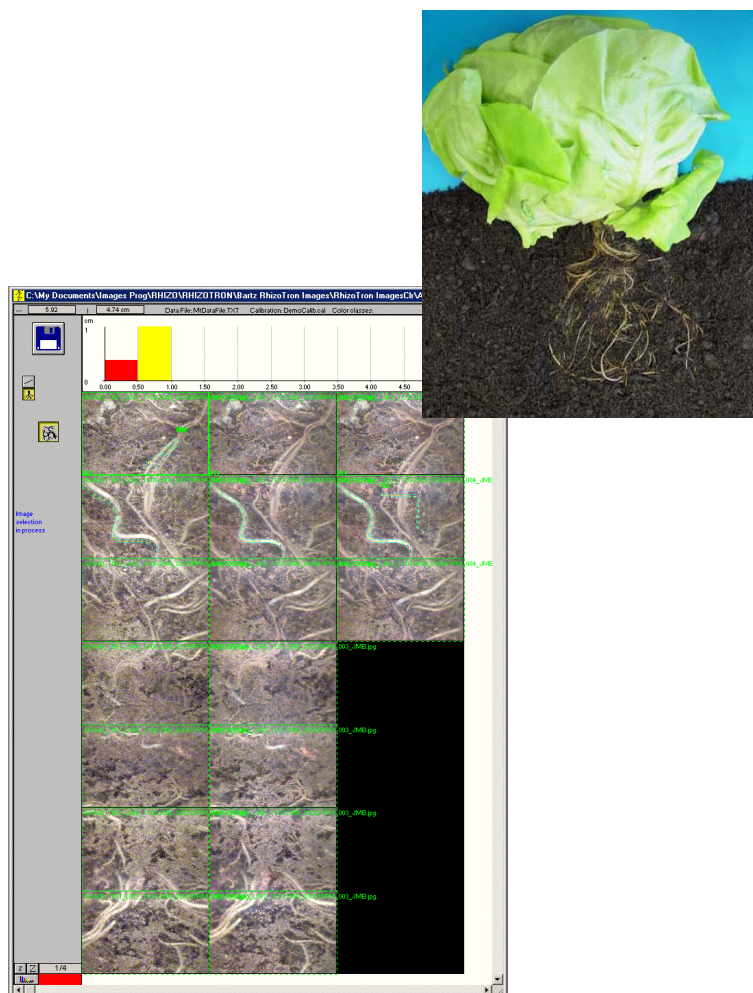# Win RHIZO TRON

FOR RHIZOTRON
AND
IN SOIL ROOT ANALYSIS

WinRHIZO Tron and *Tron MF* are manual root measurement programs that allow you to analyse images coming from minirhizotron underground video camera systems or other sources that do not always offer a good contrast between roots and their background.
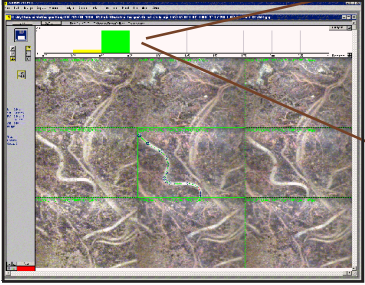
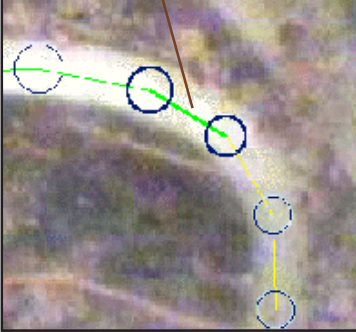Root measurement in WinRHIZO Tron is done by manually tracing over the roots in the image.

WinRHIZO Tron is available in two models;
- *WinRHIZO Tron* which can analyse one frame at a time,
- *WinRHIZO Tron MF* which can analyse multiples frames simultaneously (***MF=Multiple Frames***).
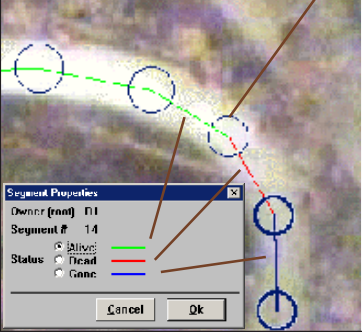
In WinRHIZO Tron you can measure roots interactively and easily

The distribution of root length, area, volume or number of tips is displayed as a function of diameter in a graphic above the image. The color classes are the same as those used to draw the roots in the image. RHIZO measures the real root diameter distribution rather than the average diameter as some other programs do. For example, if a root segment encompasses three diameter classes, the root length will be distributed among those three classes rather than only in the average class.
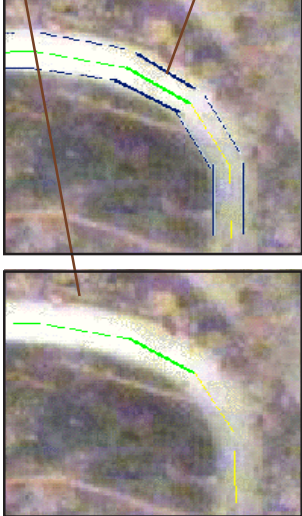
An analysed root is made of segments delimited by nodes.

The root color can be function of;
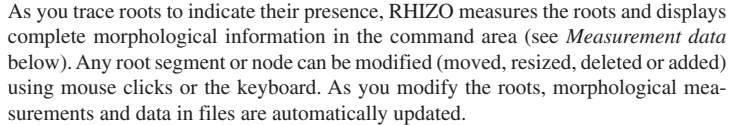- *segment diameter*
- *livings status (live, dead, gone)*

Root diameter can be shown with;
- *circles at nodes,*
- *lateral lines along the root edge,*
- *no display at all.*

Unlike some programs that display images at a fixed resolution, you can scroll and zoom in on some parts of an image or zoom out to view larger areas.

As you trace roots to indicate their presence, RHIZO measures the roots and displays complete morphological information in the command area (see *Measurement data* below). Any root segment or node can be modified (moved, resized, deleted or added) using mouse clicks or the keyboard. As you modify the roots, morphological measurements and data in files are automatically updated.
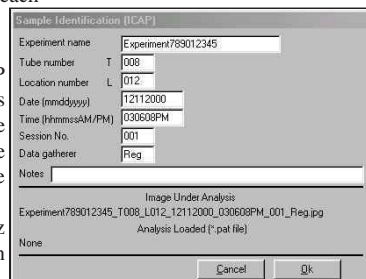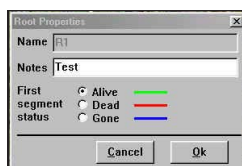
Details that makes your work more efficient or faster

- When you create a root segment, you can either enter its properties manually or, with the press of a keyboard key, automatically assign it the same properties as the previous segment.

- Root and segment naming can be done individually (you enter the name you want) or it can be done automatically (you enter the beginning of a fixed name and RHIZO appends to it a number which is increased for each subsequent root).

- When you load an image that has the ICAP naming scheme, RHIZO automatically extracts the parameters that will be used to identify the sample (tube #, location #, date...) from the file name (you don't have to type them on the keyboard).
Note: The ICAP naming system is used by Bartz Technology Mini-Rhizotron image acquisition systems.

Other features

- You can shift the position of a single root or all of the roots in an analysed region (useful to align a prior analysis over a new image).

- Use menu commands to view/edit root properties entered during root creation or to continue/modify a previously measured root.

- The original images are never modified. The analysis is displayed over them.

- The Tron version can be upgraded to WinRHIZO Reg or Pro for automatic measurement of washed roots. The Pro version can be used for extensive morphological measurements including topology, fractals and color analysis.

- You can change the colors used to display information.

- You can add notes (comments, observations) to images, roots or segments.

Measurement data

You can choose which information is displayed and how it is presented (content, text size and color). Each analysed frame has its name written in its upper left corner, over the image. You can also select which of the following morphological information you would like displayed in the command area;

- *Total root measurements (for the whole image) (root length, surface area, projected area, volume, average diameter and number of tips).*

- *Image information extracted from file name using the ICAP naming scheme (Experiment, Tube, Location, Session, Date, Time and Data Gatherer).*

- *Active root name (Ex: R1) and its measurements data (length, surface area...).*

- *Active segment number and its measurements data (length, surface area...).*

Detailed sample information, analysis settings and measurement data are saved in data files. These files are in ASCII text format and are well adapted for opening in spreadsheet-style programs (like Excel). We do offer, as an option, a program written in VBA that runs in Excel for root data visualization and manipulation. This program simplifies data handling and comparison. Root growth can be calculated and plotted graphically as a function of time, for example.
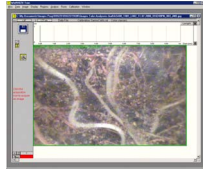
*In WinRHIZO Tron **MF** with one mouse click, you can load, view and analyse neighbouring images (frames), even whole tubes on your computer screen!*

You can work with one image at a time,

three consecutive locations of the same tube,

First (top) image of the tube

Second image of the tube

Third image of the tube

Traced roots can overlapp frames or can be constrained to their boundaries (see below).

or three consecutive images in time of the same location.

Image a first session

Same location a session after

Same location at a later session

Or combine the left *Space* and *Time* series to get a *Space-Time Tile* of neighbouring images.

Space (locations)

Time (sessions)

Load one or more sessions of a complete tube simultaneously!
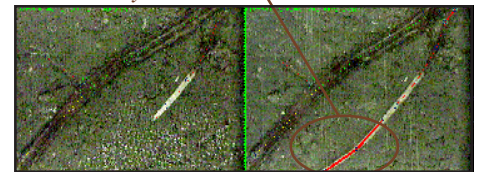Just click any image belonging to a tube and RHIZO will load all images in order of deepness. With simple mouse clicks, you can move up and down the tube just as you would do with the camera inside the tube.
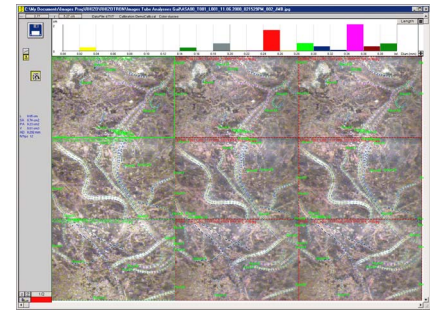
WinRHIZO Tron can highlight root growth or mortality over time.

For a given location, roots that were not present in the previous session or have since disappeared are drawn with bold lines.

LOAD NOT ONLY THE IMAGES BUT THEIR ANALYSES ALSO
Without any additional intervention, a previous analysis can be loaded and displayed over the image.

MAKE MANY ANALYSES AT A TIME (MF VERSION ONLY)
When multiple images are loaded, they can be analysed individually (each image has distinct measurement data) or globally as a session unit (roots can overlap frames and a single measurement data set is saved for the group of images). Individual or tiled images which have been analysed, can be saved to a file or printed with or without their analyses superimposed over them.

You can easily copy the analysis from an image or a series of images to another. For example, to save time you can copy the analysis of an image from a previous session onto an image that has not yet been analysed and modify the analysis rather than starting from scratch. You can even copy the analysis of a complete tube to another with a few mouse clicks.

As you make or modify existing analyses, measurement data are automatically saved to data files and summary information is displayed on the screen. There is no need to activate specific commands.

Thanks to WinRHIZO's Tron *Space-Time Traveler,* with a single mouse click you can load, relative to the image(s) displayed on the screen, the next or previous:
• Tube,
• Location in the tube (move up and down in depth one frame at a time),
• Session in time (same tube, same location(s), but at a different sampling time).

Regent's
SPACE-TIME TRAVELER
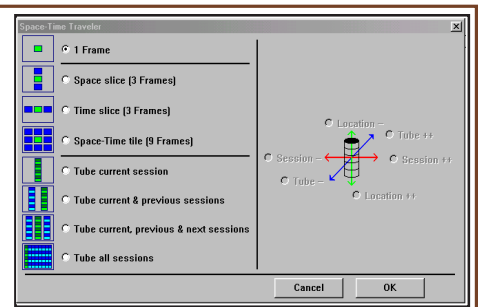
When comes the time to visualize and analyse data produced by WinRHIZO Tron & Tron MF, XLRhizo Tron is greatly appreciated. This is a utility program that runs in Microsoft Excel. It allows you to manipulate, reorganize and display measurement data graphically. It can for example plot root growth as a function of time for images acquired at different moments and analysed with WinRHIZO Tron & Tron MF. XLRhizo Tron is a utility program that is optional and which can be ordered separately or with WinRHIZO Tron & Tron MF. It is very affordable and can save a lot of time (and manipulation errors).
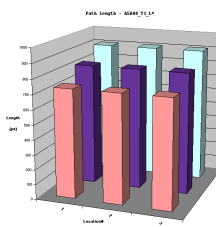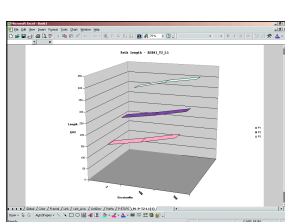
ORDERING INFORMATION

To get information, or the latest technical information, visit our web site at:

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To place an order or for questions, please contact: **sales@regentinstruments.com**
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