Blender 2.59 Tutorial Grass and Waving Grass:

Introduction:

If you want to make waving grass in Blender first you have to make grass in the first place. So one thing to do is to look for grass on the Internet and several Tutorials are helpfull in some degree.....

This tutorial is okay, but contains a small but significant error (at least in Blender 2.59) I will discus later: www.youtube.com/watch?v=3Vj5vI9PYS

This tutorial: http://www.blenderguru.com/videos/the-secret-to-creating-realistic-grass

 is referred to in the previous tutorial and is also (more then okay).....but non of them gave me what I wanted and that is a layered longer flowing grass......giving it a unmowed, sort of lush character.......so frustrations mounted......and three, four and five letter words were used.

But off course these tutorials were not for nothing......gradually I started to understand the priciples behind the Blender particle system......as a ex-professional software developer I'm not to pleased with the Blender interface which has all the charateristics of parameterized algorithms, which do not make software, but having said that it is usable if you're willing to climb the edifice like learning curve.

The actual tutorial is split up into two sections......first the creation of the grass and then the creation of the movement. I will start with an admittion, I do not fully know and do not fully guarantee that every parameter I used has an influence on the end product and wether the end product (the video) is the best video possible. Blender is not an exact art to that amount and it isn't supposed to be.....one mans perfection can be anonther mans (or womans) starting point and if someone wants to improve, prove me wrong on certain parameters or ad his or hers own wisdom, feel free......there are comment lines attached to my blog and these have a purpose.....of course compliments are also welcome but disussion is mostly more fruitfull.

Now on to the good stuf....

Materials used:

Software: Blender 2.59 r39307 using Blender render as reder engine.

Hardware: HP Pavillion
   Processor: Intel 7300 Dual Core Pentium
   Graphic card: Intel Graphics Media Accelerator
   Memory: 2 Gb
   Monitor: Dell 1280x1024
   In all a pretty much a bottom feader these day, but hey there no budget like no budget, is
   there :-).

Setup of the scene (non moving):

A: A standard plane (not scaled in any way in a position near the origin of axes)
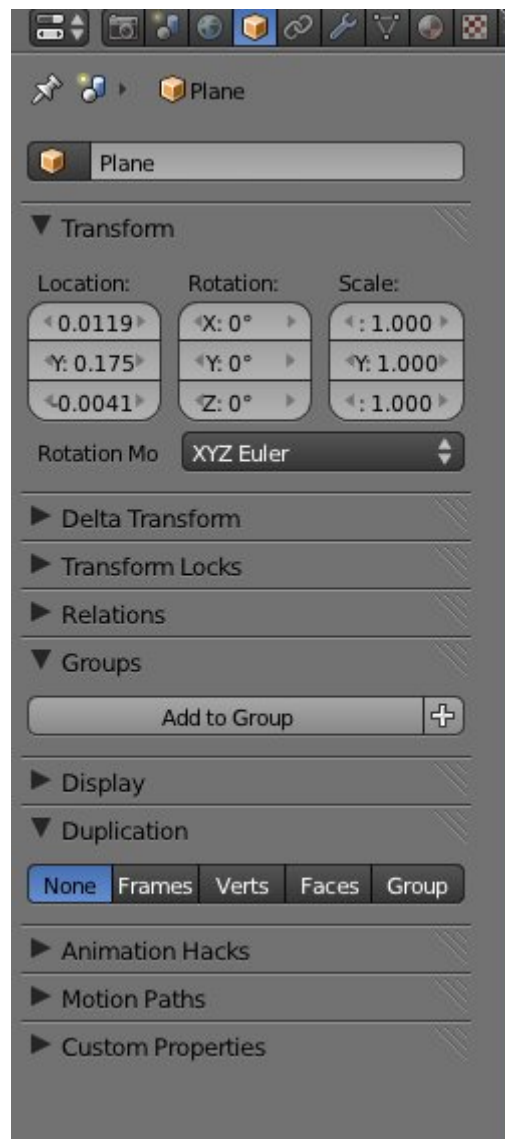

Fig 1: Setting of the standard plane........can't be to basic (all closed tabs were never toughed).

B: The camera

I wanted a clear view of the plane (and the sky) creating the impression of a small hill (or a dyke/levvy since well these are what keeps us dry in The Netherlands). So i aligened the camera with the front face of the plane and tilted it slightly down.
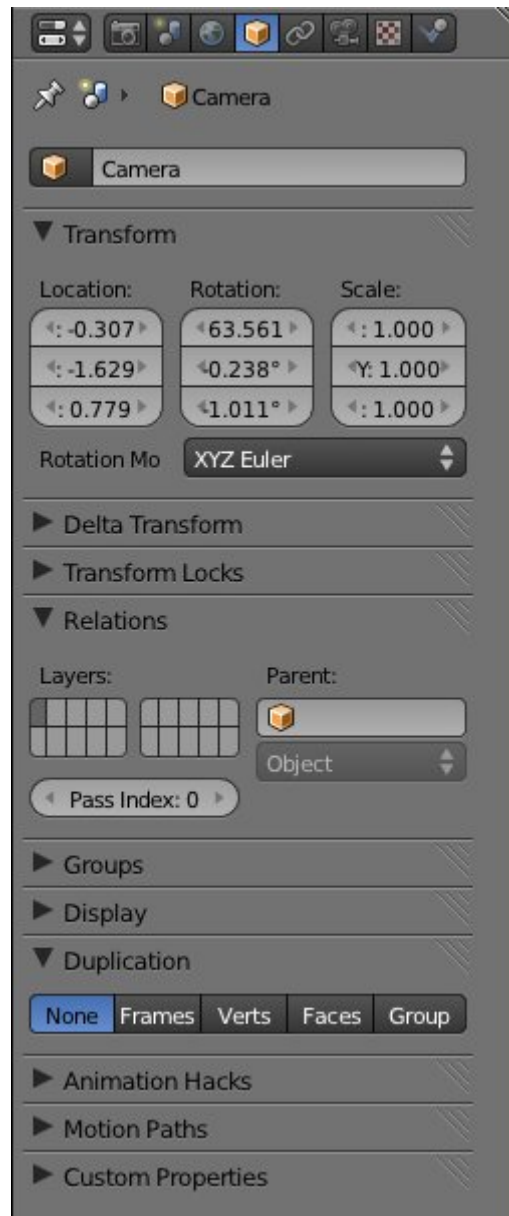

Fig 2: Setting of the Camera, all closed tabs were never toughed.

C: The light

Now a few tutorials use ambitious lighting in order to light grass. More lamps, different colours, different intensities and that's all fine by me, but I was a bit worried what would happen if I would use this a a stage for future projects. Things that look good under a certain lighting.......well you know.......so I limited myself to be as close to the truth as possible and use a single light source (in this case a Sun object, in order to light the scenery. The Sun object also comes with free sky attached to that was a nice bonus. The light of the sun was directed onto the plane (of course).
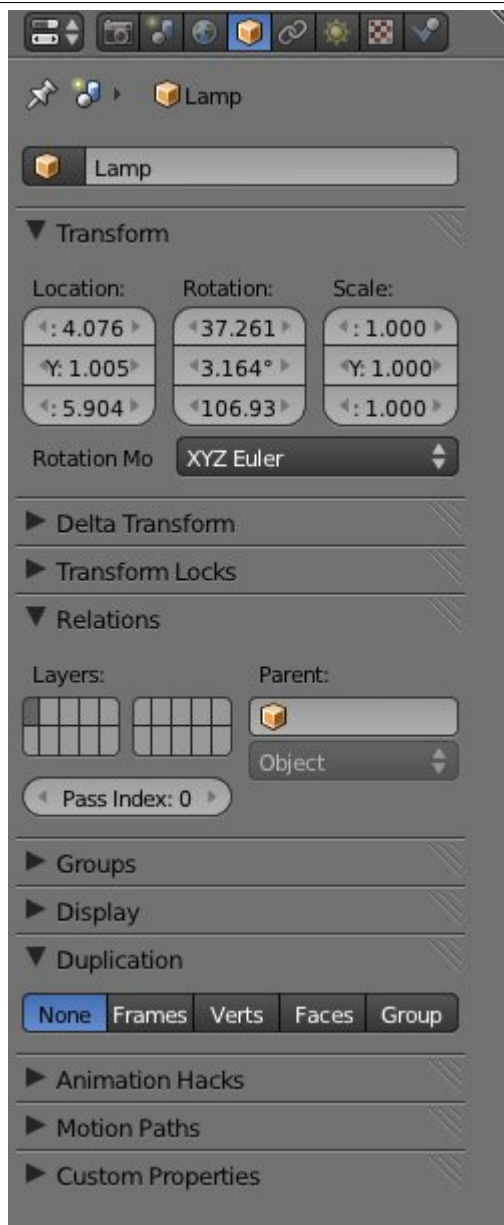
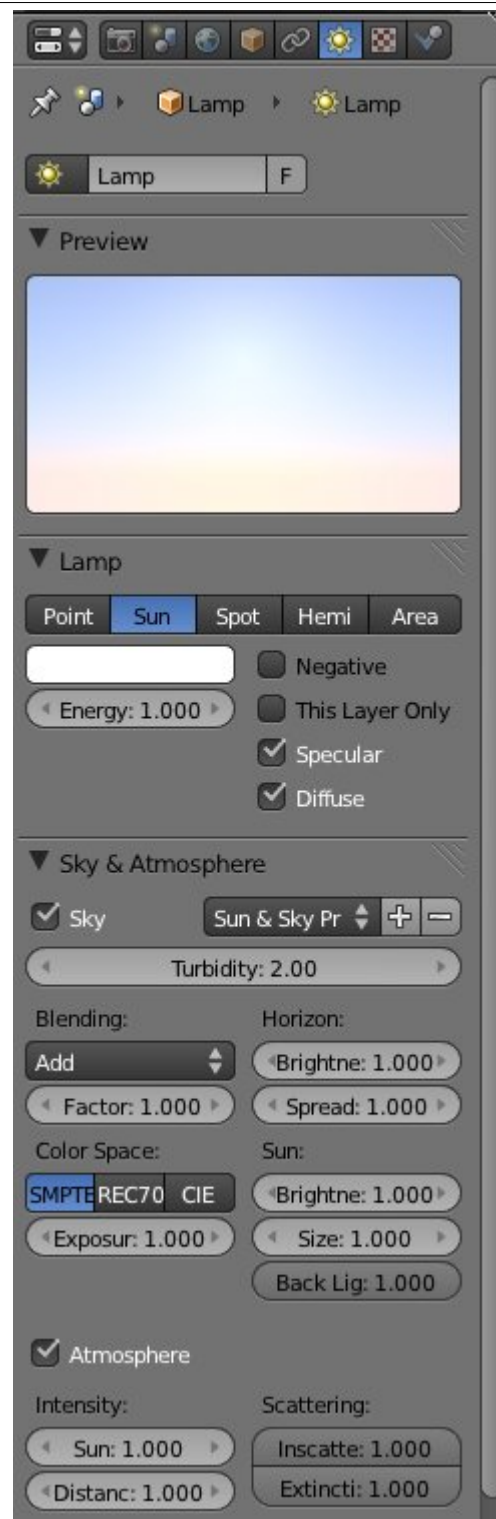Fig 3a: Location and direction of the sun......

Fig 3.b: Settings of the sun.

The materials

In principle there are three materials used.....since there will be three different parts of the plane that will have to behave differently. The ground in which the grass is rooted, the short floppy green grass, and the longer more rigged brown grass. So three materials will have to be created all stacked on top of the plane object.

Material 1: The dirt

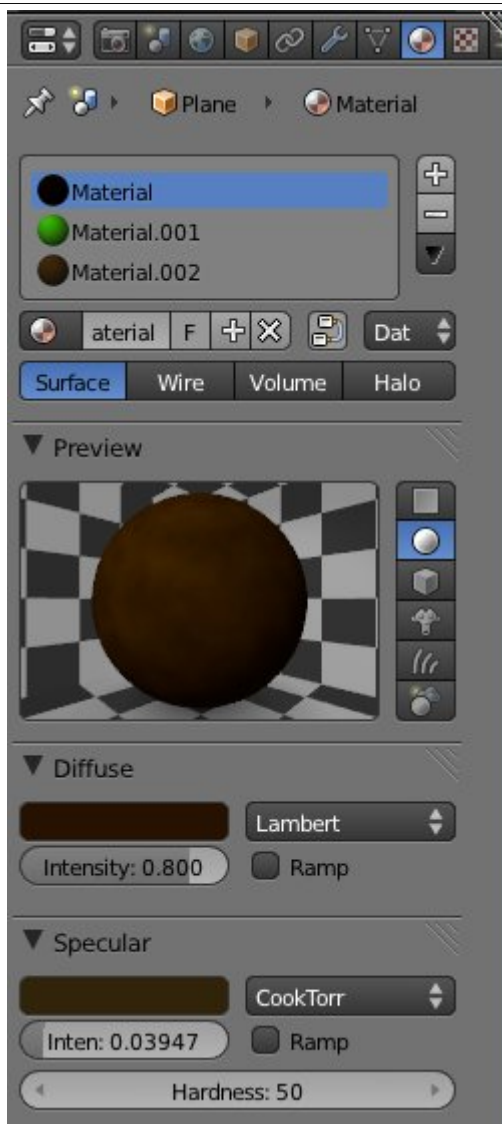This matial is attached to texture number one (see next paragraph)

Fig 4b: Color of the diffuse

Fig 4c: Color of the specular

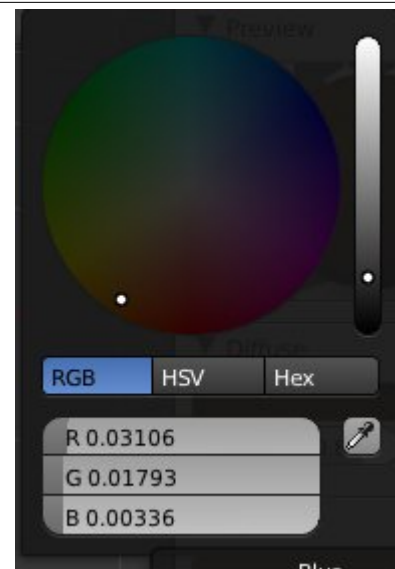Fig 4a: Materal settings, specular near 0.

Material 2: The short green grass

Besides color this material also contains Transparancy and Strand settings. The former in order to give the Texture (see next paragraph) the dominance in the Transparancy of the individal shoots of grass from to to bottom and the the latter in order to taper the grass slightly from bottom to top.

Fig 5a: Material settings: specular 0, and hardness down to 14. Note the shading in the preview window......we'll get back to that later.

Fig 5b: Color diffuse

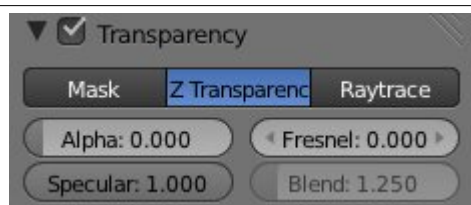Fig 5c: Color specular (could have saved the trouble with a specular of 0.000 :-))

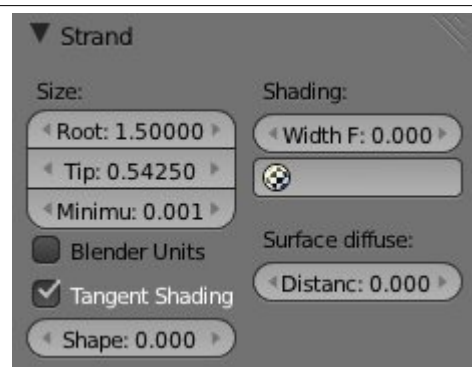Fig 5d: Transparancy settings indicate Z-Transparancy and an Alpha down to 0.000.

Fig 5e: Taper the grass.

Material 3: The long brown grass

This material should reflect the fact that long dry grass is brown but also more pointy and not as inviting as short green grass.......it is also more ridget and that is something we will get to. By the way, the colors set here shall not show up in the final result, due to the transparancy settings....but that figures.....I guess, sort off.
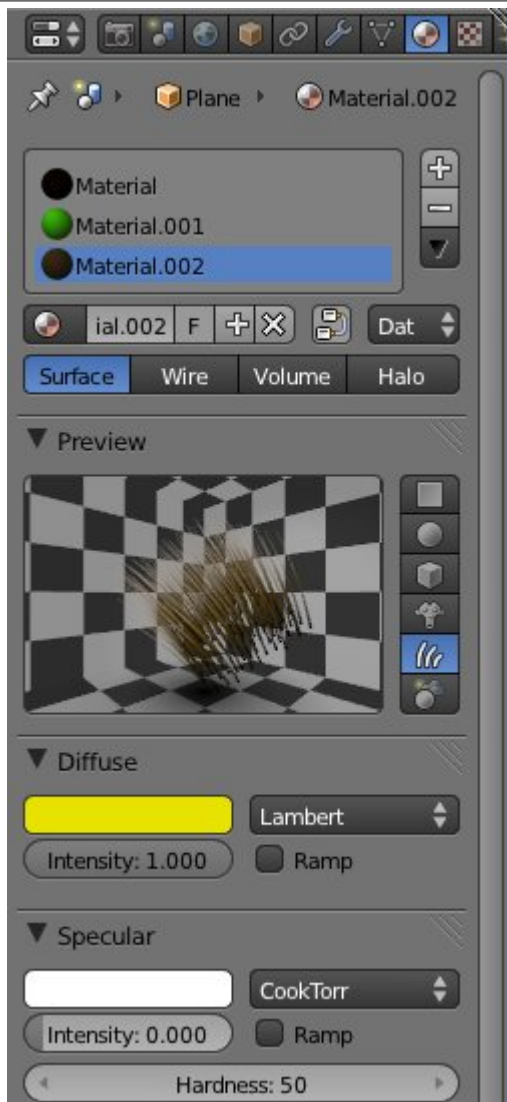

Fig 6a: Specular set to 0.000
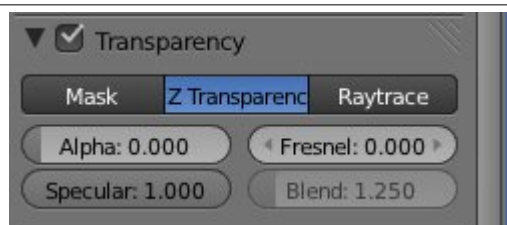

Fig 6b: Color of the diffuse

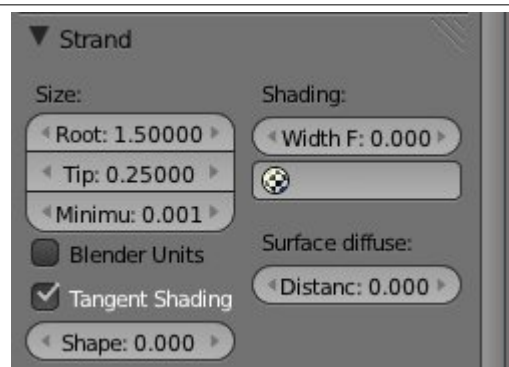Fig 6d: Transparancy set to 0.000 and Z-Transparancy

Fig 6d: Taper from 1.5 till 0.250 a little more taper this time

Addendum:

I used these additional settings for material 2 and 3 respectively but I'm not to shure about their
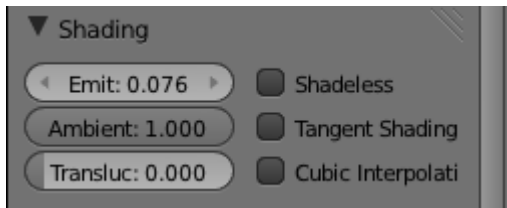influence on the final rendering.

Fig 7a: Shading for Material 2

Fig 7b: Shading for Material 3

The idea behind these settings was to emulate a bit the translucent behaviour of grass on a warm
summer day, wether that succeeded or failed needs to be determinned.

The Textures

The grass plane uses three different textures in order to render the grass. The first texture is used to make the dirt less uniform in color. The second and third texture are used to make the grass shaded in color and shaded in transparancy in order to simulate shadow behaviour without stressing the render engine of Blender to much, thus keeping the render times workable (sort off). The idea being that more transparant but also more vibrant top colors are mixed with less transparant but also less vibrant colors of the bottom layers of the next strand of grass. This should create a more or less natural looking grass since grass itself has sort of the same behaviour outdoors. This is an adaptation from BlenderGuru's protocol........but with a minor change.

Were BlenderGuru and others chose Blend → Progression → Vertical, I had to chose Blend → Progression → Horizontal in order to reach the same effect as BlenderGuru had, had, I could see my settings and I could see BlenderGuru's settings but the results were different. Now Einstein says a fool can be identified because he believes in doing the same over and over again and expecting a different outcome, but in this particular instance I had to do something different in order to reach the same outcome. Now I don't know wether that is a Blender 2.59 issue (or undocumented feature) or a real error soon to be corrected but however keep that in mind when using this tutorial in the future. Unfortunatly parameterization in Blender versions seems not to be that stable, and that is the cause of much confusion at the user stage. As a professional UAT test engineer (stopped exactly for reasons like these), I would have a stark discussion with the development team and question their choises in these. A stable interface should always be the main concern in software development, and changes should be logical and organic. Having said that lets get on with the Blendering.

Texture 1: The dirt

What I want here is relatively simple. Create a dirt that is not uniform brown but has a limited amount of texture. Thus I used the default values and only changed the color and the influence of the color on the Alpha (that was probably not usefull and could at best be forgotten). Of course this texture is linked to object plane and material 1......that is enough to asume it is not linked to one of the two particle systems which is a good thing.
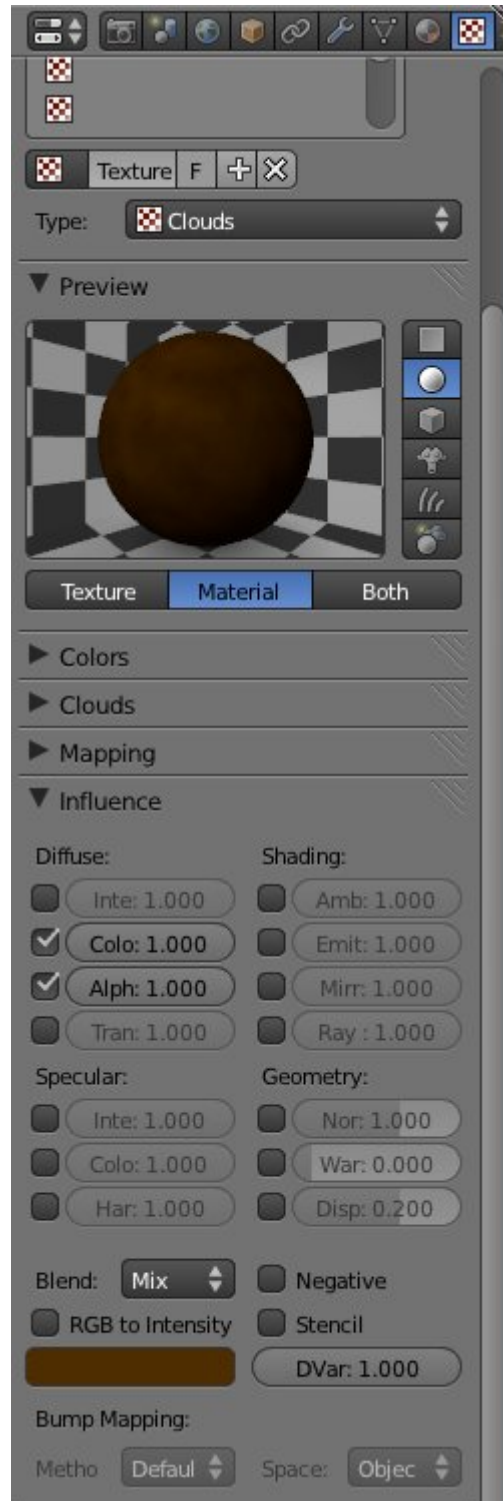

Fig 8a: The color of the dirt is a brown to brownish. The brown is set in the material tab and the brownish in the texture tab......not that intuitive, but once you know what's going on it is quit workable (but so is freeclimbing and I have never tried that for good reasons :-)).

Texture 2: The short green grass

Here had to use the color ramp for the first time in my life and that meant blood, sweat and tears (no not tears) in order to fugure out the workings of the color ramp. In order to get going we first have to set the type of Texture to Blend (change from Cloud to Blend in the Type-window). Blend creates a blended texture from left to right (if set to vertical) and from bottom to top (if set to horizontal) and Blend progression is set to linear. The color ramp is assebled out of 4 different color/alpha combinations. The alpha setting has shifted from behind the color field (numerical value) to the color pop-up, personally I would return that to it's original position as this makes checking transparancy curves a lot less easy......and uses a lot more keyclicks (maybe a consideration towards the Blender team).
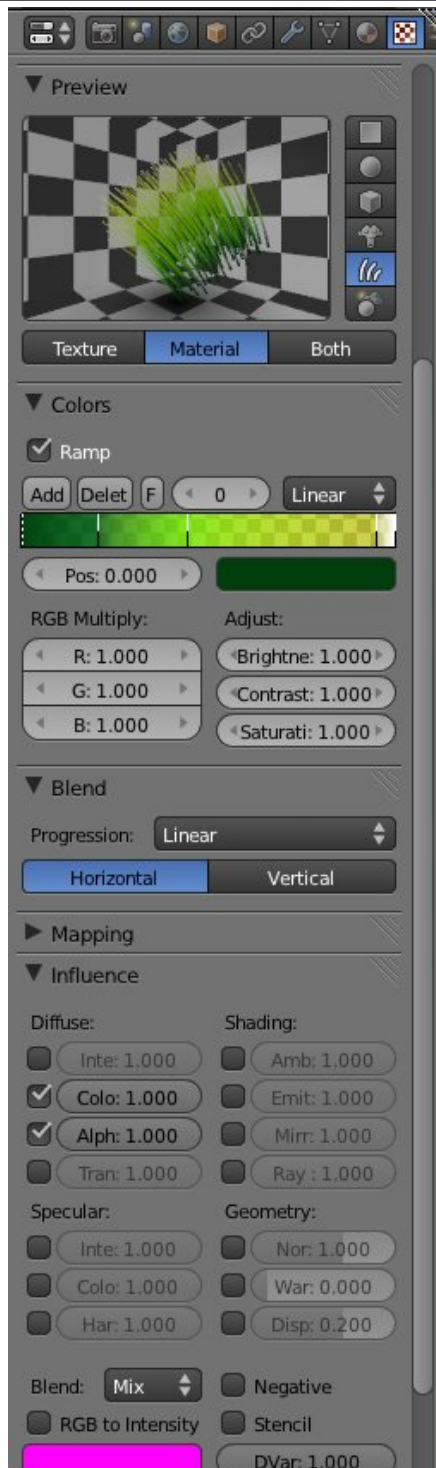

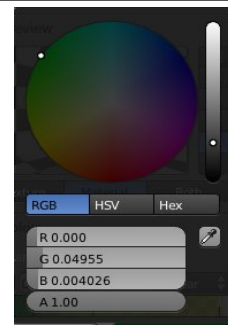Fig 9a: Watch Alpha and Blend progression

Fig 9b: Dark green and Alpha = 1.000

Fig 9c: Lighter green and Alpha = 0.870

Fig 9d: Bright green and Alpha = 0.800

Fig 9e: Bright yellow and Alpha = 0.500

Texture 3: The long brown grass.

Settings are essentially the same here only the colors of the ramp are different, shading from brown to white via yellow. In the influence tab tha Color: 1.000 settings invokes 100% influence of the color setting of the texture over the color setting of the material (thus rendering the former useless) and the Alpha setting invokes 100% influence of the Alpha setting of the texture over the Alpha setting of the material but in this case the Alpha setting of the material would still dominate if set to 1.000 therefore the Alpha setting of the material had to be set to 0......additive versus substractive logic I guess.
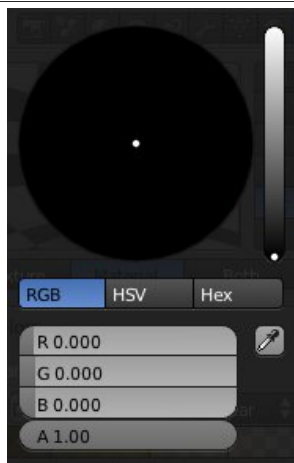

Fig 10a: Black with an Alpha of 1.000

Fig 10b: Dark brown with an Alpha of 0.780

Fig 10c: Medium brown with an Alpha of 0.700

Fig 10d: Light brown with an Alpha of 0.450

Fig 10e: Near White with an Alpha of 0.190

The particle systems

In this scene two particle systems are used.......the first particle system for the short green soft grass and the second particle system for the long rough grass. The setting of the particle systems are devided into a lot of sections and thus what counts and what not is not so easy to determine. I have strugled with all sorts of settings, variations on settings, and I have to say it can creat beautiful results but a more user oriented approach would be favourable to the users. For instance a set of build in presets for hair, curly hair, flowing hair and grass would come in handy and reduce the steepness of the learning edifice. But having said that, if you know what you are doing and have reached the top of the cliff the view from up there is magnicant as you can tweak the particle system to your hearts content.

Particle system 1: The short green grass

In order to make grass the main setting for the particle system has to be changed from emitter to hair......okay grass and hair look similar and similar looks force similar rendering so that figures. But grass is something different then hair, more hard, more ridget and green.......eh, do I hear a sloth complaining?
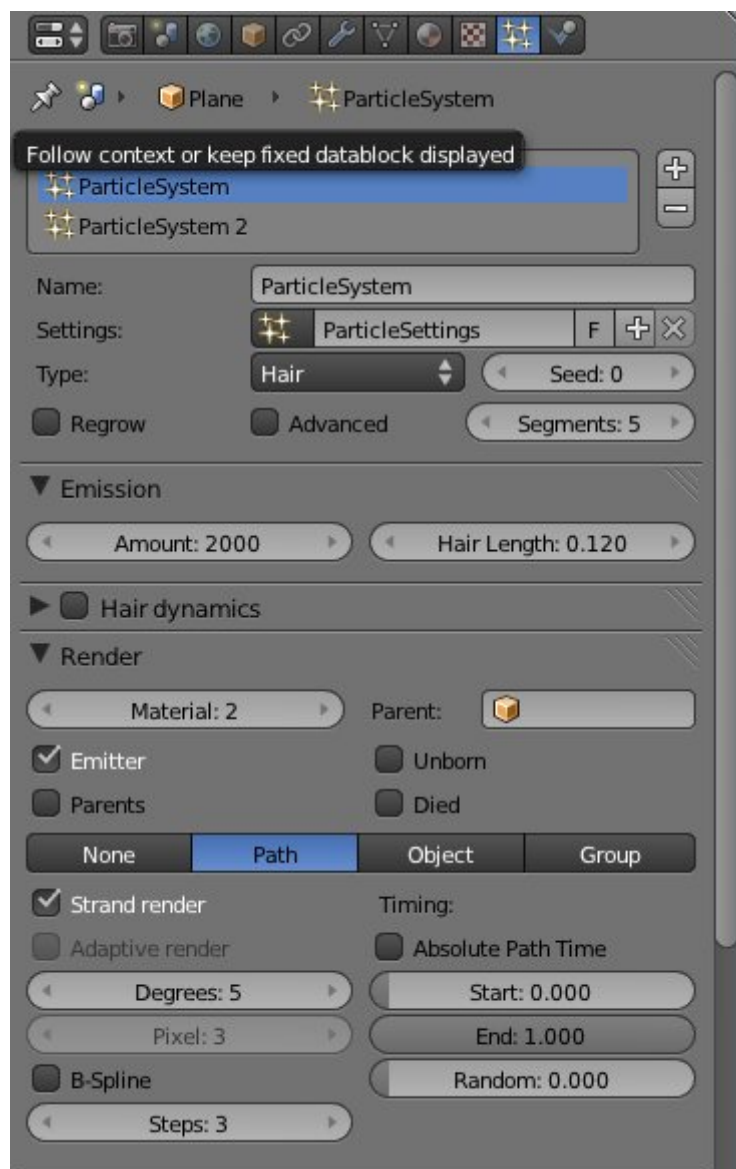

Fig 11a: Type is set to hair, amount is set to 2000, hair length is set to 0.120 and Strand render is selected. Most important Render → Material is set to Material: 2 in order to make grass green.

Now 2000 strands of grass can seem like much but in order to create a nice meadow you need a lot more grass.......so we can up the setting to 20.000 but try it and render and your computer will most probably say adios and crash in a big way (if not congrats you've got an enviable machine to work on). But for the most we need a trick and that trick is provided in form of the Children tab of the Particle system. That tab allows you to increase the amount of grass without to much increasing the memory use of the render engine while redering. For that to happen set the following parameters.

Fig 11b: Children. Set the type to Simple and this set op options appears (if you set to interpolated a different set of options appears but using the same amount of children my computer pers happyly allong using Simple and crashes in big way using Interpolated children so simplicity is the way for me. Display affects the amount of children that are displayed in the editor when editing per parent particle and Render sets the amount of children that are displayed in the final redering per parent particle. Size is set to 1.000 meaning overall shape and size between parent and children is equal. Clump and Shape are used to clump strands together (and to creat down from hair is needed). Length determinnes the length of the strand io of grass and is set to 0.500 in order to make the children half as long as the parents. Uniform is set to 0.006 in order to create bit of variation in the roughness of the strands according to location and random is set to 0.008 to create the same effect but without the location parameter. Both are in some ways complementory to each other.
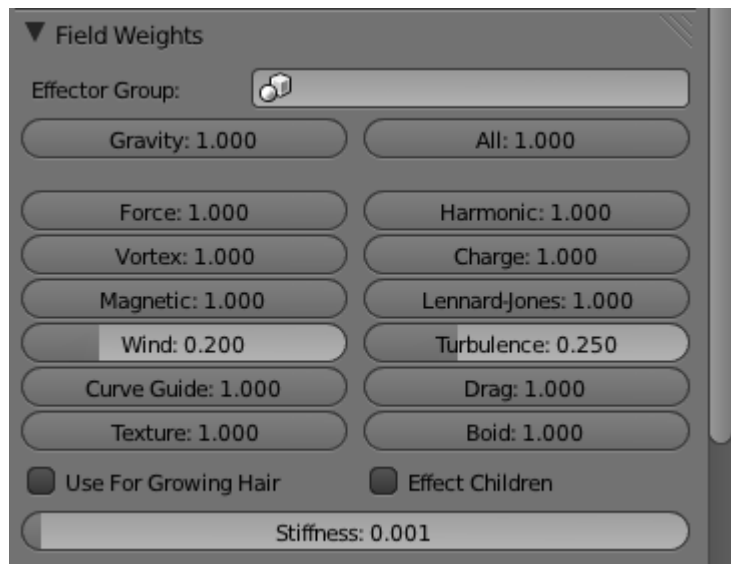
Figure 11c: Field Weights are not important right now but will come into play when movement is added to the grass via Wind and Turbulence.......this grass is rather weak and fluffy so Wind and Turbulence have a rather big influence on it.

Particle system 2: The long brown grass

Actually the same as the short green grass but with a few different parameterizations because of the different feel of this type of grass.
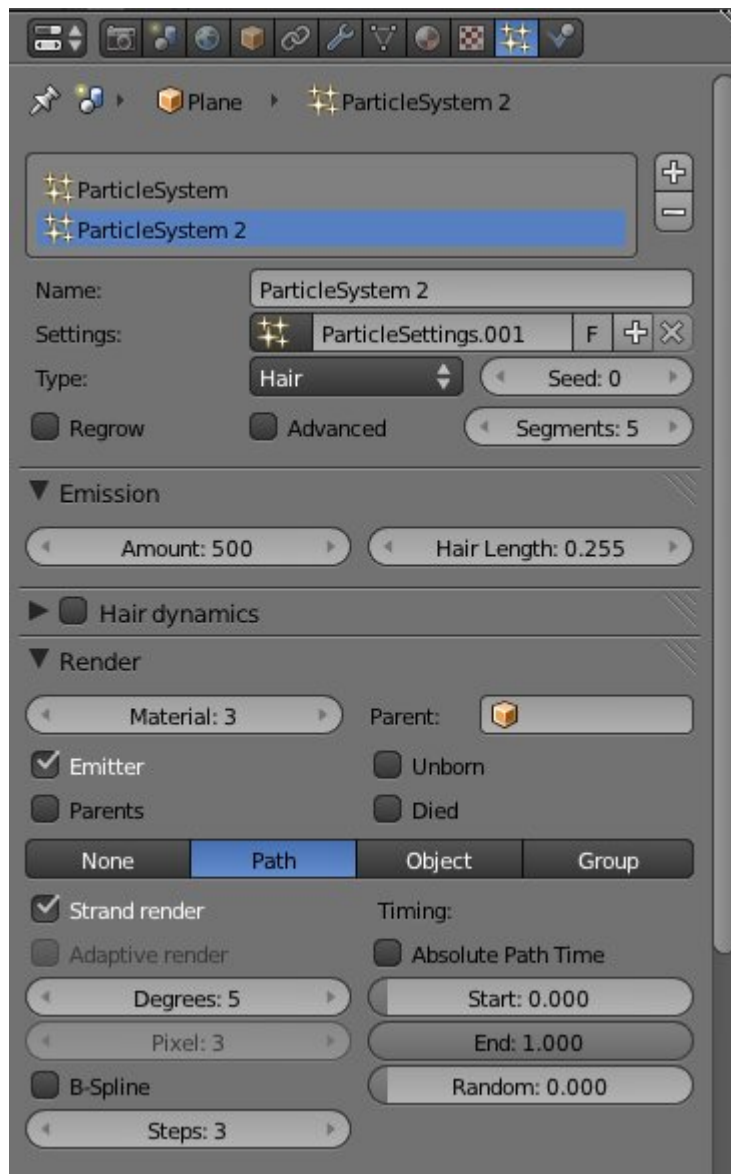

Fig 12a: Notice that the material is now changed to Material 3 in order to make the grass brown yellow. The amount is set to 500 reflecting less strands of grass of the long yellow variety compaired to the short green variety but this is made up by the fact that these are almost 2 times longer. Remember to check Strand render in order to releave some of the burden of rendering.

Fig 12b: Only 50 children this time but the radius from the parent is slightly smaller (0.150 versus 0.200 for the green grass giving a slightly less dispers look to the longer grasses, the roughness parameters also reflect the different type of grass. You can play with these but be carefull at higher settings the results can be a bit bizar......to say the least.
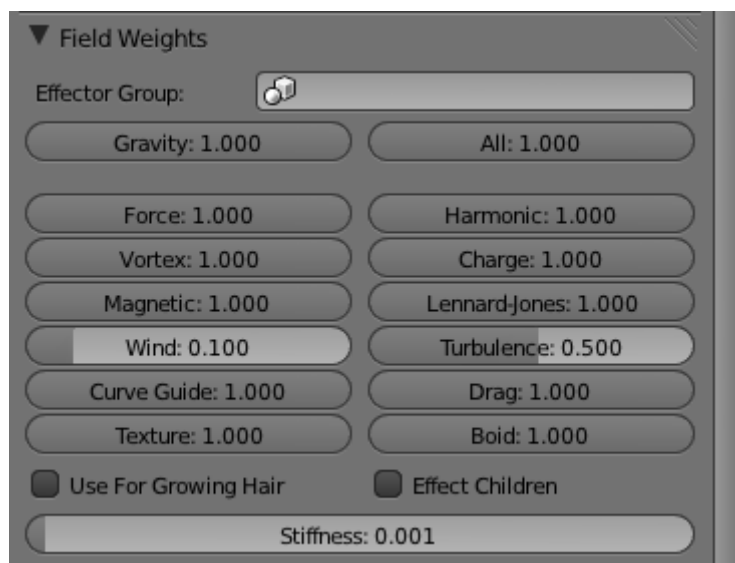

Fig 12c: The field weights reflect a little more stiffness in the this grass, since the wind is less influence but heavy turbulence has more influence. At least that is the theory.......now for the song. So the first render...............to this result.

Fig 13: The first render still static and no wind what so ever brushing these grasses and that means they are all standing around rather uniform. Just a little random variation in the texture due to the different spread of the two types of grass. That is exactly what I wanted.

Setup of the scene: Moving

Now to the rest of the scene, moving in the wind. This is now the simple part, but since every parameter change involves a new render (up to 5 hours) this is a part that needs a lot of patience from me (and I'm not known for my patience.....no way).
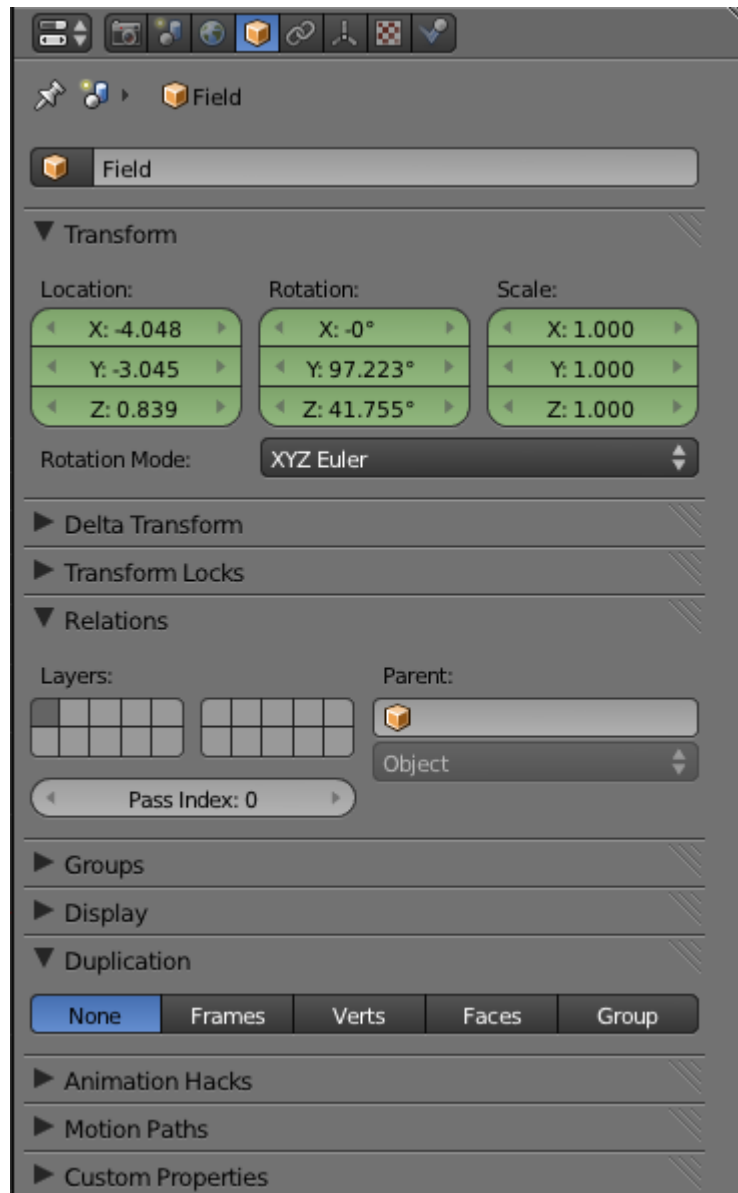
The wind:

Fig 14a: The wind is a ventilator shaped object that is in my scene directed towards the field from a distance an blowing steadily over the grass from above.......that would in itself introduce a movement, but only a slight on. The grass would bend and that would be it since an equilibrium would be found between the grass and the wind. The wind settings are standard.
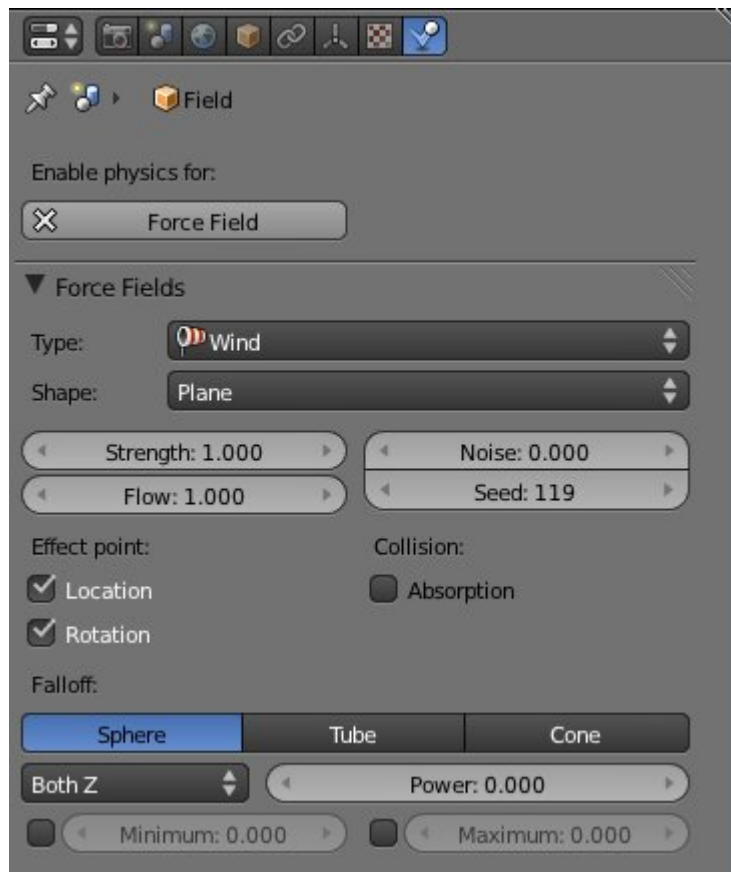
Fig 14b: Wind settings. I've played with them a bit but the standard settings worked best for me, sometimes doing nothing is best.

The turbulence:

This is what makes the movie come to life and it needs some animation in order to work. Now it is basic animation but animation non the less and that means opening the Graph Editor and using two keyframes to create the movement in the line of the camera. Now I wont go into the details of animation (there are more then enough good tut's on the net) but I will go into the parameters of the turbulence.
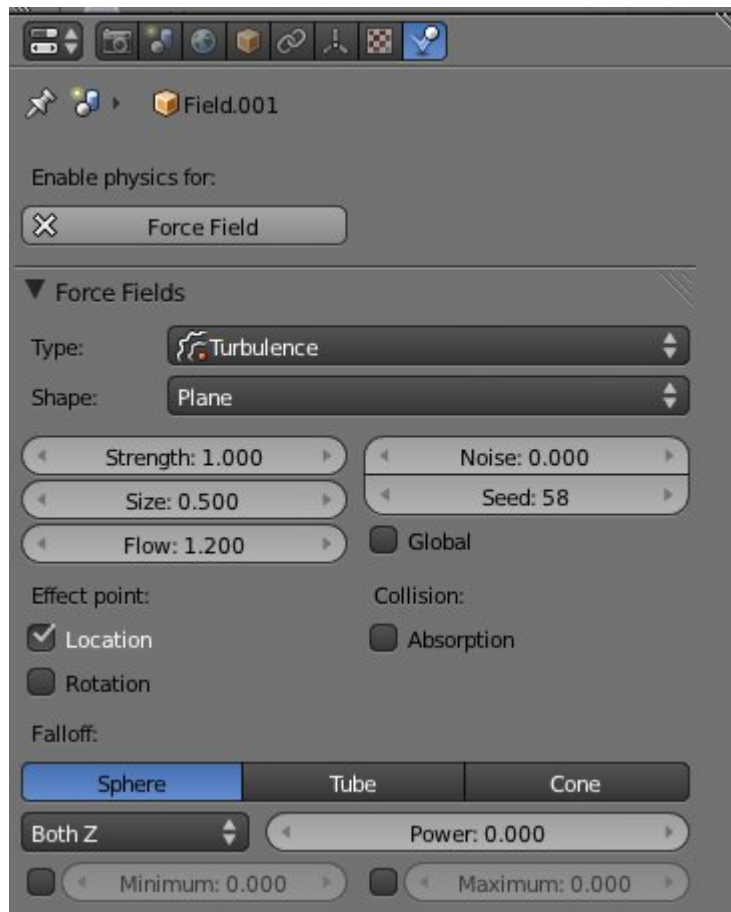
Fig 15a: The settings of the field. Nothing special..........effect point is only Location, size = 0.500 but you are free to play with these parameters but keep in mind. This does all next to nothing if the turbulence itself does not move. A tutorial on www.blenderdiplom.com can tell you a lot more about the Turbulence system then I will do here. So I created a move from frame 1 till frame 250.
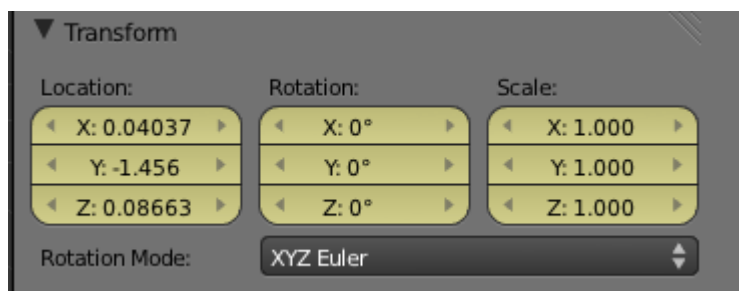

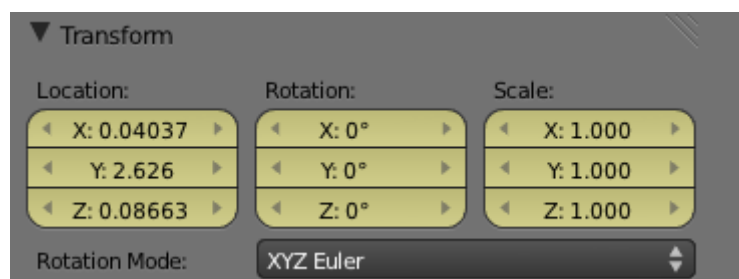Fig 15b: Location and Rotation at frame 1

Fig 15c: Location and Rotation at fram 250

Then you onlyu need to render 250 frames and voila the effect should be convincing long grass.