



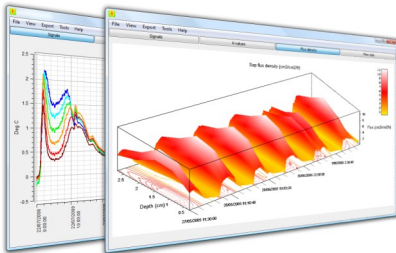
Phyto-IT Newsletter

June 2009

Sap Flow Tool

Phyto-IT released version 1.0 of Sap Flow Tool. A software for analysis and visualization of sap flow data. For more information see also:

URL: http://www.phyto-it.com/Phyto-IT_Software_Sap_Flow_Tool.shtml
URL: <http://www.sapflowtool.com>



**Analysing
sap flow data
has never been
so easy...**

Sap flow?

Sap flow, also called xylem sap flow, is the upward flow of water through a plant from the soil to the leaves. The speed at which this water flows and the amount of water transported can be monitored using sap flow sensors.

Developed for

The Sap Flow Tool software was developed in cooperation with ICT International, an Australian company which provides monitoring solutions for soil, plant and environmental research.

URL: <http://www.ictinternational.com.au>



Supported sensors

Sap Flow Tool is able to analyse data of the [HFD \(Heat Field Deformation\) sap flow sensor](#), a sensor which can measure high sap flow rates as well as low to zero and reverse sap flow.

Version 1.1 of Sap Flow Tool will also support the [HRM \(Heat Ratio Method\) sap flow sensor](#).

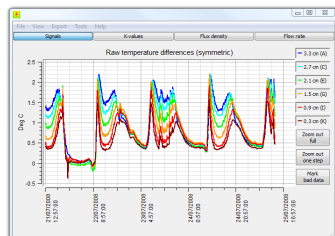


Main software features

Analyse large data files

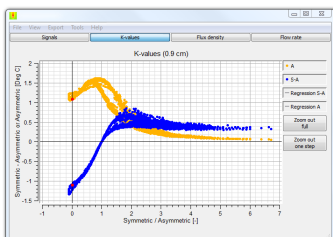
Sap Flow Tool imports raw sensor data from .csv text files. Very large data files (100000+ lines) are also supported.

Raw sensor signals can be analysed in detail and "bad" data can be quickly fixed by using one of several available data filters.



Automatic calculation of HFD K-values

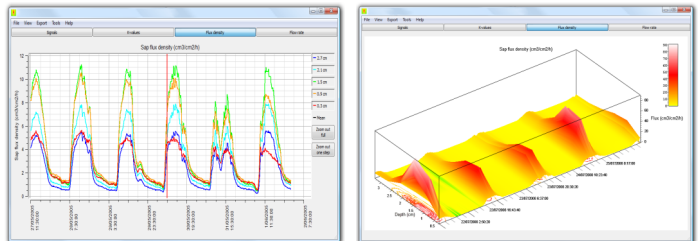
Sap Flow Tool automatically calculates HFD K-values using an intelligent adaptive regression algorithm that will automatically determine the optimal portion of the data needed for the regression.



Visualize sap flux densities in 2D and 3D

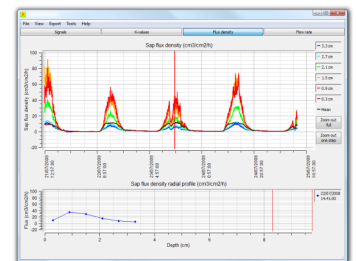
Visualisation of sap flux densities ($\text{cm}^3 \text{cm}^{-2} \text{h}^{-1}$) is done in 2D (as a function of time) and in 3D (as a function of time and depth).

All graphs are interactive and can be zoomed, scaled and rotated. A top-view surface plot is also available.



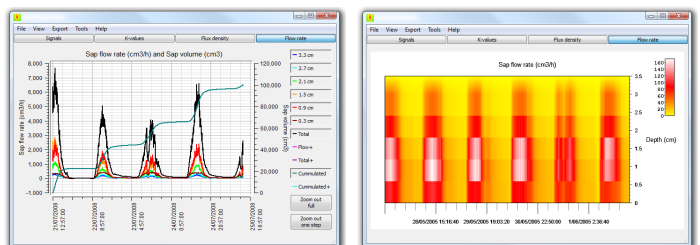
Interactive radial sap flux density profile

The radial profile at each time instance can be visualised by moving a red marker line across the upper graph. This causes the corresponding radial profile to be shown in the lower graph.



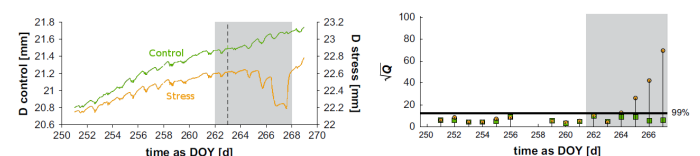
Visualise sap flow rates in 2D and 3D

Sap flow rates ($\text{cm}^3 \text{h}^{-1}$) are calculated for the sapwood rings around each thermistor position of the sensor. Besides the total sap flow rate, a cumulated flow over time is also calculated.



Plant stress-monitoring paper

A paper dealing with on-line plant stress modelling, co-authored by Dirk De Pauw (Phyto-IT), has been published in Biosystems Engineering. Continuous monitoring of stem diameter variations combined with Unfold Principal Component Analysis (UPCA) allowed for successful on-line stress detection, days before the appearance of visible symptoms. The technique was applied successfully to two plant species: young apple trees and truss tomato plants.



Full reference details:

Villez K., Stepe K. and De Pauw D.J.W. (2009). Use of Unfold PCA for on-line plant stress monitoring and sensor failure detection. Biosystems Engineering, 103(1), 23-34.