

## VIRUS-INDEXED PRODUCTION OF RASPBERRIES AND GRAPES

HENRY A. WELLER

Congdon & Weller Wholesale Nursery, Inc.  
North Collins, New York 14111

The introduction of virus-indexed registered red, black, and purple raspberry and virus-indexed registered grape production was created because of a very definite need to improve a decreasing quality level, a quality level concerning both vegetative growth and fruiting. Our red raspberry virus-indexed registered program got underway in 1964.

The procedures are all rather basic; red and black raspberries both wild and cultivated, are very susceptible to a number of viruses. Some viruses are present in plants without producing visible symptoms and in this case, can only be detected by transmitting them to sensitive indicator plants. The cultivar, Henry, is commonly used as a test plant. Viruses are very detrimental to cultivated stock. From a point of economics we are concerned with four diseases; raspberry mosaic, leaf curl, streak, and crumbly berry.

Viral symptoms affect new cane growth in early summer when temperatures are still low. Foliage becomes mottled with light yellowish-green spots and with some cultivars a definite blistering occurs; leaves are usually smaller and cupped. General deterioration becomes more evident with age and with each year's growth dwarfing becomes progressively pronounced. The fruit on plants infected for more than 1 yr becomes very dry, seedy and quite tasteless.

The spread of mosaic concerns a vector identified as *Amphorophora agathonica* Hottes. Leaf curl is spread by the aphid, *Aphis rubicola*. This disease can reduce fruiting yields by as much as 40%. Streak virus brings about a stunting of growth and affects fruiting appearance and size. The specific vector concerning streak has not been identified, but it is acknowledged to be an insect. Crumbly berry is a disease of red raspberry caused by a strain of the tomato ringspot virus which infects a wide range of woody and herbaceous plants. The fruit becomes crumbly and tends to fall apart when handled. The tomato ringspot virus is transmitted by the dagger nematode (*Xiphinema americanum*). This vector is found in soils all across New York.

The control of virus diseases involves the following steps:

1. Plant nursery stock originating from virus-indexed stock.
2. Isolate the new plantings from old plantings and any wild brambles; recommendations suggest up to 1,000 ft of isolation from wild brambles.

3. Keep red and purple raspberry plantings isolated.
4. Rogue raspberry plantings twice a year, preferably in June and August.
5. Establish a preventive insecticide spray program that restricts the build-up of aphids. Fumigation of soil is included where there is evidence of the dagger nematode.

Propagation of red raspberry is comparatively simple. The usual routine is by suckers which arise from the ground. Plants are cut back the beginning of the second year and dug at the end of that year. The suckers are cut free from the mother plant and if grown under good conditions, can yield as many as 15 new plants each. The caliper of canes and the amount of root determines saleability. Generally two grades are sold: A#1 S grade, 3/16" in cane caliper and a transplant grade, at least 1/4" in cane caliper. The root system must be in balance with top growth.

Nuclear stock, meaning new stock, is acquired from the U.S.D.A. located in Beltsville, Md. It is planted in a screenhouse of 100 mesh plastic which restricts aphid flight. Our screenhouse for red raspberry cultivars now measures 50 x 500 ft. Stock from the screenhouse is planted in an isolated, fumigated field with 1,000 ft of isolation from any other plantings including wild brambles. A spray program is incorporated to prevent any aphid population build-up. After 2 years in the field, the plants produced from screenhouse stock are dug and can be sold as Foundation I stock. Our program has been very successful and we now involve Foundation I and, after replanting and growing for 2 more years, we have Foundation II stock. These plants can be planted back and grown for 2 more years and sold as Registered stock. Plants grown from Registered stock are certified but make no reference to virus-free. It is recognized that, in most cases, this certified stock is still better in terms of being virus-free than stock not having been subjected to the controls concerning a registered virus-free program.

Problems encountered include the isolation requirements. One thousand feet of isolation from any wild bramble is difficult to find in our area and forces us to eliminate wild brambles along hedge rows and adjoining fields by means of spraying. We've been using Ammate X with oil coupled with fumigation requirements, screenhouse requirements, and a preventative aphid spray program. All of these factors represent problems that no doubt would have discouraged us if it had not been for the excellent co-operative assistance we've received from the N.Y. State Agric. Dept. which in cooperation with the N.Y. State Dept. of Agric. and Markets has taken over the indexing program and we've been able to move along in a nicely regulated direction.

The registered program of growing black and purple raspberry

is the same as red raspberry. The propagation of black raspberry however, is different in that black and purple raspberry are propagated by means of tip-layering which we schedule for August or September. A well-drained loam or sandy loam is desirable. One-year old plants are preferred for tip-layering. Unbranched laterals of canes are selected as being ideal. Tips are perpendicularly inserted 3 to 4" below the soil surface, the soil firmed to keep the tips secure in the soil. This is still being done by hand, but we are attempting to develop means of tipping and harvesting mechanically.

Virus-free grape production is a completely different program involving its own rules and regulations. Historically, N.Y. vineyards have not been subjected to any critical reductions or crop yields and/or fruit qualities; however there has been an emphasis on planting premium vines namely, *Vitis vinifera* types and French hybrids. These cultivars are susceptible to virus infections and presently five virus diseases (tobacco mosaic, leafroll, fanleaf, tomato ringspot and tobacco ringspot) have been identified in N.Y. The nematode vector, *Xiphinema americanum*, is also present in grape production. Since 1968 there have been two outbreaks of grape vine decline; specifically, tomato ringspot virus and tobacco ringspot virus have been confirmed pointing out the fact that disease spread can be very rapid especially if adequate controls are not established. Recent surveys indicate commercial plantings of both *viniferas* and French hybrids showing disease at 1% levels. Symptoms vary from stunted shoots, mottled foliage, poorly developed fruit clusters attributed to poor pollination because of diseased pollen which causes poor fruit set. Due to the soil inhabiting nature of the virus affecting grape production and the vectors involved, control is very difficult to achieve. Real problems in established vineyards involve eradication of infected acreage, but in areas where new plantings are to be established, the soil can be fumigated to reduce the population level of nematode vectors.

Virus-free and resistant rootstocks appear to be the forthcoming approach and is presently under investigation at several state stations. In order to protect the industry which has been growing very rapidly, the N.Y. Dept. of Agric. and Markets promulgated rules and regulations for the production of virus-free grape plants. The program which is voluntary was adopted March 15, 1973. Objectives are: 1) to provide grape plant materials indexed free of known virus diseases, and 2) to assure trueness-to-cultivar type. Indexing in some cases involves chip-budding dormant accession buds into each of four woody indicators. In some cases, symptoms are identified only after 2 years of growth. This is a very detailed program dedicated to provide certification endorsed by all segments of the grape industry.

Unless yields of fruiting and quality further deteriorate, the program will only continue in a state of limbo. Fumigation required on a total acreage basis represents a tremendous cost to the grower. The lack of virus-indexed stock available and an industry that is out of balance in terms of production versus consumption are problems.

Production of many cultivars involves hardwood cuttings of the current year's wood. Cuttings of 8 to 15" in length, 3 buds or more, and pencil-size in caliper are ideal. Depending on the cultivar the hardwood cutting method is acceptable; however there are many cultivars requiring grafting to selected understocks which respond to adverse soil conditions even though climatic conditions are favorable.

The degree of success in rooting is determined to a great extent on the condition of the wood prior to processing for rooting. Cutting wood should be fully dormant and not left to dry out. Special care in making sure that the wood does not dry out is very critical; cutting wood generally is gathered in December and January. Other rooting methods include softwoods taken the middle of June and propagated under mist. This production usually requires potting after rooting in sand benches and holding in a temperature-controlled environment until the following spring at which time the cuttings can be planted to a permanent site. The usual procedure involves sticking hardwoods directly to a prepared field after all danger of frost. Field rooting is generally 50 to 60%. A great deal depends on cultivar as some respond at 80 to 90% rooting where as others respond only at a 15 to 25% level. Carbohydrate content and prior fruiting yields have been identified and correlated into usable evidence for predicting rooting responses.

CASE HOOGENDOORN: Instead of layering these raspberries can't you take softwood cuttings?

HENRY WELLER: We have attempted to root softwood cuttings under mist and at present are making a serious effort to develop a method that would give us a good percentage of take. To date we have not had much success by any of the methods we've tried, which include various hormones and timing throughout the summer period, extending well into the fall using semi-hardwood and hardwood cuttings.

#### **Thursday Afternoon, December 4, 1975**

The first portion of the afternoon's session was moderated by Hugh Steavenson and the second half was moderated by Dr. Paul Read.