

Solutions

2.1 Any three: stunted growth, spots, decay/rot, growths, malformed stems/leaves, discolouration, visible pests.

2.2 Magnesium ions; magnesium is needed to make chlorophyll, without which leaves cannot absorb light for photosynthesis.

2.3 Physical: cellulose cell wall / waxy cuticle / bark. Chemical: antibacterial chemical / poison deterring herbivores.

3.1 Any two fully described: compare the symptoms with a gardening manual or website; take a diseased plant, or a sample, to a laboratory for analysis of the pathogen; use a monoclonal-antibody testing kit on a tissue sample. Max 4 with one mark for the method and one for how it gives the answer each.

3.2 Without magnesium, the plant cannot make chlorophyll; less light energy can be absorbed, so photosynthesis is reduced; less glucose is produced, so there is less energy and material for growth.

3.3 Thorns – a mechanical defence; they deter animals from eating or climbing the plant. Drooping when touched – also mechanical; it discourages grazing insects or makes the plant seem less appetising / knocks pests off.