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ZO- 351 PEST MANAGEMENT

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CHAPTER V BIOTECHNOLOGY APPROACHES IN PEST MANAGEMENT

5.1. INTRODUCTION

Biotechnology is a branch of science, and its applications have the potential to provide cost-effective natural components of integrated pest management (IPM). Farming biotechnology assortments are utilized as an apparatus for entomology exploration portrayed by quality exchange of desired interest and therefore, gene transfer between a contributor can be a plant, a bacterium, growth, and plants, securely.

Molecular science, coordinated with hereditary qualities and organic chemistry, has given the fundamental apparatuses to moving and assessing hereditary attributes for a large group of insects as well as for related host plants. The molecular approaches have empowered the investigation of physiological indispensable proteins and sensilla-neural edifices that are engaged with pheromonal examines. Such information is imperative to devise protected and explicit specialists for disturbing insect pest life cycles, accordingly expanding the proficiency of endeavours to manage agricultural pests and disease vectors.

5.2. RECENT ADVANCE IN USE OF FUNGI AND VIRUSES

Fungi have the ability to transform organic materials into a rich and diverse set of useful products and provide distinct opportunities for tackling the urgent challenges before all humans. Fungal biotechnology can advance the transition from our petroleum-based economy into a bio-based circular economy and has the ability to sustainably produce resilient sources of food, feed, chemicals, fuels, textiles, and materials for construction,

automotive and transportation industries, for furniture and beyond. Fungal biotechnology offers solutions for securing, stabilizing and enhancing the food supply for a growing human population, while simultaneously lowering greenhouse gas emissions. Fungal biotechnology has, thus, the potential to make a significant contribution to climate change mitigation and meeting the United Nation's sustainable development goals through the rational improvement of new and established fungal cell factories.

5.3. METHODOLOGY IN BIOTECHNOLOGY

Various methods are employed at the different steps of a biotechnology process: upstream processing (inoculum and substrate preparation), bioconversion (by microorganisms, plants or animals or parts thereof), and downstream processing (products recovery, waste disposal). This chapter will give to the apprentice of biotechnology an overview of where methods are used in each of these steps, either to check the performance of the process (i.e. fractionation, identification, quantification methods) or to convert materials into a different form (i.e. enzymatic or chemical reactions, genetic transformations). It also gives an insight into how methods are found, used and reported in biotechnology.

5.4. SOMACLONAL VARIABILITY

Use of molecular biology techniques for the management of insect pests. The following are some strategies.

1. Wide hybridization: This technique involves transfer of genes from one species to other by conventional breeding. The genes for resistance are transferred from a different species. e.g. WBPH resistant gene has been transferred to Oryza sativa from O.officinalis.

2. Somaclonal variability: The variation observed in tissue culture derived progeny. e.g. Somaclonal variants of sorghum resistant to Spodoptera litura has been evolved.

3. Transgenic plants: Transgenic plants are plants which possess one or more additional genes.

This is achieved by cloning additional genes into the plant genome by genetic engineering techniques. The added genes impart resistance to pests.

5.5. CONCEPT OF GENETIC ENGINEERING AND TRANSGENIC PLANTS

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Transgenic plants have been produced by addition of one or more following

a. Bt endotoxin from Bacillus thuringiensis

b. Protease inhibitors

c. -Amylase inhibitors

d. Lectins

e. Enzymes

Potentials/Advantages of Biotechnology in IPM

1. Slow development of resistance against transgenic Bt, PI, lectins

2. All plant parts express toxin and so no need for insecticide spray

3. No need for continuous monitoring

4. No environmental pollution, safe to NE, non-target organism.

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