**Plant diseases**



1. Read the two statements about plant diseases.

Which one do you **most** agree with?

|  |  |
| --- | --- |
| **A** | Humans don’t need to worry about plant diseases. |
| **B** | Humans should care about plant diseases. |

1. How would you explain your answer to question 1?

|  |  |
| --- | --- |
| **A** | If all the plants die of diseases we can eat animals instead. |
| **B** | We’ll be OK so long as we don’t eat any plants that have a disease. |
| **C** | Plants can’t feel pain. |
| **D** | We depend on plants for food and materials. |
| **E** | Plants don’t get diseases. |

*Biology > Big idea BHD: Health and disease > Topic BHD1: What are health and disease? > Key concept BHD1.2: Disease*

|  |
| --- |
| **Diagnostic question** |
| **Plant diseases** |

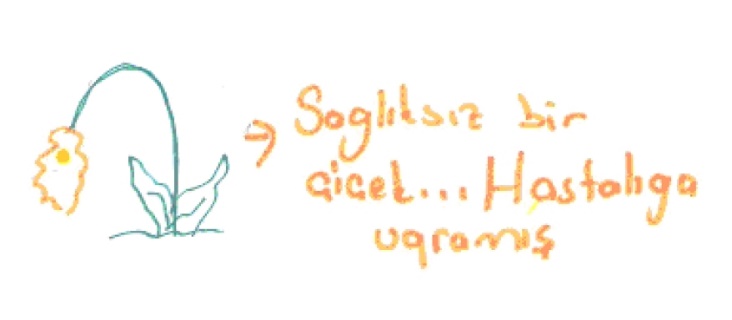
**Overview**

|  |  |
| --- | --- |
| Learning focus: | The good health of organisms can be compromised by infectious and non-infectious diseases, which can be caused by germs, lifestyle, environment, or information in the genome. |
| Observable learning outcome: | Recall that the good health of all organisms can be compromised by diseases. |
| Question type: | Two-tier multiple choice |
| Key words: | Health, disease |

**What does the research say?**

Learning about plant diseases is important due to the interdependence of organisms; for example, plant disease has a significant impact on human food security. It has been estimated that plant pests and pathogens are responsible for approximately 12.5% of global crop losses (Oerke, 2006), and for losses of up to 42% of the annual production of the six most important food crops (Guest, 2012).

When children aged 14-15 in Turkey were asked to draw and write about disease, only one student out of 81 drew anything related to plant disease (a “faded flower” that was said to be “sick”); all other answers pertained to humans (Isik, Çetin and Özarslan, 2017).



“A faded flower. It is sick.” *(from Isik, Çetin and Özarslan, 2017)*

In England, the current National Curriculum programme of study for science does not explicitly require students to learn about plant diseases until age 14, a requirement that was introduced for the first time in 2014 (Department for Education, 2013b; 2013a; 2014).

Curriculum development work undertaken by the Royal Society of Biology in the UK (McLeod, 2018) and the American Association for the Advancement of Science (AAAS Project 2061, 2009) advocates learning about the causes of both infectious and non-infectious diseases in science lessons from age 5. A focus only on disease in humans would provide an undesirably restricted view, and could lead to (or reinforce) the misunderstanding that only humans get diseases.

**Ways to use this question**

Students should complete the questions individually. This could be a pencil and paper exercise, or you could use the PowerPoint presentation with an electronic voting system or mini white boards.

*Differentiation*

You may choose to read the questions and answers to the class, so that everyone can focus on the science. In some situations it may be more appropriate for a teaching assistant to read for one or two students.

**Expected answers**

1. B - Humans do need to care about plant diseases.
2. D - We depend on plants for food and materials.

**How to respond - what next?**

If there is a range of answers, you may choose to respond through structured class discussion. Ask one student to explain why they gave the answer they did; ask another student to explain why they agree with them; ask another to explain why they disagree, and so on. This sort of discussion gives students the opportunity to explore their thinking and for you to really understand their learning needs. Responses often work best when the activities involve paired or small group discussions, which encourage social construction of new ideas (meaning making) through dialogue.

If students pick answer 2A (“If all the plants die of diseases we can eat animals instead”), or if they do not understand why answer 2D (“We depend on plants for food and materials”) is the correct answer, they may have misunderstandings about the interdependence of animals and plants. Topic BOE1 *Interdependence of organisms* provides diagnostic questions and response activities to further probe and develop students’ understanding of key concepts including food chains, food webs and the ecosystem services provided by plants.

If students struggle with the idea that plants can get diseases, the class could be asked to suggest recent examples of outbreaks of plant disease that they have heard of, such as ash dieback, or to research historical examples, such as potato blight. They could also be taken out to explore the local area around the school for signs of common plant diseases such as bramble rust or powdery mildew; the following BEST ‘response activity’ describes just such an activity, and could be used in follow-up to this diagnostic question:

* Response activity: Plant disease detectives

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Images: bramble leaf rust - BioImages.org/Malcolm Storey

**References**

AAAS Project 2061. (2009). *Benchmarks for Science Literacy* [Online]. Available at: <http://www.project2061.org/publications/bsl/online/index.php>.

Department for Education (2013a). *Science programmes of study: key stage 3 - National curriculum in England (DFE-00185-2013),* London, UK.

Department for Education (2013b). *Science programmes of study: key stages 1 and 2 - National curriculum in England (DFE-00182-2013),* London, UK.

Department for Education (2014). *Science programmes of study: key stage 4 - National curriculum in England (DFE-00677-2014),* London, UK.

Guest, D. (2012). The impact of plant disease on food security. *Agriculture,* 2(Special Issue).

Isik, E., Çetin, G. and Özarslan, M. (2017). Students' views about disease concept: drawing and writing technique. *Asia-Pacific Forum on Science Learning and Teaching,* 18(2).

McLeod, L. (2018). Developing a framework for the biology curriculum. *School Science Review,* 100(370)**,** 23-29.

Oerke, E. C. (2006). Crop losses to pests. *The Journal of Agricultural Science,* 144(1)**,** 31-43.