

UNIT 2



**FEEDING THE WORLD –
CAN GMOs HELP?**

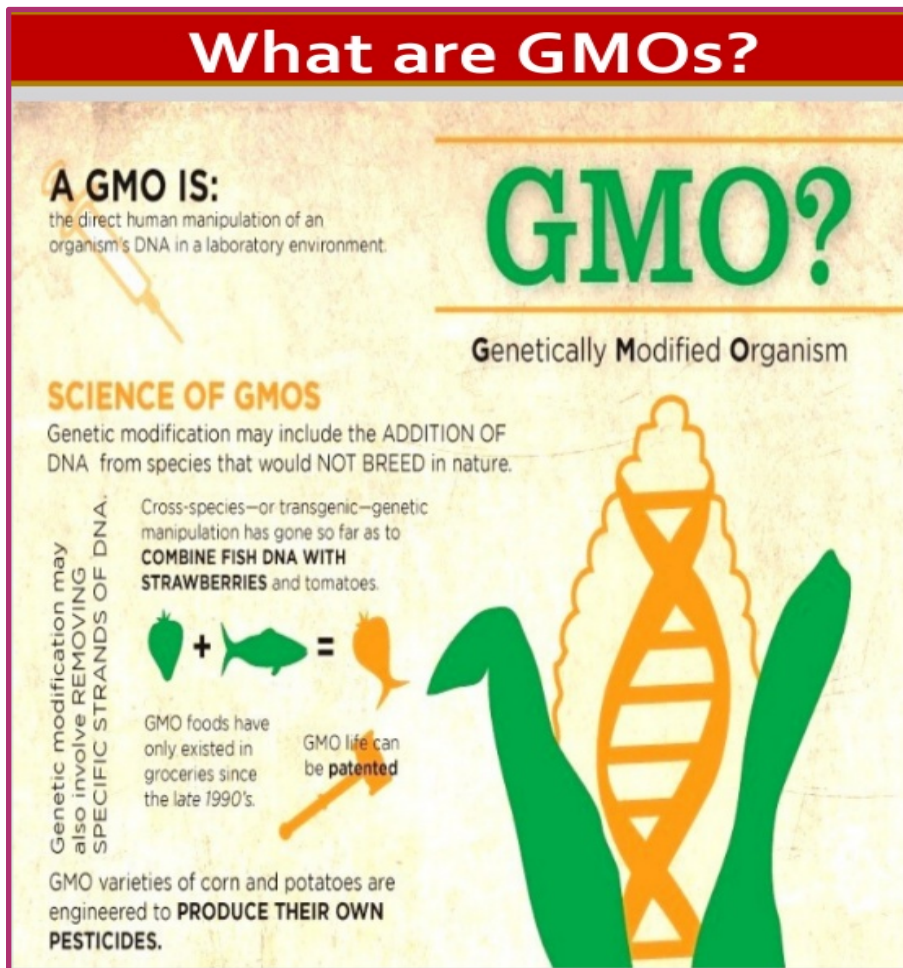


In this unit, you will:

- watch a video and read a text to get information about genetically modified organisms (GMOs)
- do some research about anti-GMO position
- learn and practice vocabulary related to the topic
- do some speaking practice on agreeing and disagreeing with a person/opinion and taking a stand in a discussion

Warm-up

Examine the infographic below and watch the video “What is a genetically modified food?” to think about and discuss the questions on the right.



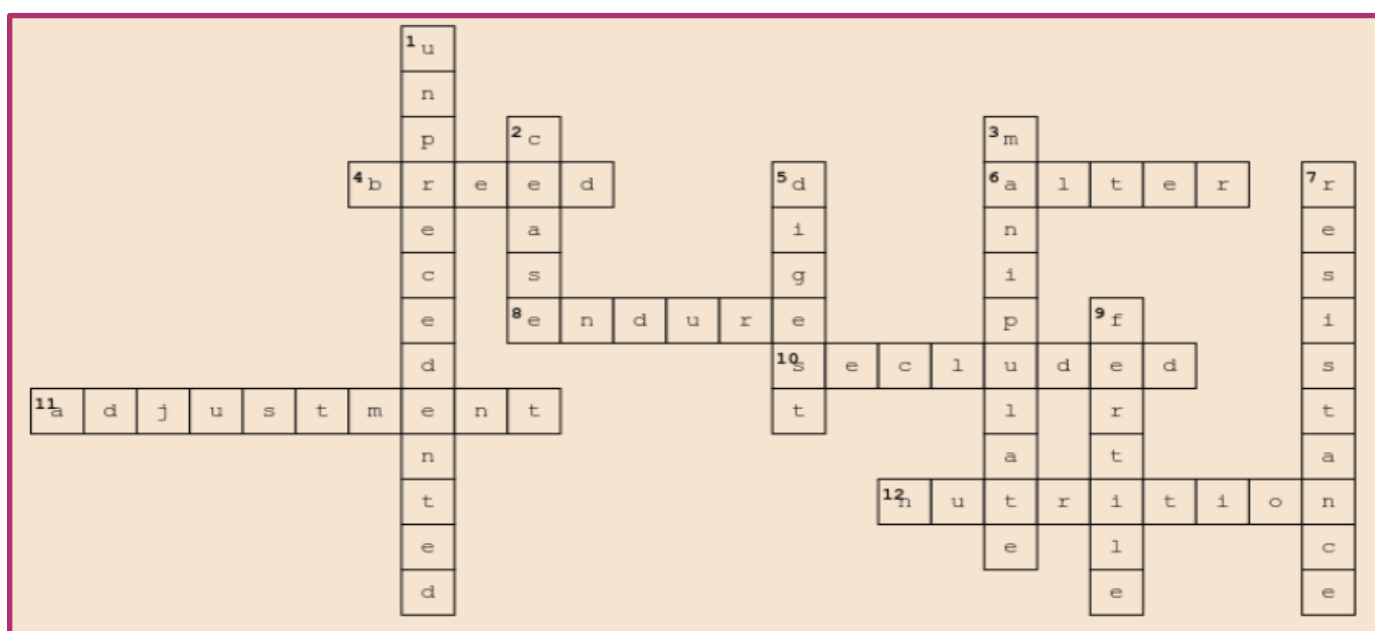
- If we look at the history of food cultivation, it is apparent that we've been eating genetically modified food all along. What might be the reason for that?
- Is there a difference between how ancient farmers modified food and how foods are modified genetically today?
- Why do you think genetically modified foods have been demonized in recent years by health advocates and environmentalists?

Reading

Below are some vocabulary items removed from the text that you will read next. First, do the crossword puzzle to find out what the words mean, and then go through the text to replace the removed vocabulary items. You will read the text a second time to do the follow-up questions.

Vocabulary – Replacing Removed Words into Text

resistance (n)	nutrition (n)	secluded (adj)	adjustment(s) (n)	endure (v)	alter (v)
cease (v)	manipulate (v)	unprecedented (adj)	digest (v)	fertile (adj)	breed(ing) (v)



Across

4. to keep animals or plants for the purpose of producing more of them with particular qualities
6. to make slight changes on something
8. to continue to exist in the same state although it is hard
10. withdrawn from or involving little social activity
11. a small change or movement made to achieve a desired result
12. the process of providing or obtaining the food necessary for health and growth

Down

1. without previous instance; not known or experienced before
2. to stop doing something or to stop happening
3. to manage, or skillfully influence some process of treatment
5. to break down food in the alimentary canal into substances that can be absorbed and used by the body
7. the act of withstanding the force or effect of something
9. producing or capable of producing abundant vegetation or crops

Before You Read

The text below details one side of the debate on genetically modified organisms. Just examining the title can give us an idea about which position the writer takes in the debate:

Is the writer a pro-GMO or an anti-GMO?

Now please read the text carefully and do the exercises that follow.



**GMO scientists could
save the world
from hunger -
if we let them**

Cutting-edge technology in food production

A Experts say global food production will have to double by 2050, at which point the world population is expected to have grown from 7 billion today to well beyond 9 billion. That's just 30 years away, but the problem is: there will be no new **(1) fertile** land that can be used for agriculture then.

B The solution to feeding *these* people, though, appears to be on the way: In 2012, a new tool was invented and it has revolutionized how scientists can examine plant genetic processes closely and **(2) manipulate** if necessary.

It's called CRISPR-Cas9, and unlike the earlier versions in the world of genetic modification, it is highly specific, allowing scientists to target and **(3) alter** parts of the genome by

removing, adding or changing sections of the DNA sequence. Initial signs suggest this tool will be an F-16 jet fighter compared with the Stone Age spear of warfare. That is, the traditional, painstaking means of (4) breeding a new plant hybrid will be replaced by the excellence of high-tech agriculture practices. Biologists and geneticists are confident it can help them build a revolution - if we let them.

The merits of CRISPR-Cas9

C The speed and simplicity of CRISPR have momentous implications for agriculture. The process could lead to plants that can (5) endure an increasingly overheated and dry nature. It could also result in a more nutritious yield, from less plant. “That’s the beauty of the technology”, says Joyce Van Eck, the senior researcher at Cornell University’s Boyce Thompson Institute, “it can be done for the world in heavily populated and (6) secluded communities, for big and small companies, it may, however, be expected that underdeveloped countries welcome the technology in the first place.”



D Van Eck and her colleagues have proved that what they already have works smoothly with the tomato. “It is a plant that’s *like the white rat in animal studies*,” she says. Soon she will be working to improve the tomato’s capacity for surviving under undesirable conditions and disease (7) resistance, “because we can go in and target exactly the areas we want,” she concludes. That promises a future where scientists are able to consider the available inputs - water, soil nutrients, temperature - and make (8) adjustments to better control the outputs: productivity, nutritional value, resilience.



Is there a future for GMOs?

E (i) In China, the only genetically modified crop currently grown is papaya. (ii) However, China's mighty science establishment has grown beyond expectations, with 400 labs and 30,000 researchers. (iii) Labs there have already sequenced the genes of 3,000 varieties of rice. (iv) In labs, researchers are matching them against one another to find the best traits for (9) nutrition, yield and resistance to environmental stressors. (v) One result is what researchers have dubbed the "green super rice": a kind of rice, matched with green beans that is now healthier, longer lasting and easier to (10) digest even when consumed in large amounts. (vi) Even if the Chinese government can't sell genetically modified crops to its own people, there's a good chance the poor populations of Southeast Asia, Africa and India will welcome the nourishment. (vii) Gengyun Zhang, head of China's giant genetic engineering center, recently said, "With today's technology, I have no doubt that we can feed the world." (viii) Now that the rate of technology is advancing at an (11) unprecedented speed, it is likely that feeding world's population will (12) cease to be a major issue in debate agendas. We will need to worry less about feeding the world population.

Comprehension Check

A. What are the arguments that the writer puts forward in favor of GMOs? Please make a list of them below:

- plants can endure an increasingly overheated and dry nature
- the process results in a more nutritious yield, from less plant
- it can be done for the world in heavily populated and secluded communities, for big or companies
- plants can survive under undesirable conditions and develop disease resistance
- scientists can make adjustments to better control the outputs: productivity, nutritional value, resilience

B. Choose the best option to answer the questions.

1 Which of the following is NOT TRUE according to paragraphs A and B?

- a. Global food production has to increase by 100% to keep up with increasing population.
- b. Food production will be a problem as farmable lands are disappearing rapidly.
- c. CRISPR-Cas9 offers a promising solution to the potential danger of hunger.
- d. **Biologists' and geneticists' research on GMOs is receiving support from governments.**

2 “these” in paragraph B refers to 9 billion people (of the world population).

3 In the comparison between an F-16 jet fighter and the Stone Age spear of warfare, we understand that CRISPR-Cas9 is seen to be _____.

- a. the first tool invented for the high-tech agriculture practices
- b. powerful enough to find the faulty sequences in DNA
- c. **a breakthrough to change the existing practices in agriculture**
- d. in high demand and use in the world of agriculture

4 According to paragraph C, the new technique for rewriting the genome is regarded as “momentous” because it both _____ and _____. (Choose two options)

- a. helps plants resist unfavorable climate conditions
- b. leads to plants with higher nutritional value
- c. relies on the mixing of different-family genes
- d. produces massive amounts of nutritious crops
- e. serves only for particular countries in the world

5 What does Van Eck mean by “It is a plant that’s *like the white rat in animal studies*” in paragraph D?

The white rat in animal studies is a very common experimental subject/animal. Tomatoes, likewise, are very commonly used in GMO research.

6-8 Find sentences in paragraph E that provide evidence for the sentences 6-7 and 8. Write the number of the sentence in paragraph E (i-viii) in the blanks provided.

6 In a lab, researchers have attained a successful outcome when they produced a plant with improved properties.

_____ **v** _____

7 China has massive facilities that can work on GM crops.

_____ **ii** _____

8 There are a number of countries in the world which will readily accept to eat GM crops produced in China.

_____ **vi** _____

Search & Discuss

The other side of the debate

Now that you have had some information about GMOs, their use and the controversy over their use in practice, it is now time to think about the other side of the debate. As you have listed the arguments of the supporters in the reading text, what kind of counter-arguments do you think opponents may put forth?



Work in groups of three and have a quick search from the internet about why the critics of GMOs argue against the use of them for food production. Here is what you need to do:

- conduct a quick individual search on the net and note down some of the counter-arguments put forth by the opponents of GMOs
- work with your group and discuss all arguments that you have come up with and decide on the ones that you will include in your work as a group for the whole class discussion
- open a shared document (googledocs, padlet, etc.) and post the information you want to share with your classmates so that everyone in class can get a thorough understanding of your no-GMO position

Speaking Task 2: Stating your opinion – Agreeing/Disagreeing with an opinion

Now that we have the basics of GMOs along with the arguments put forward by both parties; i.e. supporters and opponents, *what would your own position be on the issue?*

Are you an anti-GMO or a pro-GMO?

Take a stand by agreeing or disagreeing with the positions we have discussed. Use the *three-prong approach* to express your opinion. (You may refer to **Unit 1 Speaking Practice 1** for the speaking practice input)

Do not forget to make use of the useful structures and upgrade your speech with new vocabulary you learned in this unit. Below you can find the list of vocabulary items introduced in this unit and an additional list of more words and phrases that you may wish to use in your speech.

Vocabulary items in the exercises	More vocabulary items/phrases
resistance	food cultivation/production
cease	world population
nutrition	genetic modification
manipulate	genetically modified foods/crops
secluded	traditional/conventional agriculture practices
unprecedented	high-tech agriculture practices
adjustment	developed/underdeveloped countries
digest	breeding plants/hybrid plants

endure
fertile
alter
breed

health advocates
environmentalists

Recycling Vocabulary 2

A. Below are some pictures/illustrations for you to examine. Explain what is happening in each picture and write meaningful sentences choosing suitable words from the list. You can make necessary changes while using the words (e.g. word form, opposites, singular/plural)

alter

manipulate

resistance

nutrition

adjustment

cease

fertile

1.



*Some people show strong **resistance** to new technology. They do not want to use it.*

2.



*The woman **ceased** to be an employee in the company. She was **fired**.*

3.



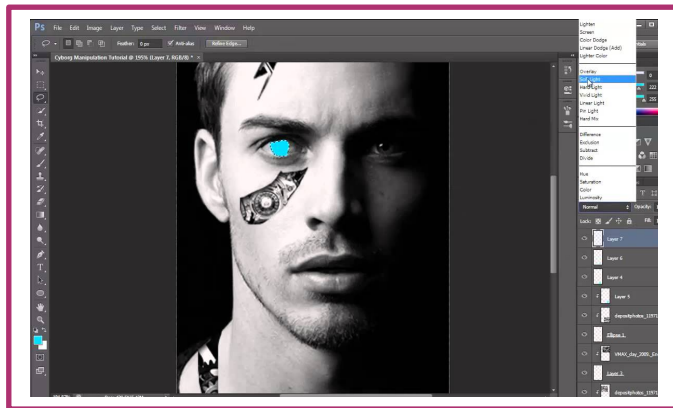
*It is difficult to carry out agricultural practices on **infertile** land.*

4.



*The city **altered** dramatically in only 24 years.*

5.



*It is possible to **manipulate** images using software programs.*

B. Think about the questions below and write your answers in the spaces provided. Make sure to give details for your answers.

1. What do *nutrition experts* recommend for a healthy diet? Do you think GMOs are in their list?

2. Would you accept to eat GMO foods that have been *altered* for greater taste but are probably harmful?

3. Do you think people who live in *secluded* areas need GMOs more than people in populated areas? Why/Why not?



References:

<https://visual.ly/community/Infographics/science/gmo-genetically-modified-organism>

<https://www.newsweek.com/2015/05/29/gmo-scientists-could-save-world-hunger-if-we-let-them-334119.html>