COMPONENT SPRAY TOOL v1.3
for SketchUp v5 and v6 (Free and Pro)
© D. Bur, 03 August2008

This script is a tool to quickly populate your model with components (trees, people, rocks, grass...) based on support shapes, options and constraints.

Installation:

Unpack the archive in the SketchUp Plugins folder.

You should have:
"compo_spray.rb" in your Plugins folder
Component Spray User Guide.pdf in your Plugins folder. You can move this file where convenient.

What's new in v1.2:
- New "shape": drops a components at each vertex of selected faces.

What's new in v1.2:
- 2D components supported.
- components lists are now OK.

Usage:

You'll find a sub-menu under the "Draw" menu:

| Component Spray ▶ | Component Spray Tool |
| | Set default settings |

"Component Spray Tool" is the main command, and "Set default settings" lets you modify the options (the tool can use three sets of options to operate: Basic, Default, and Dialog).

1. Component Spray Tool

When selecting this command from the Draw menu, the following dialog box is displayed (note that the title bar shows the number of components currently available in the model):

34 components available:		
Use settings:	Dialog	
Component 1:	Tree_2D_Schematic_Generic_12'	
Component 2:		
Component 3:		
Component 4:		
Component 5:		
Component 6:		
Spray shape:	Line	
Spray pressure:	35%	
Random rotate:	Yes	
Prevent stacking:	Yes	
Keep vertical:	Yes	
Destination layer:	Calque0	
Layer: mask:	Ocean	
Maintain proportions:	Yes	
Low scale value:	1.0	
High scale value:	1.0	
Low steepness:	0	
High steepness:	90	
Low altitude:	~ -6,10m	
High altitude:	~ 38,65m	

- **Use settings**: select wether you want to use the settings you enter in the dialog box, or use basic settings or default settings (see 2. for further details).

- **Component 1 to Component 6**: These are dropdown lists where you will find the components already present in your model. When dropping components, the tool randomly mixes 1 to 6 different components. You must select at least one component, that is why the first list has no blank field. Select other components in the other dropdown lists, or leave them blank. You can dose the amount of components if you select twice the same component name in more than one list.

Examples:

6 differents components used, each of them has the same chance to be randomly used.

Component 1:	Tree_Desert_Saguaro_Mature
Component 2:	Tree_Tropical_Coconut
Component 3:	Tree_Tropical_Palm_Queen_1
Component 4:	Tree_Tropical_Palm_Queen_1
Component 5:	Tree_Tropical_Palm_Straight_
Component 6:	V_Tree_Palm_40ft

4 differents components used, each of them has the same chance to be randomly used. Note that blank fields between two lists doesn't matter.
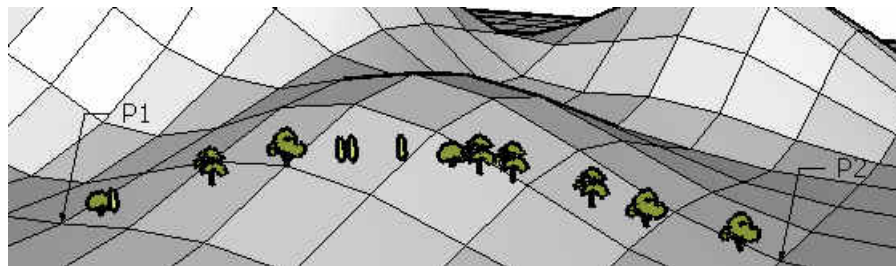
Component 1:	Tree_Desert_Saguaro_Mature
Component 2:	Tree_Tropical_Coconut
Component 3:	Tree_Tropical_Palm_Queen_1
Component 4:	
Component 5:	Big Rock
Component 6:	

3 differents components used. Because "Big Rock" was selected 3 times, it has three times more chances to be used than the other components. "Tree tropical coconut" was selected twice, thus it has 1 chance among 3 to be used.
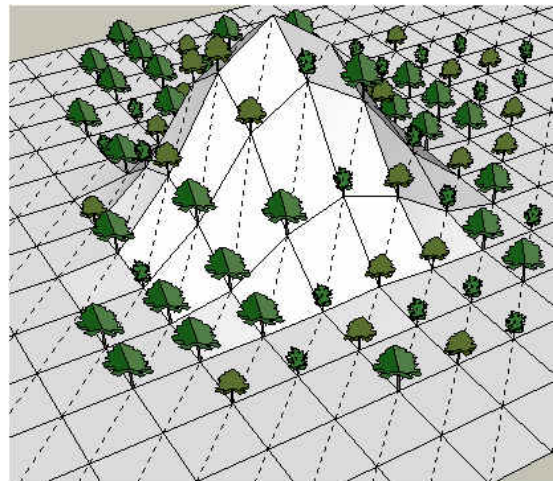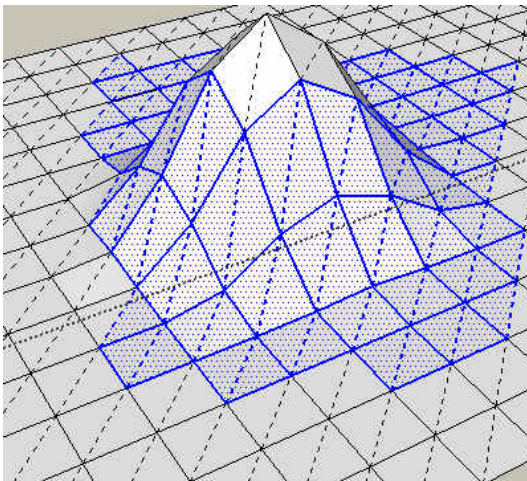
Component 1:	Tree_Tropical_Coconut
Component 2:	Tree_Tropical_Coconut
Component 3:	Tree_Tropical_Palm_Queen_1
Component 4:	Big Rock
Component 5:	Big Rock
Component 6:	Big Rock

- **Spray shapes**: there are 8 different shapes (ways of dropping components): point, line, triangle, square, rectangle, circle, spray, and selection. This last one is particular because it only appears in the list when your current selection isn't empty.
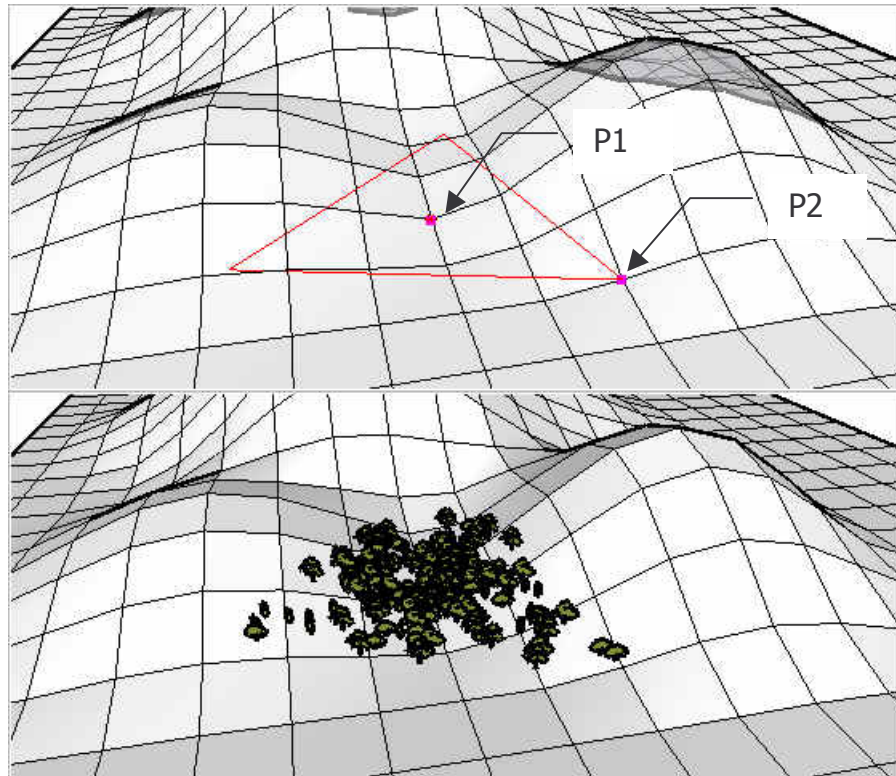
  - **Point**: inserts a single component instance at the point you click. The first component is the first in the list of selected components, next click will insert the second on the list, and so on. Other options are applied as well (see below).

  - **Line**: Click two points and component instances are randomly inserted between the two points. Other options are applied as well (see below). After the first point, you can enter a length for the line in the VCB.
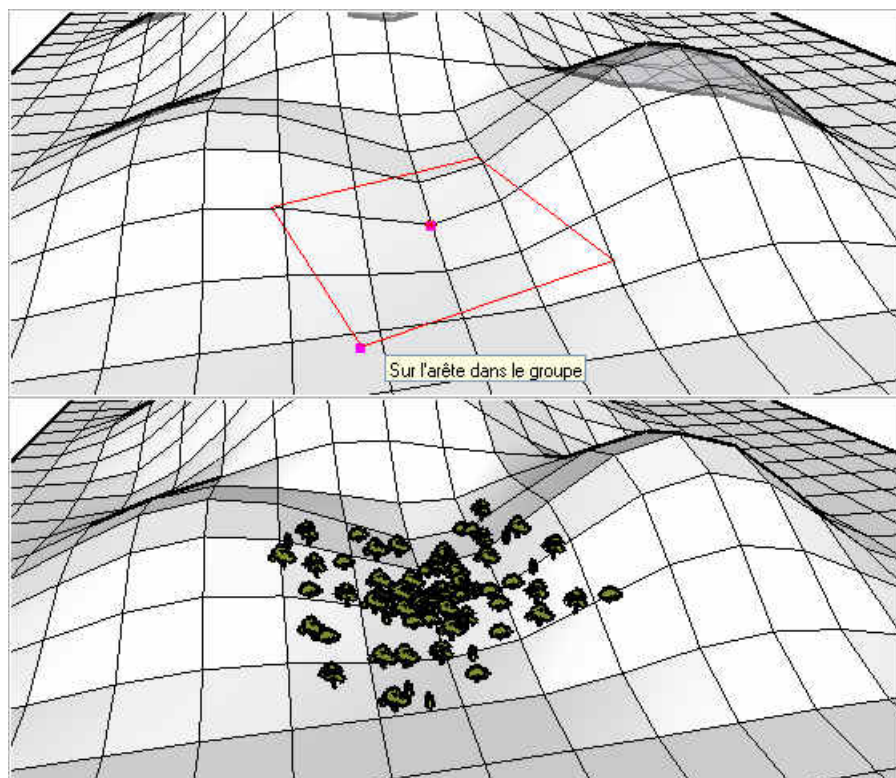

  - **Vertices of faces:** Select faces before starting the tool. You'll be in the "Selection" shape mode, so change it to "Vertices of faces". A component is inserted at each vertex of each face. Other options are applied as well.
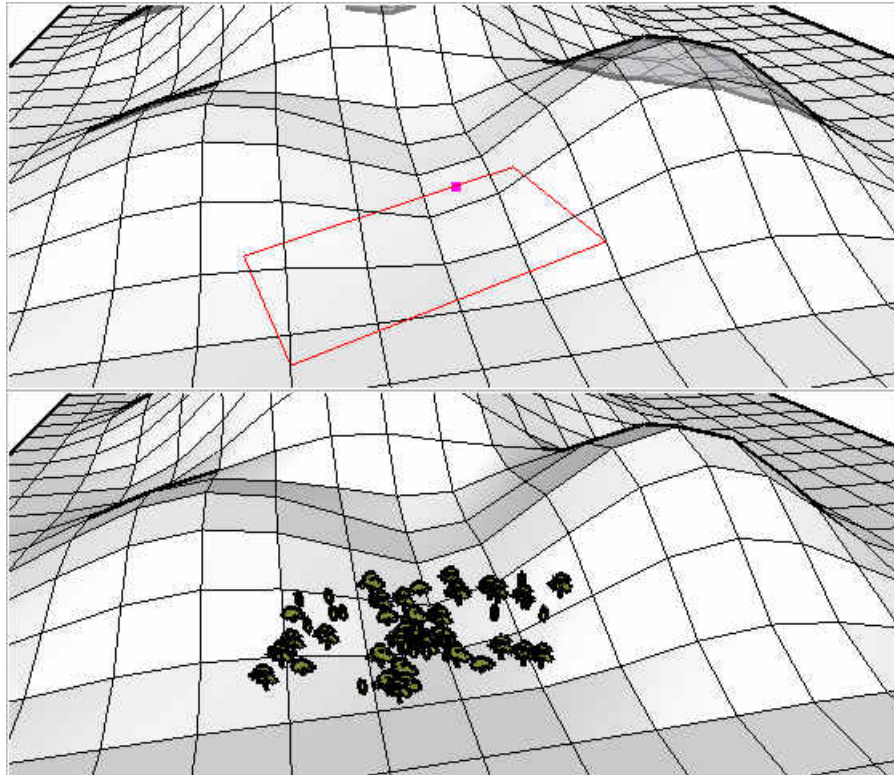

  - **Triangle**: Click a point to locate the center of an equilateral triangle. Click a second point to define a corner of the triangle. Component instances are randomly inserted on an area defined by the triangle. After the first point, you can enter a length for the distance between the center and the corner in the VCB. Other options are applied as well (see below).
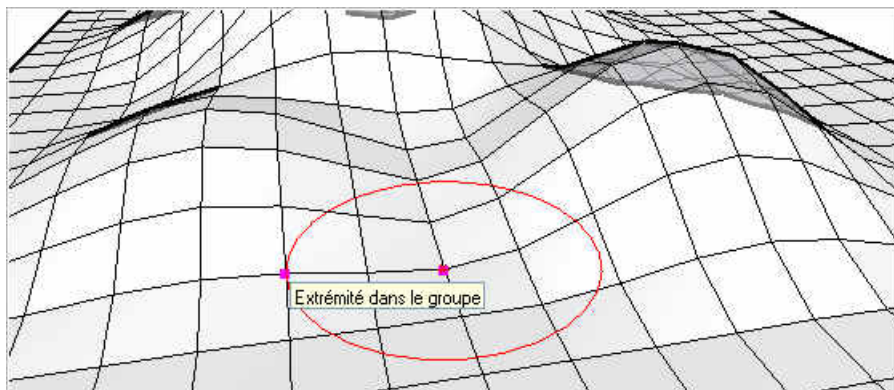
- o **Square**: Click a point to locate the center of the square. Click a second point to define a corner of the square. Component instances are randomly inserted on an area defined by the square. After the first point, you can enter a length for the distance between the center and the corner in the VCB. Other options are applied as well (see below).
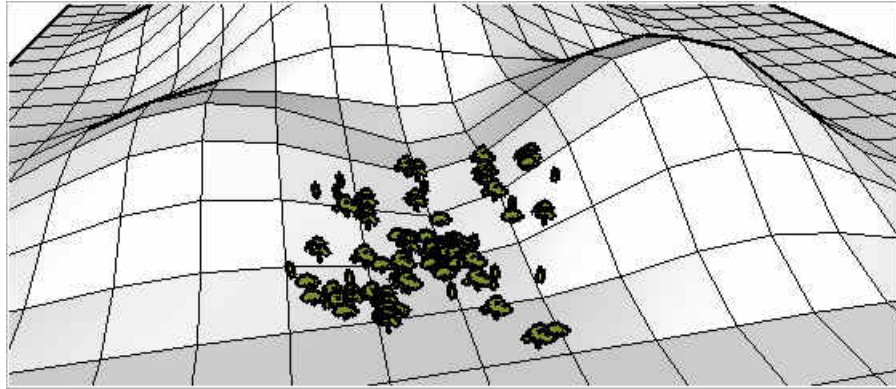
o **Rectangle**: Click a point to locate the starting point of the length of the rectangle. Click a second point to define the ending point of the length of the rectangle, or enter a length in the VCB. Click a third point to define the width of the rectangle, or enter a width in the VCB. Component instances are randomly inserted on an area defined by the rectangle. Other options are applied as well (see below).
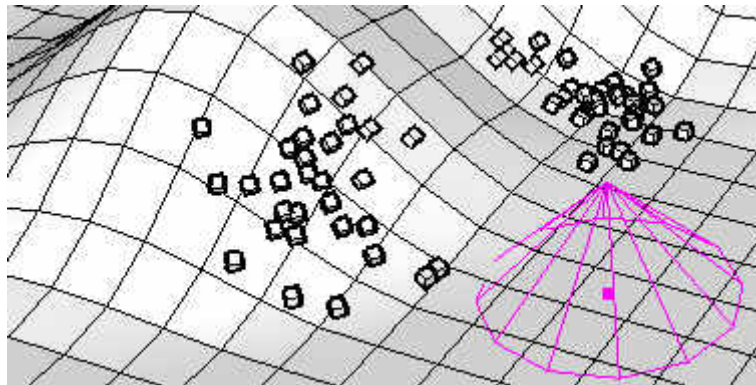

o **Circle**: Click a point to locate the center of the circle. Click a second point to define the radius of the circle. Component instances are randomly inserted on an area defined by the circle. After the center point, you can enter a length for the radius in the VCB. Other options are applied as well (see below).
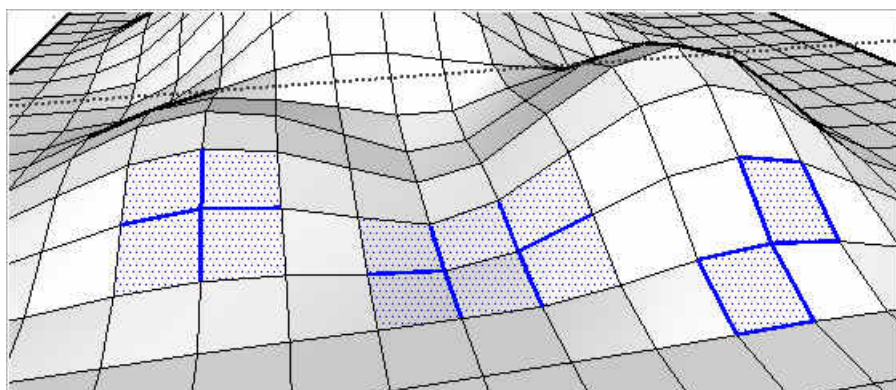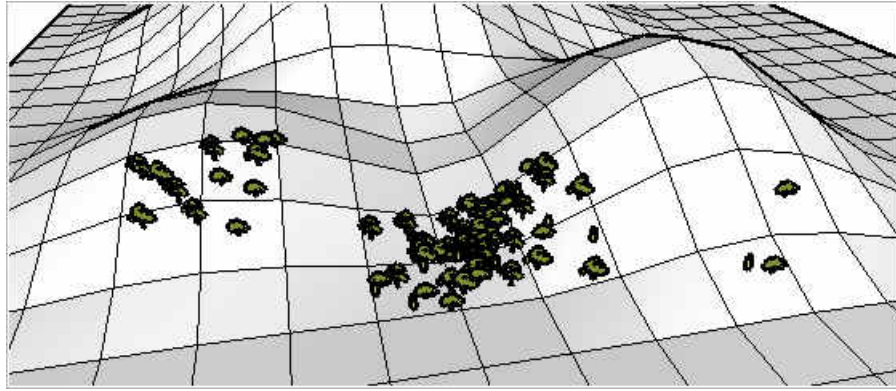
o **Spray:** this is basically similar to circle, but you can drop components on circular areas as many areas as you want without clicking the center and radius, and/or modify the radius of the spray between each drop. Move the mouse over your model and you'll see a pink cone. The center of the base is the center of the circular drop area. Click a point and components are dropped, move the mouse, click again, etc. To change the cone radius, enter its value in the VCB.
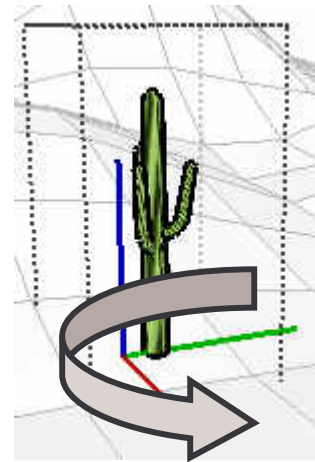

o **Selection**: as said before, this option is only available from the menu if you have selected objects before launching the command. Objects that are not faces are ignored. They can be selected in the model itself or within a group (in this case, components will NOT be enclosed in the group, but will belong to the model). Component instances are randomly inserted on area(s) defined by the boundaries of the faces. Selected faces can be adjacent to each other or not. Other options are applied as well (see below).
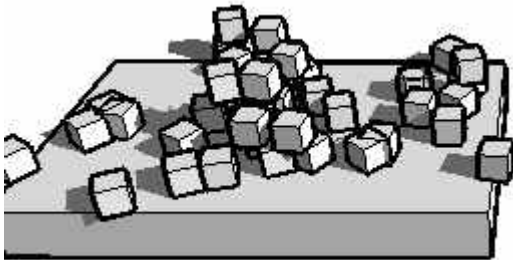
- **Spray pressure**: select a pressure percentage, from 5% to 100%. (see below what pressure means and how pressure is calculated).

- **Random rotate**: select "Yes" to allow a random rotation of each component instance along its own Z axis.

- **Prevent stacking**: Select "Yes" if you want to avoid the components to be dropped one on the other (right figure).
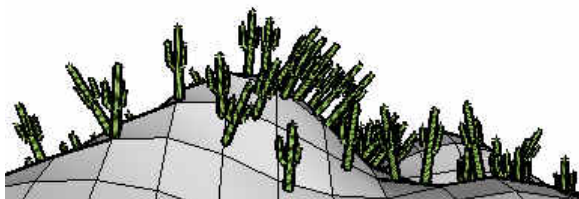

Prevent stacking : No   *Prevent stacking: Yes*

- **Keep vertical**: Select "Yes" if you want all the components Z axis aligned with the Z axis of the model (right figure). When selecting "No", all components Z axis are parallel to the normal of the face they are on (perpendicular to the face's plane).
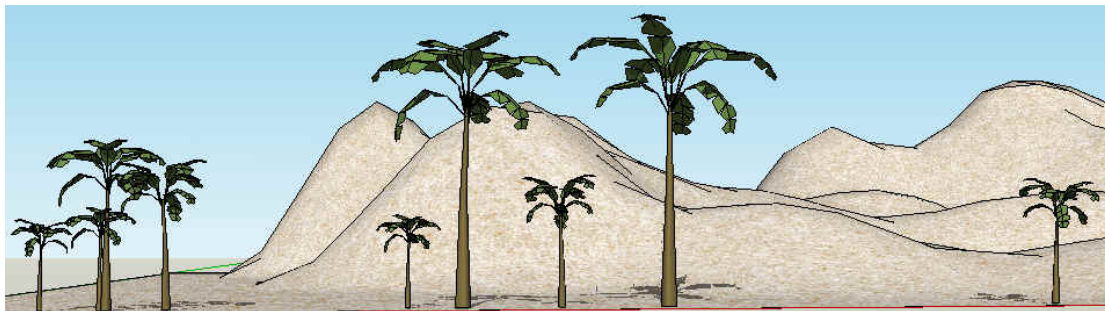

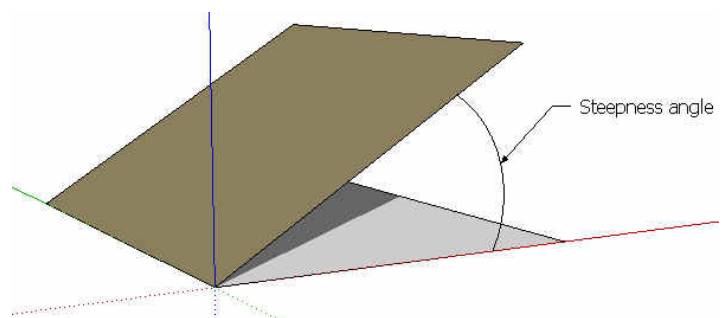*Keep vertical : No*   *Keep vertical: Yes*

- **Layer:** this is the layer on which the components will be on. Leave this field blank if you want to use the current layer.

- **Layer mask:** this is the layer on which the script can drop components, all other layers can't receive components. Leave this field blank if you don't want to use a layer mask.

- **Maintain proportions:** Select "Yes" if you want to keep X,Y and Z scale values equal for each dropped component (a cube will always be a cube, a sphere will always be a sphere, and so on...)

- **Low and high scale values**: These values tell the script wether to scale each component instance or not, in a range from low value to high value. Values can be less than 1, and entering a negative number for one or both values allows random mirroring of instances.
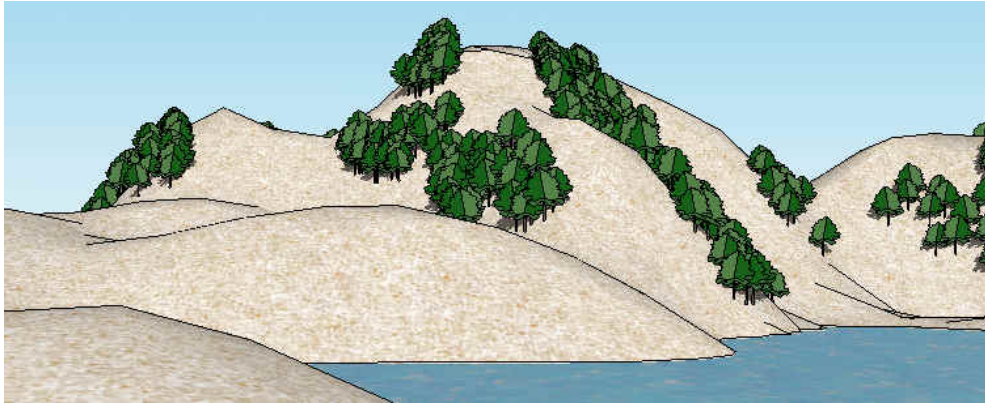

Palm trees along a line: low scale value: -1   high scale value 4

Low and high steepness:
These values tell the script to drop components only on faces whose slope angle is between low value and high value. Steepness is the angle [0=horizontal -> 90=vertical] mesured from the XY (red-green) plane. When the raycast method hits an edge instead of a face, the same principle is applied.
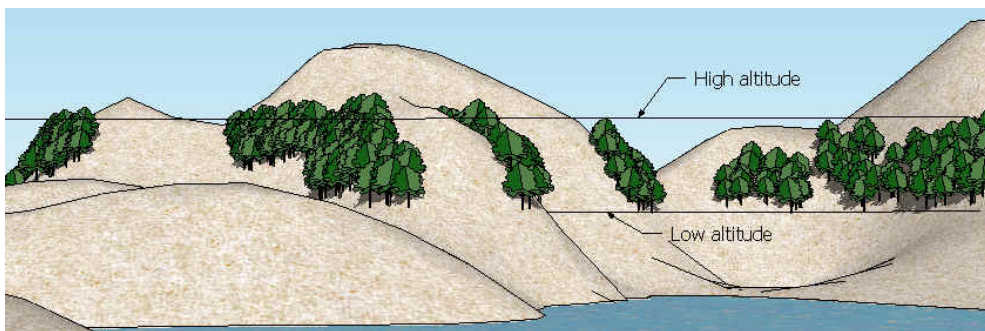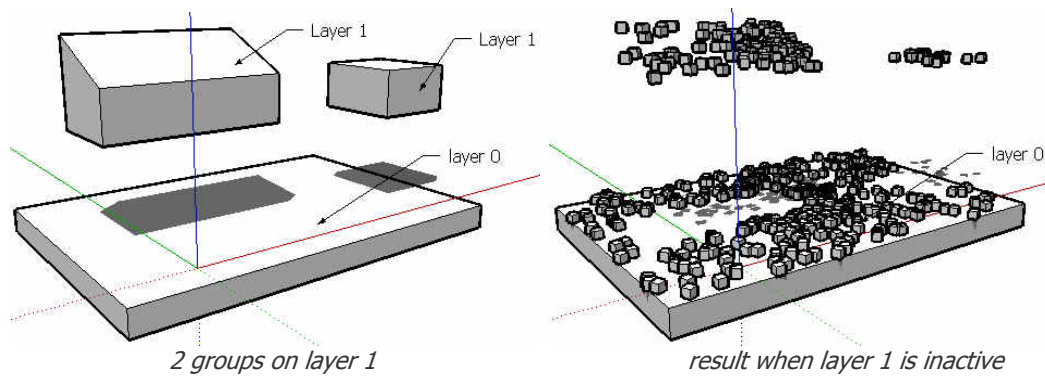
Low steepness value: 45   High steepness value 90

Low and high altitudes:
These values tell the script to drop components only on altitude points that go from from low value to high value. A component will be inserted between these two values if its insertion point matches the range. Each time the script is launched, the Z bounds of the entire model are calculated and put into the dialog box, using your current unit.
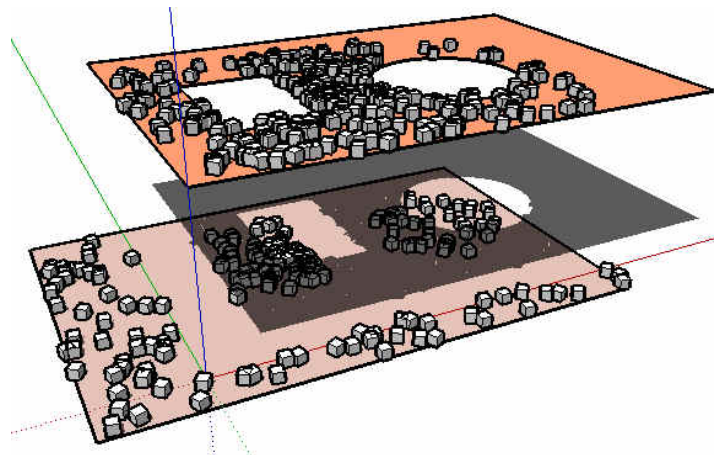

Additionnal notes:

- All of the above tools are ready to go again with the same parameters, once executed the first time (you don't have to re-launch the dialog box to redefine another drop area).
- When the mouse goes out of the drawing window, the current tool is cancelled.
- The only kind of object you cannot drop components on is the component instance (except when allowing stacking). Images, groups, and of course faces can receive components.
- Since components are dropped downwards from top of the model, the first object hit by the ray cast through the defined shape is considered as the receiver. This means that if you have objects on inactive layers they are also considered to receive components (unfortunately the "raytest" ruby method always scans the entire model with all entities, even if they are not visible).

2 groups on layer 1   result when layer 1 is inactive

- Holes in the model or within faces don't affect the behavior of the tool:

In the above figure, the lowest face were selected and cubes have "felt" through the holes of the highest face.

2. Set default values

As seen before, the first dropdown list tells the script which set of parameters to use to execute the command. Most of the time you will use the "Dialog" option, but if you often use the same parameters, you can set them as your defaults and use the "Default" option of the main dialog.

Select "Set default settings" in the Component Spray menu:

This dialog is displayed ->
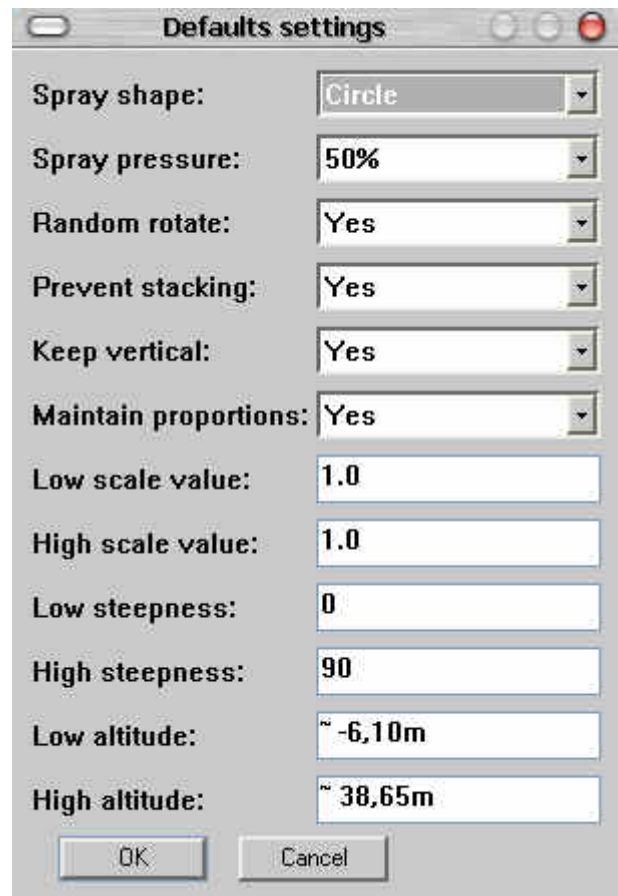Change the values as needed and click OK.

To use these values as many times as you want, select "Default" in the main dialog box:

Using basic settings:
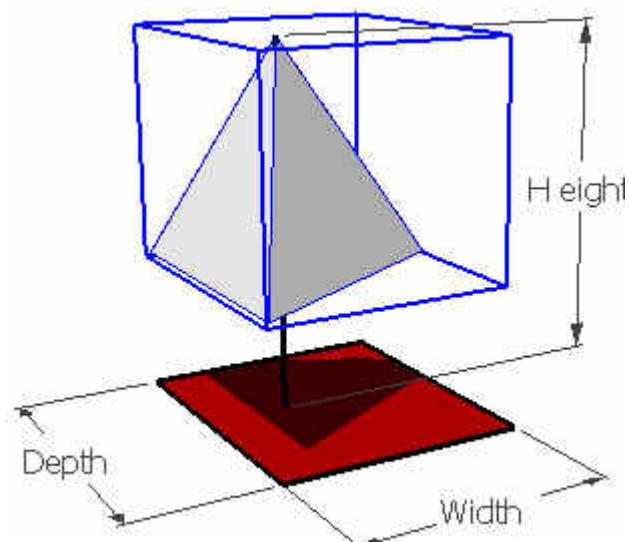When you select "Basic" in the main dialog, the values are:

- Spray shape: Circle
- Spray pressure: 50%
- Random rotate: Yes
- Prevent stacking: Yes
- Keep vertical: Yes
- Maintain proportions: Yes
- Low and high scale values: 1
- Low steepness: 0
- High steepness: 90
- Low altitude: the lowest Z of the current model
- High altitude: the highest Z of the current model.

3. Miscellaneous

How pressure is calculated ?

Each component has internal bounds values: depth, with, and height. Only width and depth are considered , thus each component has an "area", here shown as the red surface.
the script calculates the average area of all the selected components to drop,

then divides the defined area on which to drop by this average area: this gives the total number of components to drop.
This number is multiplied by the pressure percentage from the dialog box.

When using "Face me" components, depth and width are considered equal (as they are internally in the data base).

When using the line shape, the length of the line is divided by the average widthes of all selected components to define the total number of components to drop along the line, then this number is multiplied by the pressure percentage from the dialog box.

A "prevent collision of components" option would have been great, but it is so much time-consuming that it is not handled here.

Controls, errors and timers

Some shapes are very quick to fill, some are slower, especially when dropping on large areas, and some are much slower (when using constraints for instance). It even occurs that they can not end successfully. That's why several basic controls are done during the process.

- Each time the script is executed, watch the status bar to see what happens: a progress bar (Thanks to T. Burch for original, slightly modified class) is displayed, showing the percentage done and the expected end time.

- When the dialog box is validated, the script estimates how much components will be droped. When it exceeds 500, you will get a message such like this (feel free to accept or not, you'll be warned !):

- When the script tries to drop components and there is less and less place for them, or when the slope and altitude constraints make that there is not enough place for the components, or when the script tries to drop components on an area where there is no surface under, you'll get the following message:

Click on "Yes" to let it try another 100000 times, or on "No" to cancel.

- When the expected end time exceeds 3 minutes, you will get the following message:

Click on "Yes" to give it a 3 minutes additionnal time, or on "No" to stop.

- When using the "Point" shape and when the constraints aren't satisfied at the point you clicked, the following error messages are displayed in the status bar:

- The "Cannot place a component here !" message also appears when you try to drop a component on another component and the option "Prevent stacking" is on, or when you want to drop a component on nothing.

- Undo is available at each step of all the commands

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