

Transgenic plants

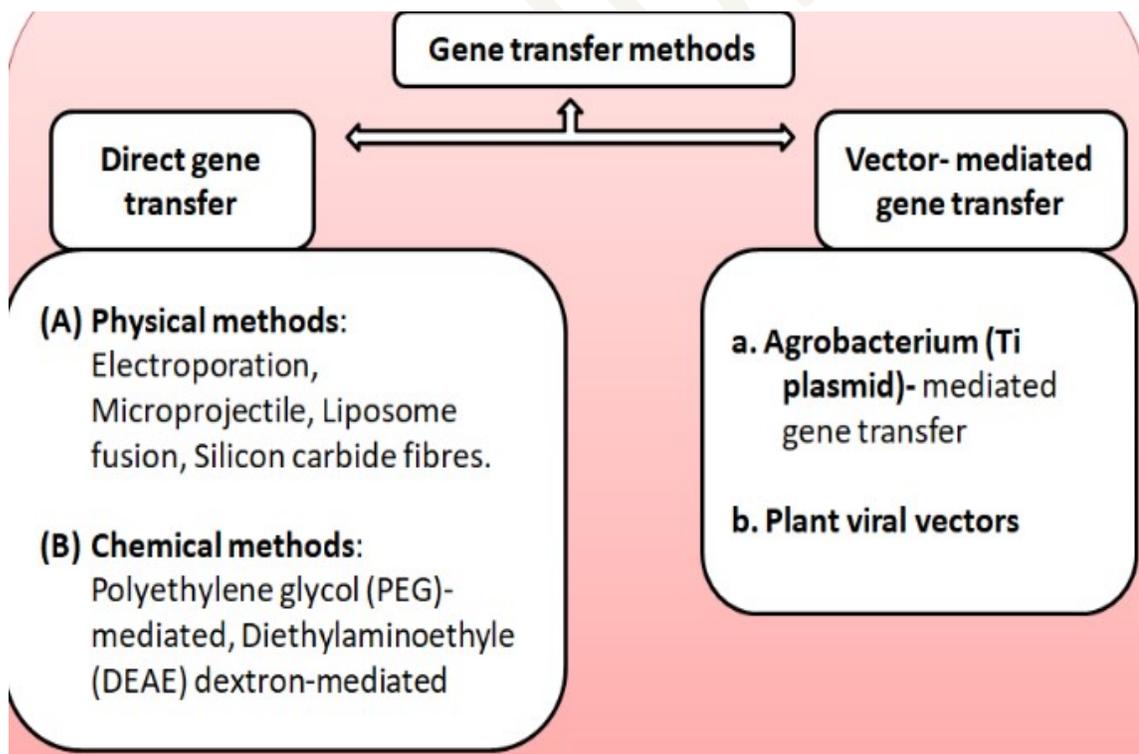
What are transgenic plants?

The genetic transformation technology basically deals with the transfer of desirable genes from one plant species to another species. The inserted (or transferred) gene expressed in the host plant. As a result new plant will developed. Such type of transgenic plants is known as **transgenic plants**.

Why transgenic plants are developing today?

- ❖ To improve agriculture, horticulture or ornamental value of plants.
- ❖ To develop plant bioreactors for inexpensive manufacture of commercially important products e.g., proteins, medicines, pharmaceutical compounds.
- ❖ To study the action of genes in plants during development and various biological processes.

How genes are tranfered:



Genetic traits introduced into transgenic plants:

- Resistance to herbicides
- Protection against viral infections
- Improved nutrient quality
- Altered flower pigmentation
- Tolerance to environment stresses
- Self incompatibility

Application of transgenic plants:

1. **Insecticidal resistance:** Through genetic engineering it is possible to develop crops that resistant to insect. Example- **Bt cotton**. An insecticidal gene (**cry gene**) of bacteria *Bacillus thuringiensis* is transferred to the cotton plant and the gene is expressed in the host plant. As a result the cotton plant becomes resistant to insect. This cotton plant is called Bt cotton. The cry gene produces a insecticidal protein called **δ -endotoxin**.
2. **Virus resistance:** By inserting the coat protein (**CP**) gene, **antisense RNA** approach and **ribozyme gene**, virus resistance gene can be develop. Example tobacco, tomato, alfalfa, potato etc. CP gene synthesis an enzyme that break the protein coat of virus. As a result the virus fail to replicate. Likewise, Movement protein (**MP**) gene is also another approach that provide resistant capacity of plants against virus.
3. **Herbicidal resistance:** Many crops have been engineered for resistance to herbicide such as. **Glyphosate (roundup)**.
4. **Development of stress tolerance.** Salt tolerance, oxidative tolerance etc.
5. **Modification of plant nutritional content:** example- **Golden rice**. Golden rice is rich in **vitamin A**. The genes such as **psy** and **lyc** are both responsible for for production of golden rice. These two genes involved in β -carotene. So that rice colour is golden.
6. **Production of plantibody:** Through genetic engineering antibody of animals can transferred into plant body and produce large number of antibody, called **plantibody**.
7. **7. Delayed ripening:** Example- **Flavr Savr** tomato. Normally, **polygalacturonase (PG)** enzyme breakdown the **polygalacturonic acid** component of fruit **pericarp** which is responsible for ripening. But by the help of genetic engineering a specific gene can inserted into the tomato which deactivate the synthesis of **PG enzymes**.
8. **Production of bioplastic:** The gene from *Alcaligenes eutrophus* bacteria which is responsible for synthesis of **polyhydroxybuterate (PHB)** bioplastic can transferred into plant. The PHB is **degradable plastic**.