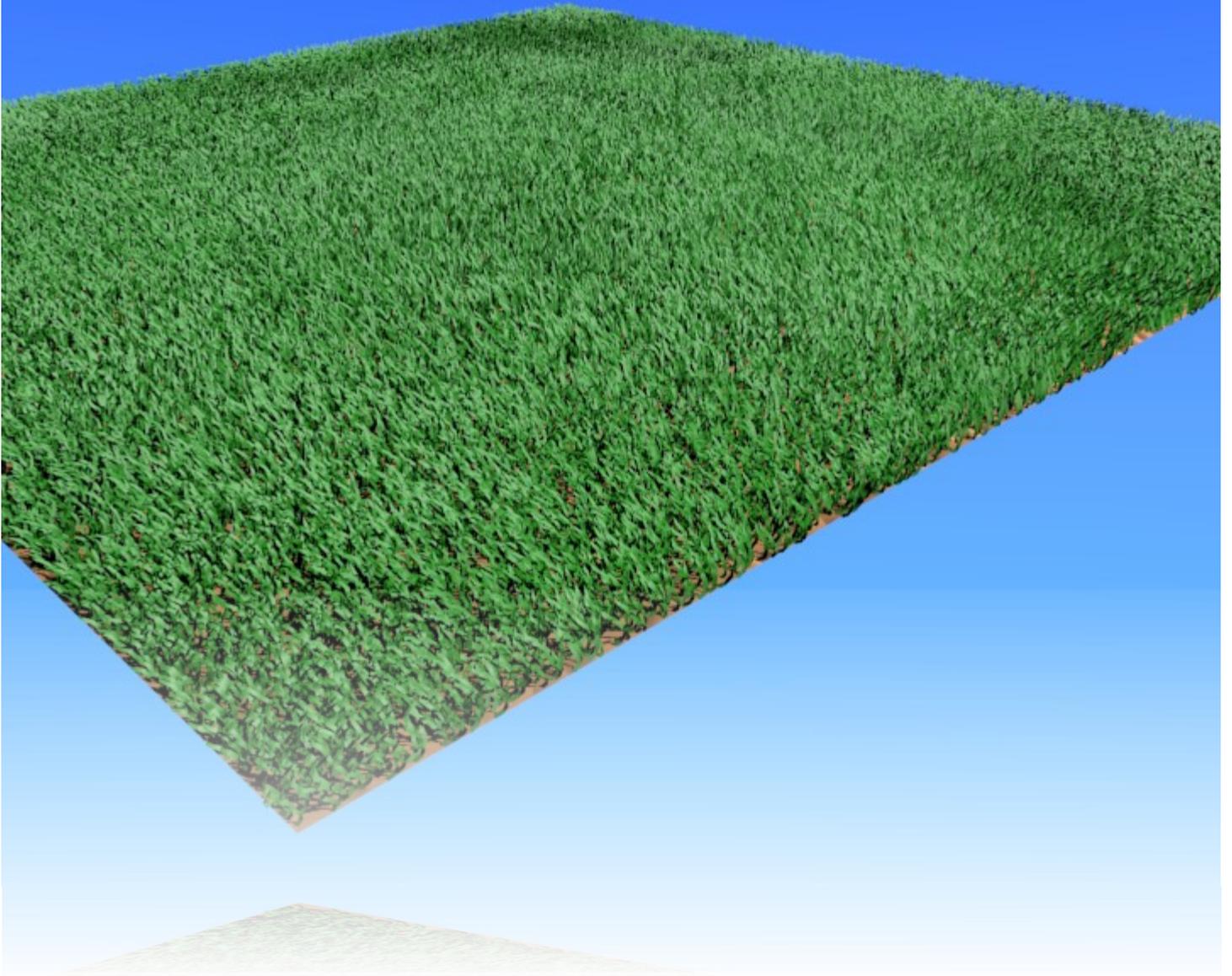


Lawn Grass

Please feel free to play around and post it on YouTube. A reference to where you got the original exercise is preferred, but not required

Requires: Blender2.5+



Panther Dynamics

Making your world beautiful through design

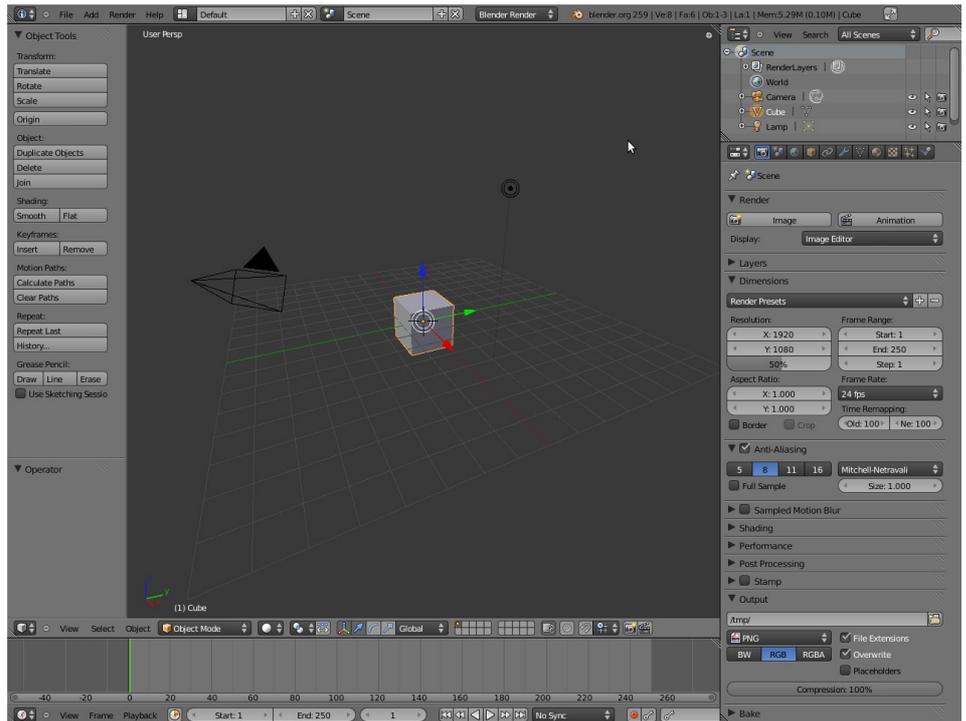
Redistribution, whether commercial or not is allowed, provided it stay intact as from the Panther Dynamics website.

Save And Set-up A New Project

-) Open Blender and save your project in a new directory.

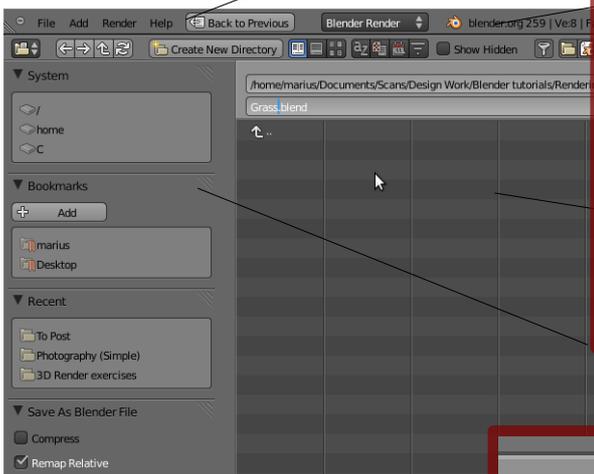
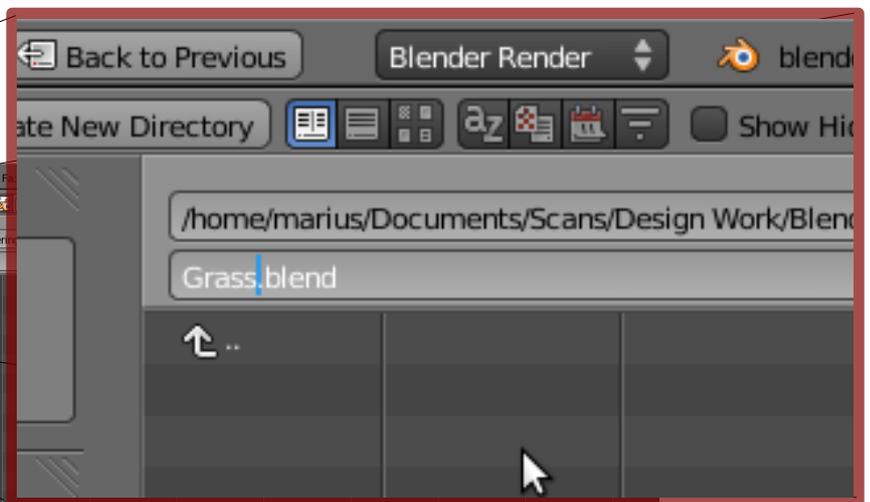
When experimenting, it's always a great idea to separate your projects into topic specific directories.

The reason for the separation of experiments is that Blender creates extra folders to store cache from the bakes that you make in Blender. It also stores other things, but more importantly, we want to export into our main directories, not temps.



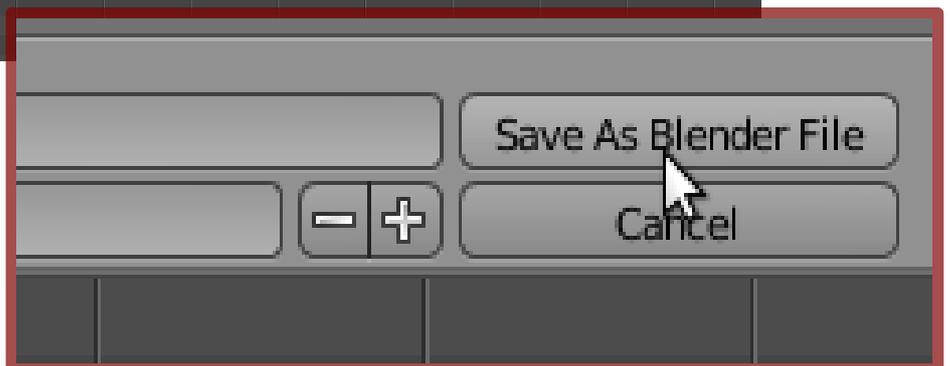
-) In this case, we'll name the main folder "Rendering Grass" and the *.blend "Grass.blend". Feel free to change it, just keep it in mind throughout the tutorial

The Blender interface upon opening.
Single left-click on the splash-screen to remove it

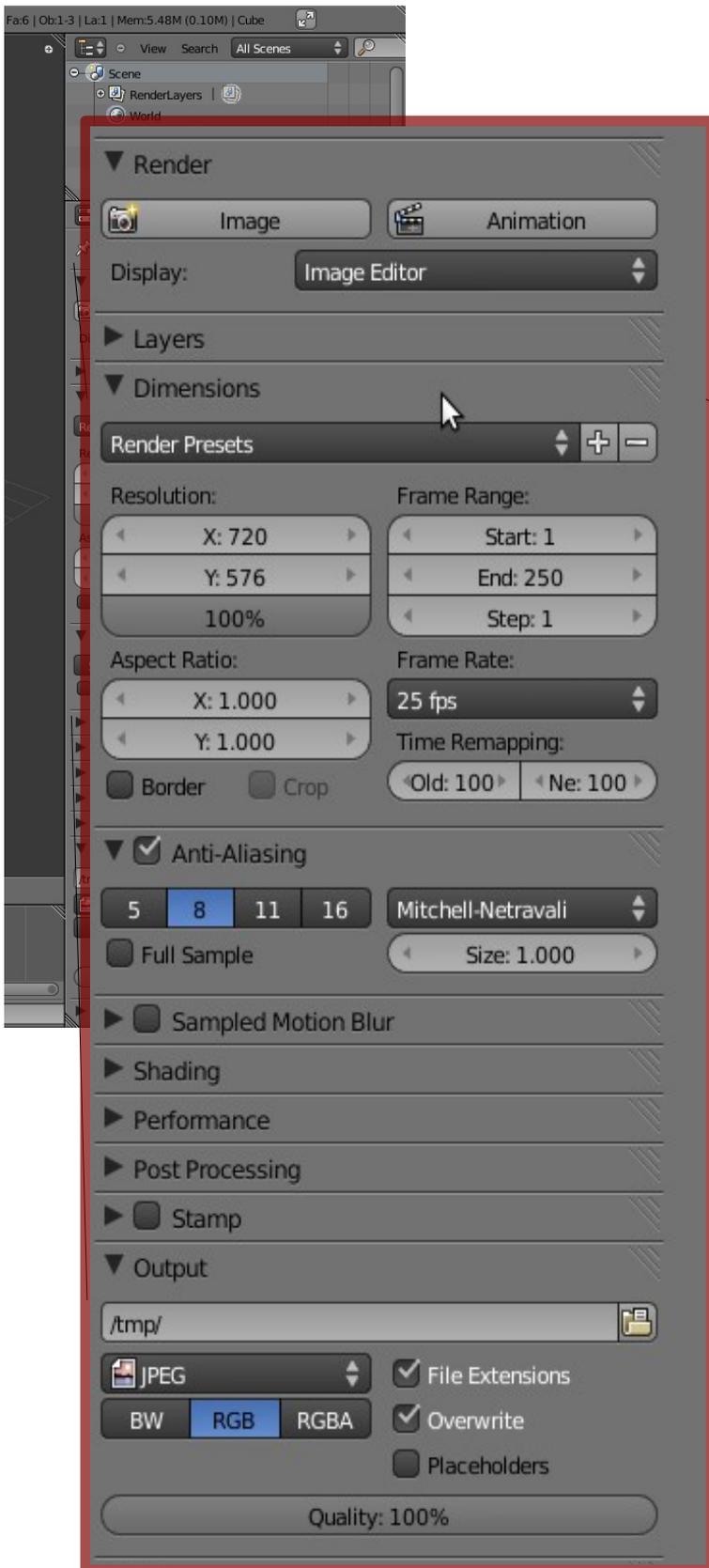


Blender file manager

After renaming your project from "Untitled" to "Grass", or your own choice, click 'Save As Blender File' and it will return you to the user interface you saw when you opened Blender.



Render Properties



-) Next we will work on setting up the project for export. This is called render.

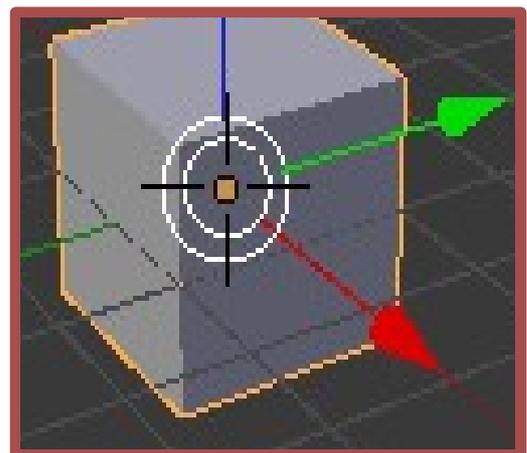
Never export directly to video. In this tutorial I will explain and show how to export to what's called an image sequence.

-) On the left you will see the basic render settings. For now we will not be using different layers, so it's minimized. Dimension is important

In this case, it's set for PAL-DVD resolution with square pixel and full frame-rate. For HI-DEF just leave the settings as-is when you open Blender or select a preset.

Note: When rendering out your final image sequence, just make sure you set the resolution percentage to 100%, not 50% as the default.

-) Anti-Aliasing is an effect that smooths out the edges, so you don't see that hard edged effect from a diagonal line like in the 3D View example:



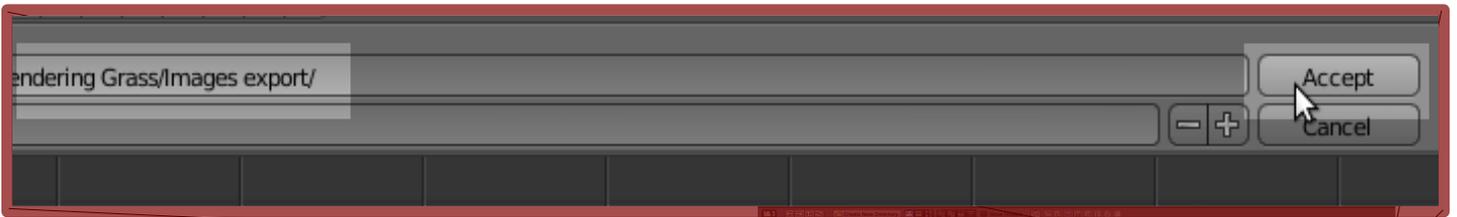
Blender properties panel.

Blender 3D View - zoomed.

-) For now we will leave Sampled Motion Blur (SMB) off, because it takes motion samples from your project and creates a multiple in render time; 2 samples = 2x render time without SMB, 3 samples = 3x render time without SMB etc.

-) Output. For a main render we will render to an image sequence. To do this, un-tick **Overwrite** and make sure **File Extensions** remains ticked.

Set your format to JPEG, for now, at 100% quality, as it is smaller with high quality.



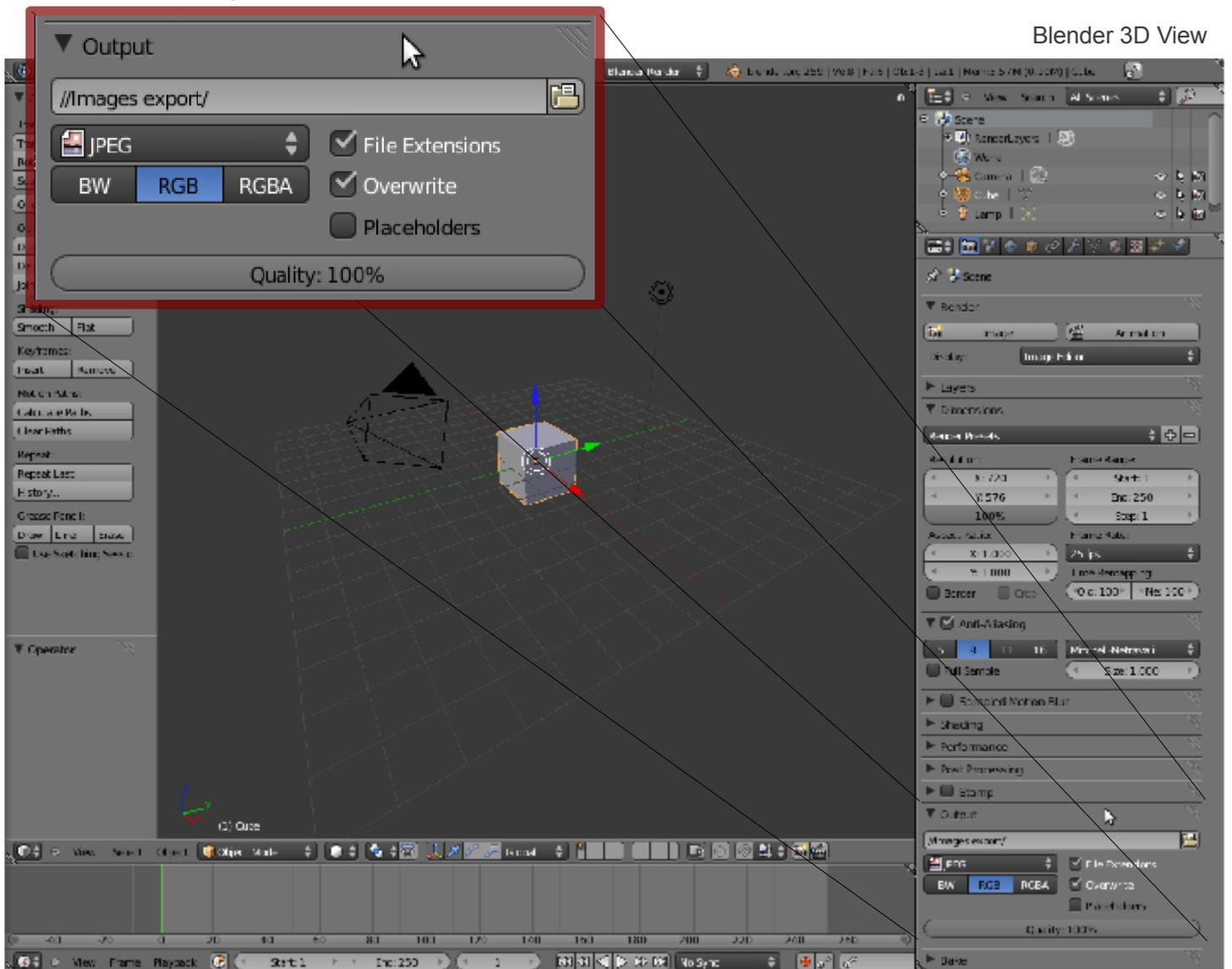
-) Set your output folder by clicking on the icon next to the location.

It's good practice to make it a sub-folder to your project location. In this case we'll need only one since we're rendering out only once. In addition, you can create the sub directory by entering:
 //<your folder name>/



Note: Please don't copy-type "<your folder name>". It's a placeholder, not a valid folder name.

Your Render properties' Output should look something like this:



Let's Make Grass!

-) Delete the cube by selecting it (default right-click), pressing 'X' and clicking "Delete X"

Add a plane by pressing 'Shift+A' or using the 'Add' menu in the Info Bar on top.

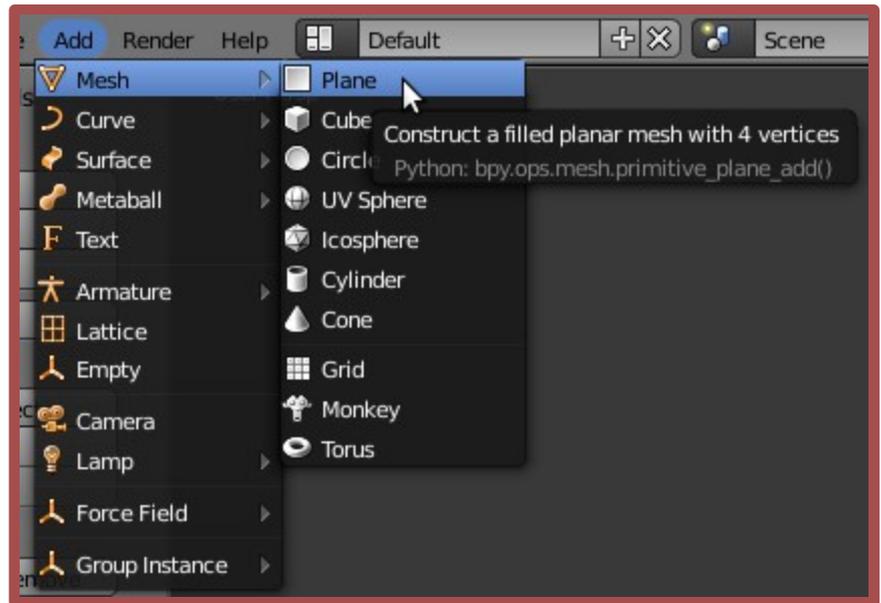
Immediately you'll see a plane where your 3D cursor is.

To scale this up we place the cursor in the middle of or close to the plane and press 'S'. Now pull the cursor away from the plane in any direction until your happy with the size.

Left-click to release the object and set new size.

For this tutorial we don't need a massive plane. A size like on the bottom of the page will be sufficient.

-) Now we need to add materials to the plane. One for the grass and one for the ground. We also need to add texture to the ground, because the ground is not 100% mathematically flat. To do this, we're going to the Properties



Add menu in the Info Bar

pane again, with the plane selected.

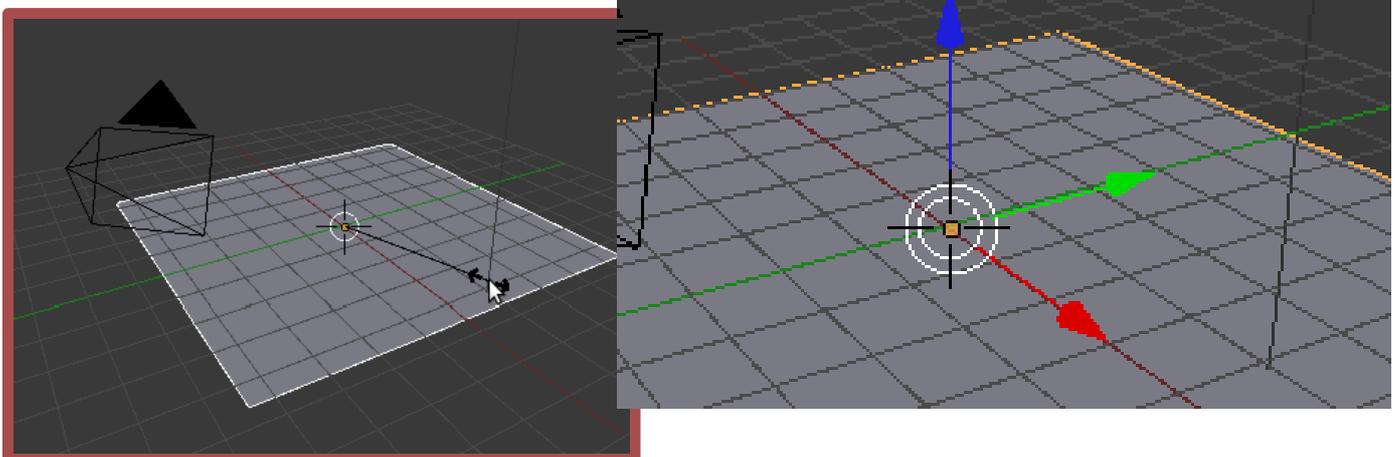
Add a material by clicking on plus next to the open list.



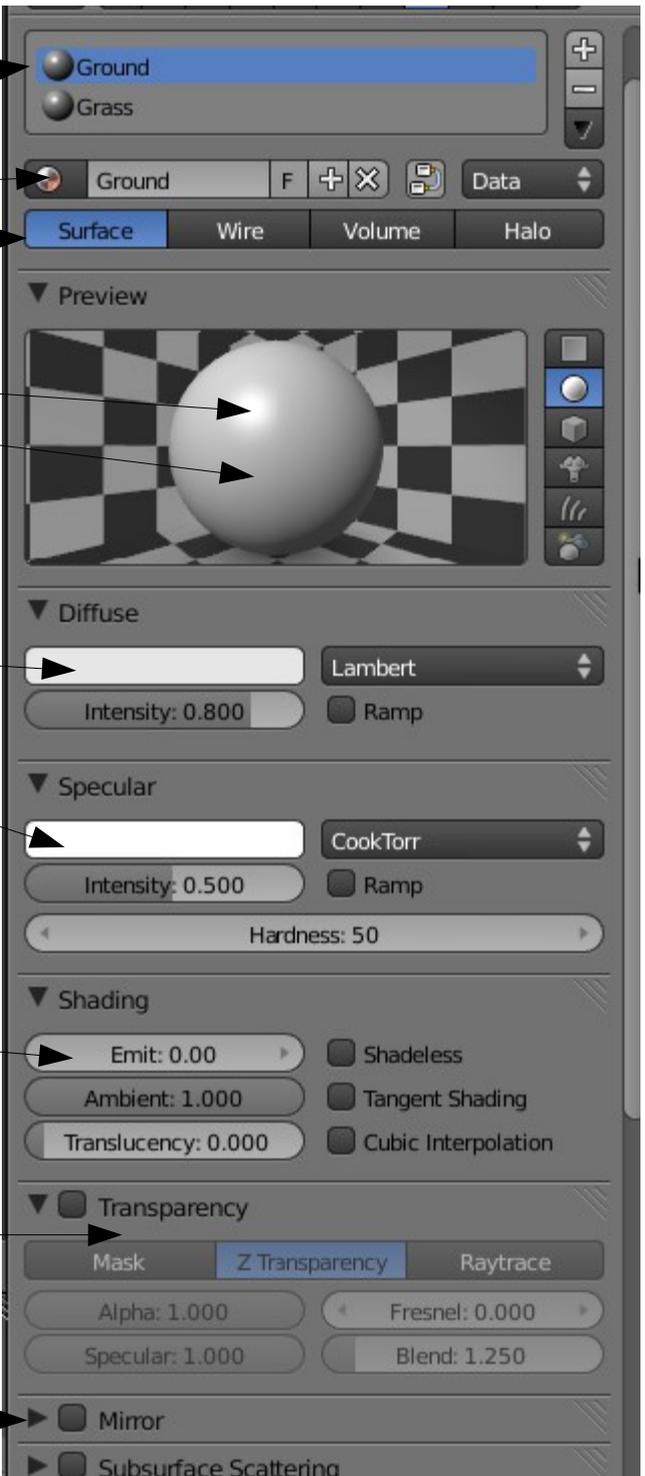
Note: You rename it by clicking on it's name; just below the list.

Call it, say, 'Ground'. Add a second material the same way and call it 'Grass'.

Scaling the plane in 3D View



Material settings:

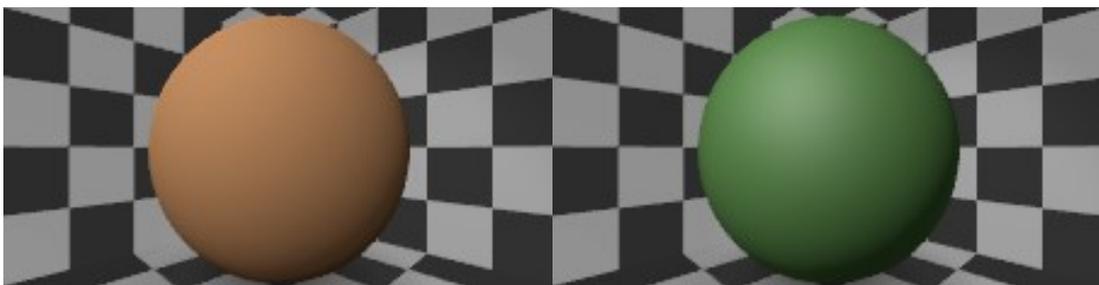


The image shows a material editor interface with several sections and controls. On the left, there are labels with arrows pointing to specific parts of the interface:

- Materials and selected material:** Points to the top list showing 'Ground' (selected) and 'Grass'.
- Material selector:** Points to the 'Ground' button in the top toolbar.
- Type of material:** Points to the 'Surface' tab in the top toolbar.
- Specular Color:** Points to the white color swatch in the Specular section.
- Diffuse Color:** Points to the white color swatch in the Diffuse section.
- Click-To-Change Color Boxes:** A bracket points to the Diffuse and Specular color swatches.
- How much light the object will give off. Will only shine on other objects with indirect lighting enabled in the World settings:** Points to the 'Emit: 0.00' slider in the Shading section.
- Make your object transparent (flat or distorted using Z Transparency and Raytrace respectively):** Points to the 'Z Transparency' tab in the Transparency section.
- How reflective your material will be:** Points to the 'Mirror' checkbox in the bottom section.

The interface includes a 'Preview' window showing a sphere on a checkerboard background. Below it are sections for 'Diffuse' (Lambert material, Intensity: 0.800), 'Specular' (CookTorr material, Intensity: 0.500, Hardness: 50), 'Shading' (Emit: 0.00, Ambient: 1.000, Translucency: 0.000), 'Transparency' (Z Transparency, Alpha: 1.000, Fresnel: 0.000, Blend: 1.250), and 'Mirror' and 'Subsurface Scattering' checkboxes.

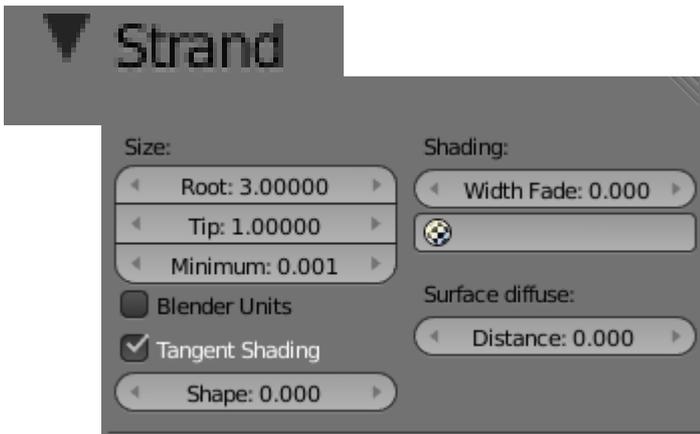
Try getting your materials like these before reading on and see if you can:



Ground

Grass

-) Additional Settings (-



Scroll down a bit and look for a section called “**Strand**”. This section has to do with any the material applied to hair. For now we'll keep these triangular in nature:

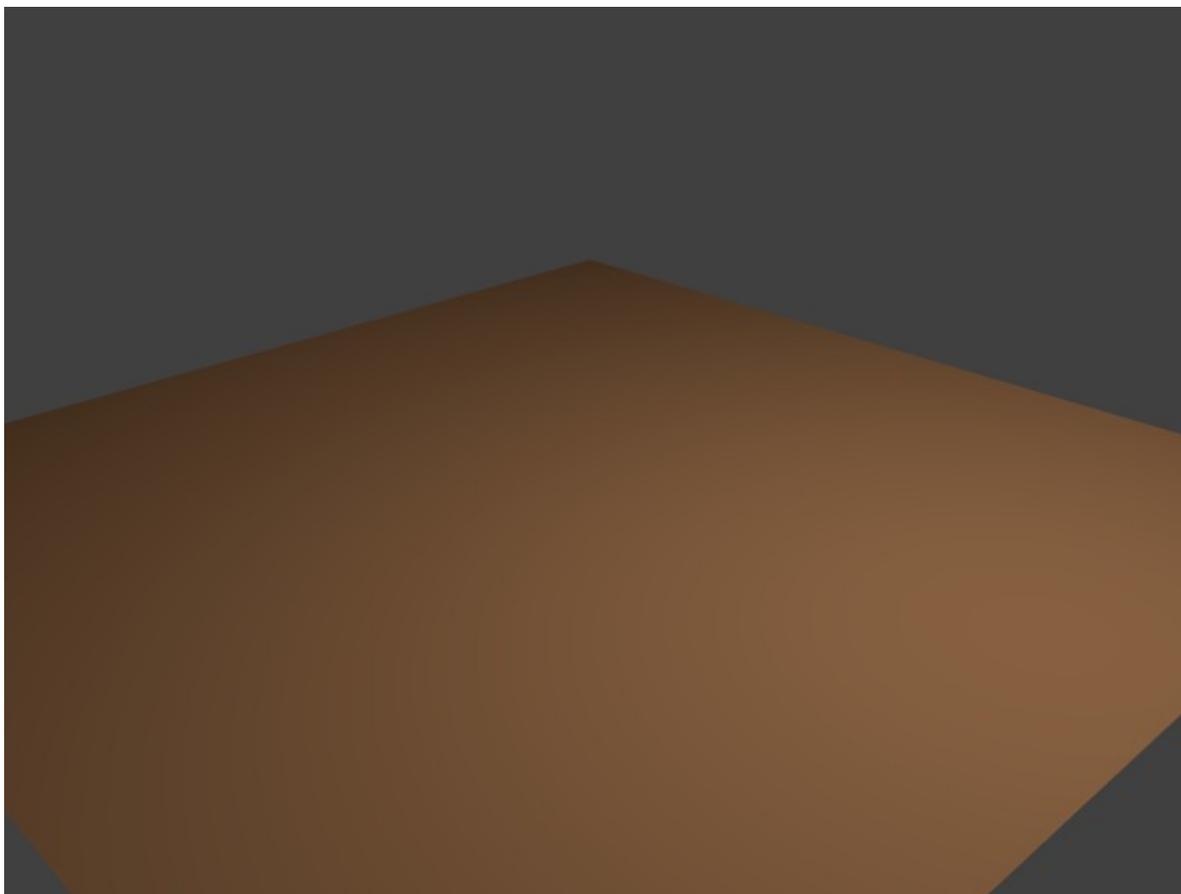
Root: 3
Tip: 1
Minimum: 0.001

Note: We may very well come back and change the strand settings, because this is a creation process and not all grass looks alike.



Scrolling further down, you find another section having to do with shadows; “**Shadow**”. Expand it, enable the material to receive shadows and transparent ones too. Reduce the Casting Alpha a bit, or you'll have pure black shadows. Keeping it fairly dark for grass is accurate as it holds a high contrast.

If you render now:

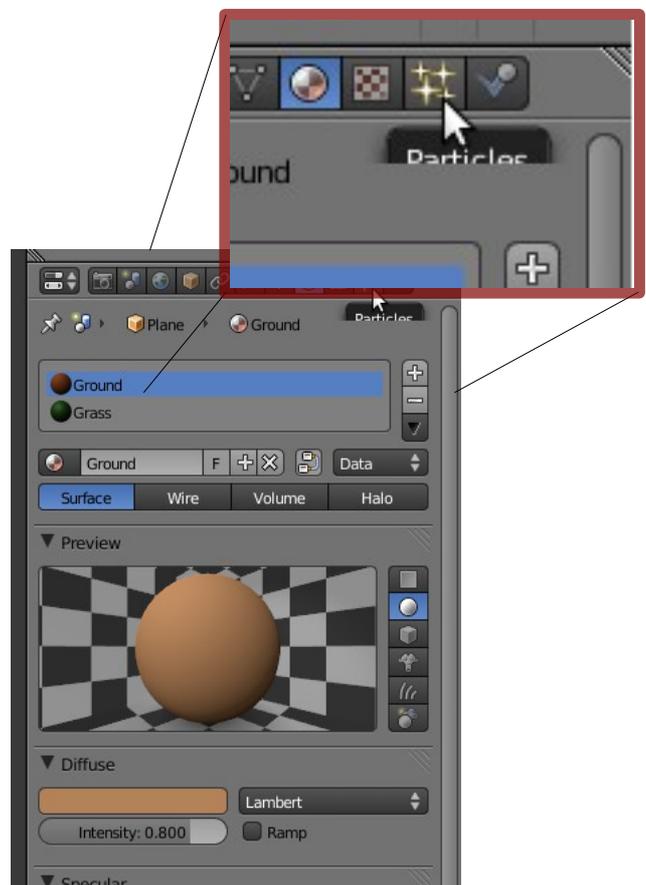
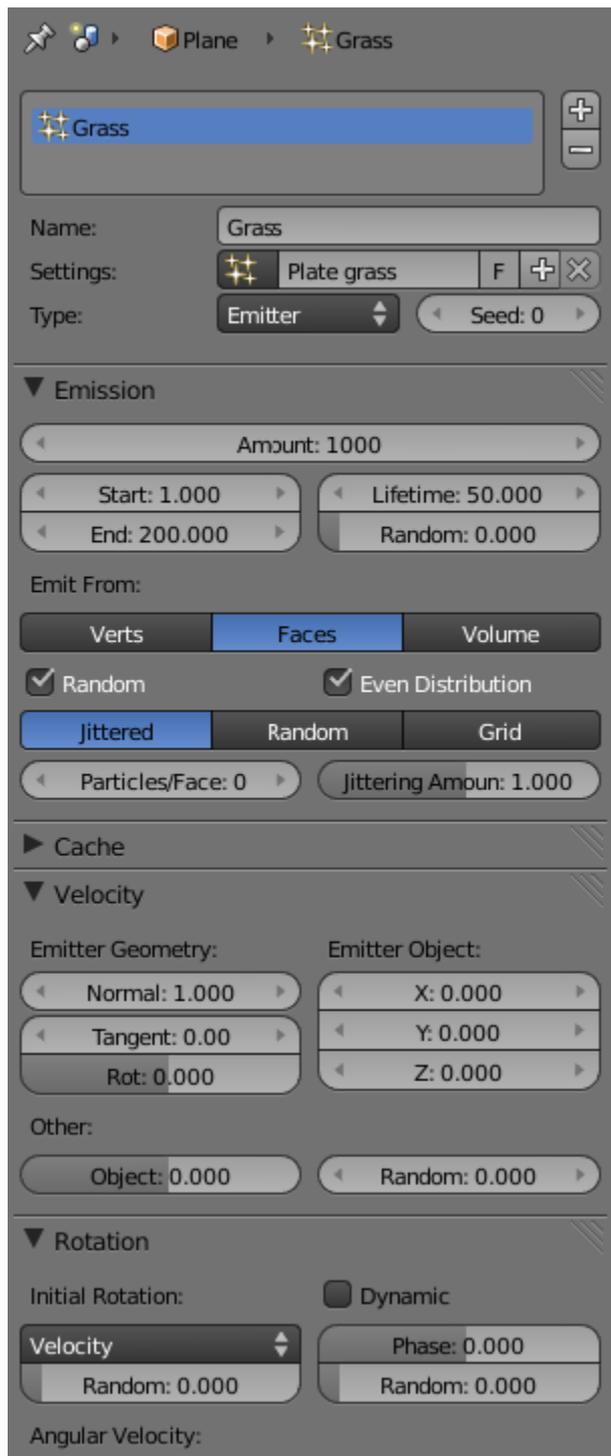


-) Adding a particle system for the hair is very simple. Make sure the plane is selected then click on Particles button in the Properties pane.

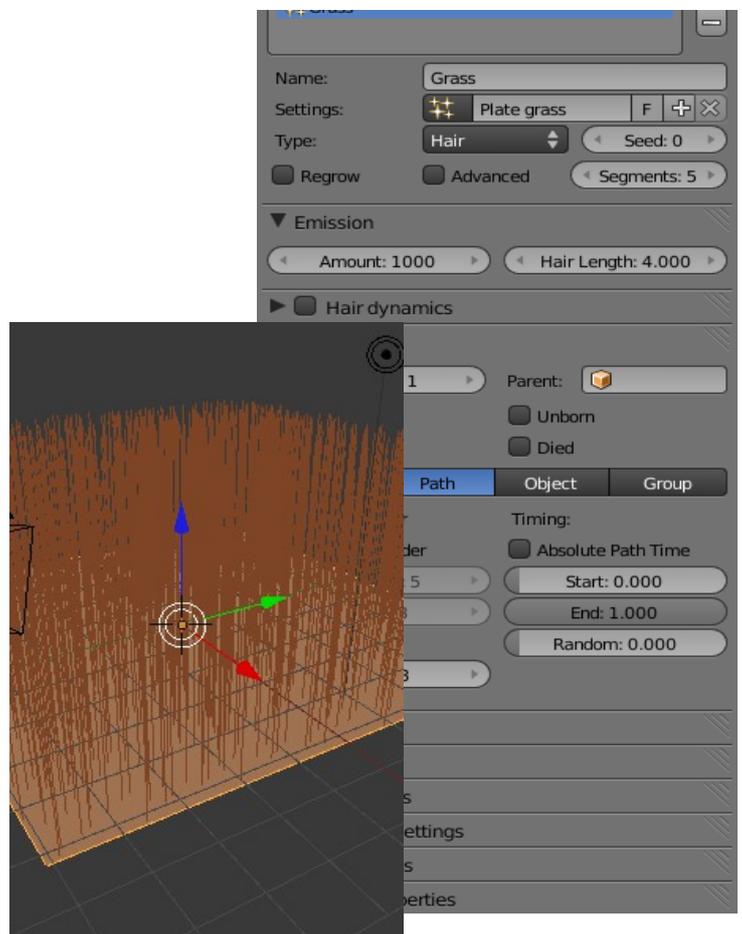
Add one system by clicking on the plus next to the empty list.

Note: Don't forget to rename it. We won't be using more than one system, but it's good practice so you don't get confused.

You should get the following:



-) With the current settings, we'll get dots. So we need to tell the system we want hair, by switching from Emitter to Hair:



Hair settings

Amount of strands.

How the hair (or grass) behavior is calculated. We'll enable this later.

Material in object's list to be used for the hair. Goes by index nr, not name. We'll material 2.

What you see in the 3DView.

From my understanding, this option makes it easier for the computer to work out the math for more hair.

The amount of effect that force fields and gravity will have on the hair.

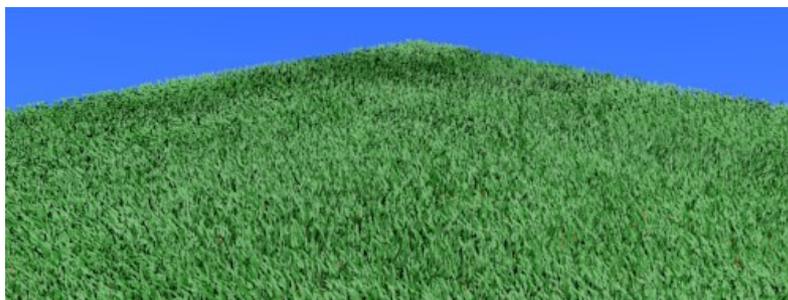
Force fields of the hair.

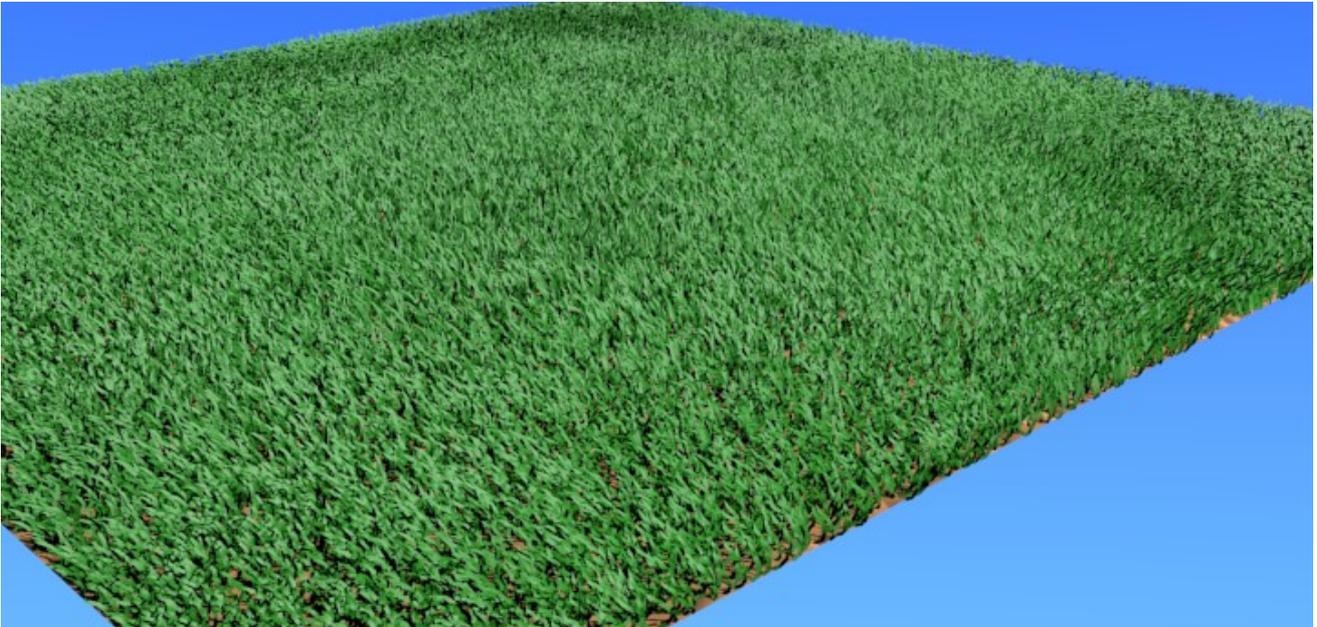
Set area related limitations for the hair.



The screenshot shows the Blender Hair settings panel. The 'Type' is set to 'Hair'. The 'Amount' is 1000, and 'Hair Length' is 4.000. 'Hair dynamics' is disabled. The 'Render' section has 'Material: 1' selected, 'Emitter' checked, and 'Path' selected in the render mode. The 'Display' section has 'Rendered' selected, 'Display: 100', and 'Number' checked. The 'Children' section has 'None' selected. The 'Field Weights', 'Force Field Settings', 'Vertexgroups', and 'Custom Properties' sections are collapsed.

See if you can get your grass looking like this:



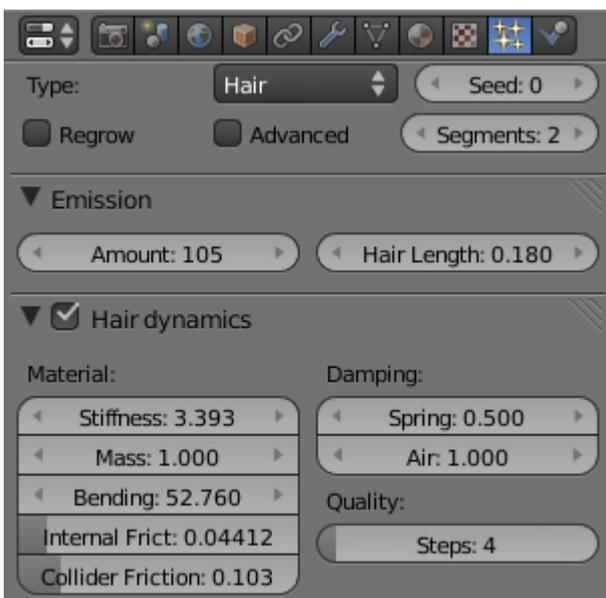


Final Grass will look like this. Note that this much grass does take a lot more power.

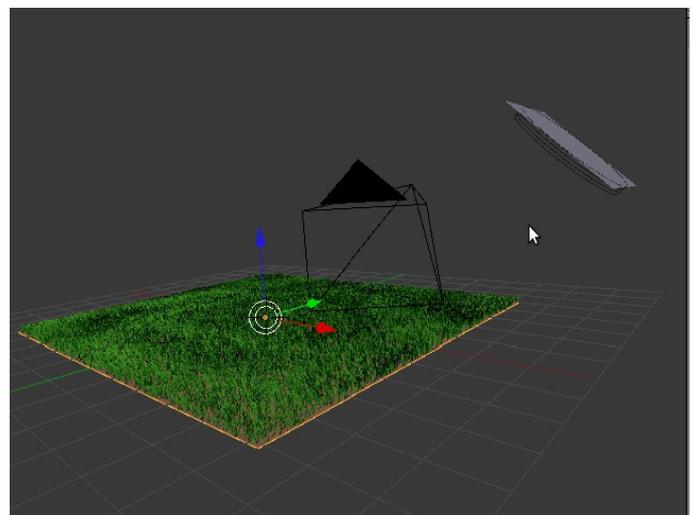
-) To achieve this, we need to do quite a bit of tinkering to get the result we want. This is for lawn grass that's fairly sparse, but you can go denser if your system enables you to.

I changed the grass material to a stronger and darker green and quite a few other changes that we'll look at now.

Let's start with the grass settings:



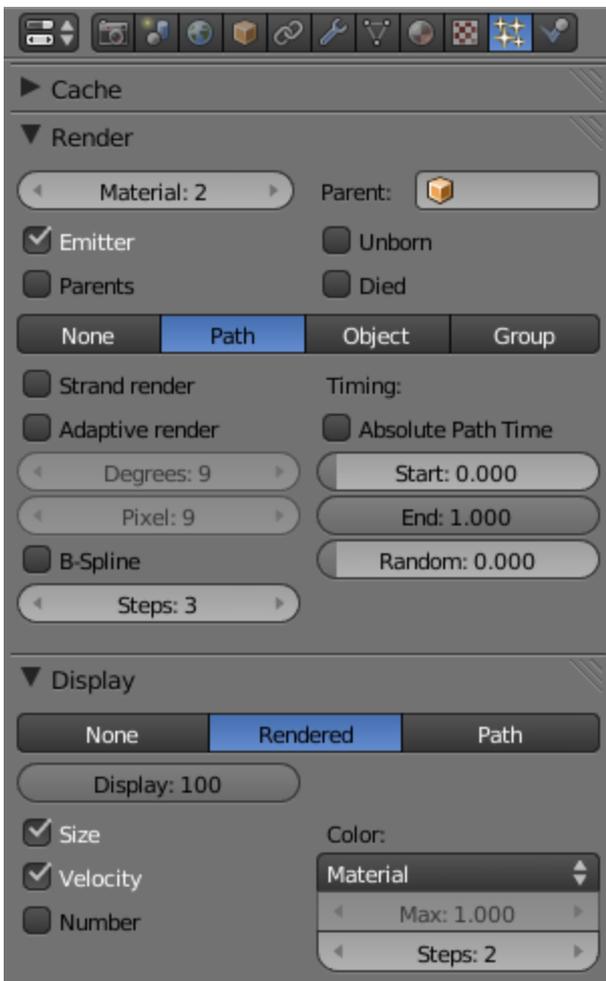
-) Like I mentioned earlier, we'll be using the children option to increase the amount of grass. The Emission (in this case also parent) amount is set to 105. Hair length is kept short at a simple: 0.180.



-) We enable hair dynamics, so the grass can be more 'alive' and react like real grass would. To set this properly. To see how your grass will behave, you first need something to push it over, in this case I used a default wind force field directed at the grass and then set the stiffness to not fall through the floor: 3.393

Mass is how heavy the grass is: 1.000
 Bending is how much the grass bends. Bigger values get you bigger bends: 52.760.

The rest of the Hair Dynamics you also play with until you are satisfied with the result. Copy these for now and play around with them on other types of grass.



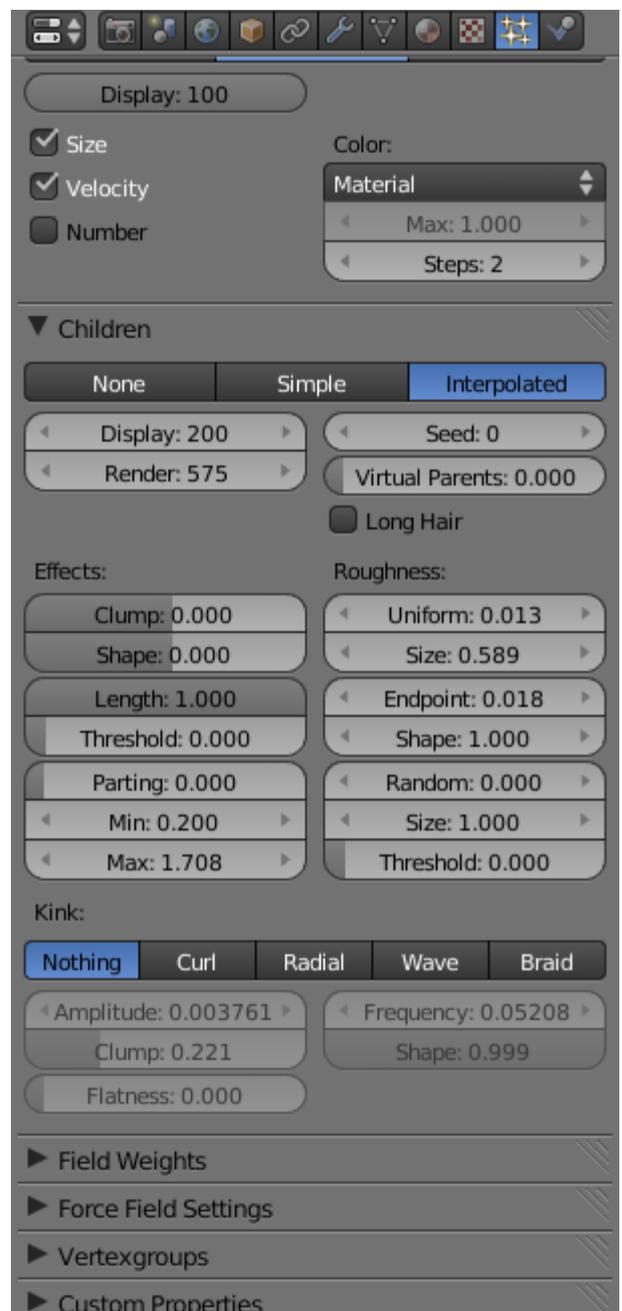
-) The render section has to do with how the grass will come out in the final render. Material 2 is the grass material.

The Emitter is the plane that the grass grew from. Unborn, parents and died has more to do with general particles.

In the case of hair, we render path, not object or group, however, play around with these settings. It's how we learn.

Strand render and Adaptive render helps smooth out the hair, but for this tutorial, it's not needed. The same with timing.

-) Display has to do with the 3D view and what you see there. Keep it on rendered and you don't have to enable velocity.



-) Now we get to the difficult part. To render a mass amount of grass and not have trouble navigating, you need to use the Children function. What this means is that it uses the main strands as guides.

For the final render I saw 575 looks great, but it was too much to navigate through, so you can turn the display down to less than 50% the final output.

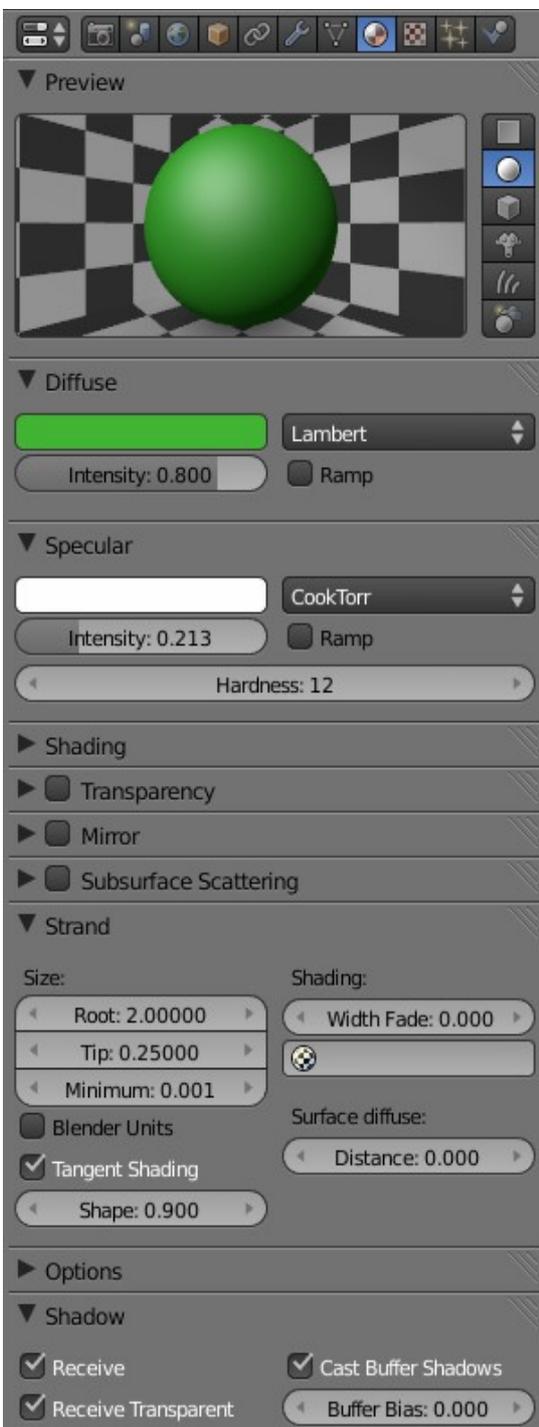
Now, you'll find everything looks to uniform. Therefore we adjust uniform a little and size as well. That way, no two areas will look the same. It's the same goal for the Endpoint function.

Note: You can ignore parting, because it's disabled here.

Fine Tune and Adjust!

And now that we have the grass configured, we need to adjust the material, because the grass' thickness needs fixing, as well as color correction. Here we'll also look at the world settings, the sky and adding a ground texture (covered with grass, but is needed for zoom quality if you wish to use the camera to create a bug's eye view).

-) Let's start with the new material settings for the grass:



-) The diffuse color has been enhanced a bit. It was just not vibrant enough. Guessing color is hard on things like grass, because, it's not single tone. You need to consider all the shades and find a common link. In this case, a healthy strong green. Like veggies.

-) Specularity needs to be subtle and soft, because biological material isn't very shiny. And grass (at least this type) is very waxy, creating an almost matte finish.

-) Strand is where you define how the grass will appear from root to tip. Know that these settings need to be changed if you change your output resolution, because it works in pixels here. You can switch to Blender units. Maybe that way you don't have to adjust per resolution.

Shape has to do with your strand's spiky or roundness. Not its base, but the form it follows to the tip.

Root is it's base size

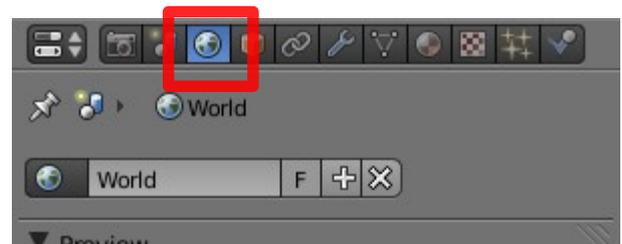
Tip is the tip size

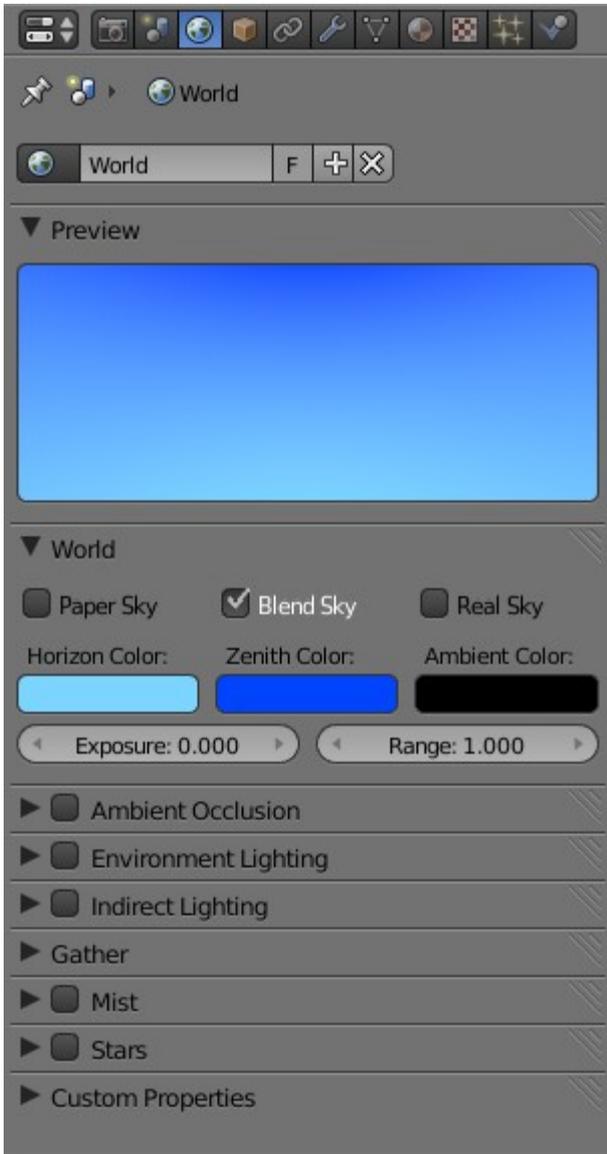
-) Width fade is the transparency along the width of the strand (quoted from the tool tip).

-) World settings (-

Earth has an atmosphere that is round and blender has this built in. Notice that when you stand outside and look up, and slowly look down to the horizon, you'll notice it goes from deep blue to a light pale blue.

We're going to add that dome effect using two shades of blue, but first, here's where the settings are:

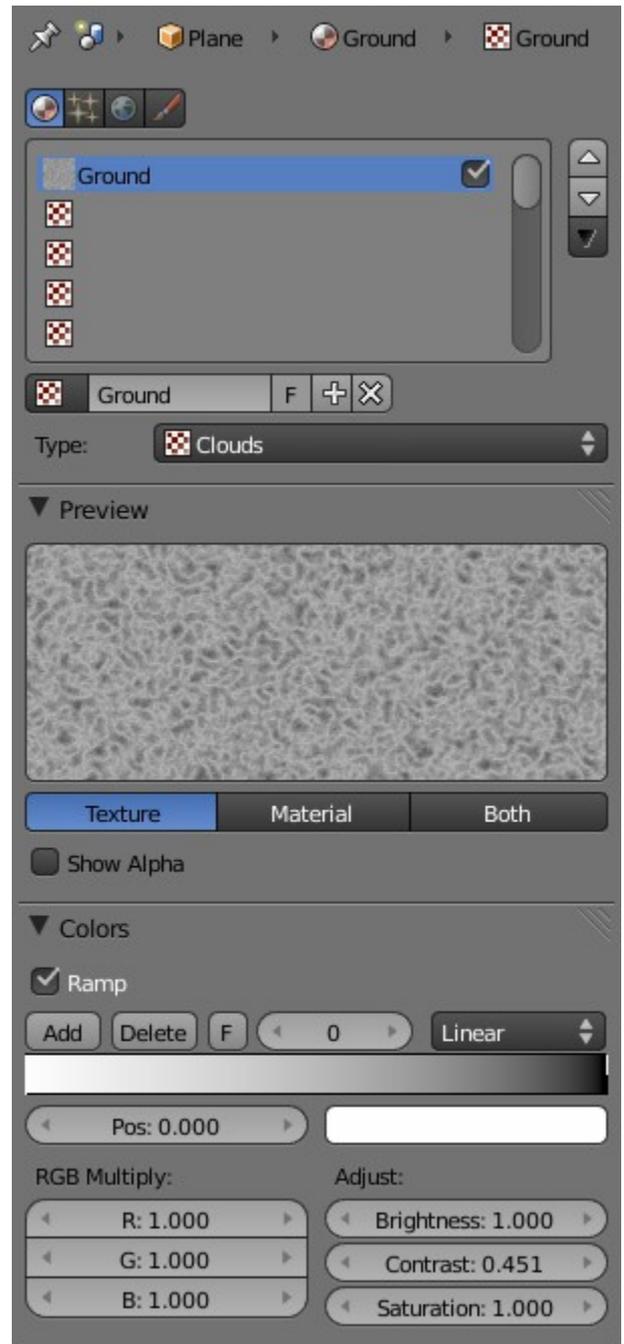




Make sure the plane is selected that contains the ground material. Then click on the texture button:



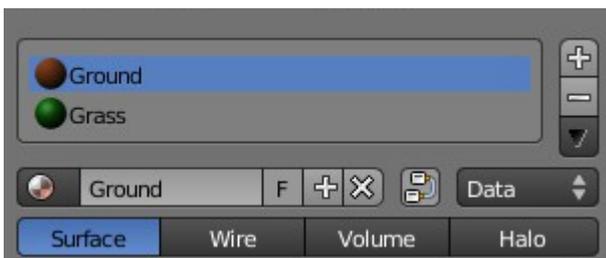
You add a texture by simply clicking on an open slot. Add one and apply these settings:



-) Tick Blend Sky. From there you can adjust Horizon and Zenith color. Your Zenith is the deeper blue and the horizon is the lighter part. You can also add clouds using this method (the clouds conform to the blend from deep to light blue).

You can ignore the other world settings for now though.

-) Let's add a texture to the Ground material.



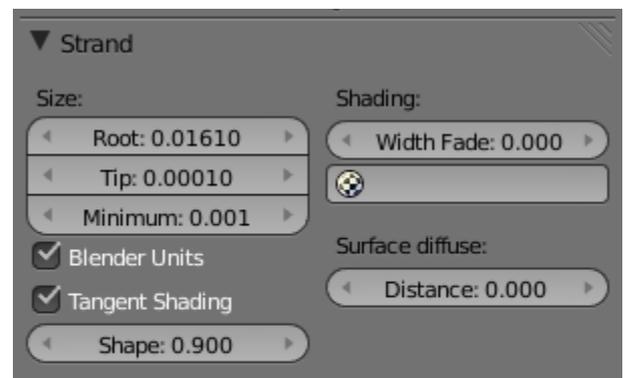


-) To achieve this you have to use Blender Units on the grass material's strand options. The settings are as follows:

-) Play around with the above settings and see if you get the result you want. Know that you can always add more textures to create a more refined effect. This, however is just something simple.

If you want to see what the surface looks like, go to the grass particle system and reduce the grass length to 0 and hit F12 for single frame render.

If you added this texture and zoomed in for a bug's eye view, you'll see this:

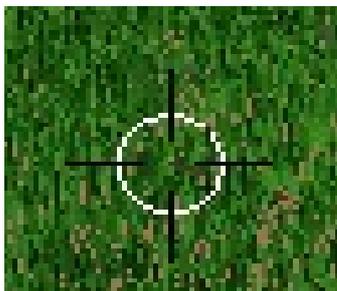


The reason we use Blender units is that if you don't, you can't zoom in on the grass. Being determined by pixel width, makes the width of the grass change as you zoom. For example, if I zoom in on pixel grass, you find it looks like fine hair, if you zoom out it looks a bit like a sponge.

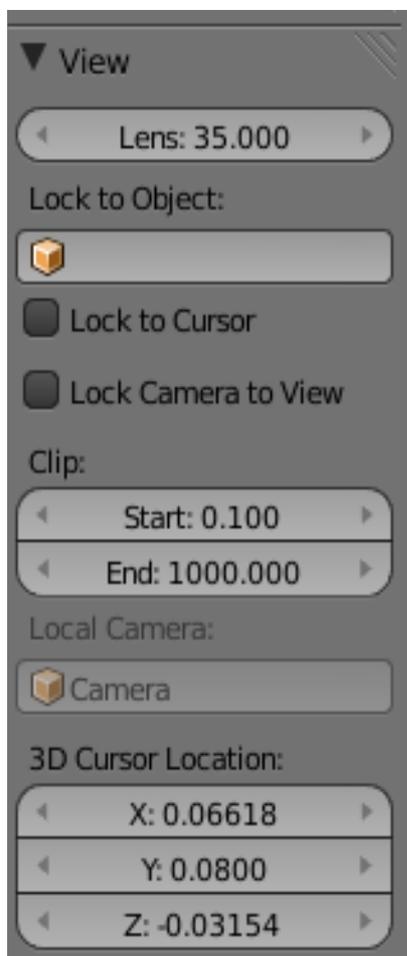
Blender units are stable.

How to add another camera:

-) To add another camera, for the bug's eye view, we have to make sure the 3D cursor (the target that floats in your 3D view) is in the middle:



To see where the cursor is, we press 'N' in the 3D View and we get this panel:



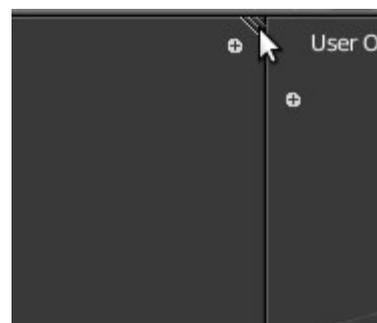
-) Set all the 3D cursor values to 0 and add a camera using the add menu in the info bar or 'Shift+A' in the 3D View.

The camera should appear where your 3D cursor is, but, since it points down, you will only see the 3D manipulator. So, with the camera selected, drag with left click the blue arrow upwards until you can see the entire camera. Now, press S to scale it and move the cursor toward the camera to shrink it.

To rotate it you can use quite a few methods but I will tell the way I do it. Position the 3D view so that your X-axis arrow vanishes, press R to rotate and X to isolate the rotate to the X-axis. Now move the cursor to tilt the camera up. Finish rotation by, using free rotate; press 'R' twice.

Note: The triangle has to point up for it to be right side up.

To get it to see where you want it to, drag open a new pane using the stripes at the corners of the 3D View pane:



-) To make Blender choose the new camera for rendering, select it and go to the View menu in your 3D View > Cameras > Set Active Object As Camera.

Note: When you click this, it will give you camera view. To exit, just scroll click on the screen and you'll be back in 3D View.

To switch between Orthographic and perspective view, just press NumPad 5 in 3D View.

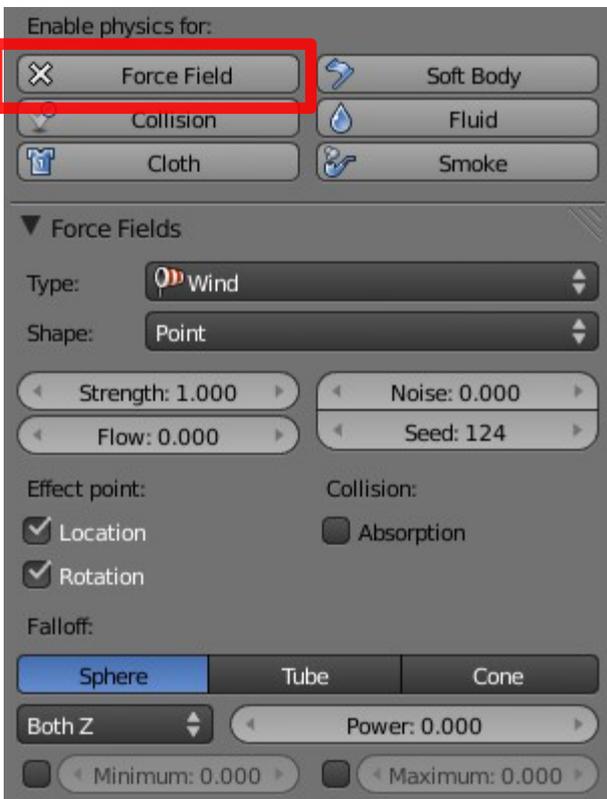
Now, you may have noticed that your grass is standing up straight and the reason is there is no force to blow it over; it's perfectly balanced.

Add a plane using 'Shift+A' in the 3D View or use the add menu in the Info bar on top. Rotate it so that you will have the angle you want the wind to blow in.

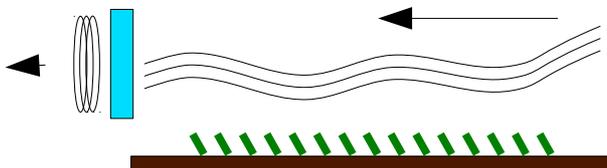
Go to the physics section of the plane:



Click on Force Field and mimic these settings for now:



Remember to use the force field as a vacuum rather than a wind machine. It works better and you have a constant flow. For example, if you want wind blowing from the right, put your force field object on the left:



When you use 'Point' as your shape, it means the wind comes from that point, existing as the entire environment, in the direction the object is facing.

For example, if I move it from side to side in an animation, the wind still be blowing in the same direction as if nothing moved; that's exactly what we want here.

The rest is pretty standard settings except for Falloff:

Falloff refers to the strength of the wind and how it is contained. For example, using the cone falloff, I select a region for the wind to blow at it's strongest (Min) and where it's weaker and then stops (Max).

Just play around with these settings.

That's it for this tutorial. On the next page are two examples of playing with the system.

Don't forget to mow the real lawn though, lol.

Other grass!



Veld Grass



Sea Weed