

Genetically Engineered Trees

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In news— More than a century after the American chestnut tree became functionally extinct, the United States is weighing whether to allow a genetically engineered (GE) version to spread in the wild.

Key updates-

- The **USA has already developed and field tested the GE version, known as Darling 58**, and is now awaiting clearances from government agencies to grow them in the wild.
- If they are successful, **it will be the first GE forest tree species planted specifically to spread freely through forests**. Once released, there will be little potential to track or reverse its spread,
- The population of the **American chestnut, a deciduous tree native to North America**, dwindled in the first half of the 20th century when a fungal blight, ***Cryphonectria parasitica*, killed over four billion trees**. The blight is believed to have travelled to the US from the Chinese varieties of the tree.
- Ever since, millions of American chestnut stumps have continued to sprout every year, but only a handful of them survive long enough to produce nuts. Most of them get re-infected with the blight and die, restarting the cycle again.
- **A group of researchers at the State University of New York College of Environmental Science and Forestry began experimenting with a GE blight-resistant American chestnut in the 1980s.**
- They finally added an enzyme from wheat that breaks down the toxin produced by the blight to develop the Darling 58 line of blight-tolerant trees. The researchers now, citing conservation of the species, hope to win the

approval of the US government for the unregulated release of these GE varieties into the wild.

- **While the US is the only country that is considering the introduction of GE tree varieties in the wild, many others have been experimenting with GE tree varieties for commercial plantations.**

Initiatives by other countries-

- In 2002, China allowed the commercial plantations of two varieties of GE insect-resistant poplar trees. According to Malaysia-based non-profit World Rainforest Movement, the country has planted about 1.4 million GE poplar trees on 300-500 hectares.
- While China is the only country where commercial plantations of GE trees has started, the US, Germany and Canada are also conducting field tests for GE poplar varieties.
- In 2015, the US and Brazil gave the go-ahead for commercial plantations of GE versions of loblolly pine and eucalyptus trees, but the plantations did not take off for various reasons.
- In Brazil, the country's native eucalyptus variety was found to be more productive than the two GE varieties, and in the US, the decision triggered massive protests from local communities.

Wide spread

While China alone has allowed commercial plantations of genetically modified trees so far, many other countries, including India, are experimenting with different tree varieties



Source: 'The Global Status of Genetically Engineered Tree Development' report released by The Campaign to Stop Genetically Engineered Trees in September 2022.

GE variety of rubber tree in India-

- India has been experimenting with a GE variety of rubber tree for the past two decades. The Rubber Research Institute of India, a Union government research centre based in Kerala, received clearance for field trials in 2010, but had to abort its plans after the Kerala government did not allow the trials. In June 2021, the research institute under the Rubber Board got the nod from the Assam government to carry out the field trials.
- The GE variety has been modified by inserting additional copies of the gene MnSOD (manganese-containing superoxide dismutase) which enables the plant to tolerate extreme climatic stress, says James Jacob, former director of the Rubber Board.
- The variety will allow non-traditional rubber states such as Assam and Mizoram to cultivate better quality rubber.

About genetically modified tree-

- A genetically modified tree (GMT, GM tree, genetically engineered tree, GE tree or transgenic tree) is a tree whose DNA has been modified using genetic engineering techniques. In most cases the aim is to introduce a

novel trait to the plant which does not occur naturally within the species.

- Examples include resistance to certain pests, diseases, environmental conditions, and herbicide tolerance, or the alteration of lignin levels in order to reduce pulping costs.
- GE trees pose a particularly high risk of contaminating other trees, along with the animal and insect species that rely on them.