1. **Viral Resistant Papaya**

Papaya ringspot virus (PRSV) is the most important disease of papayas worldwide. It can be lethal to seedlings, and older plants infected with PRSV suffer from reduced growth and reduced fruit set. Fruit that is produced is of poor quality, marred by circular dark green marks and degraded flavor. The virus is transmitted by aphids and affects a number of plants, many of which harbor the virus without showing symptoms. It takes one PRSV-carrying aphid a short time of feeding to infect a papaya plant. Consequently, insecticide applications are unsuccessful in managing PRSV because they do not eradicate the aphid or the virus. There is no cure for a PRSV-infected papaya, and no natural PRSV resistance has been found in the papaya genome. To manage the spread of PRSV, growers are advised to remove and destroy all plants suspected of having PRSV and all susceptible plants within the surrounding area.

In Hawaii, the only state in the U.S. to produce papaya, PRSV has limited 95% of the once expansive industry to a single region in the state, the Puna district on the island of Hawaii. In 1992, however, PRSV was detected in Puna papaya. By 1994, half the papaya acreage in Puna was infected with PRSV. Within five years, the entire district was infected with PRSV and Hawaii’s papaya production was almost halved.

Researchers at the University of Hawaii and at Cornell University have inserted a PRSV viral coat protein gene into an elite papaya cultivar. Through traditional crossbreeding of the transgenic papaya with other elite cultivars, two elite papaya varieties with pathogen-derived resistance to PRSV have been developed, one red-fleshed and one yellow-fleshed. Resistance to PRSV, and fruit and horticultural qualities were tested in field trials in the early 1990’s. With regulatory approval granted in 1997 and licensing agreements settled in 1998, the virus resistant seed was distributed free of charge to Hawaiian papaya growers in May of 1998. By 2000, approximately 53% of papaya acreage in Hawaii was planted with one of the PRSV-resistant cultivars and statewide production had increased by 33%. Transgenic papaya is being credited with saving the Hawaiian papaya industry.

**Potential Impacts of Viral Resistant Transgenic Papaya**

Prevent the loss of Hawaiian papaya industry, with 53 million pounds annual production and $17 million annual value.

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**Full Report:** *Plant Biotechnology: Current and Potential Impact For Improving Pest Management In U.S. Agriculture 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](http://www.ncfap.org)

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