and the translation of discoveries on virus-host or virus-vector interactions for enhanced approaches to protect crop plants.

Major goals of the program are to assist growers in the diagnosis of virus diseases, to characterize emerging viruses through extensive surveys done in close collaboration with extension specialists and growers, and to guide the grower's decision process for the selection of virus disease management strategies that are efficient, economical, and based on environmental stewardship.



Leafroll disease on *Vitis vinifera* cv. Cabernet franc in a Finger Lakes vineyard

### **Program Justification:**

Fruits and vegetables are important components of New York State's agriculture and there is a recognized need for high quality and sustainable production of these crops.

Leafroll, decline, yellowing and mosaic are important virus diseases of grapevines, blueberries, tree fruits, onions, beans and cucurbits.

These diseases affect yield and fruit quality, as well as the lifespan of infected plants. No cure is available for these diseases in the field.

There is a need for the development of efficient management strategies based on improved diagnostics, identification of virus-tested, clean sources of planting material and seeds, and educational efforts.

### **Impact to Industry:**

- Surveys indicated a widespread distribution and high prevalence of leafroll viruses in Finger Lakes vineyards and their transmission by grapevine mealybugs. Leafroll disease reduces yields, delays fruit ripening, reduces soluble solids by 1-4 Brix and increases titratable acidity by 1-3 units in fruit juice with an economic impact estimated to \$10,000-\$17,000 per acre over a 25-yr lifespan of a vineyard. This impact can be substantially reduced to \$1,000-\$9,000 through roguing if disease prevalence is moderate (1-25%) and replacement of entire vineyards if disease prevalence is higher than 25%. The use of vines derived from certified, virus-tested stocks in replant sites is the most economically viable option that keeps costs to \$750 per acre. Our findings and outreach activities to the industry have prompted growers to respond to the occurrence of leafroll disease by removing entire vineyard blocks, practicing roguing, and carefully selecting planting material.
- Virus-free, clean grapevines are produced in close collaboration with local nurseries by extensive indexing and virus elimination therapy.
- Surveys of highbush blueberry plantings raised awareness within the industry on the widespread occurrence of viruses, stressing the need for bushes of higher sanitary quality.
- *Iris yellow spot virus*, an emerging virus in onion, can be prevalent and weeds such as chicory, common burdock, curly dock, and dandelion, can serve as potential reservoirs.
- *Cucumber mosaic virus* remains a major threat to snap bean production and efforts to develop resistant cultivars are ongoing.
- Our testing and outreach activities contribute to the success of the eradication program of *Plum pox virus* in stone fruits in New York
- Educational materials (facts sheets and website) on virus diseases were created and published.

### **Program Team Members:**

Patricia Marsella-Herrick, Research Support Specialist

Rosemary Cox, Research Support Specialist

John Gottula, Graduate Student

Jonathan Oliver, former Graduate Student

Yen Mei Cheung, Technician

Dave MacUmber, Technician



Mosaic symptoms on *Phaseolus vulgaris* cv. Hystyle in the Finger Lakes region