3.4 Plant disease

Name: _____ Class: _____ Date: _____ **Total: 18 marks**

KEY WORDS aphids • chlorosis

Objective

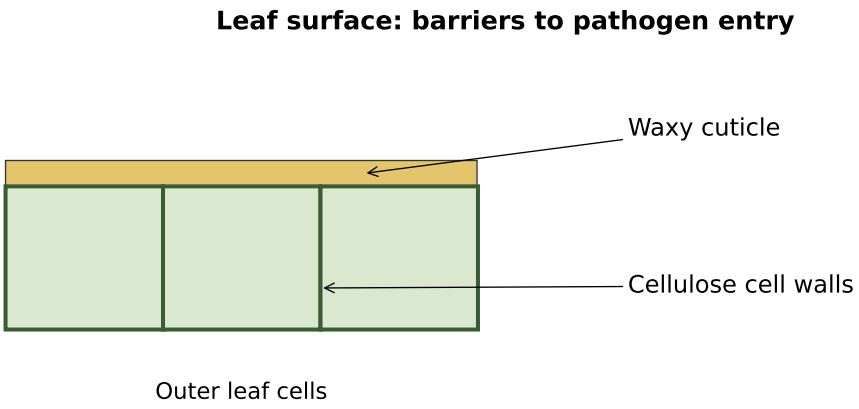
Detect and identify plant disease, explain nitrate and magnesium deficiency, and describe physical, chemical and mechanical defences. Biology only. Original questions for spec statement 4.3.3.

1 Key knowledge and worked examples

Detection and identification (HT): stunted growth, spots, decay, growths, malformed stems/leaves, discolouration and visible pests are signs, not unique diagnoses. Compare the pattern with a gardening manual/website; have a laboratory examine an affected plant/sample; use a suitable monoclonal-antibody kit for a specified pathogen antigen, following its control/instructions.

Named problems: **TMV** (virus), **rose black spot** (fungus), **aphids** (insects).

Deficiency	Mechanism and sign
nitrate ions	less amino-acid/protein synthesis → stunted growth
magnesium ions	less chlorophyll → **chlorosis** (yellow leaves), reduced photosynthesis



Defences: physical – walls, cuticle, bark; chemical – antibacterial substances, poisons; mechanical – thorns/hairs, touch-induced drooping/curling and mimicry.

> **Worked example (2 marks, 2025 Q04.8):** Yellow leaves without spots **may** result from magnesium shortage (1), because magnesium is needed to make chlorophyll (1). Lack of light is another accepted explanation. The symptom alone does not prove the cause or rule out infection.

2 Practice

2.1 Give three signs of plant disease. [3]

2.2 State the ion whose deficiency causes chlorosis and why. [2]

2.3 Give one physical and one chemical plant defence. [2]

3 Exam-style questions

3.1 A gardener's tomato plants show yellowing leaves and poor growth. Describe two ways to identify the problem. [4]

3.2 Explain how magnesium deficiency reduces growth. [3]

3.3 Rose plants have thorns; some plants droop when touched. For each, name the defence category and explain the benefit. [4]