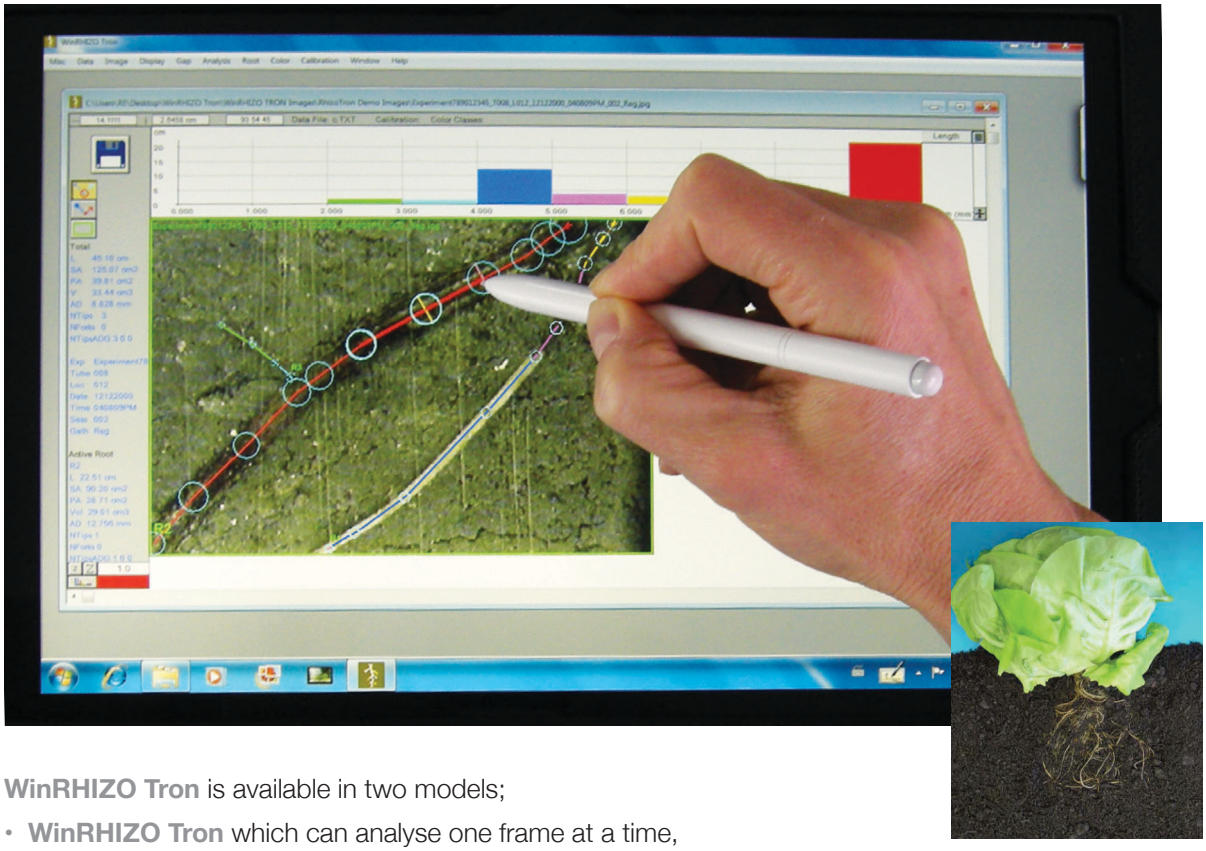
WinRHIZO TRON™ 2022

Software Program For Analysis of Roots growing in Soil and Rhizotron

WinRHIZO Tron and **Tron MF** are manual root measurement programs that allow for analysis of images produced by minirhizotron underground video camera systems or other sources that do not offer a good contrast between roots and their background*. Analysis is done by manually tracing over the roots in the image with a mouse, or if its suits you, by touching the screen of a tablet or all-in-one computers.



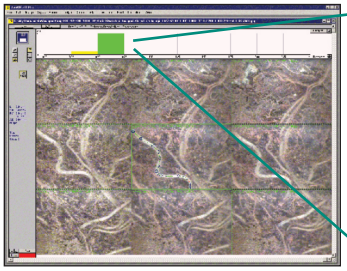
WinRHIZO Tron is available in two models;

- **WinRHIZO Tron** which can analyse one frame at a time,
- **WinRHIZO Tron MF** which can analyse multiples frames simultaneously (MF=Multiple Frames).

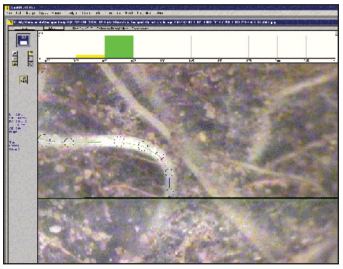
*For automatic measurement of washed roots and Arabidopsis seedlings, please refer to our WinRHIZO Basic, Reg, Pro or Arabidopsis family of products.

Our products runs on PC computers or tablets with the Windows operating system (Windows 7 to 11, 32 or 64-bit).

In WinRHIZO Tron you can measure roots interactively and easily



You can scroll and zoom in on some parts of an image or zoom out to view larger areas or more images.

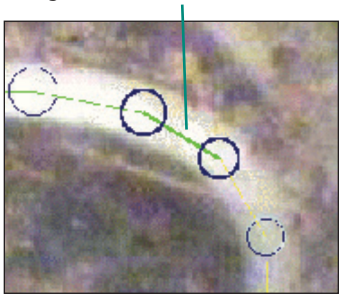


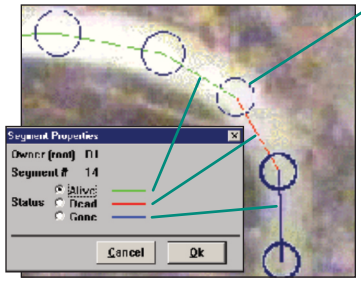
The distribution of root length, area, volume or number of tips is displayed as a function of diameter in a graphic above the image. The color classes are the same as those used to draw the roots in the image. **WinRHIZO Tron** measures the real root diameter distribution rather than the average diameter 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:

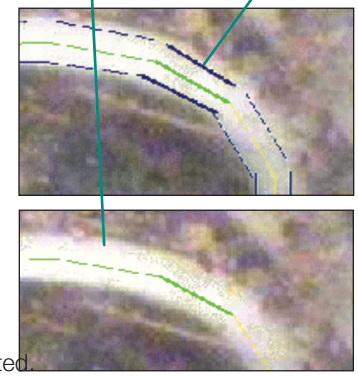
- segment diameter
- livings status (live, dead, gone)





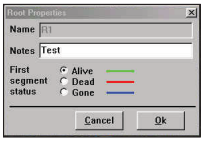
Root diameter can be shown with;

- circles at nodes,
- lateral lines along the root edge,
- no display at all.



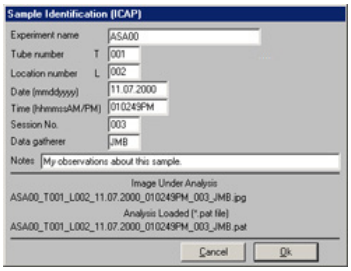
As you trace roots to indicate their presence, **WinRHIZO Tron** measures the roots and displays complete morphological information in the command area (see Measurement data below). Root segments or nodes can be modified (moved, resized, deleted or added) using mouse clicks or keyboard commands. As you modify the roots, morphological measurements and data in files are automatically updated.

Details that make 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 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 **WinRHIZO Tron** appends to it a number which is increased for each subsequent root).
- When you load an image which name follows the ICAP naming convention, **WinRHIZO Tron** 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

Note: The ICAP naming scheme is used by a few Rhizotrons 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.
- You can change the colors used to display information.
- You can add notes (comments, observations) to images, roots or segments.

Measurements dat a

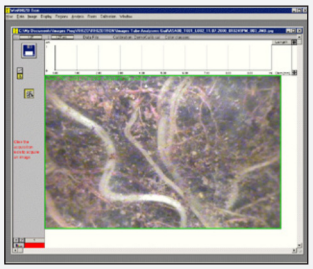
You can choose which information is displayed and how it is presented (content, text size and color). Each analysed frame has its name written in its upper left corner, over the image. You can also select which of the following morphological information to display in the command area;

- 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 measurements data are saved in data files. These files are in ASCII text format and are well adapted for opening in spreadsheet-style programs such as 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, or three consecutive images in time of the same location.



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).

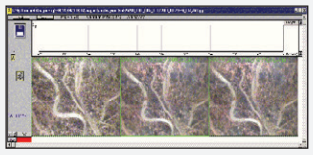
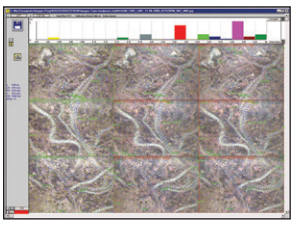


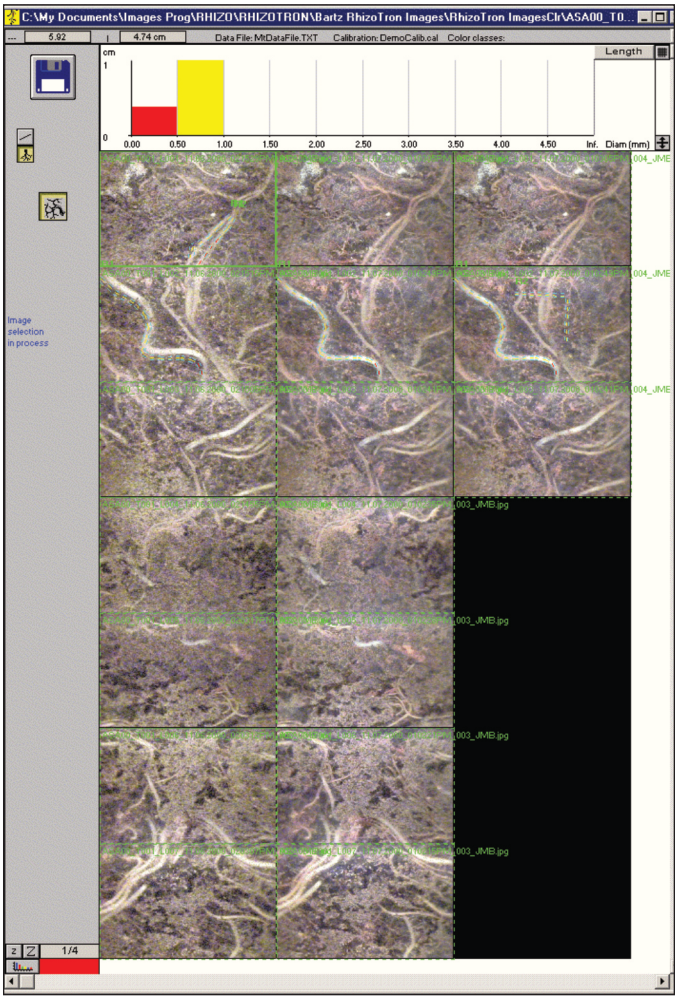
Image a first session

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.





Load one or more sessions of a complete tube simultaneously!

Just click any image belonging to a tube and **WinRHIZO Tron** 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.

Load not only the images but their analyses too!

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.

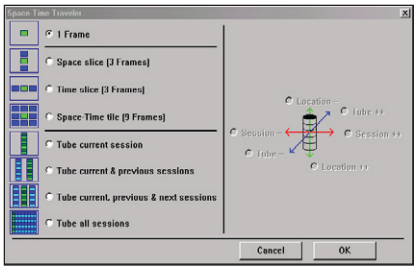
WinRHIZO Tron can highlight root growth or mortality over time.

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

Regent's Space-Time Traveler

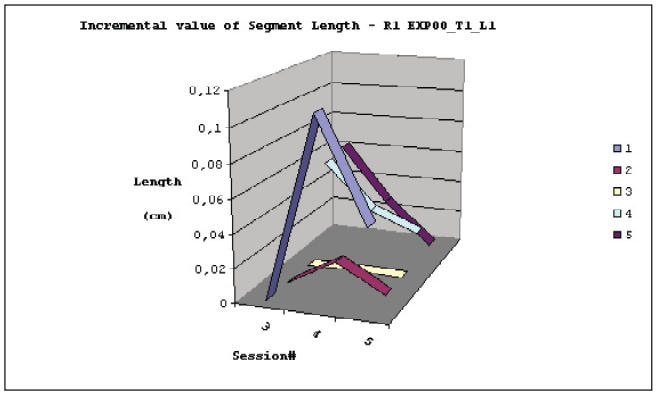
Thanks to **WinRHIZO Tron**'s Space-Time Traveler, with a single mouse click you can load, relative to the image(s) displayed on the screen, the next or previous:

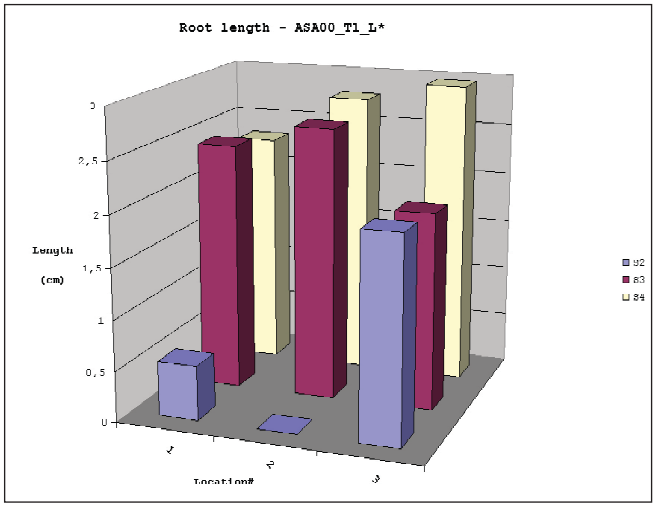
- Tube,
- Location in the tube: move up and down in depth one frame at a time,
- Session in time: same tube, same location(s), but at a different sampling time.



XLRhizo Tron companion program for data visualization

XLRhizo Tron is greatly appreciated to visualize and analyse data produced by **WinRHIZO Tron** & **Tron MF**. This utility program 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** companion program is optional and can be ordered separately or with **WinRHIZO Tron** & **Tron MF**. It is very affordable and can save a lot of time and manipulation errors.





Competent and prompt technical support is offered exclusively by email.

Complementary products sold by Regent Instruments Inc.:

- WinSEEDLE™ — seed/needle morphology & count
- WinSCANOPY™ — canopy & solar radiation
- WinRHIZO Tron™ — root morphology & topology in soil
- WinFOLIA™ — leaf area & morphology
- WinCAM NDVI™ — color area, basic morphology & ndvi
- WinDENDRO™ — tree-ring & wood density analysis
- WinCELL™ — wood cell anatomy *Free WinCELL Regular with WinDENDRO Regular & Density Software

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