

Topic 9.2 Transport in the Phloem of Plants

Define the below vocabulary words and address the below questions in a separate document.

Vocabulary words:

Phloem	Companion cells	Plasmodesmata	Isotope
Sieve tubes	Translocation	Apoplast route	Radioactive decay
Sieve tube cells	Sink	Symplast route	
Sieve plates	Source	Osmosis	

9.2.U1 Plants transport organic compounds from sources to sinks

1. Draw a picture that shows the relationship between phloem tissue, sieve tubes, sieve tube cells, sieve plates, and companion cells
2. Define translocation, phloem sap, source and sink.
3. List examples of source and sink tissues.
4. State how phloem transport occurs within plants.
5. Complete the Activity on page 413.

9.2.U2 Incompressibility of water allows transport along hydrostatic pressure gradients

6. Outline why pressure in the phloem increases due to the movement of water into the phloem.
7. Complete the DBQs on page 415.

9.2.U3 Active transport is used to load organic compounds into phloem sieve tubes at the source.

8. State the most prevalent solute in phloem sap.
9. Outline why sucrose is used for phloem transport, as opposed to glucose.
10. Describe the active transport of sucrose into the phloem via a co-transport protein.

9.2.U4 High concentrations of solutes in the phloem at the source lead to water uptake by osmosis

11. Describe how phloem becomes hypertonic to xylem. Why is this process important to the plant?
12. State the name of the process that water moves into the phloem.

9.2.U5 Raised by hydrostatic pressure causes the contents of the phloem to flow toward sinks

13. **REVIEW:** Look over Water Potential Lecture in Topic 1 and describe the factors that lead to the movement of water from one area to another area.
14. Describe how pressure potential plays a role in the translocation of water and dissolved materials.

9.2.A1 Structure-function relationships of phloem sieve tubes

15. State the function of phloem. Use the terms loading of carbohydrates at a source, transport of carbohydrates through the plant, and unloading of carbohydrates at a sink.
16. Outline the structure and function of sieve tube cells, with specific mention of the rigid cell wall and sieve plates.
17. Outline the structure and function of companion cells, with specific mention of mitochondria and cell membrane.
18. Complete the "Activity: Analysis of an electron micrograph of phloem tissue" on page 416.

9.2.S1 Analysis of data from experiments measuring phloem transport rates using aphid stylets and radioactively labeled carbon dioxide

19. Outline how aphids have been used to measure the rate of flow and composition of phloem sap.
20. Outline how radioactive carbon isotopes are used to study translocation.
21. Complete the DBQs on page 418, 419 and 420