Testing the Münch hypothesis of long distance phloem transport in plants

Long distance transport in plants occurs in sieve tubes of the phloem. The pressure flow hypothesis introduced by Ernst Münch in 1930 describes a mechanism of osmotically generated pressure differentials that are supposed to drive the movement of sugars and other solutes in the phloem, but this hypothesis has long faced major challenges. The key issue is whether the conductance of sieve tubes, including sieve plate pores, is sufficient to allow pressure flow. We show that with increasing distance between source and sink, sieve tube conductivity and turgor increases dramatically in Ipomoea nil. Our results provide strong support for the Münch hypothesis, while providing new tools for the investigation of one of the least understood plant tissues.

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