



## Biotechnology Applications in Vegetables

TARGET BENEFIT	MECHANISM	COMMERCIAL STATUS
Reduced softening and postharvest decay resistance	Inhibit polygalacturonase, a softening related enzyme	FlavrSavr® entered retail markets in 1994. Achieved regulatory exemption status in 1996.
Delayed ripening	Block ethylene production in fruit.	Endless Summer entered retail markets in 1995. Achieved regulatory exemption status in 1996
Increased solids	Inhibit polygalacturonase activity during ripening	Tomato paste marketed in United Kingdom. Achieved regulatory exemption status in U.S. in 1996.
Increased sweetness	Increase fructose content of fruit	Demonstrated in model system. In development.
Pest resistance	Many strategies	In development and field trials or demonstrations
Virus resistance	Antisense inhibition of Mosaic Virus and Tomato Spotted Wilt Virus	In development
Downy Mildew, Corky Root, Mosaic Virus resistance	Marker Assisted Breeding tracks complex traits	In development
Reduced browning	Inhibit phenylalanine ammonium lyase (PAL)	Multigene family cloned and in development
Delayed ripening	Inhibit ethylene production in fruit	In development
Virus resistance <ul style="list-style-type: none"> <li>• Zucchini Yellow Mosaic</li> <li>• Watermelon Mosaic</li> <li>• Cucumber Mosaic</li> </ul>	Antisense inhibition or several other strategies	In field trials and demonstrations
Pest resistance Colorado Potato Beetle	Plant produces the Bt-toxin a protein product of the cryIIa gene from <i>Bacillus thuringiensis</i>	Commercial seed sales began in 1995. Regulatory exemption granted in 1996.
Virus Resistance <ul style="list-style-type: none"> <li>• Potato Virus Y</li> <li>• Potato Leafroll</li> </ul>	Antisense inhibition or other strategies	Seed sales anticipated in 1998
Improved cooking and storage	Inhibit enzymes that convert starch to sugars	In development
Reduced browning	Inhibit polyphenol oxidase (PPO) activated on bruising	In development
Virus Resistance <ul style="list-style-type: none"> <li>• Cucumber Mosaic Virus</li> <li>• Potato Virus Y and X</li> <li>• Tobacco Etch Virus</li> </ul>	Antisense inhibition and several other strategies	In development or field evaluations
Delayed softening	Suppression of cell wall degrading enzymes	In field evaluations
Phytophthora Root Rot resistance	Production of lytic enzymes by plant	In development
Leaf Blight Resistance	Production of lytic enzymes in plant	In field demonstration
Virus Resistance <ul style="list-style-type: none"> <li>• Zucchini Yellow Mosaic</li> <li>• Watermelon Virus</li> <li>• Cucumber Mosaic</li> </ul>	Antisense inhibition	Commercial sales for ZYMV initiated in 1995. Achieved regulatory exemption in 1995. Multiple resistance traits expected for release in 1997.