

# 9Bd GROWING CROPS

1 Discuss the following questions as a group. Then write the best answers.

a Artificial fertilisers are highly soluble in water.

i Describe one advantage of this.

They dissolve in soil water and are quickly available for plants to absorb.

ii Describe one disadvantage of this. (Hint: think about the effect of rain.)

They can easily move into nearby water (e.g. streams, rivers) away from crop roots.

b Artificial fertilisers contain measured quantities of nitrogen, phosphate and potassium salts; manure (natural fertiliser) contains a complex mixture of organic substances (e.g. protein) that contain mineral salts.

i Suggest one advantage of using artificial rather than natural fertiliser.

more quickly available to plants for absorption; easier to judge the amount of nutrients that are available to plants.

ii Explain why manure is spread on a field before the crop is planted, but artificial fertilisers are sprayed on the crop when it is growing. (Hint: think about decomposers.)

Manure contains large organic molecules that need to be broken down by decomposers before plants can absorb the nutrients, which takes time. The nutrients in artificial fertilisers are available as soon as they have dissolved in soil water

c Clay soils have very small particles that clump together so that water does not drain well. Sandy soils have large particles that let water drain quickly. Suggest an advantage and disadvantage for growing crops in each soil type.

holds water so provides water to crops for longer; can keep too much water around roots after a lot of rain causing waterlogging/damaging plant roots.

water drains quickly after rain so no waterlogging of roots, but plants more likely to die if no rain.

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2 Suggest why farmers in low-income countries may not use selective herbicides.

too expensive; lack of availability; not suitable for the crops they grow.

3 Aphids are insect pests. They suck the sugary liquid (sap) from plant phloem tissue. Explain how spraying a crop to kill aphids could increase crop yield.

The liquid contains sugars that are a source of energy for the plant. Killing the aphids means more sugars/energy available to the plant for respiration and growth.

4 Explain how cross-breeding can produce improved varieties of plants.

Cross-breeding can produce varieties (or breeds) that have good characteristics inherited from both parents.

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Students carried out an investigation on fertiliser. Each group grew 20 bean plants in identical pots, one plant per pot. Each group added a different amount of the same liquid fertiliser to their pots. The mean increase in height of bean plants in each group was calculated after a week. The table shows the results.

Group number	1	2	3	4
Number of drops of liquid fertiliser	2	4	6	8
Mean increase in height of seedlings in group (cm)	4.6	6.3	7.8	7.2

Explain the trend in results between groups 1, 2 and 3.

Height increases with number of drops used because more fertiliser means more nutrients for plant growth.

What advice would you give to a farmer on the amount of fertiliser to use based on the result for group 4? Give a reason for your answer.

do not use more fertiliser than plants can absorb, because it can reduce growth (get washed away/be a waste of money).

Describe one change you would make to the method for this investigation to be more sure of the results. Give a reason for your answer.

make sure the plants are grown in same conditions of light and temperature, because they can both affect growth

- 6 An apple breeder has parent plants of a yellow apple variety that is not sweet and a red apple variety that is sweet. Complete the sentences to describe how the breeder could produce a yellow sweet variety by selective breeding.

The two parent plants are crossed-breeding and new plants grown

The breeder selects plants that produce the yellowest and sweetest apples to breed from.

This process is repeated over many generations to produce the new variety.

- 7 Farms in the UK today produce 35% more food per m<sup>2</sup> than they did in 1973. Explain how.

Farmers use better fertilisers, higher yielding varieties, more efficient machinery and more pesticides than they did in 1973.