



Cefiler using

Goal : How to set and use the Cefiler module from plugins *Toaster* and *C-Toaster*.

If you use **the basic IJ plugin**, i.e. if you don't use the plugin *Toaster*, **jump to the section 5**.

Content

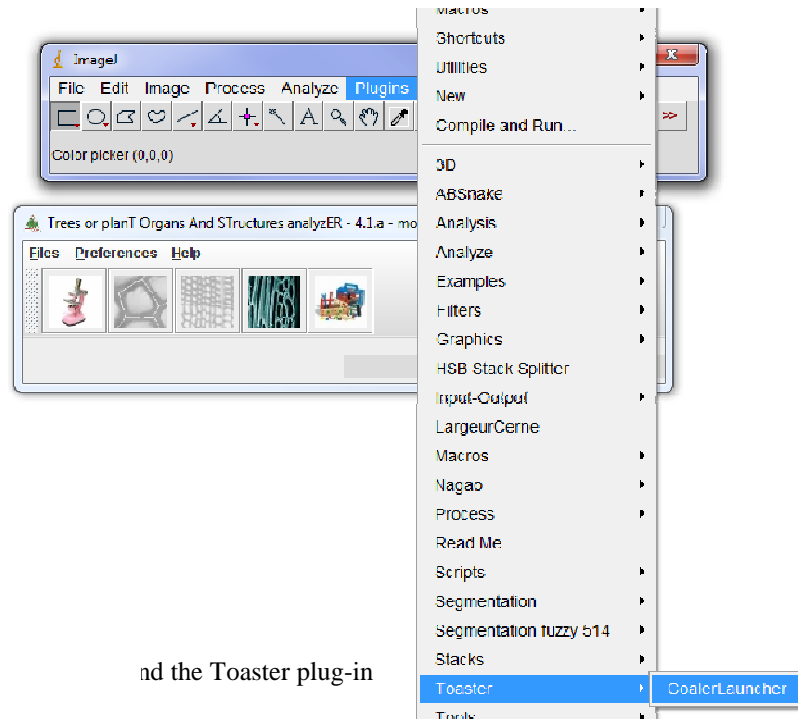
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1. Toaster/Coaler running

The *Toaster* plug-in is run from the *ImageJ* application. So,

- Run ImageJ...
- Select the *launcher* item of the *Toaster* sub menu of the *plugins* menu



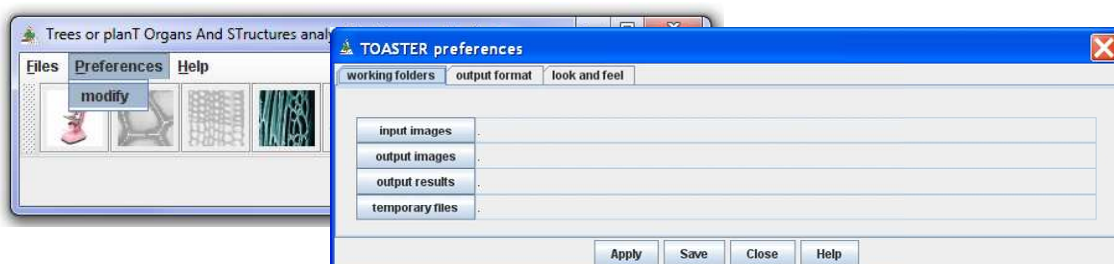
and the Toaster plug-in

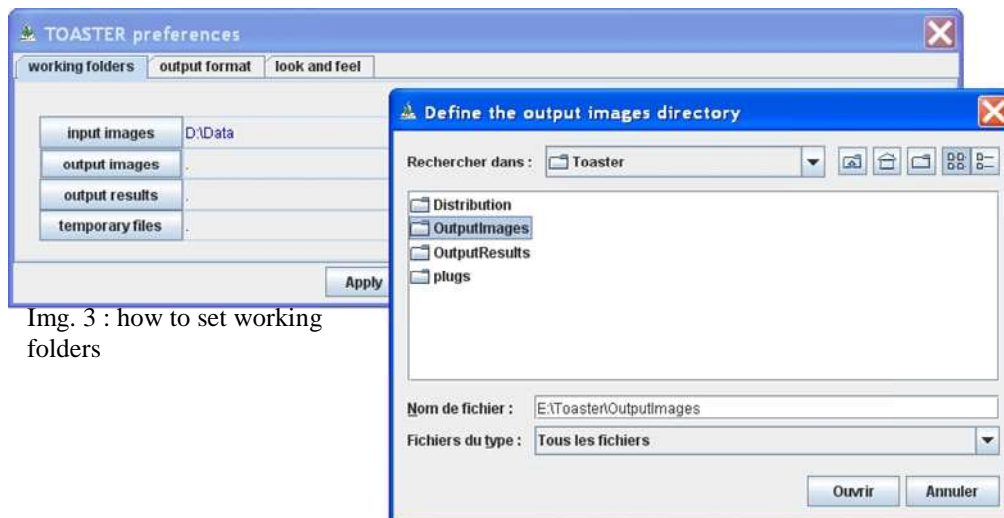
2. Toaster setting

The *Toaster* plug-in offers an working folders manager: the user can specify where find input data or achieve output results, and this once and for all.

- Select the *modify* item of the *Preferences* menu
- In the *working folders* page, set the different fields from the corresponding browsers (the buttons located at the left of the text fields) (see img 3.). **Save** the settings if you want the application use it at each time; in other case, **Apply** only the settings (see img 2.).

Img. 2 : the folders setting





Img. 3 : how to set working folders

Note: rules of colors (fig 4.)

Different colors are used to indicate the specified paths.

- ✓ In black: validate path already used – *the indicated folder exists and has been already used*
- ✓ In blue: path modified by the operator– *the indicated folder exists when it is selected from the browser*
- ✓ In red: invalidated path – *the indicated folder does not exist on the current computer ; you should give a good path.*



Note: folder syntax (fig 4.)

The working folders are normally given by their extend name, that is to say from the root. However, a relative path can be displayed. The “.” means the local ImageJ folder, that is to say the repertory where is installed the ImageJ application.



3. Data loading

Different modes are available: load (and process) only one file, or load (and process) all the files of a folder.

3.1. I want process only one file

Use the first submenu of the files menu...



Note: results

The output data (image file or/and results file) will be saved into the output folders under the same root name as the selected file.

3.2. I want process several files

Use the second submenu of the files menu to select several files, in fact, all the files of the selected folder...



Note: results

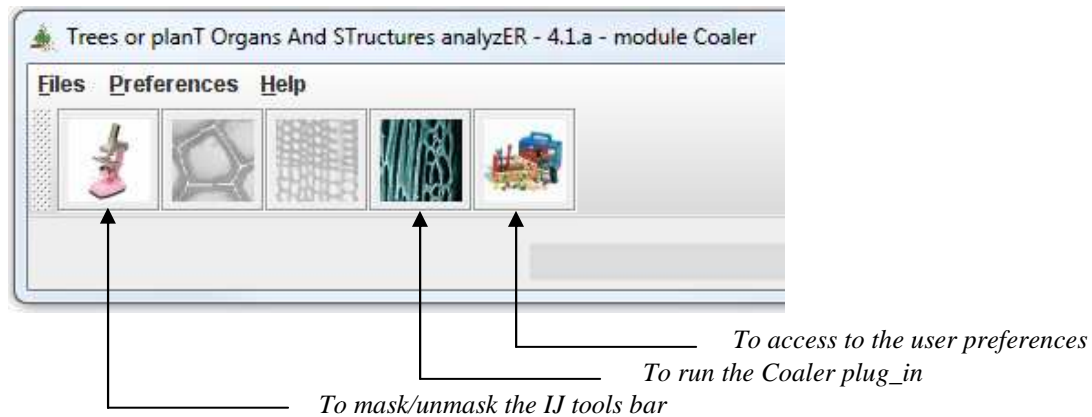
The output data (image file or/and results file) will be saved into under the same root name as the selected file, achieved in a subfolder created in the output folders.

Warning: the input folder has to contain only image files produced from the same settings, with the same optical resolution (value generally given in dpi).



4. Coaler opening

The Coaler plug-in is ran by the red cell icon in the tools bar of Toaster or C-Toaster

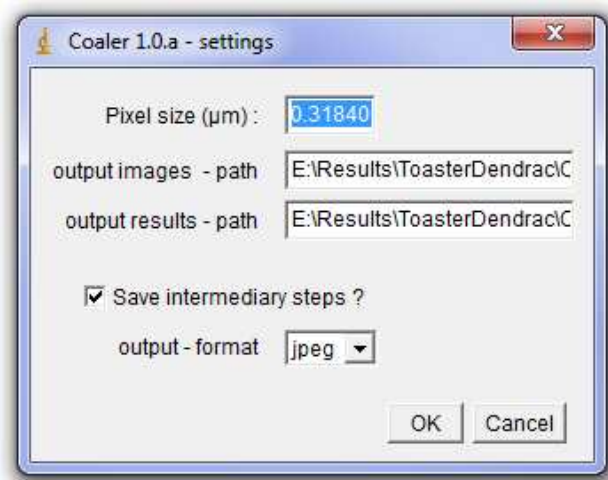


Note

- *At least one image must be loaded before the Coaler running.*

5. Coaler setting

The following dialog box allows adapting the processing to the current (set of) image(s).



Input - pixel size: defines the size of the pixel length (or width) in micrometer. This value will be given by the user; it depends on the optical components of the used microscope to shoot the image. This value will be used evaluate the real dimensions of the cells.

The default value is 0,3184, defined from reference images (see §7).



Output images - path: extended name of the folder where will be achieved the output images.

This field is set from the Toaster settings. These images are built to avoid a visual checking after data treatment.

Output results - path: extended name of the folder where will be achieved the output results.

This field is set from the Toaster settings. These files contain the numerical values of calculated parameters.

Save intermediary steps: Boolean indicating which images will be saved.

Note

The intermediary steps are the filtering, the watershed, the graph definition... they allow checking the well processing of the native images.

Output format: give the format of the output images

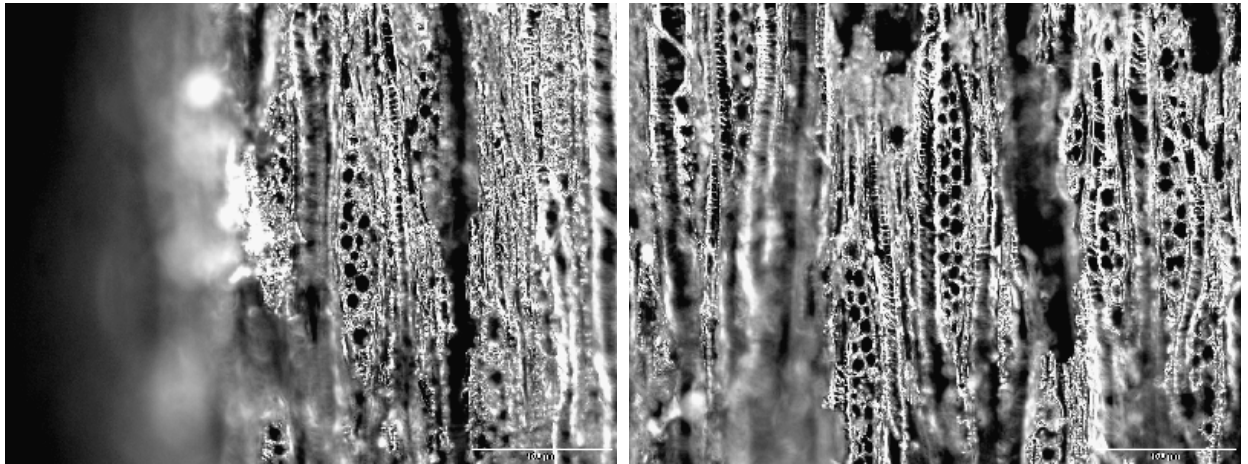
6. Coaler running

The Cefiler plugin is ran when you validate your settings: click on button “ok”.



7. Exemple

The input data are two jpeg images of broad-leaved trees located into the *Crataegus* folder

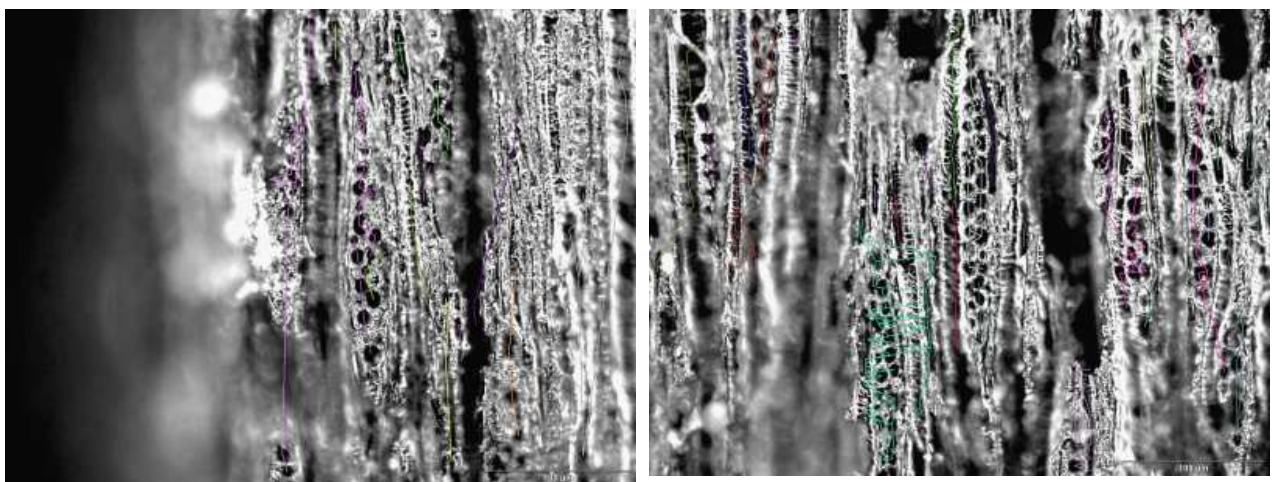


Left, image named Tv15 ; right, image named Tv17

The settings of the §5 give the following output data:

7.1. Results location

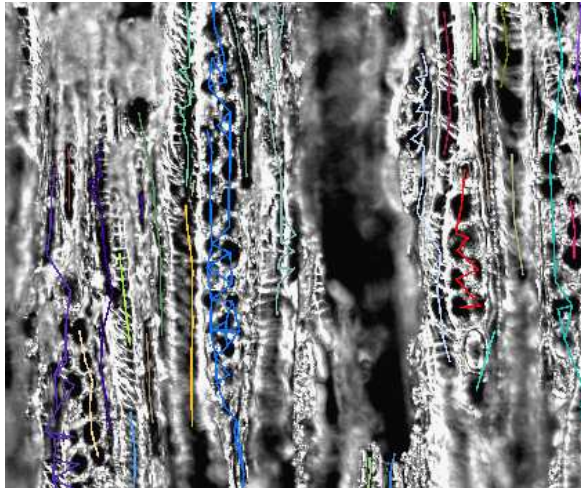
The result images are achieved in the folder **E:\Results\Toaster\OutputImages\Crataegus**, and the result files in the folder **E:\Results\Toaster\OutputResults\Crataegus**





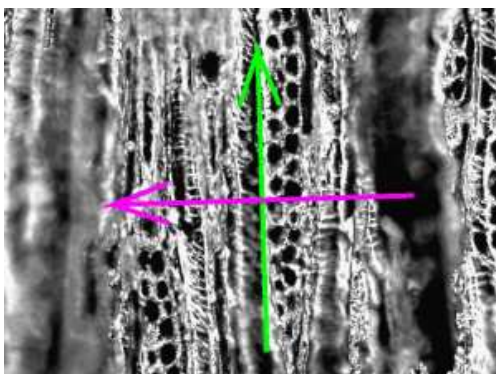
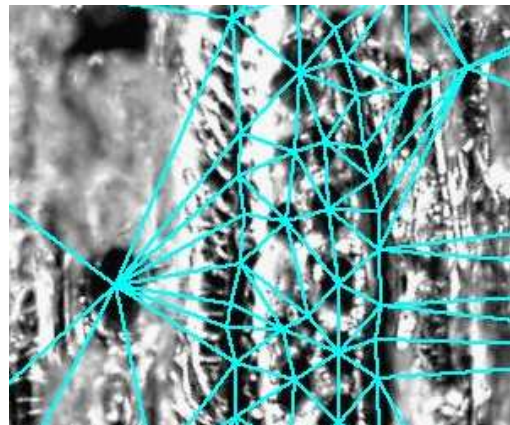
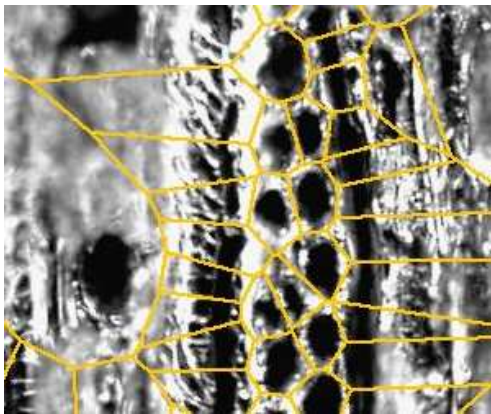
7.2. Output images

- If the “Save intermediary step” Boolean if off, only the final results are saving.



One color for each ray :

- If the “Save intermediary step” Boolean if on, all intermediary results are saving



Yellow: the Voronoi diagram to check the cells neighborhood;

Cyan: the Delaunay triangulation to check the cells neighborhood;

Green: the main orientation of rays



7.3. Output results

At each input image corresponds a CSV file, named as the input data: *Tv15.csv*, *Tv17.csv*,... Each file contains a summary description of the cell rays.

1	ray	x	y	area(px)	area(μm2)	circ,		
2	1	235,362259	28,7451791	363	36,8004173	0,80029783		
3	1	234,311828	78,0537634	186	18,8564122	0,71656806		
4	1	240,495708	118,94206	233	23,6212045	0,76314594		
5	1	268,426829	141,480488	205	20,7826048	0,79934227		
6	1	238,166667	166,25	132	13,3819699	0,84583332		
7	1	251,005922	241,058376	591	59,914729	0,80445522		
8	1	253,607246	305,926087	345	34,9756032	0,68426585		
9	1	249,817881	363,990066	151	15,3081626	0,56997787		
10	1	190,418699	378,48374	123	12,4695629	0,73233824		
11	1	191,022013	410,58805	159	16,119191	0,43596246		
12	1	193,267742	426,377419	155	15,7136768	0,58507662		
13	1	233,198113	537,292453	159	16,119191	0,48350118		
14	2	672,573394	28,9954128	109	11,050263	0,71730458		
15	2	678,257143	54,5071429	140	14,1929984	0,7122814		
16	2	667,003817	59,8969466	131	13,2805914	0,83030185		
17	2	665,026718	137,209924	131	13,2805914	0,45817498		
18	2	670,482456	204,780702	114	11,5571558	0,46582208		
19	2	668,83125	229,6875	160	16,2205696	0,46582108		
20	2	672,27451	252,745098	102	10,3406131	0,72173365		
21	2	669,946429	282,446429	280	28,3859968	0,43262455		
22	2	663,718069	305,767913	321	32,5425178	0,62739636		

The point of the decimal values must be replaced by a comma.

ray: the index of the current ray

xcenter, ycenter: coordinates of the geometric center of the cell ; this is the average of the x and y coordinates of all the pixels of the cell, given in μm.

area: area of each cell, given in pixels and in micrometers.

circularity: coefficient of circularity of the cell. It is given by the following by the following expression: $4\pi \cdot \text{area} / \text{perimeter}^2$. A value of 1.0 indicates a perfect circle. As the value approaches 0.0, it indicates an increasingly elongated shape