Biotechnology: Can It Help in Making the Desert Green?

Ziad W. Jaradat, PhD
Department of Biotechnology and Genetic Engineering
Jordan University of Science and Technology

Thank you for considering the biotechnology module for your class. I hope you and your students enjoy the module. This module is targeting the high school students who have some knowledge in biology. However; it stimulates the students to think of the questions asked at the end of each segment. This module talks about biotechnology, which is not given in schools as a class. Therefore, students have to think and come up with possible answers for the questions at the end of each segment.

The teacher can stop the video at any time and ask the students a question that may come in the middle of any segment.

In the fist segment, we will visit the desert area and will show the students pictures from there and ask several questions:

- What they see? Vast land with little vegetation
- Is there any variation in the plants? Minimal
- Do desert plants need as much water as non-desert plants? Of course not
- How do they survive the hot and dry weather? They must have some thing special which is genes that enable them to survive.
- Can we use these plants as a model to cultivate non-desert plants in the desert? Yes that is the main subject of the lecture.

Before the beginning of the second segment, the teacher can listen to the students answering the previous questions that arise about the desert and then can start the second segment.

In the second segment, the students have to see and listen to practical examples of traditional methods used for manipulating plants to produce desired plants. The teacher can ask them about the problems of using the traditional methods. Such a discussion should stimulate them to learn about the modern methods of plant manipulation.

In the third segment the students will be introduced to the methods of making transgenic plants and will be asked to think of the main question that was asked at the beginning of the module which is: can we use this technology to make the desert greener? The teacher asks the question again and sees what kind of answer they will come up with after knowing all this about biotechnology. And see what kind of traits they want to see in the new plants. Basically, they should start thinking about what kinds of genes they should transfer from the desert plants or to those plants.

In the fourth segment, students will learn that traits other than dryness and salinity can be transferred to plants. They are asked to think of using biotechnology to modify regular products and to think about what are the genes of the traits that can be introduced to

enhance products. And they are actually asked to think out of the box and see if we can use plant biotechnology for medical purposes, like for example introducing the gene of beta carotene (precursor of vitamin A) to rice so that this fortified rice will minimize night blindness in poor countries.

Finally, the students will be introduced to different applications of biotechnology that relate to the main theme of the module - making the desert greener - by combating insects and fungus diseases. At the end, students are left with a big question. Now you have seen the use of biotechnology in agriculture, can we use it to solve other problems such as the energy crises that we asked about at the beginning of the first segment?

We welcome your feedback; please feel free to contact me at jaradatz@just.edu.jo if you have any suggestions or criticisms.