**TIME LINE**

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| [**INTRODUCTION**](http://docs.google.com/Page1.html) | [**HYPOTHESIS**](http://docs.google.com/Page2.html) | [**PROCEDURE**](http://docs.google.com/Page3.html) | [**DATA**](http://docs.google.com/Page4.html) |
| [**TIME LINE**](http://docs.google.com/Page5.html) | [**CONCLUSION**](http://docs.google.com/Page6.html) | [**RECOMMENDATION**](http://docs.google.com/Page7.html) | [**BIBLIOGRAPHY & LINKS**](http://docs.google.com/Page8.html) |

**This time line shows the chain of basic research that led to the development of seeds bioengineered to resist insects, viruses, and herbicides.**

**1901- Ishiwata Shigetane discovers that the cause of a disease out break in silkworms is a new species of bacteria, later called *Bacillus thuringiensis*, or *Bt.***

**1905- Sir Roiland Biffen shows that the ability of wheat to resist infection with a fungus is genetically inherited**

**1907- Erwin Smith and C.O. Townsend discover that the cause of crown galls is a bacterium called *Agrobacterium tumefaciens*.**

**1930s-Plant breeders notice that plants infected with a mild strain of a virus are protected from infection with a more destructive strain.**

**1938- The first commercial insecticide that contains *Bt* its the market.**

**1947- Armin Braun shows that *A. tumefaciens* introduces a factor into plant cells that permanently transforms them into tumor cells.**

**1950s- Studies show that proteins produced by *Bt* bacteria kill insects.**

**1972- Ernest Jarowski reports that glyphosphate herbicides work by inhibiting a critical biochemical pathway in plants.**

**1974- Jeff schell and Marc Van Montagu discover that a circular strand of DNA(plasmid) carried *A. tumefaciens* transforms plant cells into tumor cells.**

**1977- Eugene Nester, Milton Gordon, and Mary-dell Chilton show that genes on the A. tumefaciens plasmid are transferred into infected plant cells.**

**1981- Helen Whiteley and Ernest Schnepf, at the University of Washington, clone a Bt toxin gene.**

**1983- Jeff Schell and Marc Van Montagu, Mary-Dell Chilton and colleagues, and scientists at Monsanto introduce genes into plants by using A. tumefaciens plasmid vectors.**

**1986- Roger Beachy shows that plants bioengineered to produce a viral coat protein are protected from infection with the virus.**

**1990- Field trials show that Bt cotton strains resist bollworm and budworm**

**1994- genetically engineered virus-resistant squash seeds hit the market.**

**1996- Bt cotton hits the market.**

**1996- Herbicide-resistant strains of soybeans, cotton, canola, and corn reach the market.**