8.7 Commercial uses of plant hormones

How plant hormones may be used in commercial contexts

Auxins

Auxins are responsible for some cell elongation, and are involved in responsive processes, such as positive and negative phototropism. Under a commercial context, artificial auxins can be used to prevent leaf and fruit **abscission** ('drop') and to promote flowering in plants which flower. Other uses may also include:

- taking cuttings – dipping the end of a cutting in rooting powder before planting it encourages root growth, and this rooting powder contains auxins, among other ingredients
- growing seedless fruit – treating unpollinated flowers with auxins can promote seedlessness in fruit growth
- herbicides – artificial auxins can be used for herbicides to help kill unwanted weeds, as it enters the phloem and flows around the entire plant and elongates the shoots so much that the stem cannot support the plant any further that it buckles over and dies

Cytokinins

Because **cytokinins** prevent **senescence** of leaves and fruit (the removal of nutrients due to ageing), these hormones can be used in our favour for example to prevent the yellowing of lettuce leaves after they have been picked. It is when levels of cytokinin decrease (which happens after being picked) that senescence occurs, and this results in the yellowing of leaves – senescence is what gives leaves their autumn colour.

Cytokinins are also used in **tissue culture** to help with the mass production of plants. They also promote bud and shoot growth from small pieces of tissue taken from a parent plant. This produces a short shoot with a lot of side branches, which can be split into lots of smaller plants, and all grown separately.

Ethene

The gas **ethene** is inhibited by the hormone auxin, so as auxin levels drop, ethene is produced which stimulates the production of **cellulase** in the *abscission zone* of a leaf. Whilst ethene is a gas, and therefore cannot be sprayed directly, a liquid spray has been developed which releases ethene inside the target plants. Commercial uses include:

- speeding up ripening of fruit (in apples, tomatoes and citrus fruits)
- promoting fruit drop in cotton, cherry and walnut plants
- promoting lateral growth in some plants, yielding compact flowering stems

Gibberellins

In plants, **gibberellins** are involved in both cell elongation and cell division. Under a commercial context, gibberellins may be involved in:

- fruit production – gibberellins delay senescence in fruit, extending the time they can be left unpicked or in the shops
- also, gibberellins acting with cytokinins can promote elongation in apples, improving their shape
- brewing – adding gibberellins to the process of producing malt (in a malthouse at the brewery) speeds up production