

SULCO MANIA 2018

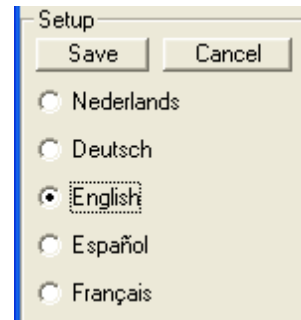
23-12-2018




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Install:


(program Cactus)
Open Explorer
Select the DVD-device,
Select the folder INSTALCACTUS,
Doubleclick on SETUP.exe.



Main menu

Click on  to choose another language.

SulcoMania is based on **field numbers**. In many cases the chosen names are arbitrary, but they are used frequently.
You can select a name or a field number. By default the program starts with a list of names [1].

If you prefer to select immediately a field number, you click on  [2]

Move the cursor to the left upper corner of the screen. A list of names or field numbers appears. Select a name and then a field number [1] or immediately a field number [2].

Frame with thumbnails

Left at the bottom a frame with small pictures (= thumbnails) appears.

A click on a thumbnail: the picture is shown.

A click on the picture: the picture disappears.

Names of the pictures

The first 7 characters are reserved for the field number.

Then a character follows what indicates the type of picture:

F = photo of a flowering plant

P = photo of a plant without a flower


H = photo of a plant in its natural habitat


B = picture of a flowersection, usually made by a photo scanner

Z = picture of a seed, taken with a microscope

S = photo of a seedling, usually with an age of 4 months

D = macro-picture of a radial spine, sometimes with areole

The frame with the thumbnails disappears by a click on the frame or on .

The paneel with the thumbnails is shown again by clicking on .

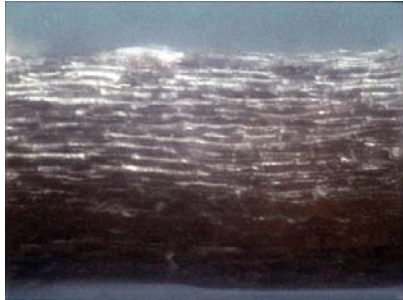
Frame with characteristics

In the right upper corner a frame containing 33 characteristics appears.

- Body offsetting *strongly: more than 1 offset pro year*
- Areole *line = no felt*
narrow = oblong with felt
elliptical
- Position radial spines *pointing down*



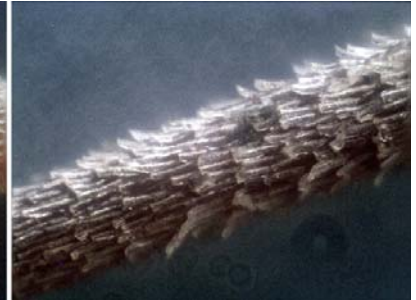
- Lobes radials



smooth

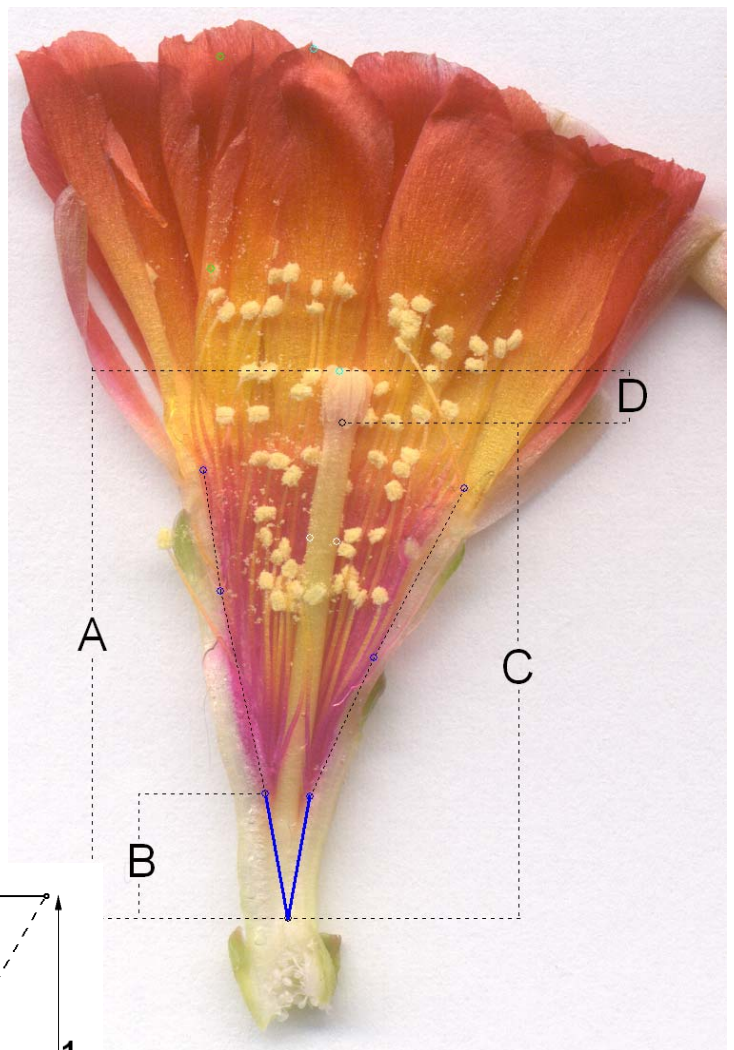
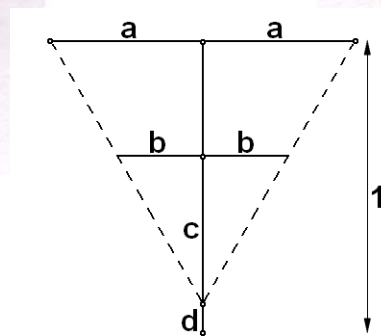
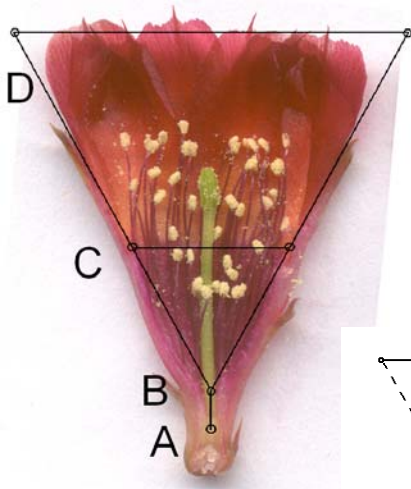


rough



false lobes

- % style diam./length
 $\frac{\text{diameter style} \times 100\%}{\text{length style}}$
- Style attached
see picture of flower: $\frac{B}{A}$
- % stigma/style
see picture of flower: $\frac{D}{C}$
- Angle tube
see picture of flower:
dark blue lines
- Flower model
The model is defined by
 $A(0,0), (0,y_B), (0,y_C), (x_D, 1)$




The **altitude** of the habitat is arithmetically rounded on 25 m.
 The **coordinates** are written as decimal numbers, rounded on 0,05°. The real habitat is situated in a rectangle of approximately 5,5 km length and width.
 In an **Info** window additional information can possibly be found.
 If **Picture right tab** has been selected, the picture will be shown against the right edge.
 Click on an item in the list of "Other field number". This record is selected.
 N.B. Field numbers of the same area must not belong to the same taxon.
 Therefore in SulcoMania various populations are called "species of a place".


The frame with characteristics disappears by a click on the frame.

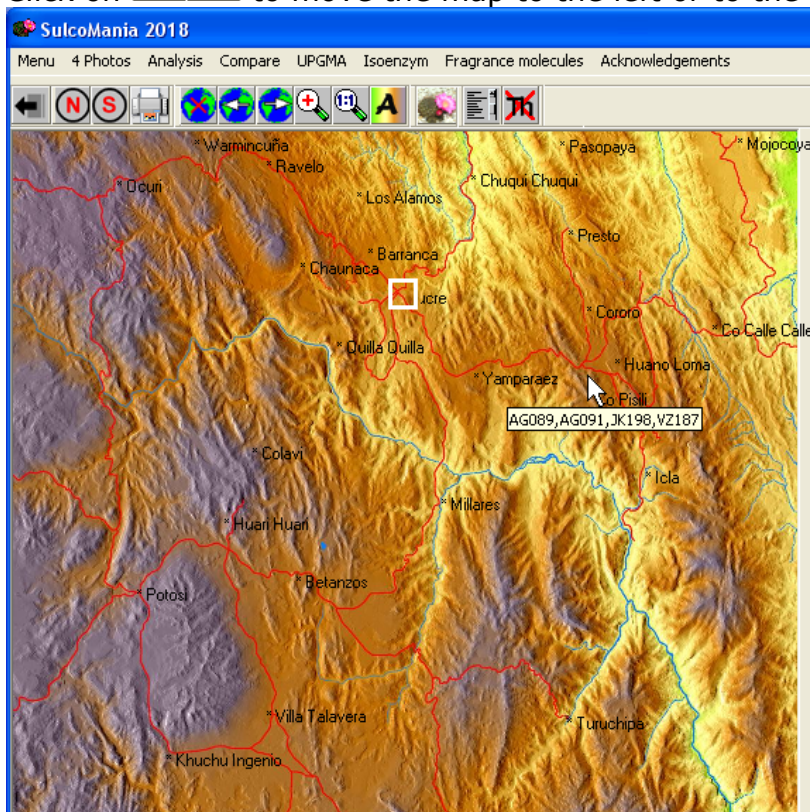
The frame with characteristics is made visible again by a click on .



If the habitat of the selected field number is known, the icon with the globe will be shown in colour. Click on it to display a map. The name of the map is found on the frame with characteristics.

Click on  to enlarge the map or to shrink it to the original format.

Click on  to move the map to the left or to the right.



Click with the right mousebutton on the map. If available a list with alternative maps will be shown. Click on the name of a map in this list.

If the cursor above the map is paused and weingartia's / sulcorebutia's have been discovered on that site have been discovered, the field number will be displayed, see cursor on the map.
 The colours of the map indicate the altitude.

Click on  to see the relation between colour

and altitude.

Click on the map to hide.

If a first description of the name is available, right in top of the screen appears **DESCRIPTION**. If the text is outlined in red, the type plant was a member of the population of the selected field number.

Click on **DESCRIPTION**: the text of the first description. Click on the tekst: the text of the first description disappears.

UPGMA

EH06242-tarabucoensis
EH06243-tarabucoensis
EH06244-tarabucoensis
EH06253-sp.Yamparaez
EH06256-applanata
EH06266-sp.Mizque
EH06273-sp.Yacuparticu
EH06278-sp.Juntutuyo

Select fieldnumbers,
max. 40

☐ Select one by one.
☐ Select on names.
☒ Select most similar.
☐ Select on habitat.

The method is used to pair together field numbers with very similar plants.
Click on an option to make a selection of field numbers.

Select:

one by one: any desired item is clicked in the list manually.

on names: all plants having the name of the selected item are marked.

most similar: of all field numbers in de list, characteristics are compared with these of the selected item. The 40 items with the highest similarity are marked.

on habitat: items with the same coordinaten are marked. If the number is lower than 40 there will be looked for nearby field numbers.

See Compare - Fields.

Similarities

JK053--canigueralii

G162A--pasopayana
G165--longispina
G166--sp.Co.Chakaloma
G167--sp.Co.Chakaloma
G169--sp.Chunu Saruna
G170--sp.Chunu Saruna
G178--totorensis
G182--sp.Totora-Omeriq
G183--huanacuniensis
G186--sp.Totora-Mizque
G187--mizquensis
G191--markusii
G215--jolantae
G221--huanacuniensis
G254--sp.Mojocoya
G257--naunacaensis
G259--elizabethae
G318--purpurea
G332--sormae
G334--tarvitaensis
G360--sp.Potero
G361--sp.Laime
GH292--sp.Ocuro
HE090B--sp.Pasorapa
HE120--markusii
HE215--carichimayensis
HE216--carichimayensis
HE219--carichimayensis
HE220A--carichimayensis
HE222--carichimayensis
HE223--carichimayensis
HE224--carichimayensis
HE225--carichimayensis
HE226--carichimayensis
HJ0239--hertusii
HJ0241--sp.Ludafiez
HJ0242--sp.Tunas Mokho
HJ0243--sp.Esmeralda
HJ0246--sp.Yamparaez

40 items selected

☐ Select one by one.
☐ Select on names.
☒ Select most similar.
☐ Select on habitat.

50% 60% 70% 80% 90%

JK053--canigueralii

D01--chatajillensis
KO TAVA--sp.Chauanaca?
VZ037--sp.Yamparaez
EH06253--sp.Yamparaez
HJ0246--sp.Yamparaez
JK066--tarabucoensis
MC5554--canigueralii
VZ099--canigueralii
EM349--aureiflora
HS041--cardenasiana
HJ0986--sp.Llagua Loma
NL022--chatajillensis
HJ0952--callichroma
JK053--canigueralii <<<
VZ159--canigueralii
KK1802--minima
WR671--pojonienis n.n.
VS433--gemmae
VZ205--naunacaensis
HS071--canigueralii
MC6142--zavaletae
WR281--canigueralii
WR599--canigueralii
HS076A--pedroensis
WK217A--applanata
G158--tarabucoensis
HJ0986--sp.Ecia.Saucoyo
HJ0961--sp.Co.Santiago
HJ1135--azurduyensis
HJ1168--azurduyensis
HJ0243--sp.Esmeralda
HS125A--sp.Mandinga
L387--pasopayana
JK063--aureiflora
JK189--aureiflora
WR479--aureiflora
JK191--aureiflora
HJ0991--sp.Huara Khasa
NL091--pasopayana
G167--sp.Co.Chakaloma

SulcoMania 2018-database (9-12-2018)

JK053-F1 canigueralii

VZ159-F1 canigueralii

Picture: click on a name in the cladogram.
Drag the red name into a window above.

Selected item JK053. Click on **Cladogram** and the cladogram is calculated.

Click with the left mouse button on a field number in the cladogram. The mouse icon changes into a small cactus and the text becomes red. Keep the left mouse button down and drag to one of the three frames right of the cladogram. If a picture is available, it is displayed in this frame.


Click with the right mouse button on the cladogram. The cladogram is save as a BMP image in C:\SulcoMania.

Isoenzym and Fragrance Molécules are used in the same way.



Print

The list has been based on names.

Click on  to select a name. A list appears.

Select an item of this list.

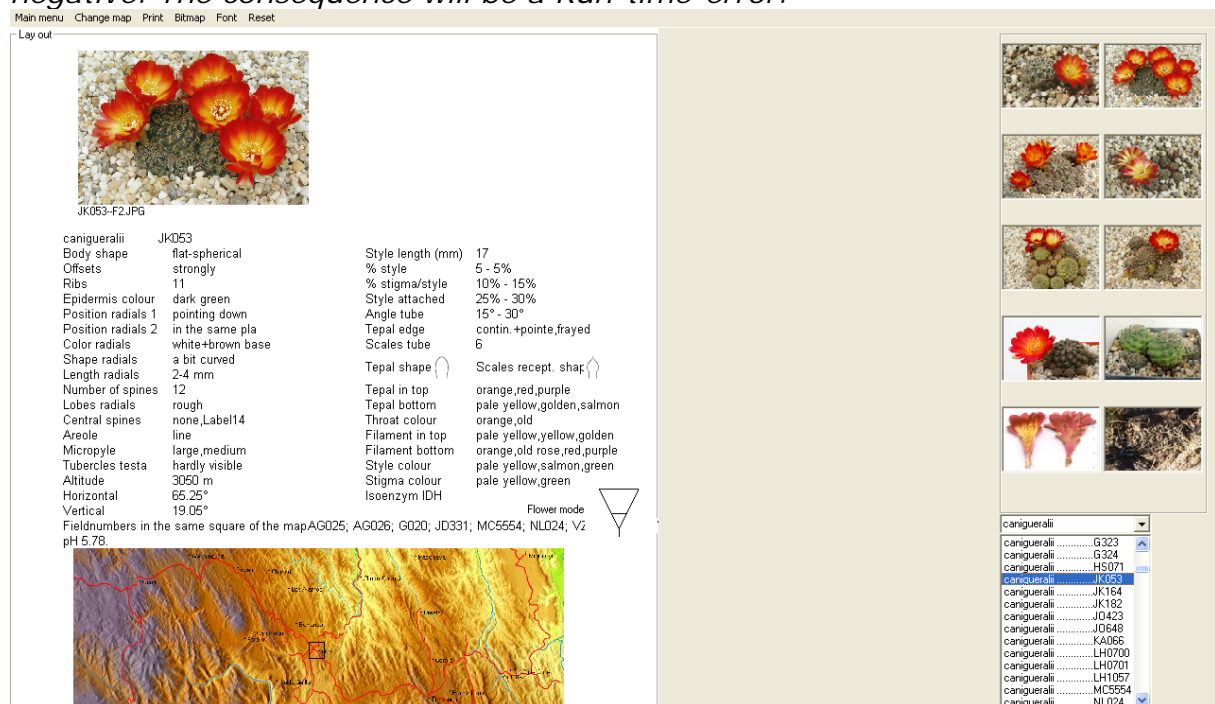
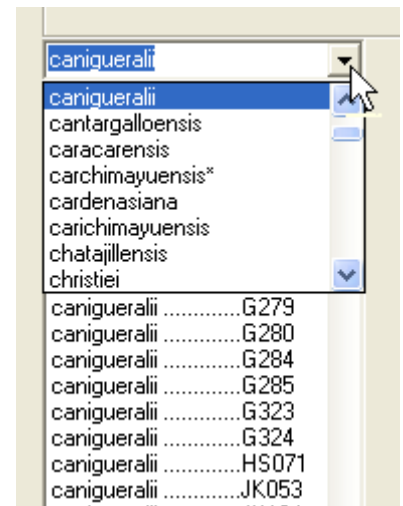
In the Lay-out the characteristics and the text of the field with additional information appear.

Below this you will see a map. The height of this map is determined by the available space on the page (A4).

Above the list the thumbnails belonging to the selected field number appear.

Select one or more photo's by clicking on the thumbnails.

By adding pictures the space for the map will shrink. It is possible, that after selecting many pictures the height of this space becomes negative. The consequence will be a Run-time-error.





To move a photo: click with the left mouse button on the photo, keep the button down and drag to the the desired position.

To enlarge or reduce a photo: click with the right mouse button on the picture. Enter a new width and click on O.K.



4 Photos

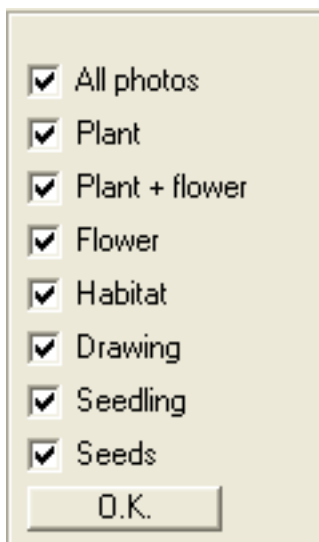
Click on a item of the list. The mouse icon changes into .

Keep the left mouse button pressed and drag to one of the four frames. The mouse icon changes into .

Release the left mouse button above the desired frame. The picture appears in the format of the frame: the height is adjusted.

Click on the picture to see the original format.

Click on the original picture to hide.



The program offers the overall list of the pictures. One can exclude a part of the list or limit to a certain category of pictures.

Analysis

There are various options.

- find field numbers with a selected characteristic or a combination of selected characteristics.
- find all field numbers with a selected acronym.
- find all field numbers with a selected name.
- find field numbers with a high degree of similarity in characteristics with those of a selected field number.

Find field numbers with a selected characteristic or a combination of selected characteristics

There are 33 lists with characteristics. Click in a list on one or more items. Click on **Find**

The screenshot shows a complex software interface for analyzing field numbers based on various characteristics. The interface is organized into several panels. At the top, there's a 'Main menu' with 'Find' and 'Map' options. Below this, there are multiple panels for selecting characteristics: 'Body' (Shape, Ribs, Epidermis colour, Offsets), 'Flower' (Style length, % style diam./length, % stigma/style, Style attached, Throat colour, Tepal in top, Filament in top, Style colour, Tubercles testa, Micropyle, Stigma colour, Isoenzym IDH), 'Seeds', 'Spines' (Position radials 1, Position radials 2, Colour radials, Length radials min, Number of spines, Shape radials, Central spines, Lobes radials, Length radials max), 'Flower model', and a 'Result' panel. The 'Ribs' characteristic is selected with the value '13'. The 'Result' panel shows 'Result 250/813 30% [7%]' and a list of field numbers and species names. A map of Cuba is also visible.

In the example in characteristic **Ribs** **13** is selected.

The result appears in the top right of the screen. Above the obtained field numbers you find "Result 349/746 46%[9%]". The number of ribs has been found in 746 records. In 349 of these the number of **13** was found. This is 46% of 746. If the numbers of ribs ranging from **6** to **>15** had been divided equally, the result would have been 9%.

Obviously **13** occurs relatively very often. 13 is a number of fibonacci sequence.

Click on an item in the list of **Result**.

A list with pictures belonging to the selected field number appears.

Click on an item of this list. The picture appears.

Click on the picture and it disappears.

Left of this list you can select the type of pictures to be displayed ("All photo's", "Plant + flower", and so on.)

The screenshot shows a detailed view of the 'Result' panel. It displays 'Result 349/746 46% [9%]'. Below this, there is a list of field numbers and species names. The 'Ribs' characteristic is selected with the value '13'. The 'Result' panel shows 'Result 349/746 46% [9%]' and a list of field numbers and species names. A map of Cuba is also visible.

Map: a map is displayed. On this map there is an indication where the results occur.

Click with the right mouse button to select another map.

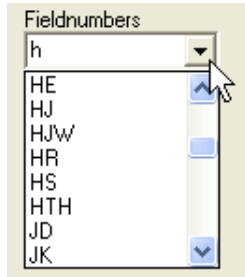
Click on Print to print the map.

More items per characteristic can be selected.

More characteristics can be selected.

Clear: all selections in the list of the characteristics are cleared.

Find all field numbers with a selected acronym



Click on of the combobox of **Field numbers**.

Select an acronym.

Click on **Find**.

Keep the mouse cursor 1 second above the textbox, after selecting an acronym. The meaning of the acronym is displayed in a "Tooltiptext", if known.

Find all field numbers with a selected name

Click on of the combobox of **Names**.

Select a name.

Click on **Find**.

Find field numbers with a high degree of similarity in characteristics with these of a selected field number

Of all field numbers in the list 30 or more characteristics have been provided with data.

To change the number of 30 you click on of the combobox under the list.

Select a field number.

The screenshot displays a complex software interface for selecting field numbers based on various characteristics. The interface is divided into several sections:

- Main menu:** Find, Clear, Map.
- Body:** Body shape (flat, spherical, cylindrical), Ribs (<8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18), Epidermis colour (green, dark green, greenish bro, violet), Offsets (no, a bit, strongly), Areole (line, narrow, wide).
- Spines:** Position radials 1 (pointing down, parallel, spreading), Position radials 2 (pointing down, parallel, spreading, in the same pl, addressed, projecting, str. projecting), Color radials (white, yellow, brown, black, light+dark tip, white+brown, yellow+brown), Length radials min. (1, 5, 7, 9, 11, 13, 15, 17, 19, 21), Number of spines (<9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19), Shape radials (straight, curved, mixed-up, lobes radials (smooth, rough, very rough), Central spines (none, 1, 2, 3, 4, 5), Length radials max. (1, 2, 3, 4, 5).
- Flower:** Style length (mm) (<10, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20), % style diam./length (1%, 2%, 3%, 4%, 5%, 6%, 7%, 8%, 9%, 10%, 11%, 12%), % stigma/style (5%, 10%, 15%, 20%, 25%, 30%, 35%, 40%, 45%), Style attached (<5%, 5%-10%, 10%-15%, 15%-20%, 20%-25%, 25%-30%, 30%-35%, 35%-40%), Throat colour (yellow, golden, orange, salmon, old rose, red, purple, magenta), Tepal in top (pale yellow, yellow, golden, orange, salmon, old rose, red, purple, magenta), Filament in top (pale yellow, yellow, golden, orange, salmon, old rose, red, purple, magenta), Style colour (salmon, old rose, red, purple, magenta, pink, white, green), Seeds (visible, hardly visible, micropyle (large, medium, small), Tubercles testa (visible, hardly visible, micropyle (large, medium, small), Izoenzym IDH (old rose, red, purple, magenta, pink, white, green).
- Flower model:** A diagram showing the flower's structure with labels like 'Calyx' and 'Tepal'.
- Result:** A list of field numbers and their corresponding characteristics, such as JK053 (100% canigueralli), WR671 (84% pojoniensis n.n.), WR599 (84% canigueralli), WR479 (84% aureiflora), VZ159 (84% canigueralli), HJ0952 (84% callichroma), WR281 (83% canigueralli), L387 (82% pasopayana), JK189 (82% aureiflora), JK066 (82% tarabucoensis).
- Histogram of the 25 best results:** A bar chart showing the frequency of various characteristics for the top 25 results. The x-axis lists characteristics like Body shape, Ribs, Epidermis colour, Position radials 1, Position radials 2, Shape radials, Number of spines, Lobes radials, Central spines, Areole, Style length (mm), % style diam./length, % stigma/style, Style attached, Tepal edge, Tepal shape, Scales tube number, and Micropyle.

In the label **Result** (right picture right in top) you find the fieldnumbers in order of the percentage of similarity.

N.B. As the number of features used is lower, the color of the character will be lighter. This will be noticeable if **Minimum number of features to compare** is set much lower.

The map shows the habitats of the 25 field numbers with the highest percentage. At the bottom of the screen an histogram is displayed for these 25 field numbers with the highest percentages of similarity.

Every item (possible value) of every characteristic is represented by a column. The height of the column is determined by the number of times this item occurs in 25 "best" results.

The items belonging to the selected field number get a red colour.

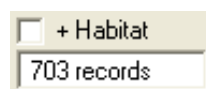
Calculation:

Example:

Compared is a characteristic of field number A and field number B.

- characteristic_A = *rough*, characteristic_B = *rough*: similarity = 1
- characteristic_A = *rough*, characteristic_B = *smooth*, *rough*: similarity = 0,8

The percentage of similarity is calculated by
$$\frac{\text{sum favorable outcomes}}{\text{number of characteristics with data}}$$

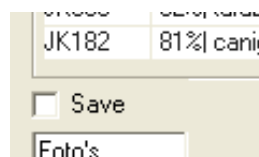


Some people believe, that close together growing populations must be more related. If **+Habitat** is activated, the habitat will be used as 23^e characteristic.

Using the coordinates the *distance* is calculated.

Then the percentage similarity is calculated by:

$$\frac{\text{sum favorable outcomes} + 0,0625 \times (4 - \text{distance})^2}{\text{number characteristics with data} + 1}$$



If **Save** is activated, Result is saved as a text file (.txt) and the small map as bmp-file (.bmp) in the folder *C:\SulcoMania*.

Below you find a part of the different results up to 81%, belonging to this example. The number of used characteristics is displayed between [].

+Habitat off

100% JK053	canigueralii[33]
84% WR671	pojoniensis n.n.[33]
84% WR599	canigueralii[33]
84% WR479	aureiflora[33]
84% VZ159	canigueralii[31]
84% HJ0952	callichroma[33]
83% WR281	canigueralii[31]
82% L387	pasopayana[31]
82% JK189	aureiflora[33]
82% JK066	tarabucoensis[33]
82% JK063	aureiflora[33]
82% HS125A	sp.Mandinga[33]
82% HJ0966	sp.Ecia.Saucoyo[33]
82% HJ0961	sp.Co.Santiago[33]

+Habitat on

100% JK053	canigueralii[34]
85% WR599	canigueralii[34]
84% WR479	aureiflora[34]
84% VZ159	canigueralii[32]
84% HJ0952	callichroma[34]
83% WR281	canigueralii[32]
82% WR671	pojoniensis n.n.[34]
82% L387	pasopayana[32]
82% JK189	aureiflora[34]
82% JK066	tarabucoensis[34]
82% JK063	aureiflora[34]
82% HS125A	sp.Mandinga[34]
82% HJ0966	sp.Ecia.Saucoyo[34]
82% HJ0961	sp.Co.Santiago[34]

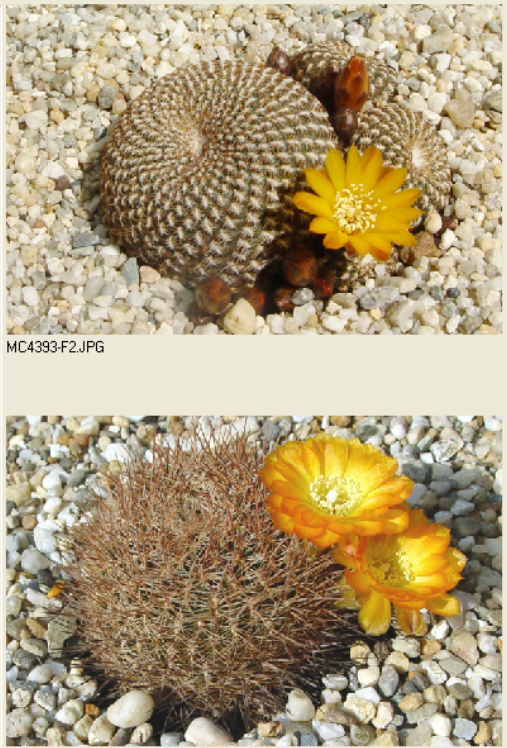
Compare 2 Field numbers

Main menu 2 Fieldnumbers Fields Map

MC4393	MC4393...arenacea	PR HOF...hoffmannii	%	PR HOF
MC4393...arenacea	Body shape	flat-spherical, spherical	100	PR HOF...hoffmannii
MC4393...glomeriseta	Offsets	strongly	100	PR KAI...polymorpha
MC5493...traqueus	Ribs	>=21	86	PR KRU...krugerae
MC5493...krugerae	Epidermis colour	greenish bro	0	PR LAP...sp.Lapia
MC5532...menesii	Position radials 1	parallel	100	PR SEC...sp.Tiraque
MC5553...taratensis	Position radials 2	adpressed	0	PR TIR...sp.Tiraque
MC5554...canigueralli	Color radials	brown, light+dark tip	80	PR TUN...tunariensis
MC5555...tunariensis	Shape radials	a bit curved	0	PR ZAP...polymorpha
MC6140...breviflora	Length radials	2 mm	4	RB237...sp.Rio Chayantha
MC6142...zavaletae	Length radials max.	3 mm	27	RB266...juckeri
MC6222...breviflora	Number of spines	16	86	RB284...sp.Rodeo
MC6309...caracarensis	Lobes radials	very rough	0	RH2065A...kargiana
MC6332...steinbachii	Central spines	none	0	RM272...sp.Quiroga
MN057...neumanniana	Areole	narrow	86	RM273...sp.Quiroga
MN172...neumanniana	Style length (mm)	16	0	RM274...sp.Quiroga
NF01...fidana	% style diam./length	5%	0	RM278...sp.Quiroga
NF02...neumanniana	% stigma/style	25%-30%	80	RM383...cardenasiana
NF03...cintia	Style attached	10%-15%	100	RM443...sp.San Pedro
NF09...fidana	Angle tube	45°-60°	95	RM704...crispata
NF10...hediniana	Tepal edge	continuous, contin.+pointe	80	RV109...torotorensis
NF12...hoffmannii	Scales tube number	5	60	RV109...hoffmannii
NL021...sp.Chataquila	Tepal shape	1, 5	80	RV313...hoffmannii
NL022...chataquillensis	Scales recept.	1, 5	80	SE KARG...kargiana
NL023...chataquillensis	Tepal in top	golden	100	SE106A...sp.Cucho Ingerio
NL091...pasopayana	Tepal bottom	golden	80	VS160...pygmaea
NL117...krahni	Throat colour	orange	80	VS311...cintensis
NL147...horrida	Filament in top	golden	100	VS312...westii
OE829...trollii	Filament bottom	red	100	VS321...lecoriensis
OE861...koehresii	Style colour	pale yellow	80	VS326...westii
PL20-037...slabana	Stigma colour	pale yellow	80	VS419...variabilis
PL20-395...heliosides	Flower model	11232303	100	VS426...sp.Viricuri
PR ARA...sp.Juntutuyo	Isoenzym IDH	7	83	VS433...gemmae
PR COL...sp.Colcha	Microphyte	medium, small	86	VS456...canigueralli
PR GLAN...glanduliflora n.n.	Tubercles testa	visible, ± visible	59	VS462...alba
PR HOF...hoffmannii			96	VS514...cintensis
PR KAI...polymorpha			74	VZ007...steinbachii
PR KRU...krugerae			79	VZ013...polymorpha
PR LAP...sp.Lapia			96	VZ023...sp.Sucre
PR SEC...sp.Tiraque			100	VZ037...sp.Yamparaez
PR TIR...sp.Tiraque			0	VZ047...tarabucoensis
PR TUN...tunariensis				VZ050...rauschii
PR ZAP...polymorpha				VZ052...rauschii
RB237...sp.Rio Chayantha				VZ052A...hertusii
RB266...juckeri				

66 % 31 %

compatible different indefinite



Characteristic in both of the columns equal: printed green, bold (value 100)

Characteristic in both of the columns partially equal: printed green (value 80)

Characteristic in both of the columns fully unequal: printed red (value 0)

In case of characteristics **Ribs**, **Number of radial spines** and **Length of radials** is calculated $\text{abs}(\log(\text{first}) - \log(\text{second}))$ (value $100 \times (1 - \text{result})$)

In case of the flower colour and flower model a distance between two points is calculated using Pythagoras. The RGB numbers are the coordinates of the points. Under the columns there is a strip with green, red and grey colour.

Green = (sum of the values) / 33 [66%]

Grey = (sum of the lines in which a characteristic is empty) / 33 [3 %]

Red = $100 - 66 - 3 = 31\%$.

Of all items of the list for **2 Field numbers** at least 30 of the characteristics has been collected. In the list for **Fields** you will find *all* items, as well these of which no data were entered.

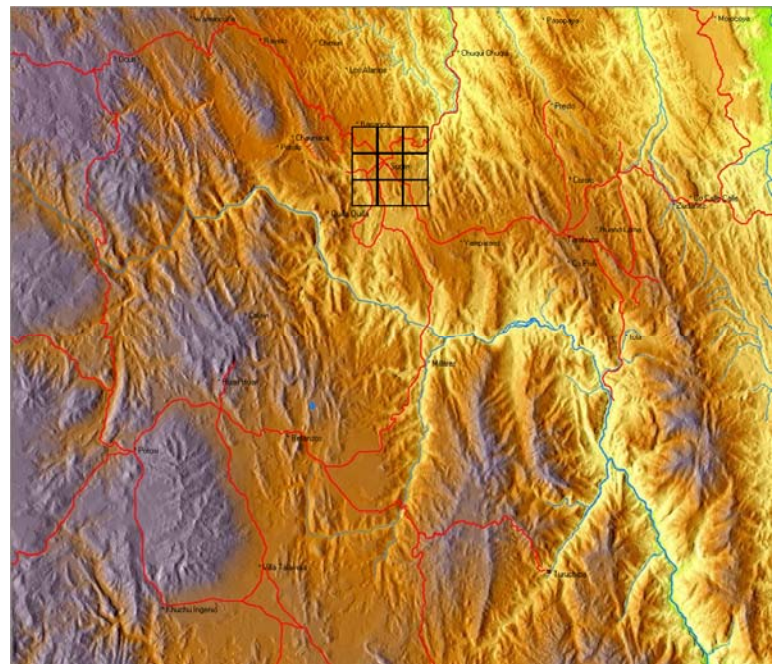
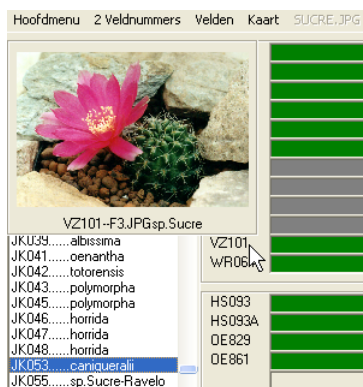
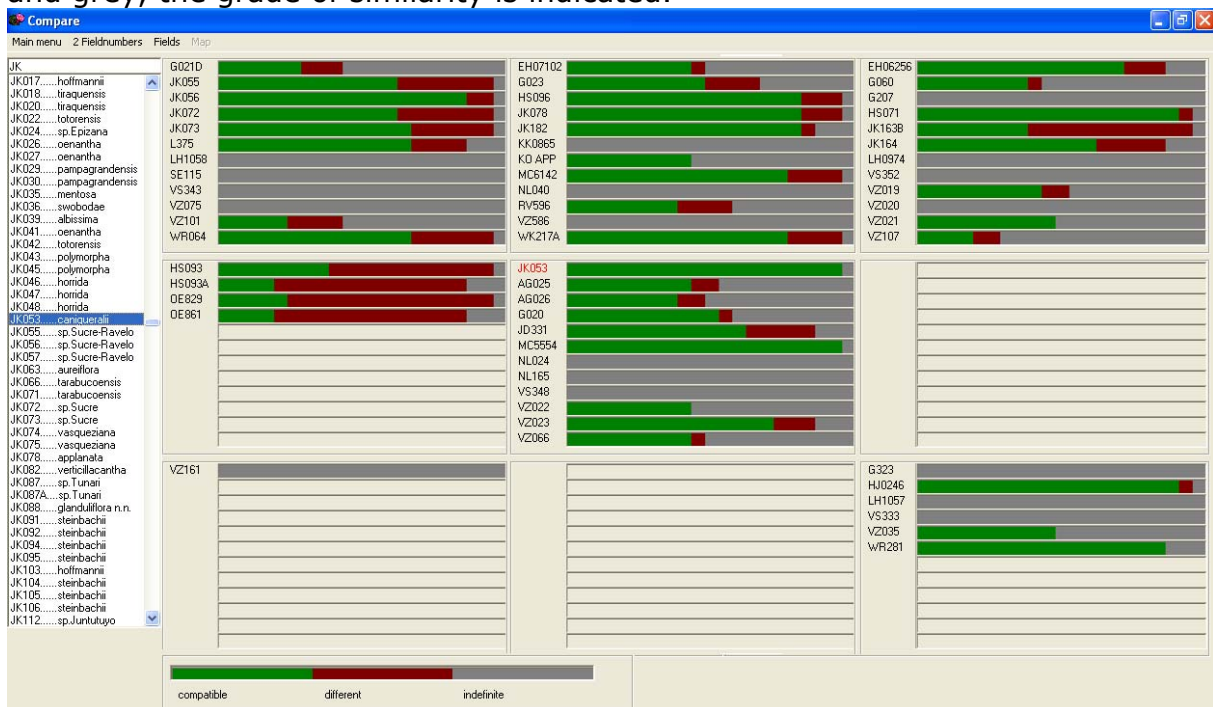
Fields

The goal is to see what field numbers are close to a selected field number.

Therefore a square is divided in 9 sections. Every section represents a part of the map of $\pm 5,5 \times 5,5$ km.

Click on an item in the list. This field number is put in the central section, printed in red. If available in every section, 10 field numbers will be shown.

If characteristics of the *selected* field number are known, they will be compared with these of the other shown field numbers. Again with the colours green, red and grey, the grade of similarity is indicated.



Click on a field number to see a picture.
Click on **Map** to see the map, on which the square with 9 sections is displayed.

Acknowledgements.

Annually the database of images is improved and enhanced by the participation of a great number of people. This is not only gratifying, but it also encourages me to develop this project further.

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