

Exercises biotic and abiotic factors

1. Explain Liebig's Law of the Minimum in your own words and state what agricultural tool it is often compared to.

Example answer: Plant growth is limited by the single most scarce essential resource (the "minimum" factor), not by the total amount of resources. It is often illustrated using a barrel with staves of different heights.

2. Describe vernalisation and name one crop that requires it. What risk does climate change pose to this process?

Answer: Vernalisation is the process where a plant requires exposure to a period of low temperature (below 8°C for winter wheat) to trigger flowering. Risk: Warmer winters due to climate change may prevent this stimulus, leading to lower grain yields.

3. Differentiate between direct and indirect damage caused by pests, giving one specific example of each from the text.

Answer: Direct damage: Physical harm from feeding (e.g., Colorado potato beetle eating leaves). Indirect damage: Harm caused secondarily, such as transmitting a virus (e.g., green peach aphid spreading PLRV/PVY).

4. Why is it important to maintain a "sufficient interval" between crops of the same plant family? Relate your answer to pest and disease management.

Answer: Plants in the same family often share similar pests and diseases. Planting them successively without a break allows pest/disease populations to build up in the soil, increasing the risk of severe infestation.

5. Define the difference between the "damage threshold" and the "control threshold" in IPM.

Answer: The damage threshold is the pest level at which yield loss equals the cost of control. The control threshold is the pest level at which control measures must be taken to prevent the population from reaching the damage threshold.

6. A field of maize is experiencing poor growth. Soil tests show adequate nutrients, recent weather has been warm and sunny, but the soil is compacted and heavy clay. Using Liebig's Law of the Minimum, identify the most likely limiting abiotic factor and explain why it is limiting growth.

Answer: The most likely limiting factor is water availability/aeration due to soil compaction. Even with adequate rainfall and nutrients, compacted clay soil restricts root growth and oxygen supply, limiting the plant's ability to take up water and nutrients.