Histological Atlas of Cassava (*Manihot esculenta* Crantz), Euphorbiaceae

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&

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2000

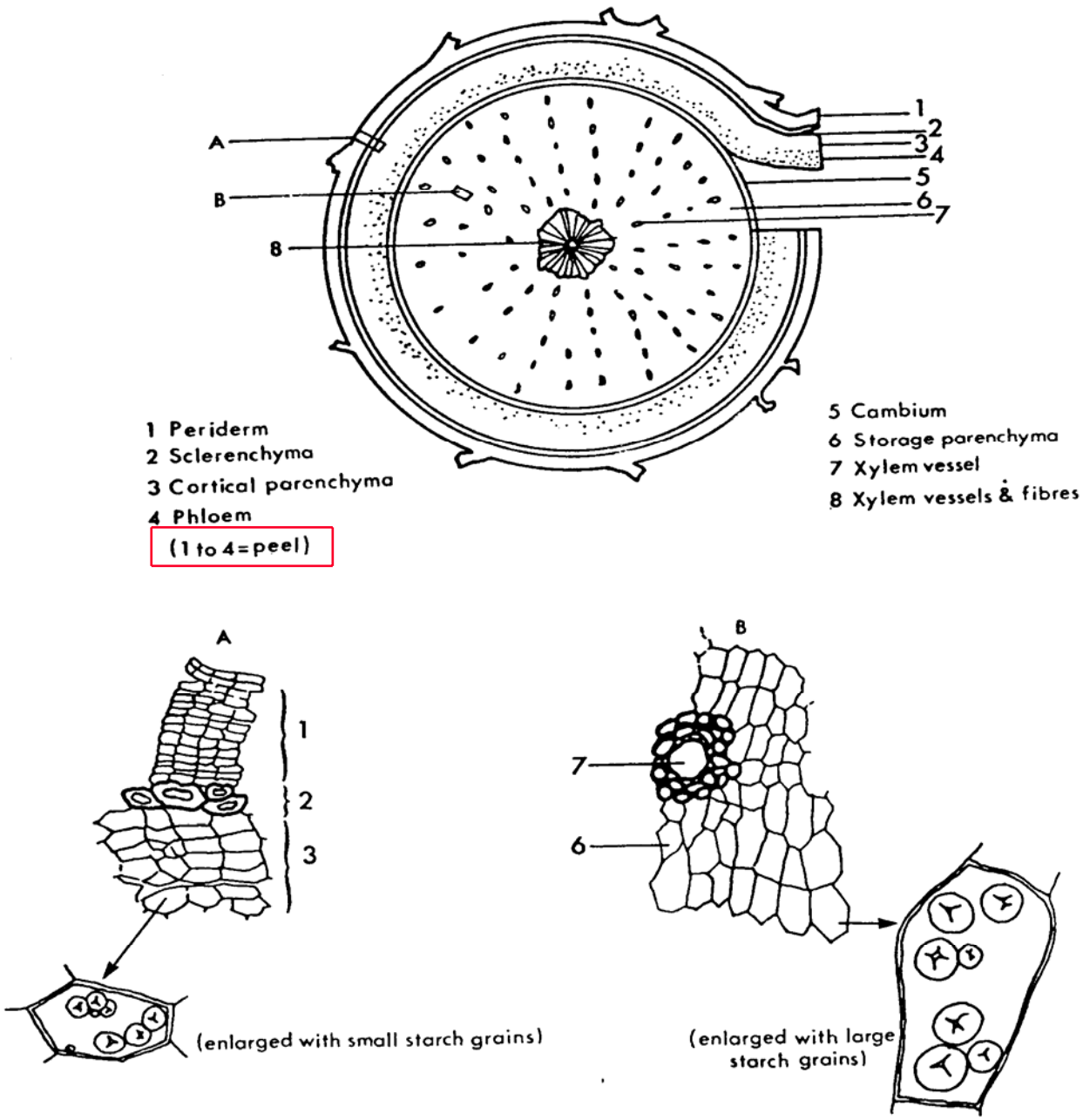

Fig 1: Transverse section of a young storage root.
from: Hunt, L.A., Wholey, D.W. and Cock, J.H. (1977): Growth physiology of cassava (*Manihot esculenta* Crantz). Field Crop Abstracts 30 (2), pp. 77.

Root Tubers

Fig 2: Transverse section of a cassava root (waxed material from CIAT) showing vascular streaking

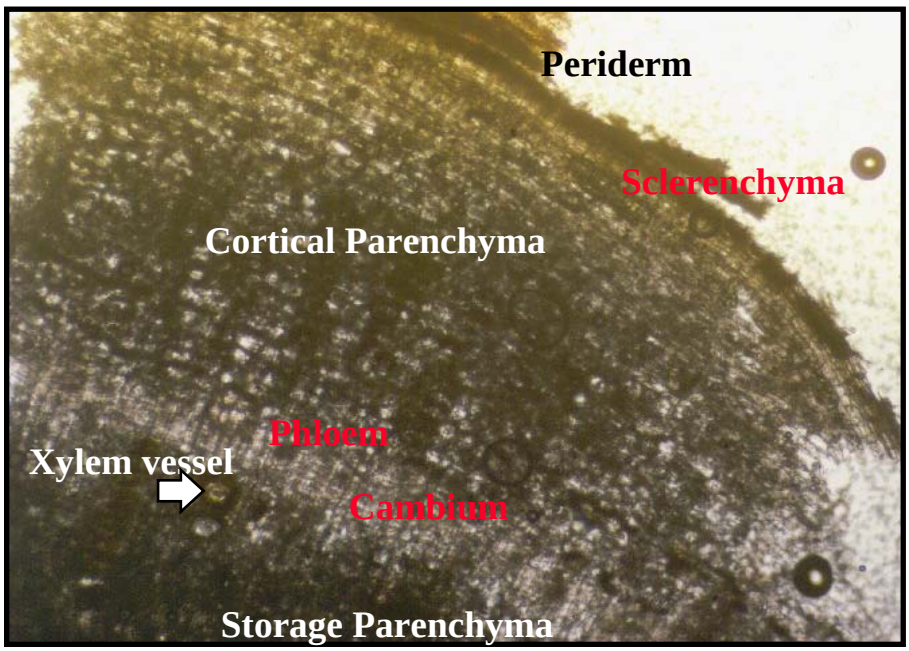

Fig 3: Overview over the outer root tissues

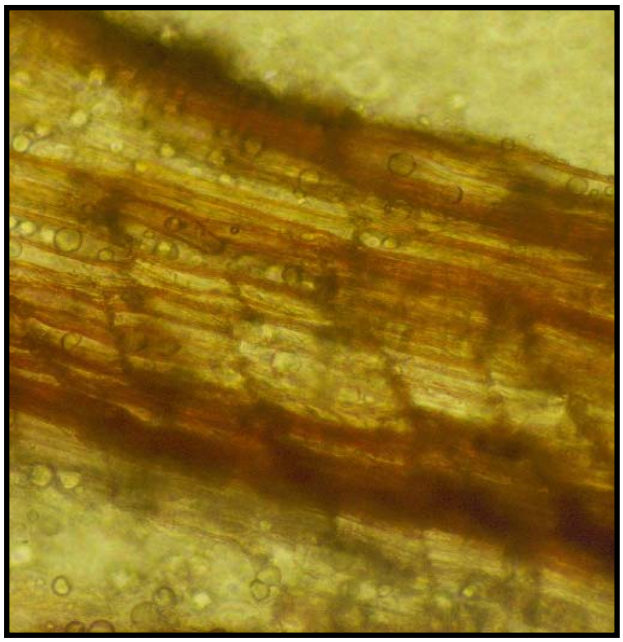

Fig 4: Periderm (cork layers) as secondary boundary tissue (suberification, yellow-brown). Cells are built by a secondary meristem the phellogen or cork cambium.

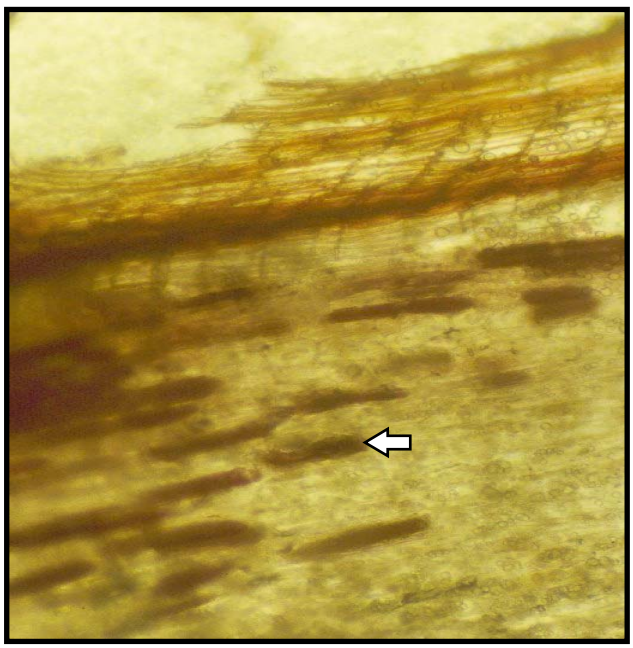

Fig 5: Some cells of the cortical parenchyma contain red coloured pigmentation. Pigmentation does not occur in all cassava cultivars.

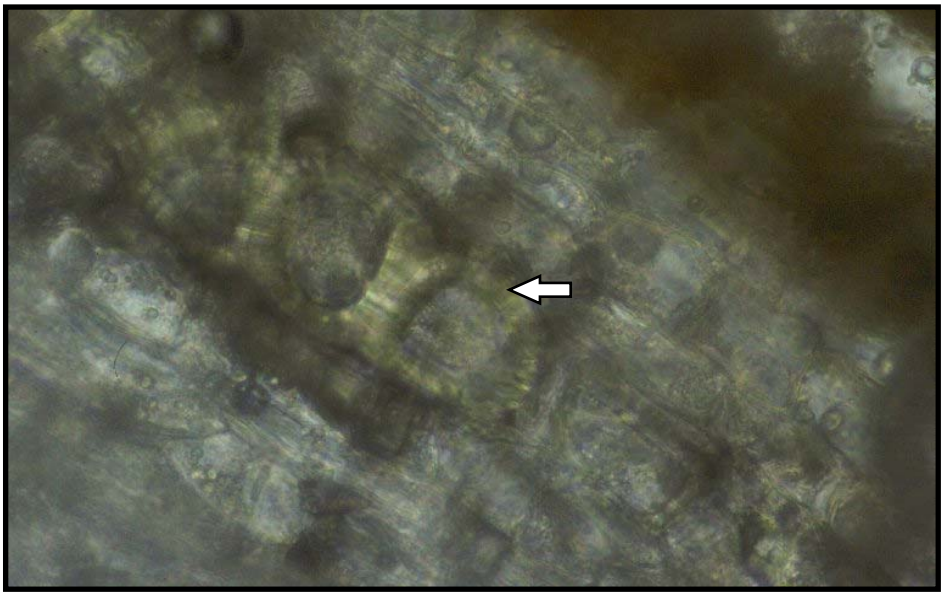

Fig 6: Sclerenchyma with sclereids (stone cells). Sclereids do not occur in all cassava roots. Cell walls are passed through by pits.

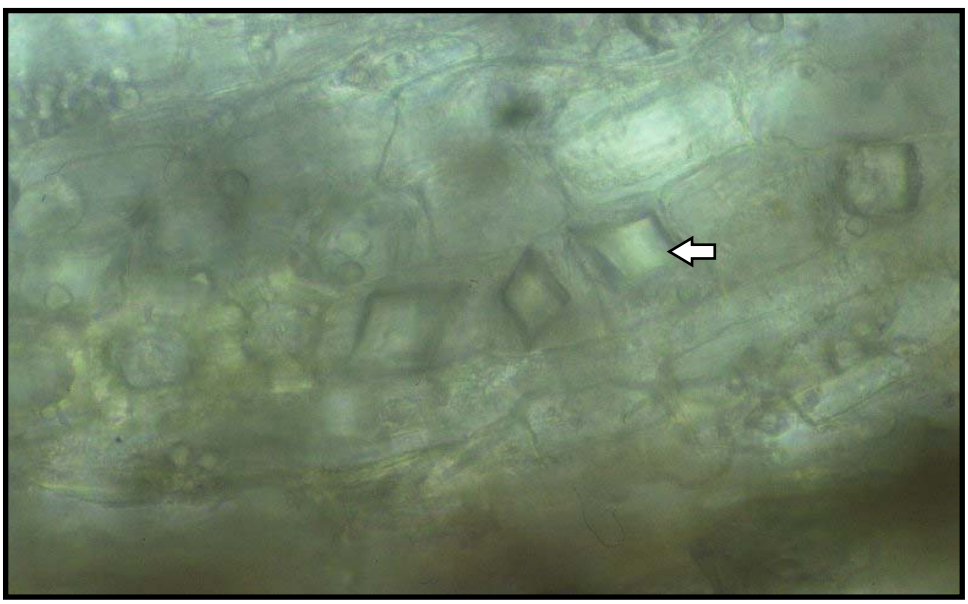

Fig 7: Sclerenchyma with cells containing crystals

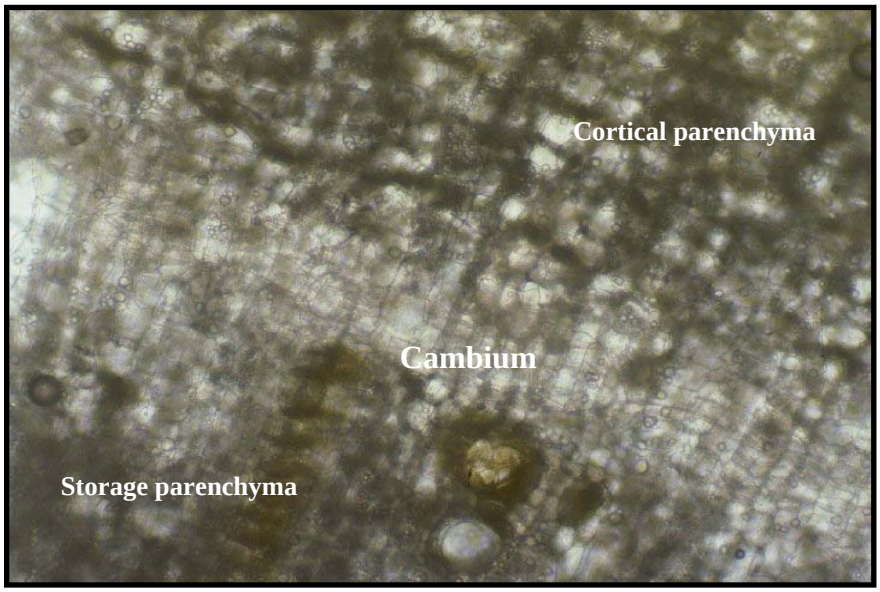

Fig 8: Detail of the cambium tissue (light cells)

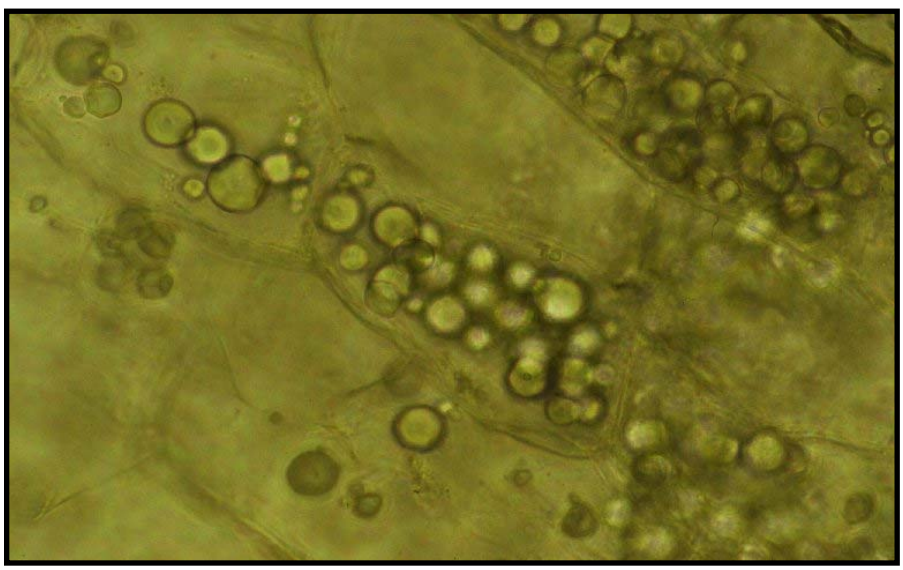

Fig 9: Cell of the storage parenchyma containing starch grains

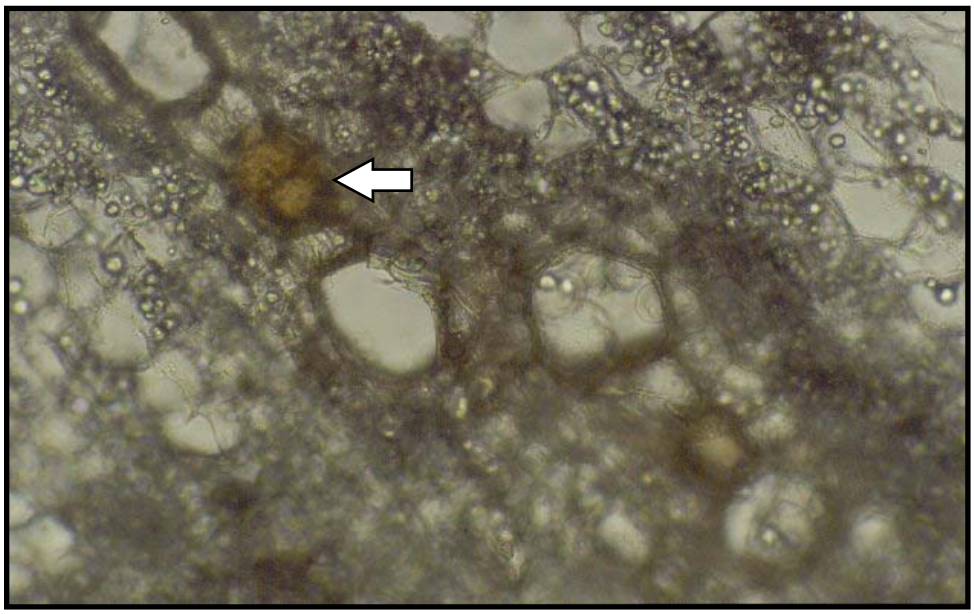

Fig 10: Xylem vessels at the stage of "browning"

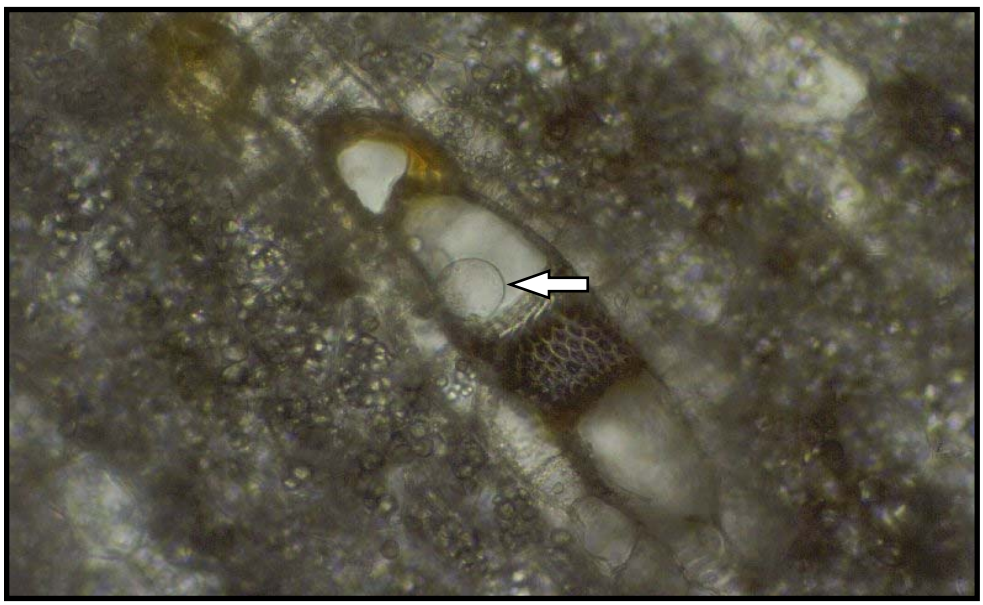

Fig 11: Xylem occlusions of callosis (thylloids).

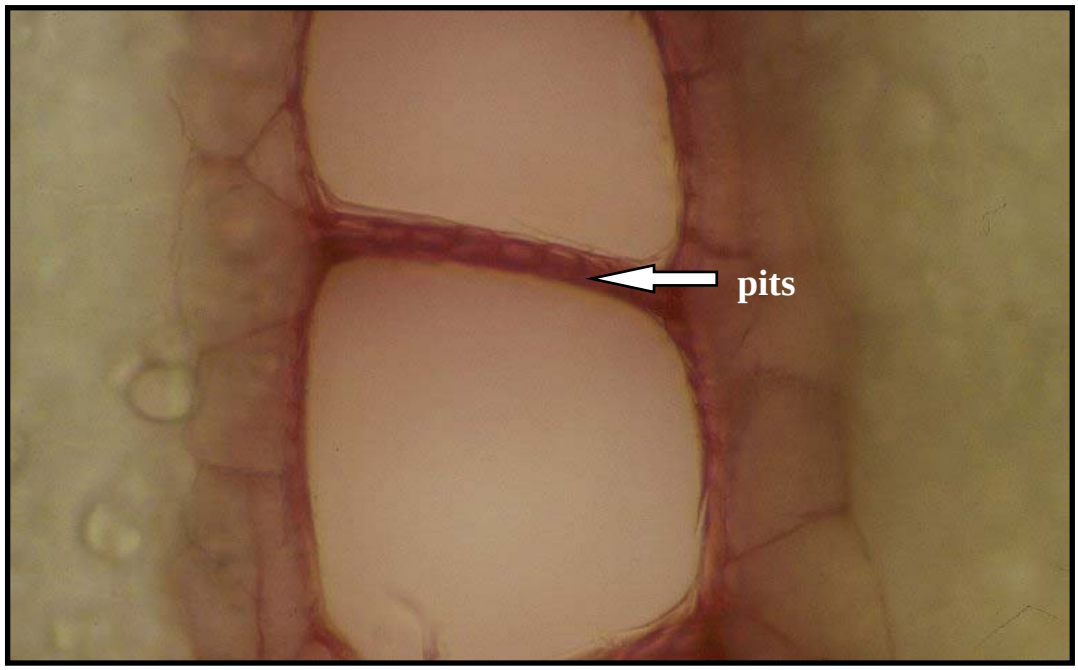

Fig 12: Xylem vessels. secondary cell walls stained with phloroglucin + HCl, indicating the lignification.

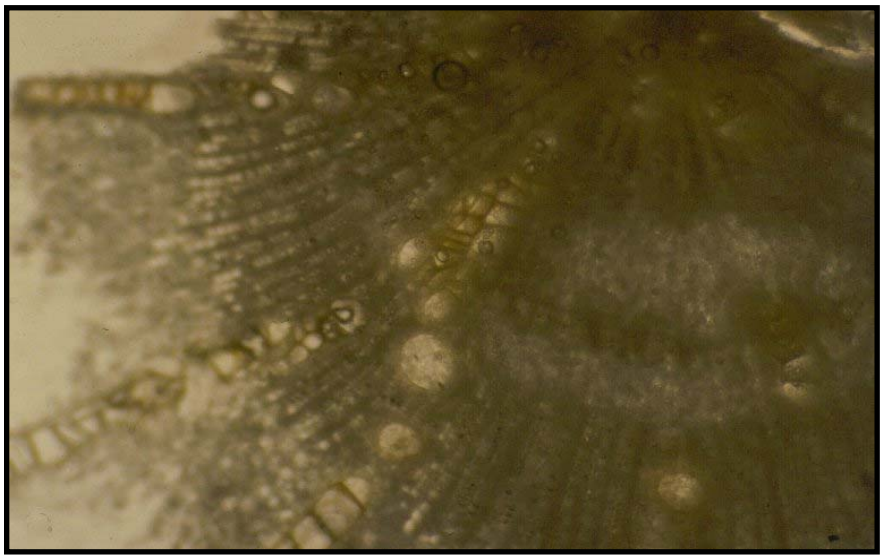

Fig 13: Xylem vessels and fibres of the central root part

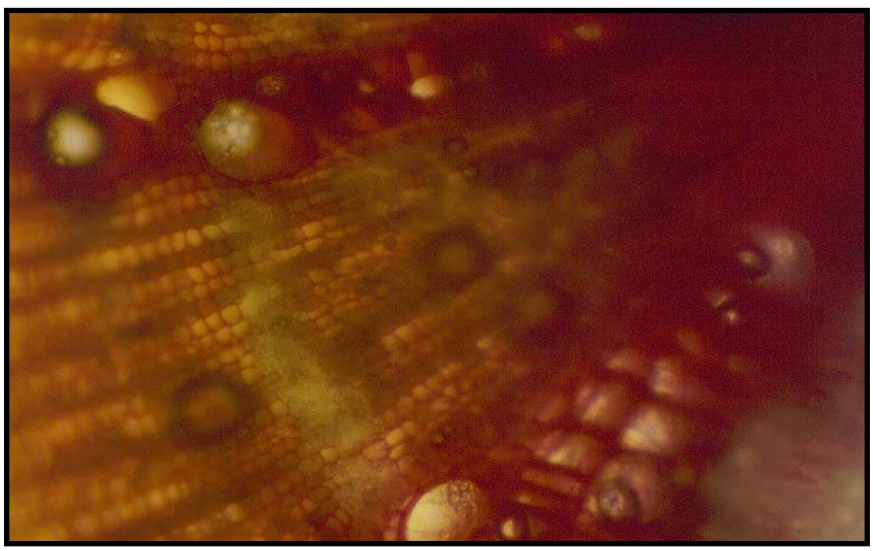

Fig 14: Xylem vessels and fibres of the central root part stained with phloroglucin +HCl. The light coloured parts are parenchymatic cells.

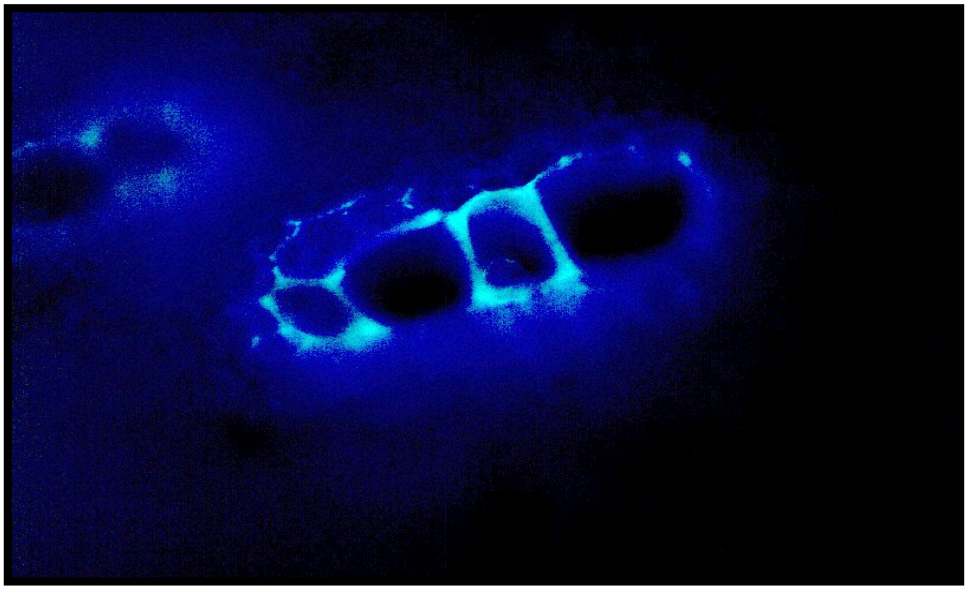

Fig 15: Fluorescence image of root tissue one day after harvest

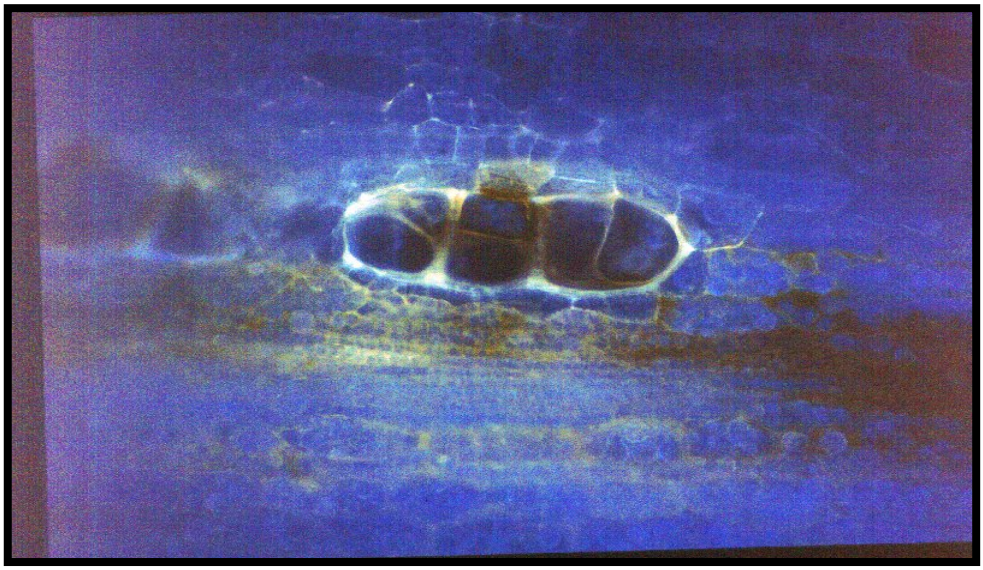

Fig 16: Fluorescence image of root tissue four days after harvest

Primary and Secondary Roots

Fig 17: Cross-section through a primary root

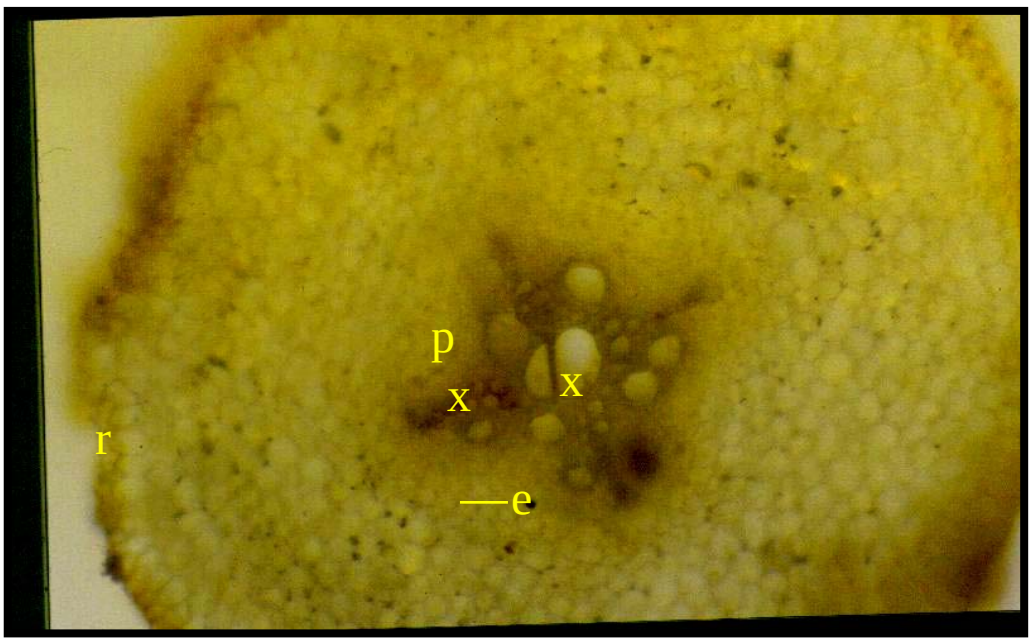

Fig 18: Cross-section through a primary root.
Vascular bundles in tetrarch order (r = rhizodermis (or exodermis); x = xylem; p = phloem; e = endodermis)

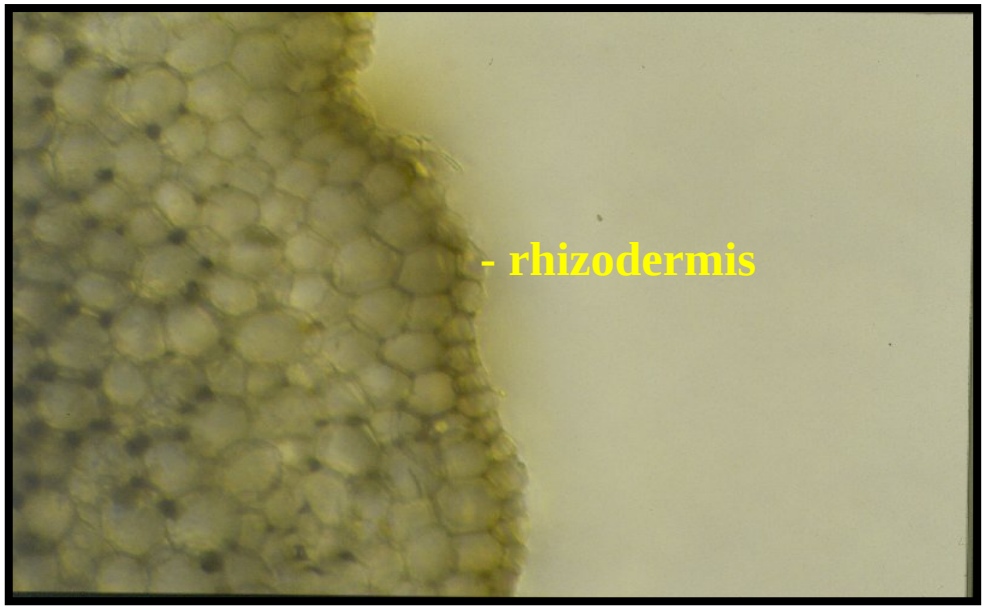

Fig 19: Detail of a primary root showing the rhizodermis and primary bark (large parenchymatic cells).

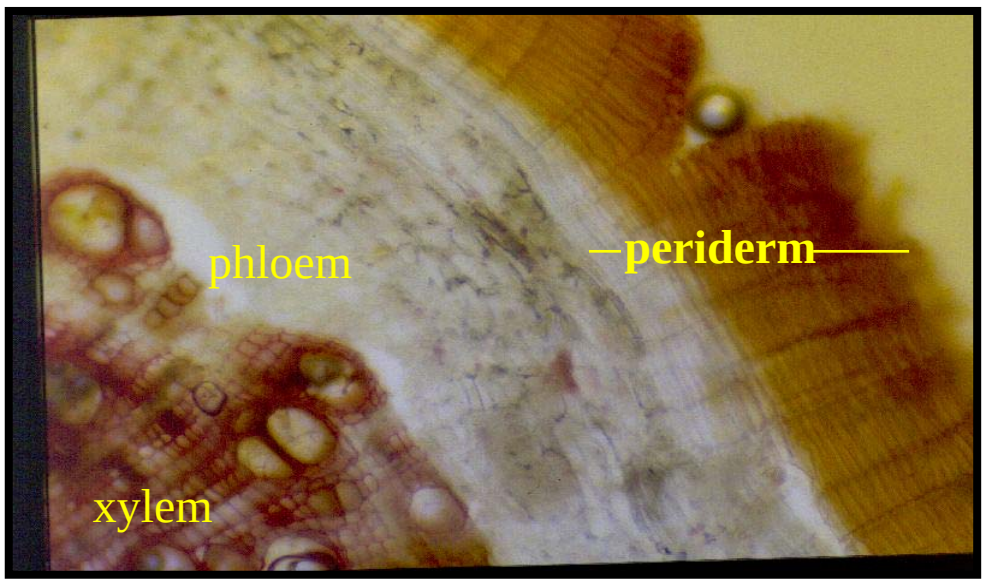

Fig 20: Detail of a secondary, non tuberous root. The morphology is similar to the storage root but it contains no storage parenchyma.

Stem

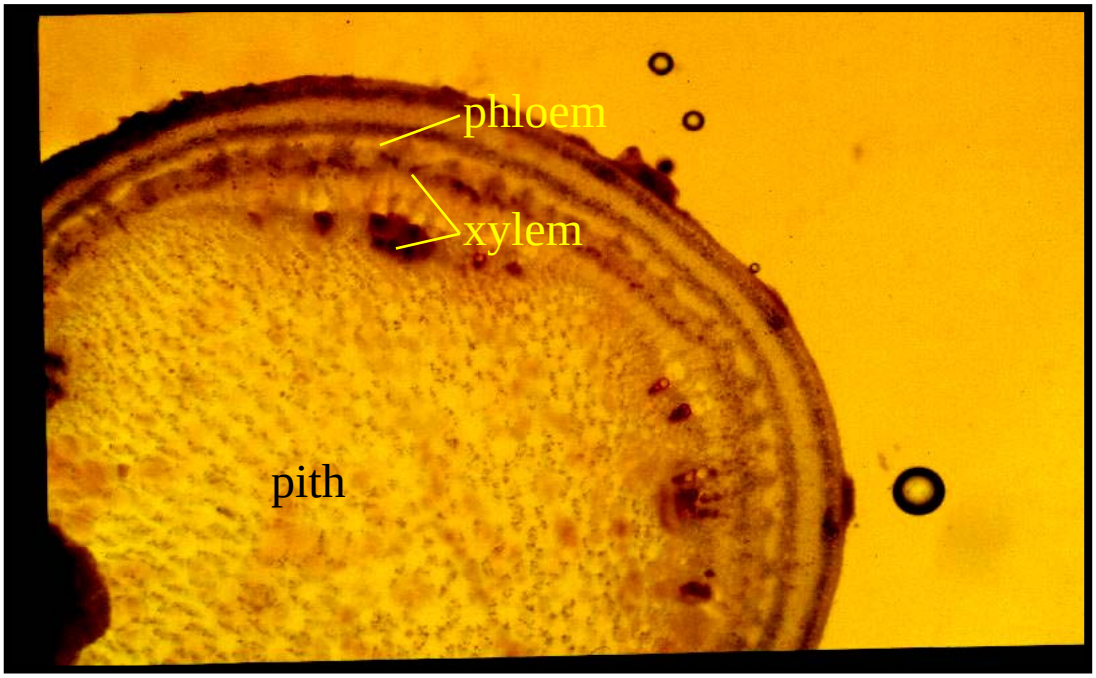

Fig 21: Cross-section of an internode (one year old twig). Staining with phloroglucin for lignification.

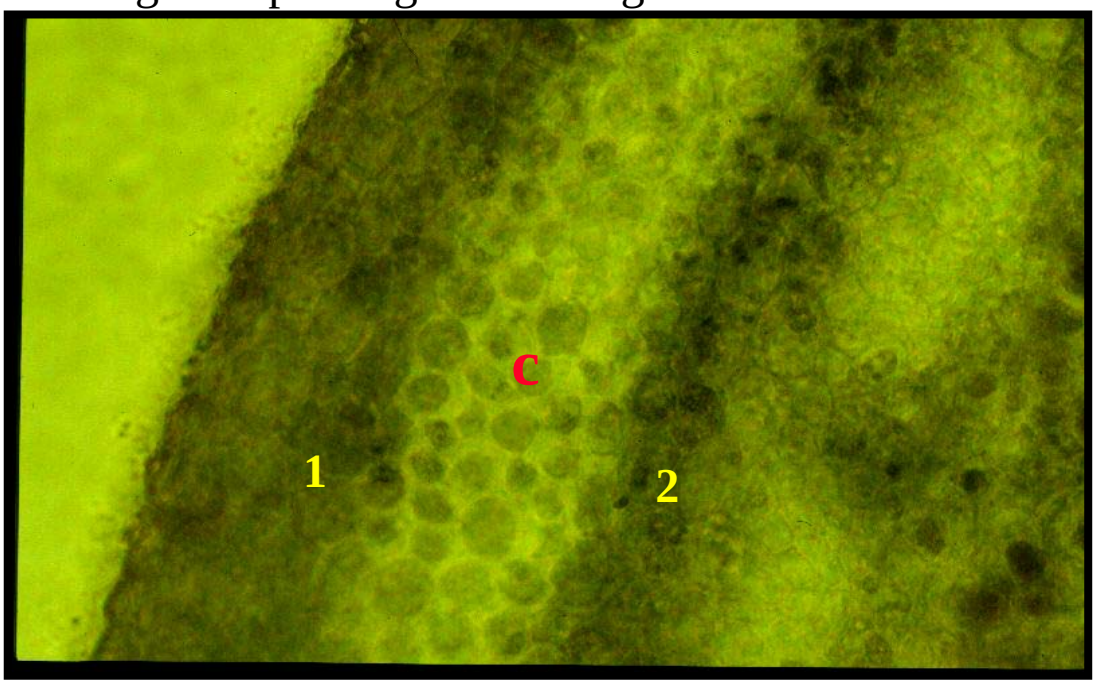

Fig 21: Cross-section of a internode (one year old twig). Staining with phloroglucin for lignification showing two tissues containing chloroplasts (1, 2) and a tangential collenchyma (c).

Leaf

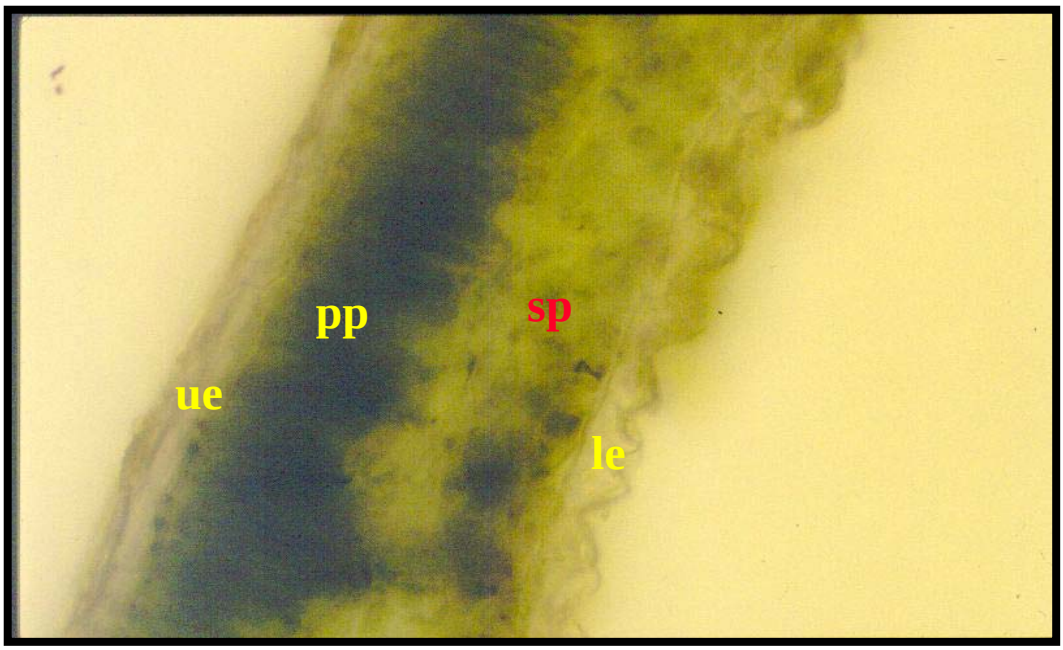

Fig 22: Cross-section of a leaf (ue = upper epidermis; le = lower epidermis; pp = palisade parenchyma; sp = spongy parenchyma)

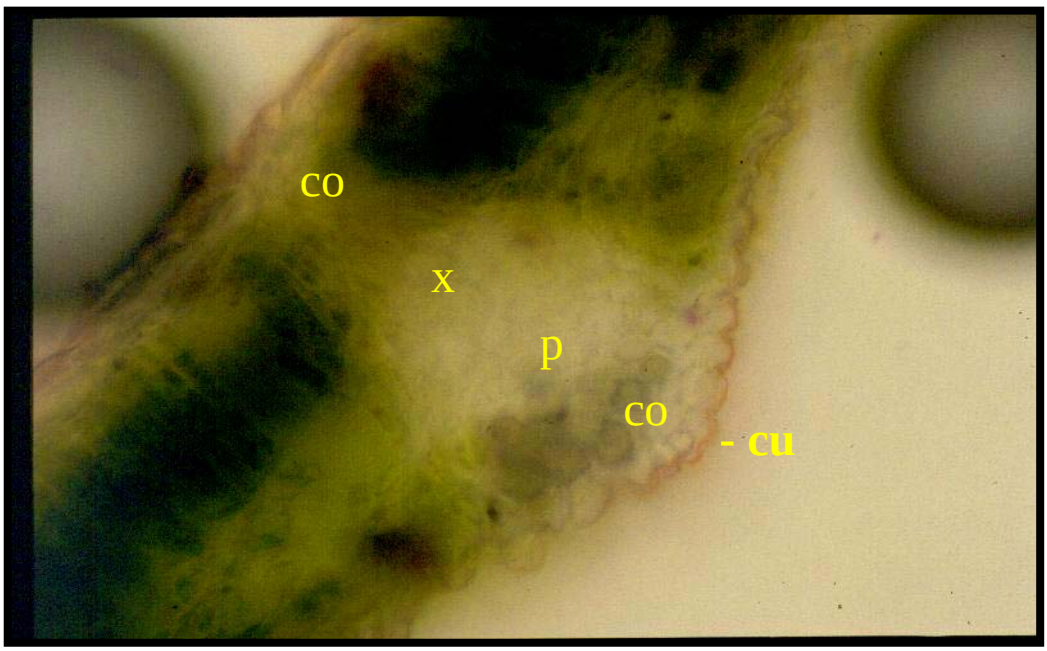

Fig 23: Cross-section of a leaf across the midrib. Cuticle stained with sudan III (co = collenchyma; cu = cuticle; x = xylem; p = phloem)