**14.5 Tropic responses**

**Define gravitropism** - a response in which parts of a plant grow towards or away from gravity

**Define phototropism** - a response in which parts of a plant grow towards or away from the direction from which light is coming

**Investigate gravitropism and phototropism in shoots and roots**

*Phototropism* Investigation:

*IGCSE Biology* (Jones & Jones), p. 139, Activity 10.5 ‘To find out how shoots respond to light’.

*Geotropism* Investigation: *IGCSE Biology* (Jones & Jones), p. 140, Activity 10.6 ‘To find out how roots respond to gravity’.

**Explain phototropism and gravitropism of a shoot as examples of the chemical control of plant growth. Explain the role of auxin in controlling shoot growth, limited to:**

 **– auxin made in shoot tip (only)**

 **– auxin spreads through the plant from the shoot tip**

 **– auxin is unequally distributed in response to light and gravity**

 **– auxin stimulates cell elongation**

*Control of plant growth by auxins*

* Auxins are growth hormones;
* They are produced by the shoot and root tips of growing plants;
* An accumulation of auxin in a shoot stimulates cell growth by the absorption of water;
* However, auxins have the opposite effect in roots, when they build up, they slow down cell growth



*Role of auxins in phototropism and geotropism*

*Phototropism:*



* When a shoot is exposed to light from one side, auxins produced from the shoot tip towards the shaded side of the shoot;
* Cells on shaded side stimulated to absorb *more water* than those on the light side;
* Thus unequal growth causes the stem to bend towards light;
* This is called *positive phototropism.*
* If a root is exposed to light in the absence of gravity, auxins produced by the root tip moves towards the shaded side of the root;
* Cells on the shaded side are stimulated to absorb *less water* than those on the light side;
* Thus unequal growth causes the root to bend away from the light;
* This is called *negative phototropism*.

*Geotropism*

* Shoot and roots also respond to gravity;
* If a shoot is placed horizontally in the absence of light, auxins accumulate on the lower side of the shoot, due to gravity;
* This makes the cells on the lower side grow *more quickly* than on the upper side, so the shoot bends upwards - *negative geotropism*;



* If a root is placed horizontally in the absence of light, auxins accumulate on the lower side of the root, due to gravity;
* Thus the cells on the lower side grow *more slowly* than those on the upper side, so the root bends downwards - *positive phototropism.*

**Describe the use in weedkillers of the synthetic plant hormone 2,4-D**