

Chronology of Scientific and Genetic Engineering Developments since 1953 showing the very different paths these have taken.

Date	Scientific Developments - progress slow and new insights reveal gene function not as simple as once thought.	Genetic Engineering Developments - very rapid progress towards commercialisation of GE crops followed by many incidents.
1950s	<p>1953 Structure of DNA published</p> <p>1957 Central dogma postulated (DNA makes RNA makes protein)</p>	
1960s	<p>1966 Genetic code deciphered</p>	
1970s	<p>1970 reverse transcriptase discovered in viruses (RNA makes DNA)</p> <p>1977 Introns discovered – genes are not continuous in higher organisms but interdispersed with non-coding sequences.</p>	<p>1973 Recombinant DNA technology – cloning</p> <p>1976 Genentech, the first GE company founded.</p>
1980s	<p>Techniques of “DNA fingerprinting” introduced to courtrooms.</p>	<p>1983 First genetically modified plant – tobacco</p> <p>1984 First GE plants in field tests</p> <p>1985 First <u>unauthorised</u> release of GE organisms (bacteria)</p> <p>1987 Calgene receive patent for DNA sequence for extending shelf life of fruit (tomato).</p>
1990s	<p>1990-1996 interfering RNA discovered in several organisms – previously unrecognised properties of RNA now recognised as important.</p> <p>1995 First full DNA sequence of an organism, a bacterium, published.</p> <p>1996 Sequencing of the genomes of ancient organisms leads to a new kingdom in the classification of life, the Archaea</p>	<p>1990 First genetically modified cereal</p> <p>1993 The US FDA declares that GE foods do not require “special regulation”</p> <p>1994 The first GE food, Flavr Savr, the GE tomato produced by Calgene is approved by FDA.</p> <p>1994 Roundup Ready soya approved for commercial planting.</p> <p>By the end of 1995, 35 applications to commercially grow GE plants in US and Canada granted</p> <p>1996 Roundup Ready soya and Bt corn commercially grown for the first time in US.</p> <p>1999 Imported seeds for commercial planting in the EU contaminated with unauthorised GE seeds.</p>
2000s	<p>2000 Sequence of first plant genome published, <i>Arabidopsis thaliana</i>. This is still the only plant genome whose sequence has been made public, although GE companies are thought to have privately sequenced several of the major crops.</p>	<p>2000 Starlink scandal in North America causes hundreds of corn products to be recalled because of contamination with GE corn not approved for human use.</p> <p>2000 Roundup Ready soya found to have unintended additional fragments of the genetic insert.</p> <p>2000 Imported seeds for commercial</p>

GREENPEACE Briefing

Genetic Engineering Campaign

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Date	Scientific Developments - progress slow and new insights reveal gene function not as simple as once thought.	Genetic Engineering Developments - very rapid progress towards commercialisation of GE crops followed by many incidents.
		planting in the EU contaminated with unauthorised GE seeds (again). 2000 Outcrossing of GE and conventional oilseed rape in Canada results in plants with resistance to 3 herbicides
	2001 Draft sequence of the human genome published with far fewer genes than expected. This radically alters the understanding of how genes must function – a paradigm shift. The Central Dogma is now viewed as over-simplified – genes are subject to a control network. 2002 Landmark publication demonstrating a complex regulatory network of DNA function in yeast, a simple, but multicellular, organism. 2002 small interfering RNAs named as a scientific highlight of the year. New insights into gene silencing and regulation of gene function.	2001 Mexican maize scandal. The presence of transgenes in traditional races of maize revealed. Thought to have originated in maize exports from US. 2001 Roundup Ready Soya found to have a region of unidentified DNA at one end of the genetic insert 2001 Imported seeds for commercial planting in the EU contaminated with unauthorised GE seeds (yet again). 2002 Legal action by organic farmers in Saskatchewan against GE companies – it is no longer possible to grow uncontaminated oilseed rape in Canada. 2002 Prodigene pharm crops scandal. Millions of dollars worth of soya destroyed in USA because it may be contaminated with GE corn to produce drugs.