



Practice Worksheet on Biotechnology and Genetic Engineering

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Subject: Biology

Date: 1/14/2025

Long Answer Questions

1. Explain how Bt cotton demonstrates the application of genetic engineering in pest control.
2. Describe the significance of transgenic animals in biomedical research, providing specific examples.
3. Discuss the potential benefits of genetically modified organisms (GMOs) in agriculture.
4. Elaborate on the mechanism of the 'cry' gene in conferring insect resistance in Bt cotton.
5. Define transgenic organisms, and provide two examples illustrating their diverse applications.
6. Identify and discuss some of the ethical considerations and potential risks

associated with the use of GMOs.

7. Explain how biotechnology contributes to improving crop production and addressing food security challenges.

8. Discuss the potential future applications and advancements in the field of biotechnology, focusing on transgenic organisms.

Multiple Choice Questions

1. What is the primary function of the 'cry' gene in Bt cotton?

- a) It is a naturally occurring pesticide.
- b) It produces proteins toxic to insects.
- c) It enhances nutrient uptake in plants.
- d) It increases plant growth hormone production.

2. Transgenic organisms can be found in which kingdoms of life?

- a) Only plants
- b) Only animals
- c) Both plants and animals
- d) Neither plants nor animals

3. The 'cry' gene is sourced from which bacterium?

- a) *Bacillus thuringiensis*
- b) *Escherichia coli*
- c) *Saccharomyces cerevisiae*
- d) *Agrobacterium tumefaciens*

4. What is a major benefit of using Bt cotton in agriculture?

- a) Decreased crop yields
- b) Increased pesticide use
- c) Reduced reliance on chemical pesticides
- d) Increased soil erosion

5. What is a significant contribution of transgenic animals to scientific research?

- a) They have no impact on research.
- b) They provide models for disease studies.
- c) They are only useful in agriculture.
- d) They are ethically problematic and should not be used.

6. Which of the following is a direct application of genetic engineering in agriculture?

- a) Human insulin production
- b) Pest-resistant crops
- c) Disease-resistant livestock
- d) Development of antibiotics

7. What statement best describes the ethical considerations surrounding GMOs?

- a) They are always harmful to the environment.
- b) They pose no potential risks.
- c) Their long-term impacts require careful evaluation.
- d) They have no effect on human health.

8. Where are transgenic organisms used?

- a) Only in agriculture.
- b) Only in medicine.
- c) In various fields, including agriculture and medicine.
- d) They have no practical applications.

Answer Key

Long Answer Questions - Expected Responses

1. Explain how Bt cotton demonstrates the application of genetic engineering in pest control.

Expected Answer: Bt cotton's pest resistance comes from the cry gene from *Bacillus thuringiensis*, producing insecticidal proteins.

2. Describe the significance of transgenic animals in biomedical research, providing specific examples.

Expected Answer: Transgenic animals help study human diseases and biological processes due to shared genetic mechanisms.

3. Discuss the potential benefits of genetically modified organisms (GMOs) in agriculture.

Expected Answer: GMOs enhance agricultural productivity by increasing crop yields, pest resistance and nutritional value.

4. Elaborate on the mechanism of the 'cry' gene in conferring insect resistance in Bt cotton.

Expected Answer: The cry gene creates proteins inactive until in insect guts, where they become toxic, effectively controlling pests.

5. Define transgenic organisms, and provide two examples illustrating their diverse applications.

Expected Answer: Transgenic organisms have DNA from another species, resulting in new traits. Examples include glowing mice and pest-resistant crops.

6. Identify and discuss some of the ethical considerations and potential risks associated with the use of GMOs.

Expected Answer: Ethical considerations surrounding GMOs include potential environmental impact, human health effects, and corporate control of food production.

7. Explain how biotechnology contributes to improving crop production and addressing food security challenges.

Expected Answer: Biotechnology improves crops by enhancing resistance to diseases, pests and stress factors, boosting yields and nutritional value.

8. Discuss the potential future applications and advancements in the field of biotechnology, focusing on transgenic organisms.

Expected Answer: Future developments in biotechnology might lead to disease-resistant crops, new medicines and more efficient industrial processes.

Multiple Choice Questions – Correct Answers

1. What is the primary function of the 'cry' gene in Bt cotton?

Correct Answer: It produces proteins toxic to insects.

2. Transgenic organisms can be found in which kingdoms of life?

Correct Answer: Both plants and animals

3. The 'cry' gene is sourced from which bacterium?

Correct Answer: *Bacillus thuringiensis*

4. What is a major benefit of using Bt cotton in agriculture?

Correct Answer: Reduced reliance on chemical pesticides

5. What is a significant contribution of transgenic animals to scientific research?

Correct Answer: They provide models for disease studies.

6. Which of the following is a direct application of genetic engineering in

agriculture?

Correct Answer: Pest-resistant crops

7. What statement best describes the ethical considerations surrounding GMOs?

Correct Answer: Their long-term impacts require careful evaluation.

8. Where are transgenic organisms used?

Correct Answer: In various fields, including agriculture and medicine.