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TRANSGENIC BREEDING: MEANING & ACHIEVEMENT'S IN CROP IMPROVEMENT

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TRANSGENIC BREEDING: MEANING & ACHIEVEMENT'S IN CROP IMPROVEMENT

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INTRODUCTION

gricultural production has increased worldwide through the development of varieties with improved yield traits. The improved yield traits can be transferred to crop through Recombinant DNA technology process and this process is called as Transgenic Breeding (Raymond Park *et al*, 2011). It is the genetic improvement of crop plants and other useful micro-organisms through genetic engineering in relation to their economic use for mankind through the use of transgenes.

By this process we can control the yield loss and develop the resistance towards both biotic and abiotic stress over last two decades transgenic breeding techniques demonstrated remarkable developments in manipulations of the gene for induction of desired characteristics into transgenic plant. Transgenic technology is a supplementary tool to plant breeding to develop the desired traits in a particular crop (James and Clive, 2003). For example development of Bt cotton (resistant to bollworm), Golden rice (precursor of vitamin A), Flavr Savr Tomato (Improved shelf-life). Bt cotton is only transgenic crop to cultivate in India.

Production of transgenic is reported in many crop, but commercialization is limited to a few selected crops such as cotton (Gossypium hirsutum),corn(Zea mays),soyabean (Glycine max) and canola (Brassica napus).

REASONS FOR TRANSGENIC PLANTS

- To improve the quality of the plant or to produce desired characteristics in the same plant.
- To transfer the genes from unrelated plant species it's impossible to perform in traditional plant breeding, but it is comparatively easy and rapid process through the biotechnology technique (Recombinant DNA technology)
- ➤ This technology is useful for the isolation of the genes from any plants species and controlling and modifying the same in the desired manner (Trigo, *et al*, 2003).
 - Improve agricultural value of plant, increases yield, herbicide-resistance, pest-resistance (Bt cotton), enhance nutrition and taste.
- These transgenic plants can produce proteins for human needs (Golden rice).
- Transgenic plants can be used to study effects of genes.



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PROCEDURE FOR PRODUCTION OF TRANSGENIC PLANTS

- Firstly, the gene needs to be identified and process of isolating that gene should be done carefully.
- Then, the gene should be made in order to load the gene of interest into the same.
- The gene construct containing the desired gene is placed in the cell or tissue of the plant and are made to grow in controlled environment conditions (Christou et al, 2006).
- Finally, the regeneration of the transgenic plant is done with inducing the desired trait.



APPLICATIONS OF TRANSGENIC PLANTS

- The nutritional quality of the crops improved considerably.
- The plants developed with insect and disease resistance, so it leads to less wastage of the crops.

- The plants which were not able to grow in salty areas become salt tolerant thus were able to produce in the salt affected areas.
- Transgenic crops can be developed by using biopharmaceuticals properties like antibodies and proteins (Oksman *et al*, 1996).
- > It helps in alleviating poverty and hunger.

FUTURE OF TRANSGENIC PLANTS

The advancement in technologies in the field of breeding program and development area are increasing at a high rate,

- Increase and Effective transformation.
- The particular genes are replaced by the advanced marker genes.
- The gene expression will be controlled in a better way by usage of more specific promoters.
 - The gene will only be active when and where needed i.e. more effective and efficient.

ADVANTAGES OF TRANSGENIC BREEDING:

- Improvement in Yield,
- > Improvement in insect and disease resistance,
- > Improvement in quality,
- Resistance to abiotic stress,
 - > Rapid and accurate technique.

LIMITATION OF TRANSGENIC BREEDING:

- Include allergic reactions, emergence of super-pest,
- ➢ Loss of biodiversity,
- Increase in cost of cultivation,
- > This process is highly expensive.

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CONCLUSION

The development of transgenic plants is the result of integrated application of rDNA technology, gene transfer methods and tissue culture techniques. Transgenic plants are designed to acquire useful quality attributes such as insect resistance, herbicide tolerance, abiotic stress tolerance, disease resistance, high nutritional quality and yield. Recently, India ranked 107 out of 121 countries on the Global Hunger Index, this can overcome by allowing the transgenic crops to satisfy the needs of world population. So we should take necessary actions and improve research on transgenic breeding and create awareness and promote transgenic crops.

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