**Xylem and Phloem Questions**

Transport in Plants

* List the components of the vascular bundle

The components of the vascular bundle are the xylem, phloem, and the cambium layer.

* Outline the role of the cambium layer

The cambium layer is one of the components forming the vascular bundle. It contributes to plant growth, being an accumulation of actively dividing cells.

Xylem

* Outline the role of the xylem

The xylem, occupying the inner portion/centre of the vascular bundle, transports water and minerals from the roots to aerial parts of the plant (unidirectional transport).

Phloem

* Outline the role of the phloem

The phloem facilitates the movement of sugars through active transport, supporting the non-photosynthetic parts of the plant such as the roots, as well as satiating storage structures such as tubers or bulbs. In this process called translocation, sap within the phloem travels by diffusion between cells and works its way from leaves down to the roots, assisted by gravity.

Check for Understanding

* Describe how the sucrose concentration changes from the leaf to the phloem and then to the roots.

The concentration of sucrose increases as it goes from the leaf and into the phloem, as the molecules are being actively transported against the concentration gradient. Upon reaching the roots, the sucrose concentration decreases, as the molecules are being actively loaded into the sink cells.

Sieve Tubes

* Outline the role of a sieve tube.

Sieve tubes are a primary component of the phloem, allowing the phloem’s function of transporting sugars, nutrients, and other metabolites. Water enters sieve tubes and creates a positive pressure, moving the solution from a source cell (leaf) towards a sink cell (root).

* Define the term sink cell and explain why they are vital.

The sink cell is the destination point for the material carried through a sieve tube. Sugars are removed from the sieve tubes at the sink cell, maintaining the difference in concentration between the sections. This concentration difference is crucial in creating the positive pressure that drives translocation, also storing sugars for future use.

Companion Cells

* Outline the role of companion cells.

Companion cells, another component of the phloem, run adjacent to sieve tube members and provide them with proteins necessary for signalling, along with ATP that sustains the transport of molecules throughout the plant. In addition, companion cells can sometimes deliver sugars and other substances into the sieve tubes from neighbouring cells.