

Knowledge



1. B-lymphocyte
2. Because they divide quickly
3. Hybridoma
4. Antigens

5.

Mineral Ion	Needed for	Symptoms of deficiency
Nitrate	making proteins	Stunted growth
Magnesium	Making chlorophyll	Yellow leaves and stunted growth

6. Waxy cuticle
7. Cellulose

Application

1. Inject a mouse with the antigen you are interested in. The B-lymphocytes will start making antibodies specific to the antigen. Collect the B-lymphocytes and fuse them with a tumour cell to produce a hybridoma, which is a fast dividing cell that can produce antibodies. Clone the hybridoma so that you have lots of them and they will produce antibodies that are monoclonal and specific for the antigen.
2. Look the symptoms up in a gardening book, get a testing kit (this might use monoclonal antibodies) or take the plant to a lab.

3. Physical defences – waxy cuticle and cellulose both act as physical barriers, and so does bark on trees, which is just layers of dead cells

Chemical defences – some plants produce poisons, e.g foxgloves and deadly nightshade, and some produce antibacterial chemicals – like witch hazel.

Mechanical defences – thorns or hairs stop animals touching or eating them.

4. Isolate the protein that is on the surface of the cancer cells. Inject this into a mouse and collect the b-lymphocytes that will be making antibodies to fit the antigen. Merge this cell with a tumour cell to create a hybridoma cell and then clone it many times. Collect the antibodies from the cells. Attach the toxic chemical to the antibodies and inject them into the patient. The antibodies will only bind to the cancer cells as they contain the antigen and then the toxic chemical will be delivered to the cells.

- sunny area, with nitrate and magnesium added to the soil B
- sunny area, with magnesium but **no** nitrate added to the soil A
- sunny area, with nitrate but **no** magnesium added to the soil D
- dark area, with nitrate and magnesium added to the soil. C