Topic: What are genetically modified organisms (GMOs)?

Level: 3rd-4th grade of secondary school, advanced level of English (C1)

Timing: 45 minutes

Aims:

- To present both general (taught in English lessons, Longman, Repetytorium maturalne, Unit 6 „Food") and specific (taught in biology lessons) vocabulary connected with the topic of food.
- To introduce the concept of GMOs.
- To make learners aware of cultural and geo-political factors that determine the perception of GMOs.
- To help learners understand that learning can be achieved in a second language.

Criteria for assessment

Teacher, peer- and self-assessment processes will be used to assess how well learners:

- Understand GMOs
- Distinguish between GMOs and organisms which are not GMOs
- Describe how to create a GMO
- Construct and use pre-taught terminology

Teaching Objectives

Content	Cognition
• Introduction of the topic • What GMOs are • How to create a GMO • How GMOs are perceived	• Provide learners with opportunities to understand the key concepts and apply them in different contexts. • Enable learners to identify GMOs. • Encourage knowledge transfer about GMOs using visual images. • Vocabulary building, learning and using. • Arouse learner curiosity – creative use of language and learner questions.

Culture

- Identify GMOs in their own country and other countries.
- Become objective: relativizing the concept depending on the point of view (whether you're a GMO consumer or a producer; whether you live in a rich or a poor country).
- Understand that they can learn no matter which language they are using.

Communication

Language of learning	Language for learning	Language through learning
key vocabulary: yield. harvest/ crop pesticides, modify/alter, genetically modified organisms, herbicide treatment, resist diseases,	Asking each other questions: What do you know about…? Can you tell me sth about..? What is a GMO? How do they do it? How to produce	Distinguish language to carry out activities. Retain language revised by both the teacher and the learners.

ingredients, packaged food, animal feed, go organic, species, cross-species/ trans-genic/ genetic manipulation, variety, strands of DNA, prevalent, prevalence, bacterium/ bacteria, protein, antibiotic resistance gene, tungsten particles, gold particles	GMOs? How to avoid GMOs? Ordering: Firstly…, secondly…, thirdly…, finally… Comparing and contrasting: All GMOs…, while … are not GMOs. Other: How do you spell…? What does … mean?	Make use of peer explanations. Record, predict and learn new words which arise from activities.

Learning outcomes (what learners will be able to do by the end of the lesson):

- demonstrate understanding of concept of GMOs
- distinguish between GMOs and organic foods
- describe how GMOs are produced
- classify information
- engage in visual matching of concepts and images
- use language creatively
- ask and respond to wh-questions about their work
- use a class vocabulary record of new words.

Instruments for assessment:

- T monitors group and individual activities
- Learners successfully play "Become and expert" game.
- Learners interact with their partners.
- Ls ' participation in all tasks and activities.
- Ls complete information gaps.
- Ls asks each other questions "What have you learned today?".

Resources

Worksheets, whiteboard, pens, leaflets from Pinterest; Skinner, Gary and Ann Skinner: Revise Salters-Nuffield, AS/A Level, Biology A, Revision Workbook, p.134 TED-Ed, Kurzgesagt, "Are GMOs good or bad?" animated movie: https://ed.ted.com/featured/0HAnxvLF

Teaching and learning activities

Introduction. "Are GMOs good or bad?" educational movie by TED-Ed and Kurzgesagt (3 min)

Exercise 1. "GMO – associations?" (2 minutes)
(warm up/ scaffolding activity on the board including brainstorming, resulting in a mind-map)

Answer:
pesticides, modify/alter, genetically modified organisms, herbicide treatment, resist diseases, ingredients, packaged food, animal feed, go organic, species, cross-species/ trans-genic/ genetic manipulation, variety, strands of DNA, prevalent, prevalence, bacterium/ bacteria, protein, antibiotic resistance gene, tungsten particles, gold particles

Exercise 2. "What is a GMO?" (15 minutes)
("become and expert" or information gap exercise)

Students A and B receive a black leaflet "What is a GMO?", students C and D an orange leaflet "GMO? Genetically modified organisms".
Instruction:
a) In pairs, analyse your leaflet about GMOs.
b) Then read the chart below with 10 statements about GMOs. According to your leaflet, mark them T (true) or F (false).
*c) For statements that were **not** presented in your leaflet, try to **predict** your answers.*

1. A GMO is an organism whose genetic make up (DNA) has been altered in a way that does not occur naturally.	
2. Crops are currently modified to survive herbicide treatment, produce their own pesticides and resist certain diseases.	
3. The most prevalent GMO crops are: sugar beets, oil, canola, cotton, corn.	
4. These products do not contain GMOs: chocolate, veggie burgers, alcohol, vanilla.	
5. In America 70% of packaged food contain GMOs.	
6. Genetic modification does not involve removing specific strands of DNA.	
7. GMO varieties of corn and potatoes are engineered to produce their own pesticides.	
8. Long-term testing of GMOs is widely accessible.	
9. The USA is the largest producer of GMO crops and mandates labels for GMO food.	
10. Mice fed GMO pesticide-producing corn over four generations showed abnormal changes to organs and reduced fertility.	

d) Now talk to a pair of students given the other leaflet to check if your predictions were correct.

Answers: 1.T, 2.T, 3.T, 4. F, 5. T, 6. F, 7. T, 8. F, 9. F, 10. T

### Exercise 3. "How to make a GMO?" (15 minutes)

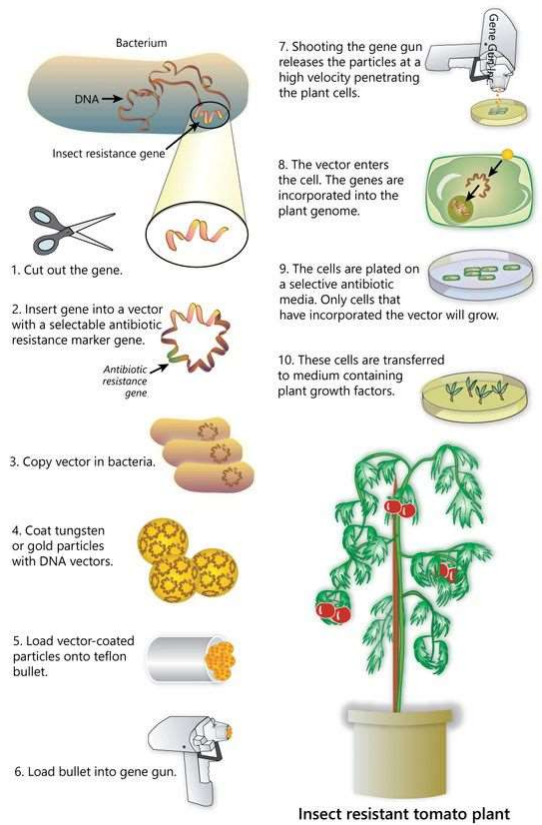*Instruction*
Students A and B:
a) Analyse "How are GM Crops made?" illustration.
b) Use this information to put in the right order cut out fragments of the graphics "Creation of an insect resistant tomato plant".
c) Check your answers with students C and D who have its full version.

Students C and D:
a) Analyse "Creation of an insect resistant tomato plant" illustration.
b) Use this information to put in the right order cut out fragments of the graphics "How are GM Crops made?".
c) Check your answers with Students A and B who have its full version.
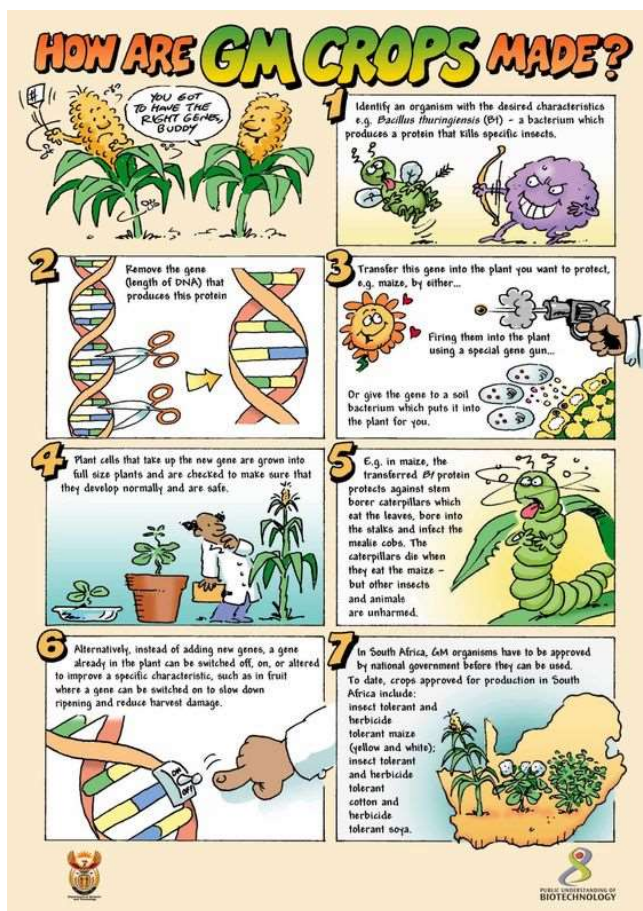
Exercise 4. "Genetically modified organisms" (10 minutes)
(Skinner, Gary and Ann Skinner: Revise Salters-Nuffield, AS/A Level, Biology A, Revision Workbook, p.134)

Instruction:
Read the information about GMOs.

"Cotton plants are used to produce fibre from which cotton cloth is made. They are grown in certain parts of the world, such as India and the USA, where cotton farming is an important way in which people earn their living. Normally, genetically modified (GM) cotton plants have

been developed which produce a natural insecticide of their own. This insecticide kills the insect pests but is harmless to humans."

These follow-up sentences list advantages to cotton farmers and to the environment of growing genetically modified cotton. Match halves of the sentences 1,2,3 with a,b,c.

1) Genetically modified cotton is likely to have an improved yield
2) It may also allow the farmer to spend less money on insecticides,
3) The reduced use of insecticides would have benefits for wildlife
a) further increasing his profit.
b) as it would not kill insects that are not pests, for example, bees.
c) which is an advantage to the farmer.

Answer:
1 c. Genetically modified cotton is likely to have an improved yield, which is an advantage to the farmer.
2 a. It may also allow the farmer to spend less money on insecticides, further increasing his profit.
3 b. The reduced use of insecticides would have benefits for wildlife as it would not kill insects that are not pests, for example, bees.

Read the information below.

In some countries genetically modified organisms are banned; in others they are freely grown. Pick words from the list to fill in the gaps.

*[convincing   harmful   widely   reduce   dependency   transferred
        exploitation   diversity   strains]*

There is little ….(a) evidence that GM is … (b) and it is ... (c) used in the USA and India. GM has huge potential to …(d) prices. In addition, it can reduce … (e) on pesticides and therefore damage to the environment (…)
On the other hand, there could be undiscovered risks of GM and not all GM projects have been successful. Genes may be (f) … from engineered plants to other organisms with consequences that we cannot foresee. There is always the potential for …(g) of poorer farmers by biotech companies. There may be a loss of genetic … (h) as we rely more and more on a small number of GM …(i).
Answer:
a). convincing b) harmful c) widely d) reduce e) dependency f) transferred g) exploitation h) diversity i) strains

Exercise 5. Sum up the discussion (critical thinking) and self-assessment (5 minutes)

Evaluate the science and ethics of banning the use of GMOs in a class discussion. Take into account both the positive as well as the negative aspects of GMOs production (cognition), relate it to the geo-political situation (culture) of a country and try to form your own opinion. Try to specify what you have learnt in this lesson.