University of Jijel

Faculty of Natural Sciences and Life

Department of Cellular and Molecular Biology

Master 2 in Molecular and Cellular Biology

Workshop on Recent Advancements in Genetic Engineering for Plant Improvement

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Objective:

To provide students with an in-depth understanding of the latest advancements in genetic engineering for plant improvement, focusing on the tools, applications, and implications for sustainable agriculture and food security.

Agenda for the project:

Importance of genetic engineering in plant improvement.

1. **Cutting-Edge Tools in Genetic Engineering**

✓ **CRISPR-Cas9 Technology**: Basics and its revolutionary role in precise gene editing.

✓ **RNA Interference (RNAi)**: Mechanisms and applications in silencing undesirable traits.

✓ **Synthetic Biology**: Designing new plant pathways for enhanced productivity.

✓ Case Studies: CRISPR-edited wheat for drought resistance and Golden Rice for vitamin A enrichment.

2. **Applications of Genetic Engineering in Plant Improvement**

✓ **Biotic Stress Resistance**: Engineering plants for pest and disease resistance.

✓ **Abiotic Stress Tolerance**: Enhancing tolerance to drought, salinity, and extreme temperatures.

✓ **Nutritional Enhancement**: Development of biofortified crops for improved human health.

✓ **Sustainable Practices**: Reduced pesticide use through pest-resistant transgenic crops.

✓ **Industrial Applications**: Biofuel production from genetically modified plants.

3. **Challenges and Future Directions**

• Regulatory frameworks for genetically modified plants.

- Ethical considerations and public perception.

- Next-generation technologies in plant improvement.

Expected Outcomes:

By the end of the workshop, Students will:

- Understand the latest advancements in genetic engineering tools for plant improvement.

- Gain insights into practical applications and success stories in transgenic and gene-edited crops.

- Be equipped with knowledge to navigate challenges and explore new directions in sustainable plant biotechnology.