

## **Lawnmaker V1.2** **written by Uwe Gleiß (2003)**

**Made up-to-date and completed with additional instructions by Thomas de Groot (2020)**

### **1. Introduction by the author**

Lawnmaker can be used to 'grow' patches of grass on height\_fields. Simply copy Lawnmaker into the Povray\include folder.

The plugin is explained in the include file lawnmaker.inc itself. Several examples (all beginning with LM) should illustrate some of the possibilities.

Uwe Gleiß

### **2. What does the package contain?**

The Lawnmaker.zip package contains the following files and folder:

- The folder "Lawnmaker\_original" for those who want the original files.
- "00\_Meshmaker\_Lawnmaker\_HowTo.pdf" this file.
- "00\_Meshmaker\_GrassBlades.pov" the meshmaker conversion macro between parametrics and mesh2 grassblades.
- "00\_Blunt3.inc" an demo meshmaker converted mesh2 grass blade.
- "Blade1.inc" to "Blade5.inc" mesh2 grass blade includes.
- "Blunt1.inc" to "Blunt3.inc" mesh2 grass blade includes.
- "Halm1.inc" mesh (sic) grasshalm include.
- "lawnmaker.inc" the Lawnmaker application macros, including extensive HowTo comments by the author.
- "lawnmaker.txt" the original author's instructions.
- "LMDandelion.inc" a set of SDL dandelion seeds include.
- "LMgrassblades.inc" parametrics for the grass blades include.
- "Spherical\_01.png" a simple image\_map for height\_field building.
- "UG\_LawnMaker\_Dandelions.pov" demo scene for dandelions.
- "UG\_LawnMaker\_english.pov" demo scene for an English lawn.
- "UG\_LawnMaker\_mytest\_01.pov" demo scene (by Thomas de Groot).
- "UG\_LawnMaker\_mytest\_02.pov" demo scene (by Thomas de Groot).
- "UG\_LawnMaker\_Round1.pov" demo scene for a round patch.
- "UG\_LawnMaker\_Round2.pov" demo scene for a round patch.
- "UG\_LawnMaker\_square.pov" demo scene for a square patch.
- "WildGrass\_2\_UR\_512.png" image\_map simulating ground cover.
- "WildGrass\_2\_UR\_512\_Height.png" image\_map for grass height calculations.
- "DrawTheAxes.inc" just a little utility for drawing xyz axes.

### 3. Additional comments and instructions for meshmaker.inc (TdG)

The original Lawnmaker made use of parametric objects for the grass blades, which were reputedly extremely slow in rendering. Recently however, William Pokorny (<http://news.povray.org/povray.general/thread/%3C5eafeab9%241%40news.povray.org%3E/>) found out that the parametric settings could be changed to such extend that render times became suddenly interestingly fast. The two sets of parameters can be seen (and experimented with) in the "LMgrassblades.inc" file.

While this correction makes the use of Lawnmaker much more attractive, a further improvement can be obtained by converting the parametric grass blades to mesh2{} objects. The use of "meshmaker.inc", which can be found within the POV-Ray package, makes such a conversion extremely easy to do. A parametric-mesh2 conversion demo scene can be found on the Friedrich Lohmueller site

([http://www.f-lohmueller.de/pov\\_tut/addon/00\\_Basic\\_Templates/49\\_meshmaker\\_inc/\\_index.htm](http://www.f-lohmueller.de/pov_tut/addon/00_Basic_Templates/49_meshmaker_inc/_index.htm)). The scene file "00\_Meshmaker\_GrassBlades.pov" can be used for this. Follow the instructions included there. A mesh2{} include file is written to the same folder. Repeat the operation for each grass blade.

After conversion and within each include file, the name has to be changed and the original finish and normal code added at the end. As you can see in "LMgrassblades.inc" the parametric grass blade objects have been commented out and the new grass blade includes added.

### 4. Additional comments and instructions for lawnmaker.inc (TdG)

The comments and instructions provided by Uwe in the "lawnmaker.inc" file as well as his demo scenes are very complete and comprehensive. To make things even more easy to use, I added two test scenes ("UG\_LawnMaker\_mytest\_01.pov" and "UG\_LawnMaker\_mytest\_02.pov") to highlight a few interesting features of Lawnmaker. However, when you start with Lawnmaker for the first time, start also with reading Uwe's instructions.



Fig. 1: UG\_LawnMaker\_english

Figure 1 shows a typical "English" lawn where all the grass blades are cut at the same height.



*Fig. 2: UG\_LawnMaker\_Round1*

Figure 2 shows the making of a round grass patch.



*Fig. 3: UG\_LawnMaker\_Round2*

Figure 3 also shows a round grass patch where the grass blades are blown to the outside in an extreme way, like when a helicopter lands.

Figure 4 demonstrates the building of a square patch of grass blades. I added a simple stone border around the patch (commented out) that shows how the grass blades penetrate through the border. To improve this, some creative thinking is asked for (left to the reader).

Finally, Figure 5 shows a patch of grass with dandelion seeds.



Fig. 4: UG\_LawnMaker\_square1



Fig. 5: UG\_LawnMaker\_Dandelions

While you can make a good head start with only the comments and instructions from the original author, I provide hereafter a couple of examples more concerned with the placing of grass patches on a height\_field. This is not more difficult to obtain than the examples above, but there are a couple of things you need to be aware of if you do not want to end up tearing your hair out or spilling your coffee. They are obvious once you have tested them.

The first example (Figure 6, from "UG\_LawnMaker\_mytest\_01.pov") shows the case of a single, large, grass patch covering a mound (Var=1) using a boxed (or a cylindrical, if you prefer) pigment\_pattern. Please take note that all (repeat: all) the transformations applied to the (elements of) the height\_field have to be duplicated in the declaration of the Lawnmaker parameter "LawnPosition". This is not explicitly stated in the comments by the author in "lawnmaker.inc". Similarly, and obviously so, "LawnPosStretch" is equal to the scale of the height\_field in the y-direction. Failing that, you will be confronted to a height\_field where the grass patch(es) are erratically positioned on or below the surface.



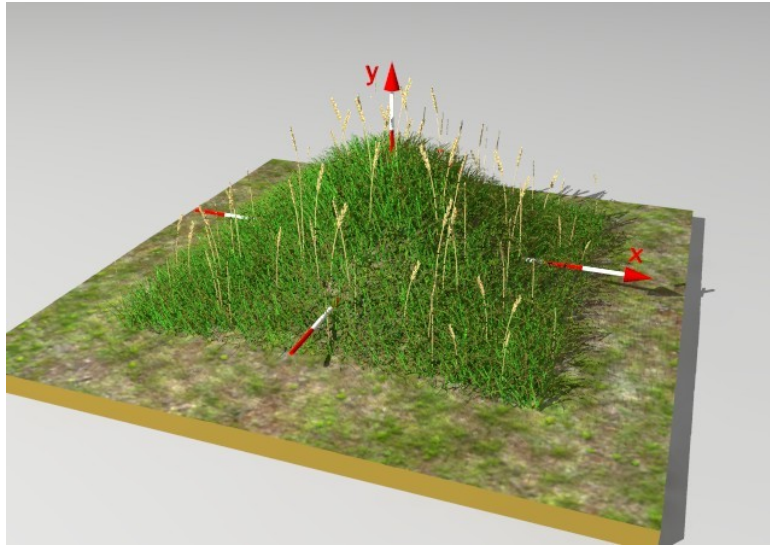


Fig. 6: UG\_LawnMaker\_mytest\_01-var1

In the second variation from the same file (Figure 7; Var=2) the boxed or cylindrical pigment\_pattern has been replaced by the same image\_map used for the height\_field ("Spherical\_01.png"). The primary reason for this is that this shows the height of the grass blades diminishing from the centre to the edge. The image has been rendered on a flat surface deliberately. It appears that if the grass patch is applied to a height\_field like in the preceding case, the same image\_map having been applied to height\_field as well as grass blade height-control ("LawnHeight") the patch does not follow exactly the surface. The reason for this is unknown to me at this stage. Possibly, the way a height\_field and a pigment\_pattern translate an image\_map is not identical. This needs further investigation that falls outside the purpose of these instructions.

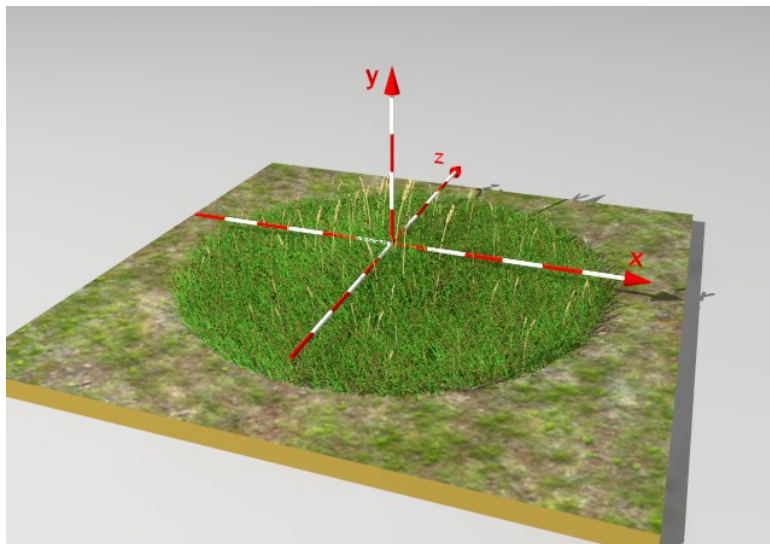


Fig. 7: UG\_LawnMaker\_mytest\_01-var2

A final example of Lawnmaker's use ("UG\_LawnMaker\_mytest\_02.pov"; Figure 8) shows the

combination of three, relatively small grass patches, applied to a height\_field by using a nested while-loop. This example demonstrates the use of the "LMRandom" parameter in particular. Obviously, the patches should not be too large in relation to the slope changes of the height\_field, so use this technique with care. Also, in this example, Reorient\_Trans() has been used to better position the patches on the slopes. Again, to be used with care.



Fig. 8: UG\_LawnMaker\_mytest\_02

You can play with different values for the spacing of the patches, increasing or decreasing any overlap between neighbouring patches.

## 5. Concluding

At this stage, you have become familiar with the settings of Lawnmaker and you will have discovered its many potentialities. Several aspects of the macro have not been treated here. I leave them to the reader to discover. Just to make a few suggestions, one could think of adding (wild) flowers for instance, or different types of grass and seed stems. For the adventurous, a totally alien grass blade suite lies in the possibilities too of course. Imagination is the only seed needed. Whatever you intend to do: enjoy Lawnmaker.

Thomas de Groot, October 2020.