15. Viral Resistant Stone Fruit

Plum pox virus is an aphid-borne virus that causes significant economic losses in stone fruits such as peaches, nectarines and plums. Leaves of infected trees may appear discolored and ringed or spotted, and fruit may be discolored and deformed. The most significant losses, however, are due to premature fruit drop, which may lead to loss of the entire crop. Plum pox is a limiting factor in stone fruit production in regions where it is found, including several countries in Europe and South America. There is no treatment or cure for plum pox, only methods to manage its spread and incidence. In areas where plum pox is established, management strategies include planting only certified disease-free plants, managing aphids that vector the virus with insecticides, and eliminating weeds that may be infected with the virus and serve as sources for continued spread. A major plum pox management strategy is to immediately remove trees that show symptoms.

In 1999, plum pox virus was detected in Pennsylvania, where more than 6,000 acres of stone fruit were in production. The state established a quarantine of the affected areas in order to prevent further spread to other stone fruit production areas within the state, in other states, and in Canada. The USDA declared plum pox a threat to the nation’s $2 billion stone fruit industry and established programs to monitor, quarantine and eradicate plum pox. The state of Pennsylvania has spent $5.1 million in eradication, which has included the destruction of approximately 900 commercial acres of infected and exposed trees, and farmer indemnity. Another $3 million has been pledged by the state and $18 million by the federal government for farmer compensation. An orchard that has been cleared for plum pox control may not be replanted with plum pox-susceptible plants for at least three years.

If eradication efforts fail and plum pox becomes established in Pennsylvania, and if containment efforts fail and plum pox spreads to other stone fruit regions, the best way to minimize losses to the disease is to plant resistant cultivars. Resistance would prevent the virus from replicating within infected trees and therefore reduce its survival, spread and incidence. The few sources of plum pox resistance that are found in stone fruit are difficult to incorporate into new commercial varieties because they are controlled by multiple genes. Through biotechnology, a transgenic plum variety has been developed with pathogen-derived plum pox resistance. Resistance in the transgenic cultivar is controlled by a single gene, potentially lending itself to incorporation into other stone fruit varieties through classical breeding techniques. In trials in Europe, the transgenic plum trees have remained virus free while all of the nontransgenic controls have developed plum pox symptoms.

Potential Impacts of Viral Resistant Transgenic Stone Fruit
Prevent loss of peach production in Pennsylvania, approximately 60 million pounds worth $17 million annually.

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An Analysis of 40 Case Studies by Leonard P. Gianessi Cressida S. Silvers, Sujatha Sankula and Janet Carpenter
National Center for Food and Agricultural Policy, June 2002.
Available at http://www.ncfap.org

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