Translokasi Fotosintat

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Floem

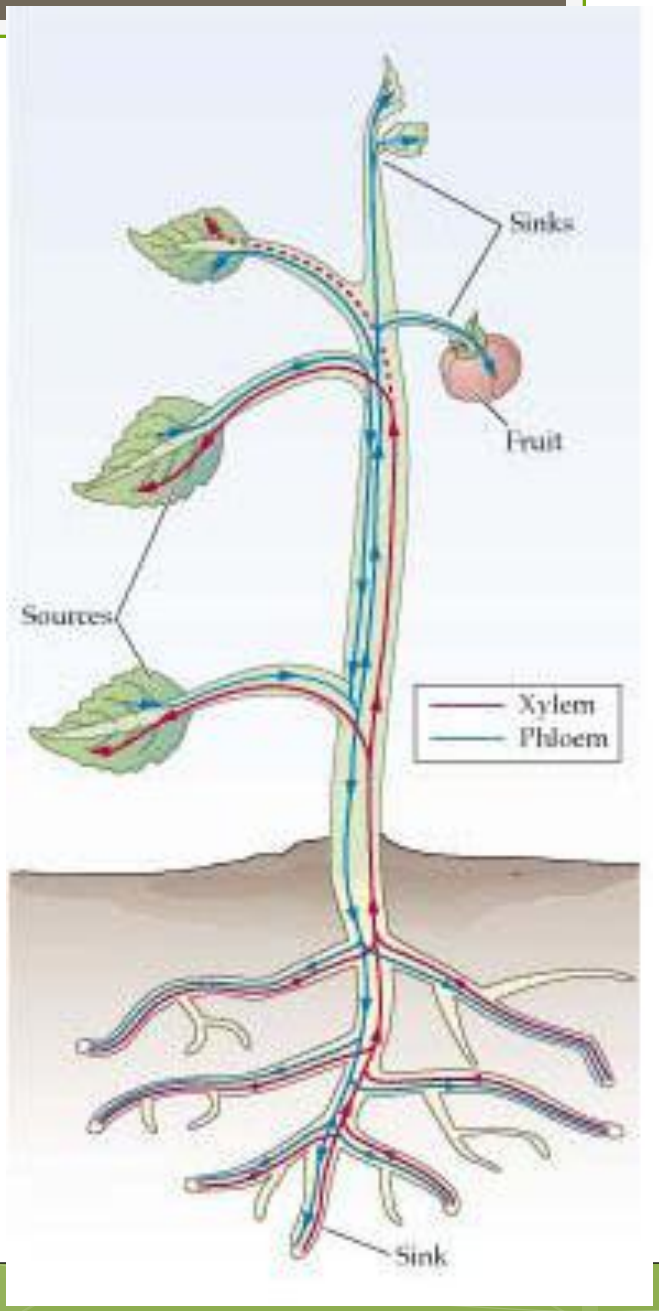
- Jaringan yang mengangkut produk fotosintesis dari dedaunan dewasa ke daerah penyimpanan atau yang mengalami pertumbuhan

Patterns of translocation: Source to Sink

Metabolites move from source to sink.

SOURCE = area of supply
- exporting organs: mature leaves
- storage organs: seed endosperm, storage root of second growing season beet

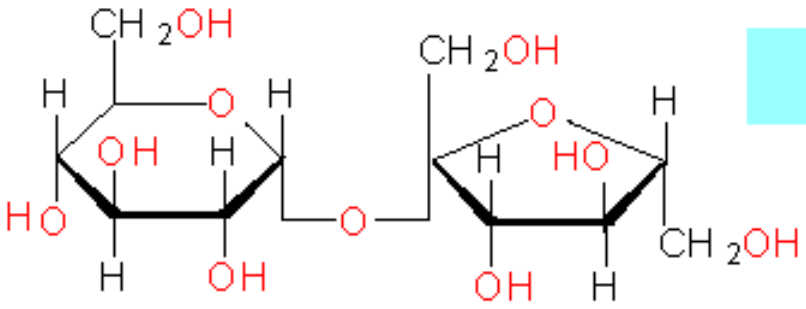
SINK = areas of metabolism (or storage)
- non-photosynthetic organs and organs that do not produce enough photosynthetic products to support their own growth or storage
- Example: roots, tubers, developing fruits/seeds, immature leaves



Sucrose

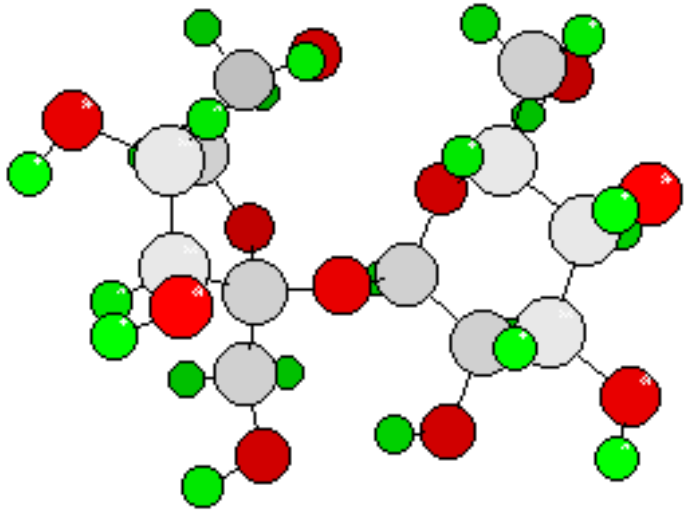
The sugar that is most important in translocation is sucrose

Sucrose is a disaccharide, i.e., made up of two sugar molecules – an additional synthesis reaction is required after photosynthesis

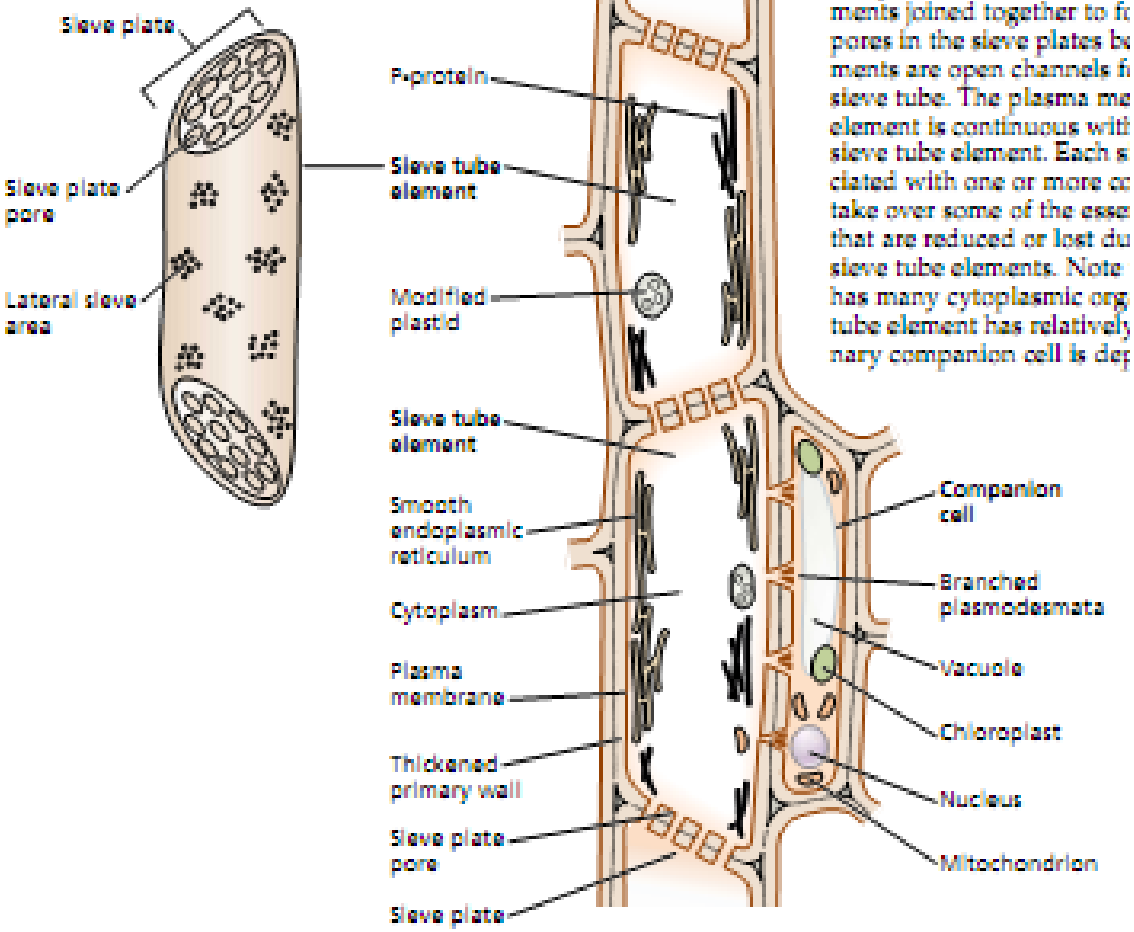


sucrose

Sucrose - is not a rigid structure, but mobile in itself.



http://www.biologie.uni-hamburg.de/b-online/e16/16h.htm#sucr



elements (sieve tube eleme
showing sieve plates and l
Longitudinal section, show
ments joined together to fo
pores in the sieve plates be
ments are open channels fi
sieve tube. The plasma me
element is continuous with
sieve tube element. Each s
ciated with one or more co
take over some of the esse
that are reduced or lost du
sieve tube elements. Note
has many cytoplasmic org
tube element has relatively
nary companion cell is dep

- Sieve elements : sieve tube elements (angispermae)
- Sieve cells : (gymnospermae)

TABLE 10.1
Characteristics of the two types of sieve elements in seed plants

Sieve tube elements found in angiosperms
1. Some sieve areas are differentiated into sieve plates; individual sieve tube elements are joined together into a sieve tube.
2. Sieve plate pores are open channels.
3. P-protein is present in all dicots and many monocots.
4. Companion cells are sources of ATP and perhaps other compounds and, in some species, are transfer cells or intermediary cells.
Sieve cells found in gymnosperms
1. There are no sieve plates; all sieve areas are similar.
2. Pores in sieve areas appear blocked with membranes
3. There is no P-protein.
4. Albuminous cells sometimes function as companion cells.

P-Protein (Phloem) dan Callose

- Penanda bahwa sieve element mengalami kerusakan
- P-Protein ditemukan hanya pd semua tanaman dikotil dan bnyk monokot, dan tdk ada pd gymnospermae
- Ex: Pd genus Cucurbita tdr 2 P-Protein yi PP1 (the phloem filament protein) dan PP2 (The phloem lectin), ke2 PP disintesis di companion cells.

Sugars are translocated in nonreducing form

- Sucrose
- Kompleks sukrosa-galaktosa

The mechanism of translocation in the floem

- In Sources : energy is necessary to move photosynthate from producin cells in to sieve elements (phloem loading)
- In Sink : energy is essential for some aspect of movement from sieve elements to sink cells, which store or metabolize the sugar (Phloem unloading)

The pressure-flow model by Ernst Munch

- That water in the phloem is moving against a water potential gradient from source to sink

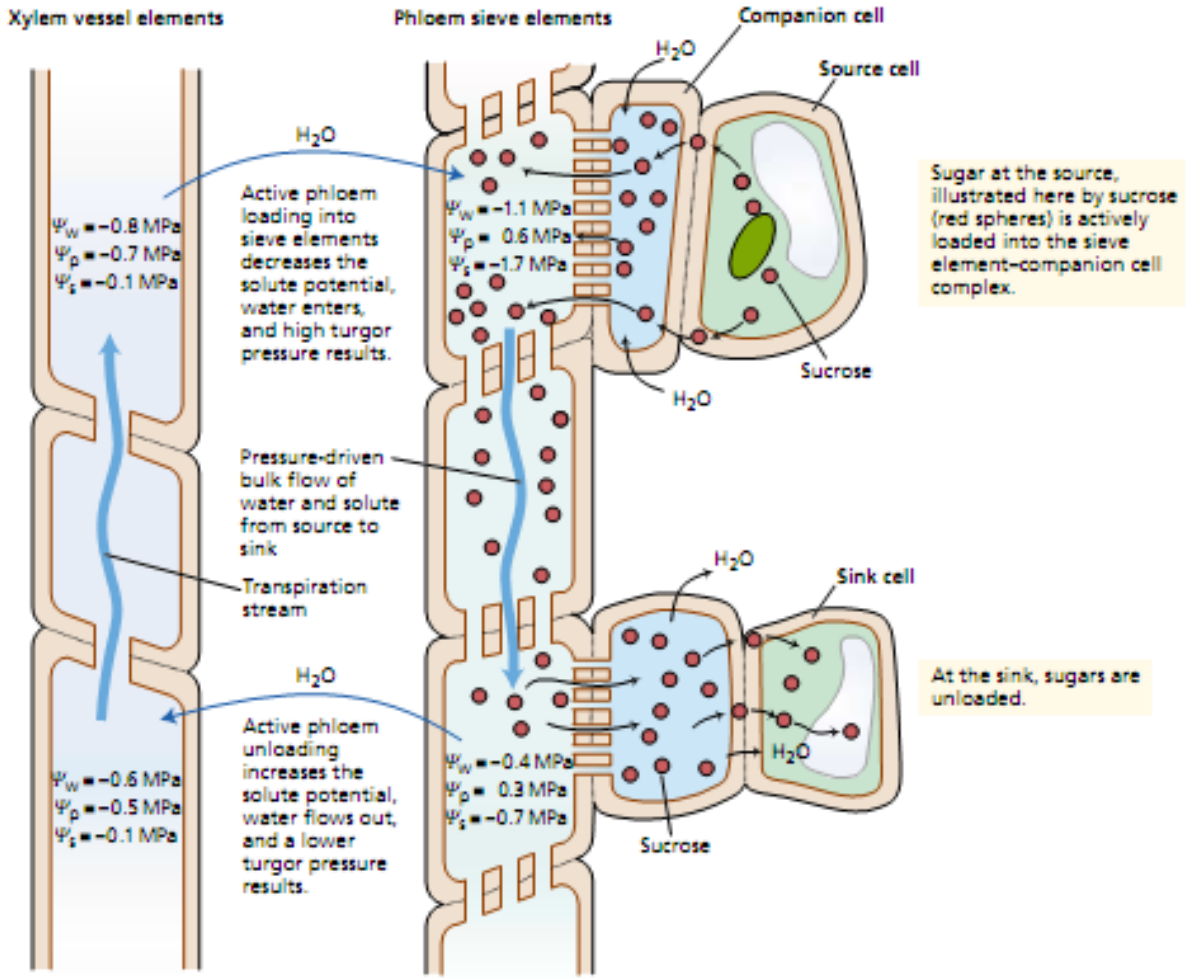


FIGURE 10.10 Pressure-flow model of translocation in the phloem. Possible values for Ψ_w, Ψ_p, and Ψ_s in the xylem and phloem are illustrated. (After Nobel 1991.)

Fotosintat dapat di angkut dari sel mesofil ke sieve elements dg 2 cara

- Apoplas : rute floem
- Simplas : via plasmodesmata

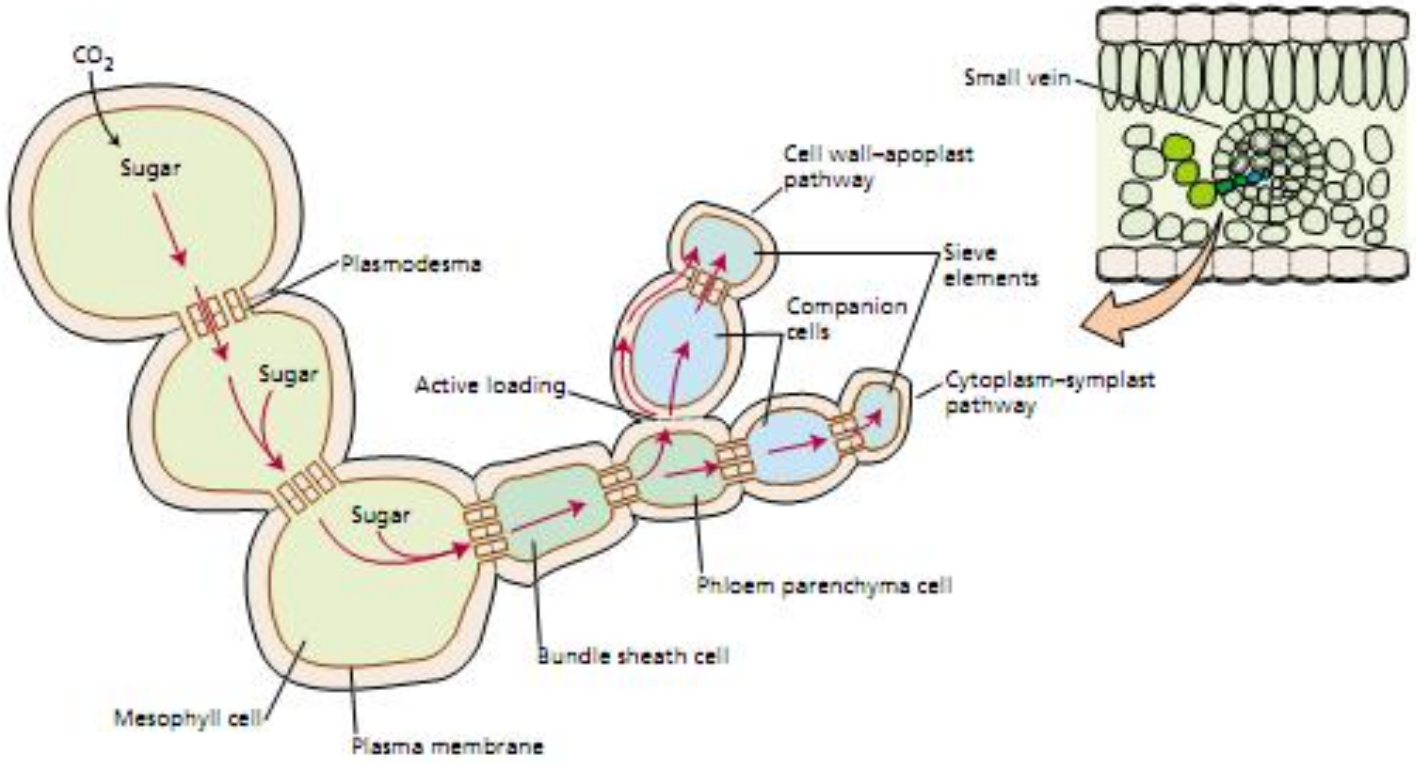


FIGURE 10.14 Schematic diagram of pathways of phloem loading in source leaves. In the totally symplastic pathway, sugars move from one cell to another in the plasmodesmata, all the way from the mesophyll to the sieve elements. In the partly apoplastic pathway, sugars enter the apoplast at some point. For simplicity, sugars are shown here entering the apoplast near the sieve element–companion cell complex, but they could also enter the apoplast earlier in the path and then move to the small veins. In any case, the sugars are actively loaded into the companion cells and sieve elements from the apoplast. Sugars loaded into the companion cells are thought to move through plasmodesmata into the sieve elements.