

WinFOLIA 2003

A Leaf Area Meter that is also a Leaf Morphology Analyser and a Leaf Disease and Insect Damage Quantifier

WinFOLIA is based on the technology of image processing and analysis to accurately make morphological measurements on broad leaves. Its components comprise non specific image acquisition hardware (cameras or scanners) and a computer program (WinFOLIA) specifically designed for leaf morphology and disease analysis. It runs on PC computers with the *Windows* family of operating systems.



WinFOLIA is available as software alone or as complete system. Different configurations are offered in function of your needs. Some are optimised for speed, others for accuracy or portability.

When portability is not required, we recommend our systems based on high quality, high resolution desktop scanners as image acquisition devices. Our scanners produce high quality images free of illumination problems (non-uniform lighting) and are extremely easy to use. Desktop scanners cannot be used in the field but are easily transportable and usable in remote locations where electrical power is available. Our scanners come in two sizes with maximum scan areas of 22 x 30 cm for Standard Area (STD) and 30 x 42 cm for Large Area (LA).



When very large quantity of leaves must be processed, our camera based system is recommended. WinFOLIA can be purchased with an analog or a digital camera and lighting system. In 2003 we have introduced a new Firewire (IEEE-1394) high resolution digital camera that is TWAIN compatible.

See our web site for specifications and pricing of the latest cameras and scanners sold by Regent Instruments.

Our portable scanner permits non-destructive leaf analysis while the leaf is still attached to the plant. It is lightweight, draws its power from the computer (no need to bring an AC adapter) and has good image quality.



WinFOLIA can analyse leaves or foliar disks. One or more samples can be analysed per image.



WinFOLIA is a member of a family of related products made by Regent Instruments for plant science research. Among the other products you will find WinRHIZO for root analysis and WinDENDRO for tree ring analysis. See our web site for more information.

For conifer needle analysis, Regent Instruments offers the WinSEEDLE program. WinFOLIA and WinSEEDLE can share the same image acquisition hardware. A rebate is offered when both products are purchased.



The WinFOLIA program is available in three versions (Basic, Regular and Pro)

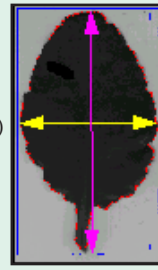
The table below lists the measurements and features offered by each version

Measurements	Version		
	Basic	Reg	Pro
• Leaf/Blade area	Y/N	Y/Y	Y/Y
• Holes area	Yes	Yes	Yes
• Leaf/Blade/Petiole length	Y/N/N	Y/Y/Y	Y/Y/Y
• Leaf/Blade perimeter	Y/N	Y/Y	Y/Y
• Maximum width (horizontal)	Yes	Yes	Yes
• Blade width at user definable positions	No	Yes	Yes
• Aspect ratio	Yes	Yes	Yes
• Form coefficient	Yes	Yes	Yes
• User definable lengths	No	Yes	Yes
• User definable angles	No	Yes	Yes
• Object numbering by row	No	Yes	Yes
• Lobe angle at user definable positions	No	Yes	Yes
• Teeth height, width and number	No	No	Yes
• Envelope	No	No	Yes
• Fractals (for leaf shape analysis)	No	No	Yes
• Diseases (via color analysis)	No	No	Yes
• Color analysis	No	No	Yes
Features			
• Image edition	Yes	Yes	Yes
• Operator Observations	No	Yes	Yes
• Leaf or Foliar disk analysis	Yes	Yes	Yes
• Debris filtering	Yes	Yes	Yes
• Interactive or batch analysis	Yes	Yes	Yes
• Interactive or batch scanning	Yes	Yes	Yes
• Interactive/Automatic leaf detection	N/Y	Y/Y	Y/Y

The Reg and Pro versions can measure blade and petiole areas separately (Blade Area+Petiole Area=Leaf Area). All versions can produce total area as well as individual areas (per leaf).

WinFOLIA can detect and measure the area of holes. It gives the total and individual holes area. Holes have no effects on perimeter measurement (the perimeter is the outside boundary length).

The Basic version measures the total (blade+petiole) length, perimeter and maximum width.



The Reg and Pro versions can measure blade and petiole lengths and perimeter separately. Blade width can also be measured at two positions (percentage of blade length) perpendicularly to blade length.



Interactive user-definable lengths and angles are complementary to the automatic measurements built into WinFOLIA. They allow you to define your own types of measurements. An example of interactive measurement use is for measuring vein angle.

The envelope is the length of a line that goes from tooth to tooth on their apex.

Colors to be quantified are specified to WinFOLIA simply by clicking in the image. Pixels of the image are classified into classes in function of their color. Classes can be grouped in order to measure areas with more than one color (for example the non-disease area may contain green and yellow colors). Note that this is true color analysis in 24 bits color space and not a simple color threshold as in some other leaf analysis programs. For color area measurement without leaf morphology, see Regent's WinCAM (Color Area Meter) program.

To analyse conifer needles (or seeds), see our WinSEEDLE product.

Batch modes are provided to optimize the acquisition speed and/or to minimize operator intervention. Example 1: Batch analyses can be done without any operator supervision. Example 2: During batch acquisition, incremental names (Image1, Image2...) can be generated by WinFOLIA instead of asking the operator to enter a name (practical in the field).

Data produced by WinFOLIA are saved in standard ASCII text files. They can easily be read by statistical or spreadsheet programs.

For a list of scientific publications in which WinFOLIA was used, please refer to: www.regentinstruments.com/pages/References.html

Filtering is available to prevent small particles, such as dust, from being considered as leaves during automatic analyses. Objects with an area larger or smaller than specified values can be filtered out.

An observation is a means of adding measurements not programmed in WinFOLIA in textual form. It allows, for example, to indicate irregularities that are observed during measurement. A simple observation could be something like: *Is Damaged*.

Image edition allows you to edit the image content to remove artifacts, debris or, as illustrated below, to remove eaten areas. You can choose the color to edit with by picking a color already present in the image.



In automatic leaf detection, WinFOLIA finds the leaves in the image without operator intervention. In interactive mode, you must click each object you wish to analyse.

WinFOLIA is TWAIN compatible, that means it can obtain and analyse images directly from many TWAIN compliant image acquisition devices (scanners, digital cameras, frame grabbers, etc...). Although WinFOLIA can work with many scanner models, it is advantageous to purchase one from Regent. You get our custom manual that illustrates how to scan biological samples for analysis with our programs. It helps you to obtain the best images for accurate measurement and also gives some tips specific to the scanner that you use. Our scanners come with a fixed permanent calibration that is made by Regent Instruments. This calibration is read by our programs to increase the precision of measurements made from images acquired with the scanner. They also come with general image scanning and editing programs that can be used for other applications (photo or document scanning, artwork...).

WinFOLIA comes with printed color manuals which are abundantly illustrated. Like all of Regent Instruments' products, it is backed with prompt and competent after-sales technical support. WinFOLIA is made by Regent's personnel, not by subcontracted firms. You can give feedbacks or ask questions to the programmers that wrote it (via technical support email). WinFOLIA is also updated regularly (typically once a year).

A CAMERA OR SCANNER BASED SYSTEM?

When image quality is a primary concern, it is preferable to choose a scanner. Scanners come with built-in lighting system(s). Lighting is therefore uniform everywhere in the image. Scanners are very easy to operate.

Scanners are limited by the size of their maximum scan area. While there are many sizes on the market, Regent sells scanners with scan areas up to 30 by 42cm. Cameras have unlimited image areas but as the area is increased, the image resolution decreases.

For precise color analysis, a scanner is recommended.

ORDERING INFORMATION

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

www.regentinstruments.com

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