

'UH Rainbow' Papaya

A High-Quality Hybrid with Genetically Engineered Disease Resistance

'UH Rainbow' papaya is a new hybrid variety developed by the College of Tropical Agriculture and Human Resources (CTAHR) of the University of Hawaii at Manoa. 'UH Rainbow' combines the superior quality typical of "solo" papayas with excellent resistance to a devastating virus disease—papaya ringspot virus (PRSV). This combination was accomplished through genetic engineering, one of the latest advances in agricultural biotechnology.

'UH Rainbow' is an F₁ (first generation) hybrid produced by crossing Hawaii's standard export variety, 'Kapoho', with the first genetically engineered papaya with resistance to PRSV, 'SunUp'. The resulting F₁ hybrid is an excellent source of vitamins A and C and is highly productive.



Questions and answers about genetic engineering

What is genetic engineering (GE)? Exchange of genetic information between individuals is normally restricted to members of the same biological species. Genetic engineering is a recent innovation in biology that allows the transfer of a trait, such as virus disease resistance, from one species into any other species. In the case of 'UH Rainbow', a gene that prevents papaya ringspot virus (PRSV) was found in the virus itself, and this was moved ("engineered") into a papaya plant, creating a PRSV-resistant variety.

Is GE risky? GE is a powerful tool for the manipulation of biological organisms and, as such, has great potential for constructive use as well as destructive abuse, depending upon human motivations.

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Appearance

Shape	pear-shaped (with short neck) to elliptical
Weight	range 1–2 lb, average 1.5 lb (650 g)
Flesh color	yellow-orange
Flesh thickness	1 inch

Taste panel evaluation

Taste	sweet (12–16% sugar) and pleasant
Texture	uniform and juicy
Aroma	mild

Nutritional value

	Percent of daily value*
Vitamin A (<i>trans</i> beta-carotene)	41%
Vitamin C	188%

*One serving = ½ papaya (220 g edible portion)

Ripening

Ready to eat when fruit is 70–90% yellow and yields slightly when squeezed.

Other characteristics

Seeds separate easily and cleanly from flesh. 'UH Rainbow' plants are highly resistant to papaya ringspot virus, a disease that has repeatedly threatened to destroy papaya production in Hawaii.

Is GE necessary? In some cases, Yes! Some problems, such as overcoming PRSV, cannot be solved without it. Without the genetically engineered 'UH Rainbow' variety, the entire papaya industry in Hawaii would be destroyed by the virus.

How can I be assured that GE food products are safe? Development of GE crops and foods is monitored by three federal regulatory agencies, including the U.S. Department of Agriculture, the Environmental Protection Agency, and the Food and Drug Administration. All three agencies have examined the development of 'UH Rainbow' from the perspectives of their mandated areas of concern and approved it as safe.

Why haven't I seen other GE fruits and vegetables in the market? GE is a new technology, and the 'UH Rainbow' papaya is the first GE fruit in the United States to be produced by university researchers. But more will be seen in markets as new varieties are approved.

Can I be infected with the PRSV virus by eating 'UH Rainbow' fruits? *No!* Plant viruses like PRSV cannot infect animals or humans, so there is no problem when people eat fruits and vegetables infected with plant vi-

ruses. Furthermore, the genetically engineered 'UH Rainbow' contains only a small part of the virus's genetic information, not the complete virus.

Does GE make 'UH Rainbow' better than other papayas? Yes! 'UH Rainbow' is a high-quality solo-type papaya very similar to 'Kapoho', which has been the standard variety in Hawaii, and around the world, for years. A large part of Hawaii's 'Kapoho' acreage has been destroyed recently by PRSV, a devastating virus disease of plants that ruins the quality of papayas. GE has made 'UH Rainbow' resistant to PRSV, thereby enabling local growers to continue to provide this delicious, nutritious fruit that many people identify with Hawaii—at an affordable price.

Can I grow 'UH Rainbow' at home with seeds from the fruit? No. Because 'UH Rainbow' is a *hybrid* variety, plants grown from seeds in the fruit will not have the same characteristics as the maternal plant, and they may not be resistant to PRSV. Small quantities of 'UH Rainbow' seed will soon be available for purchase from CTAHR; contact the UH Seed Increase and Distribution Program at (808) 956-7890.

*Richard M. Manshardt
Department of Horticulture*