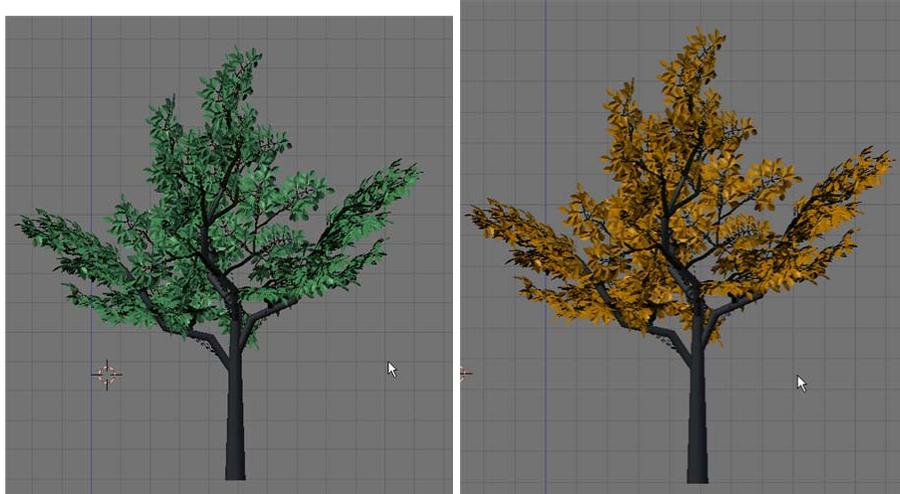


Course: 3D Design
Title: Deciduous Trees
Dropbox File: DeciduousTrees.zip
Blender: Version 2.46
Level: Intermediate
Author: Neal Hirsig (nhirsig@tufts.edu)

Deciduous Trees



In general, modeling trees is a long and somewhat tedious undertaking. Usually, each tree contains thousands of individual elements. In many instances, trees are included in a model as an accent to the main focus adding a sense of atmosphere rather than being the main focus of the completed model itself. For this reason, many 3D software products include some sort of “procedural” modeling method of generating trees which eases the task of tree modeling. There are indeed a number of Blender python scripts available on the web that attempt to do this as well as many tree modeling applications whose exported files can be imported into Blender.

In this tutorial we will model a deciduous (leaf bearing) tree with an eye toward keeping the model as low in polygon face count as possible and maintaining as much modeling flexibility as possible, so that the completed model can be re-fashioned into other types of deciduous trees with a minimum of effort.

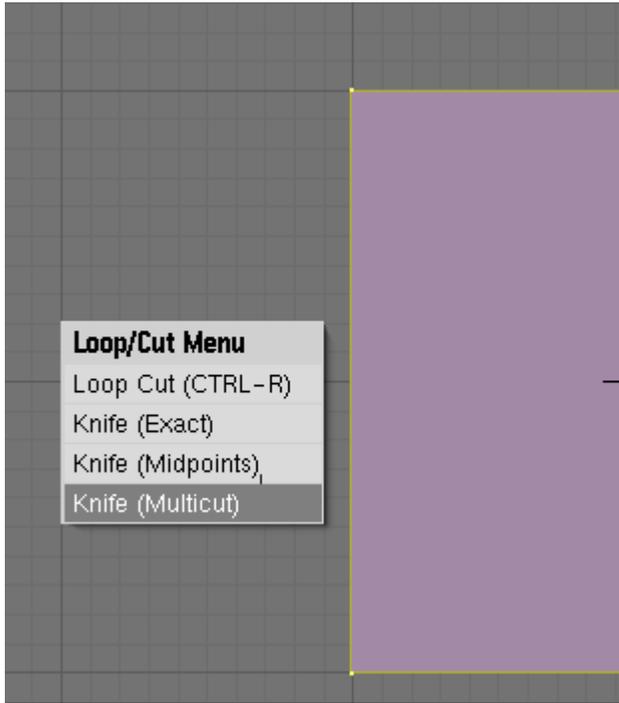
The process begins with the smallest of tree elements – the leaf, and builds to the largest of tree elements – the trunk.

Leaf:

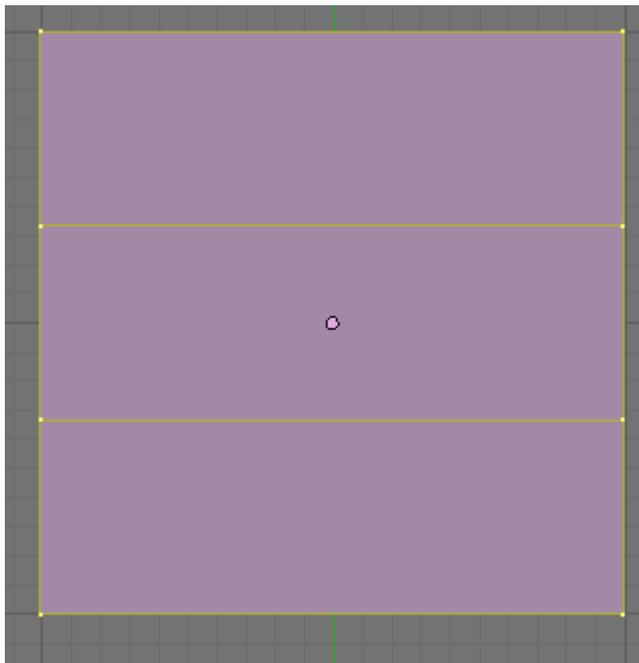
Open a new Blender file. Delete the default cube object if it exists.

In Top View, add a plane object (Space / Add / Mesh / Plane).

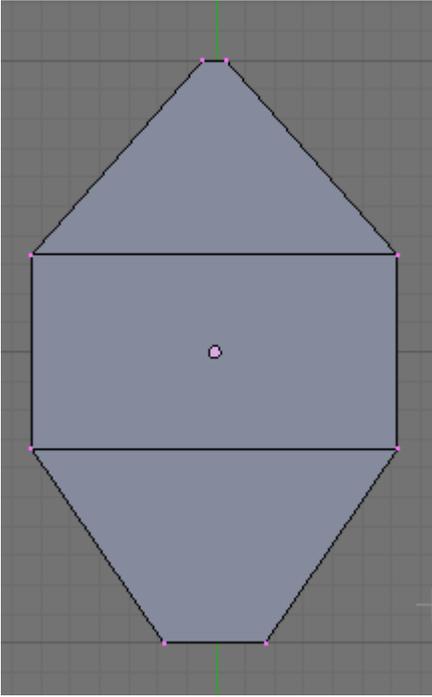
In Edit mode, with the 4 vertices selected, press the KKEY and select “Multicut”.



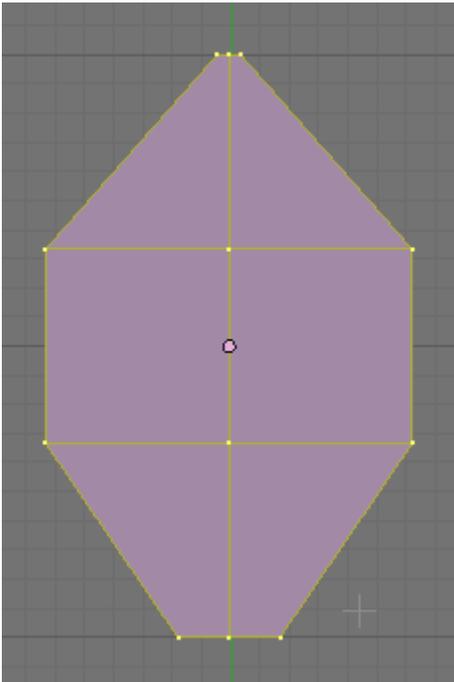
Set the number of cuts to “2”. When the cursor turns into a knife icon, click and drag the knife icon horizontally across the plane then hit “enter”. This creates 2 new edges on the plane object.



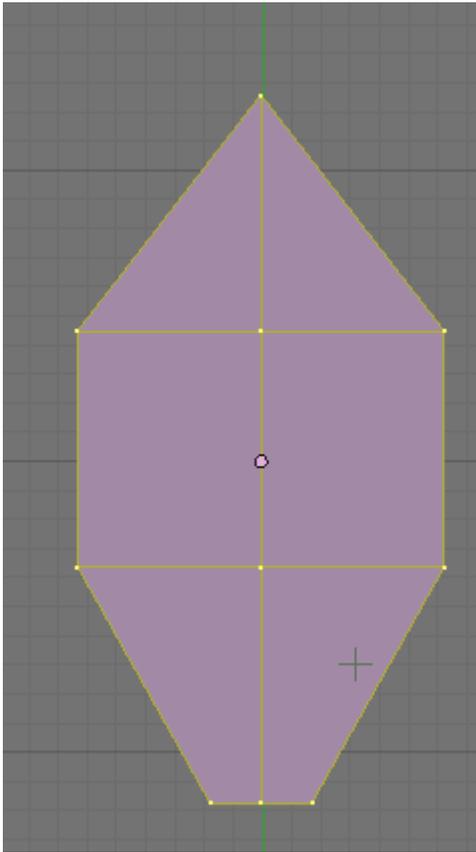
Scale down the plane a bit on X axis and adjust the vertices until you have a leaf shape as shown below.



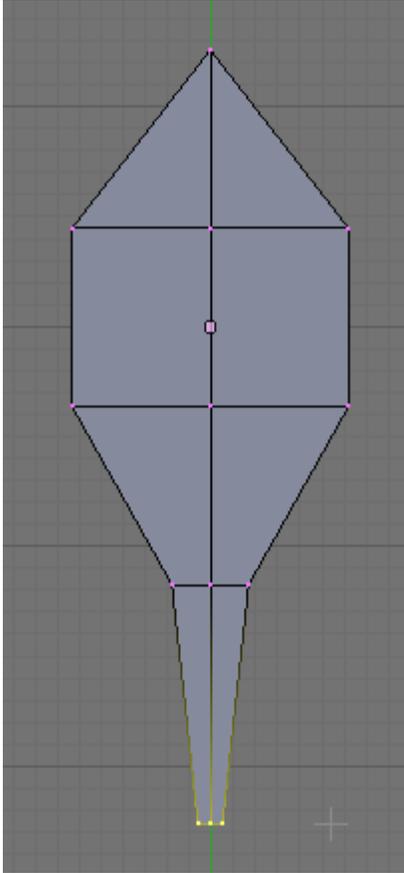
Select all of the vertices and press the **KKEY** and make a knife cut (midpoints) vertically creating a center edge as shown below:



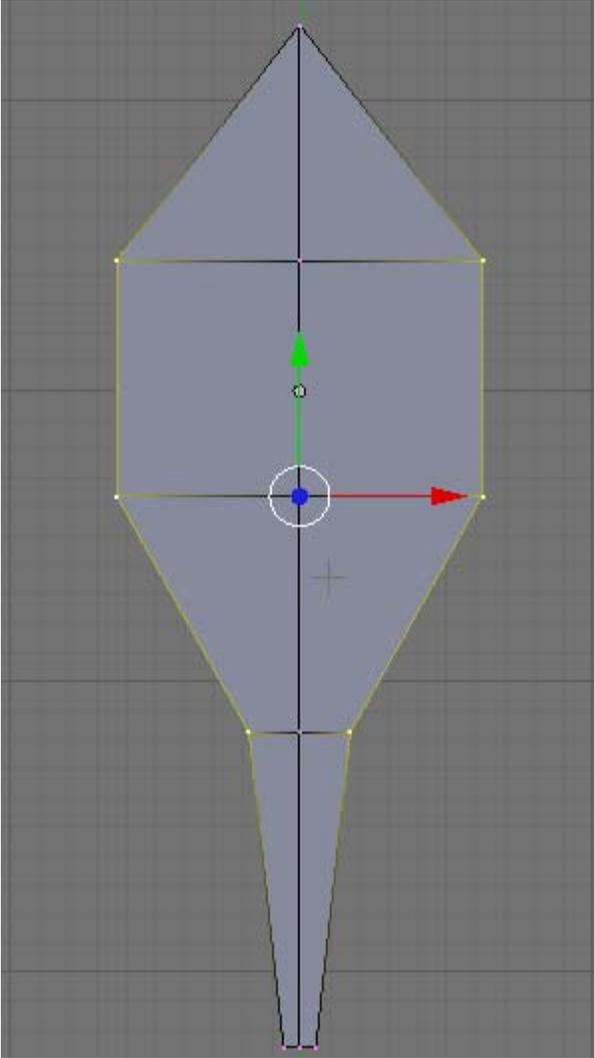
Merge (WKEY) the top 3 vertices into a point and scale the leaf along the Y axis a bit as shown below:



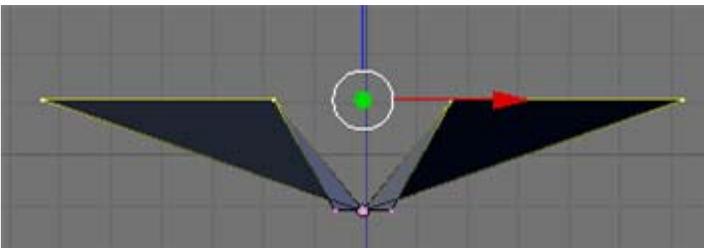
Extrude the 2 bottom edges and adjust the resultant shape as shown below:

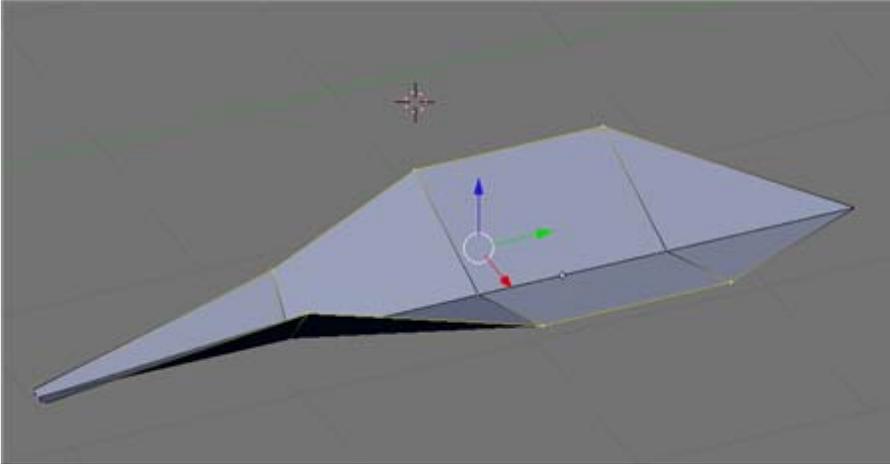


Select the 6 outside vertices as shown below:

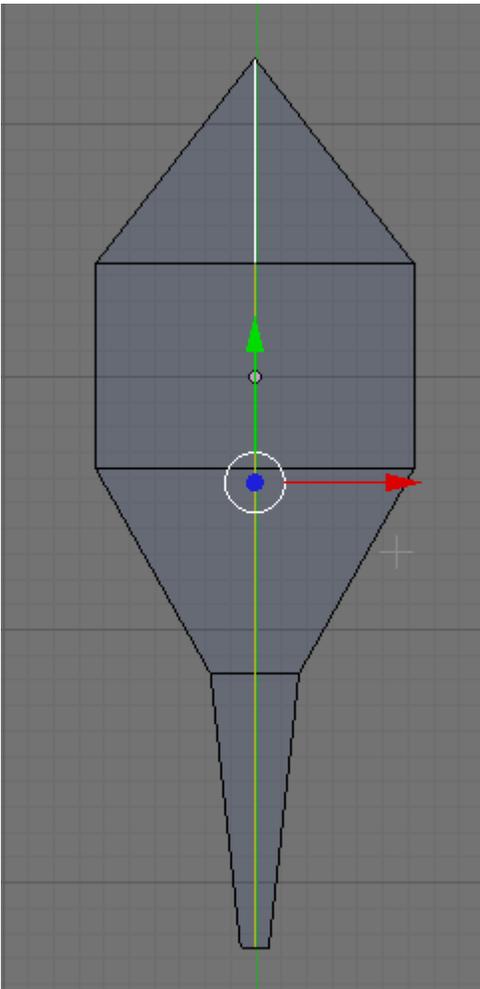


Switch to front view and move them up a bit (giving the leaf part some shape) as shown below:

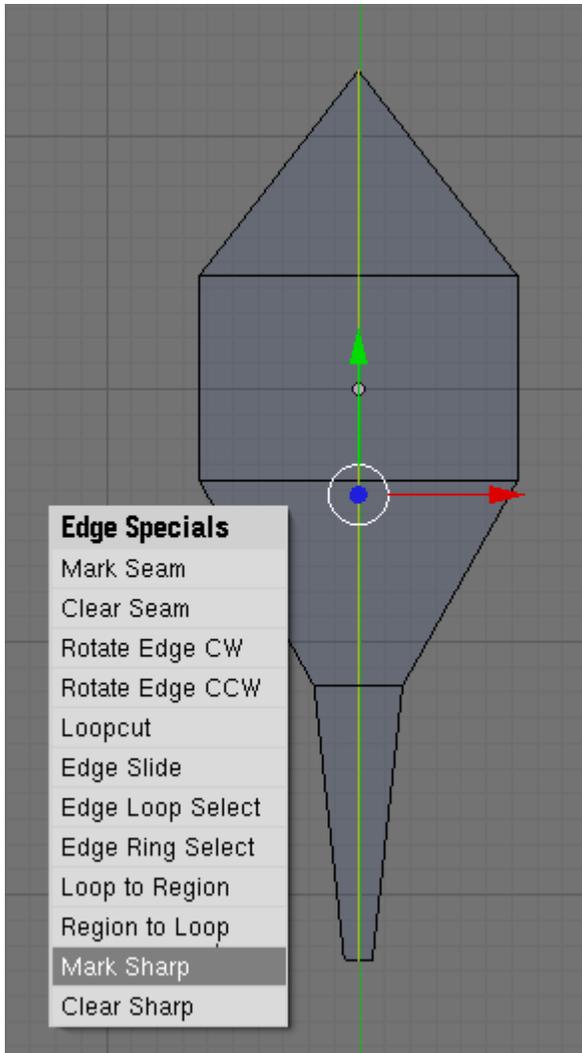




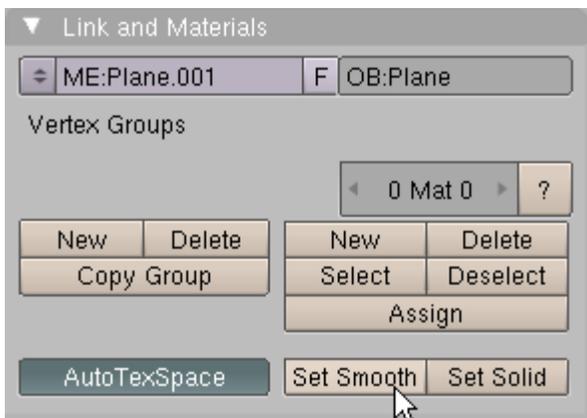
Switch to top view. Switch to wireframe and select the center edges (edge select mode).



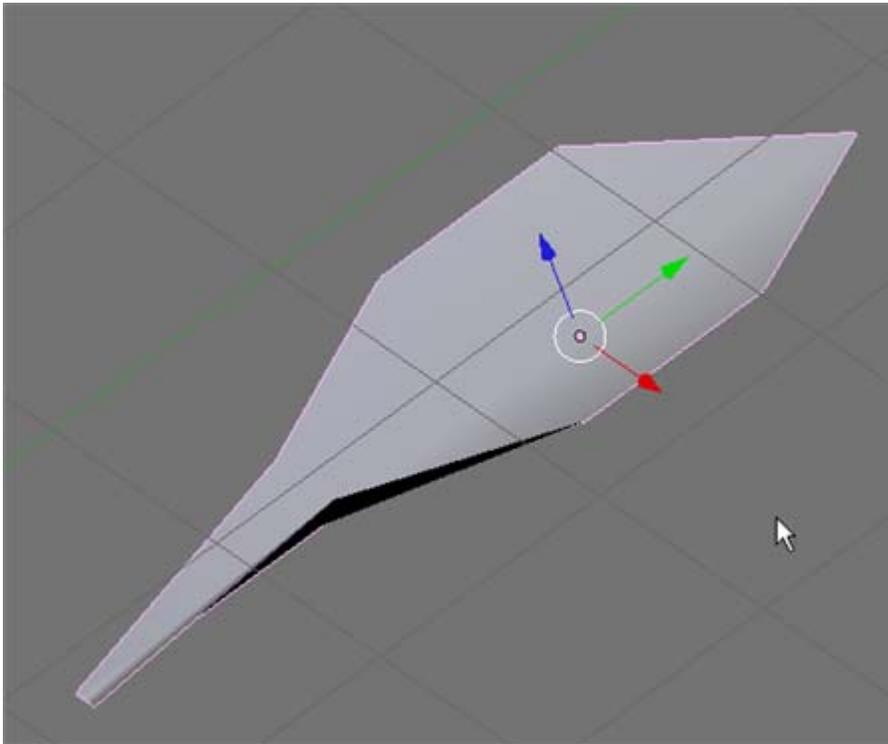
With the center edges selected, press CTRL-E and then “Mark Sharp”.



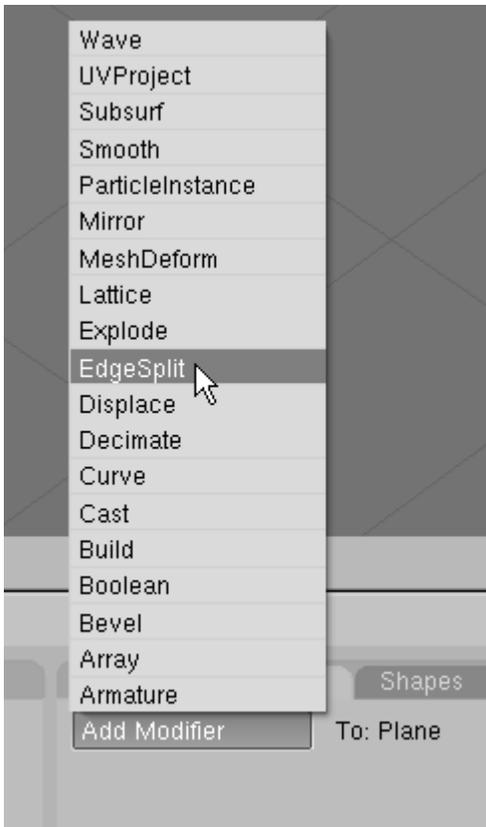
TAB out of edit mode (into object mode). With the leaf object selected, click on the “Set Smooth” button in the “Link and Materials” panel.



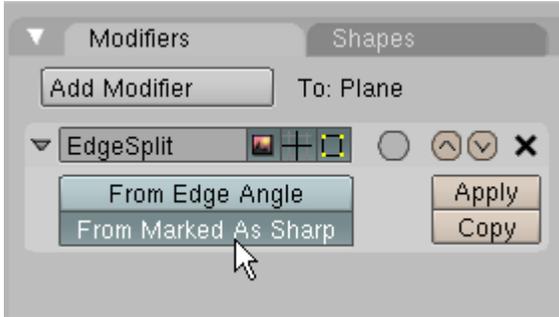
Your leaf should look something like shown below:



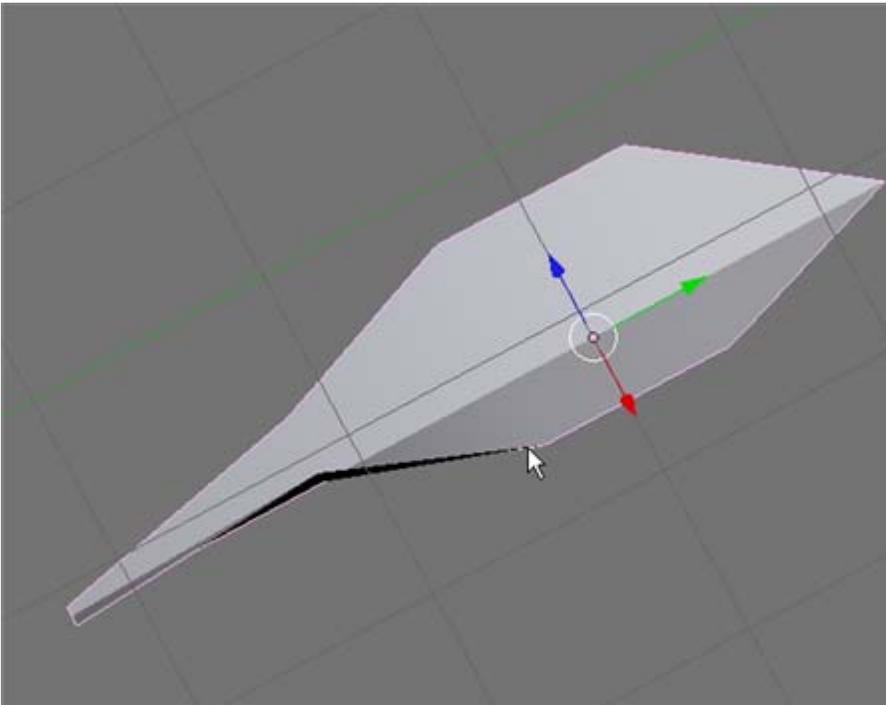
With the leaf object selected, add an Edge Split modifier in the modifier panel.



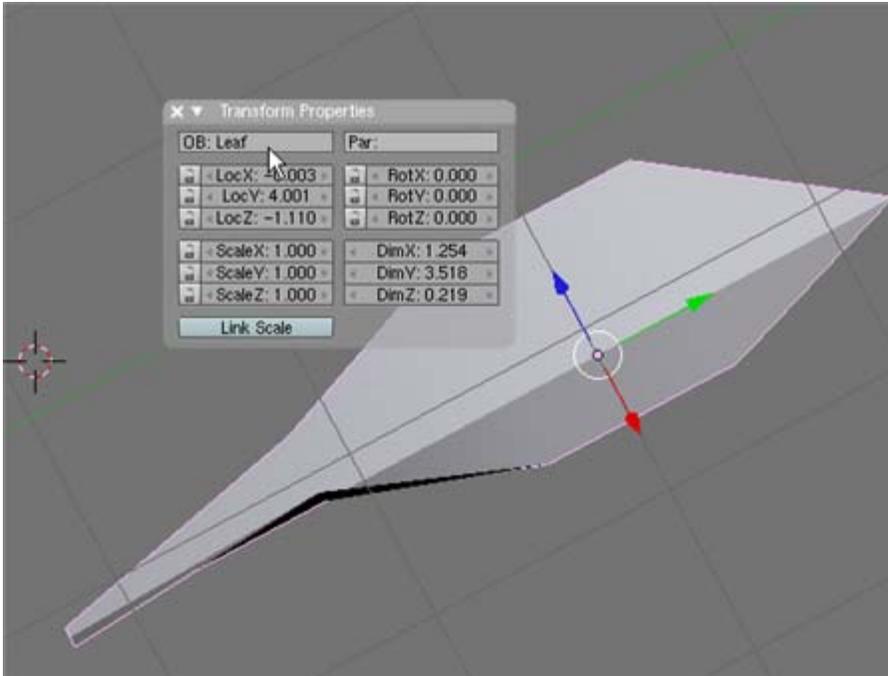
Turn off the “From Edge Angle” button leaving only the “From Marked as Sharp” button activated.



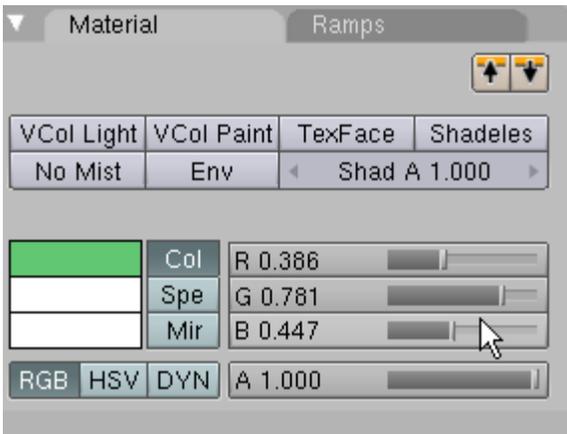
Your leaf object should now have a sharp edge in the center.



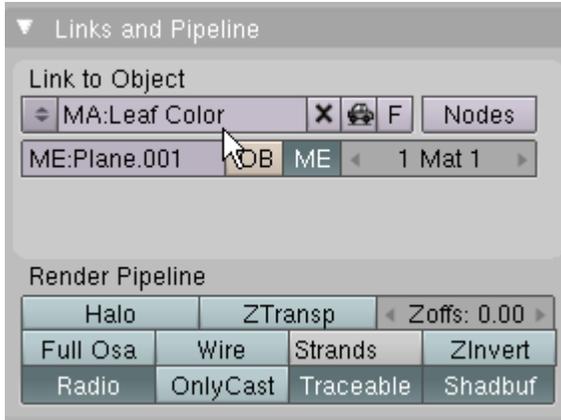
Press the NKEY and in the properties panel and name this object “Leaf”.



Go to the materials buttons and add a new material. Adjust the RGB sliders to make a green color.

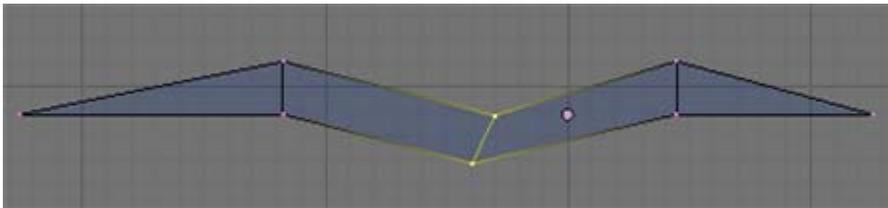


In the Links and Properties Panel name this material “Leaf Color”

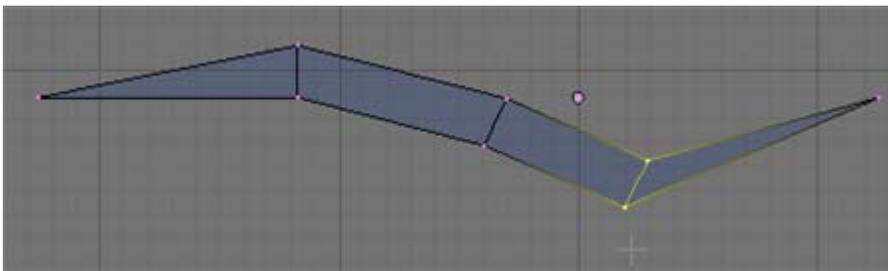


Since all of our tree leaves will be based off this single leaf you can at any time go back and adjust the color of all the leaves by adjusting the “Leaf Color” material. For instance you may want to use an orange or yellowish color for autumn leaves.

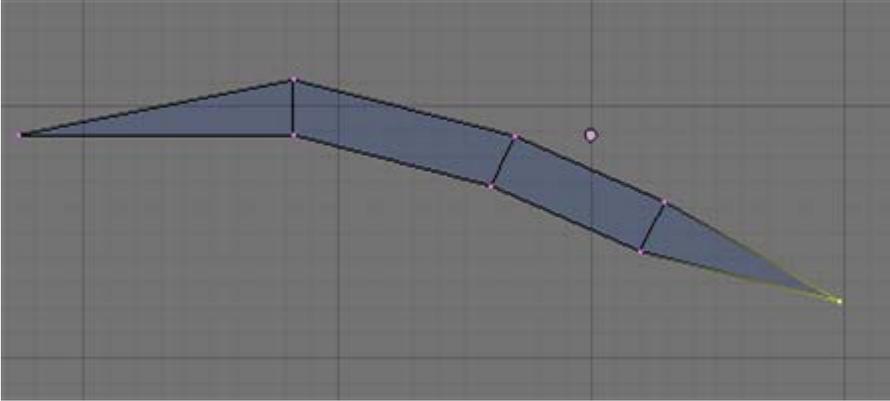
We need to give our leaf object a bit more shape. Switch to side view. ZKEY into wireframe. Box select the middle vertices, move them down a bit and rotate them a bit as shown below:



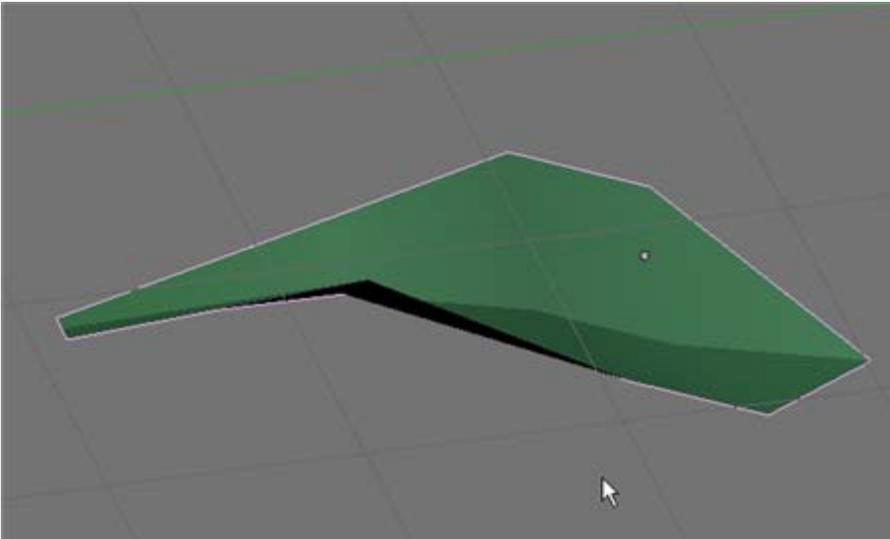
Box select the set of vertices to the right of center, move them down a bit and rotate them as shown below:



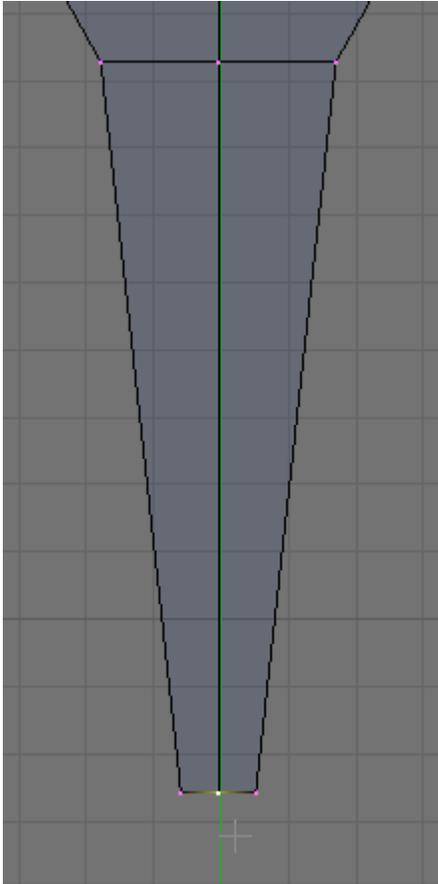
Box select the last set of vertices and move them down a bit as shown below:



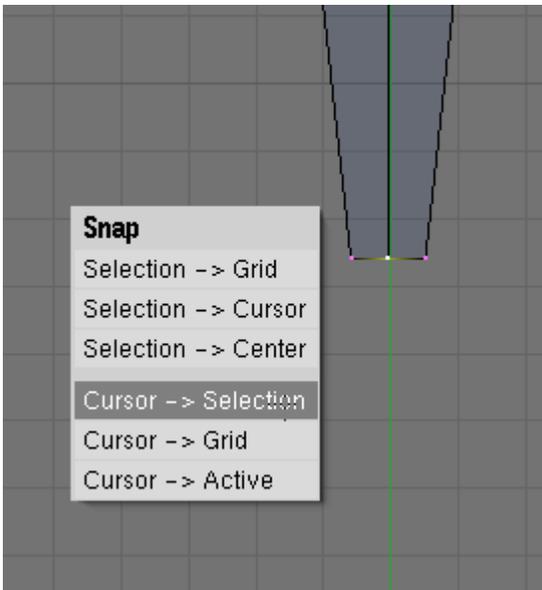
TAB out of edit mode, ZKEY into solid mode. The leaf object should now look something like shown below:



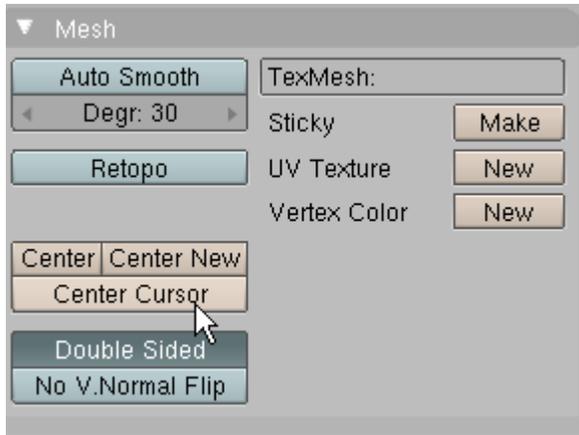
Switch to top view. ZKEY into wireframe and then TAB into edit mode. Select the bottom center vertex of the leaf object.



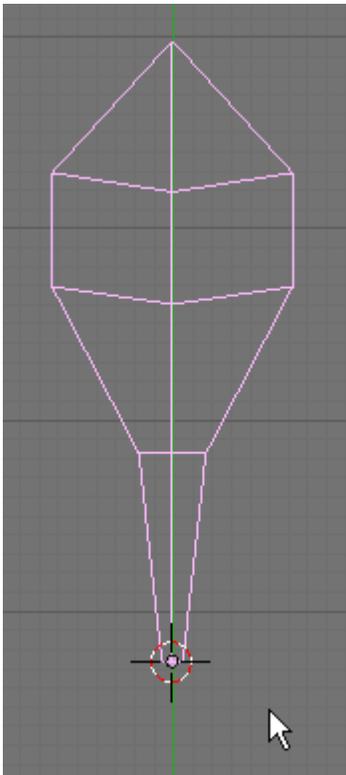
We need to make the leaf object's center pivot point correspond to this vertex so that we can later easily rotate the leaf in any direction. With this bottom vertex selected, press **SHIFT_S**. This brings up the snap menu. Choose "Cursor to Selection".



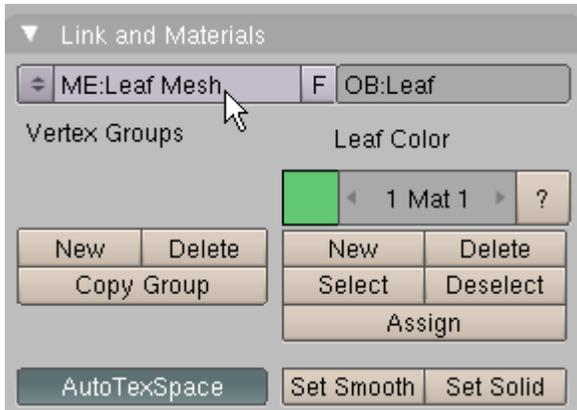
This places the 3D cursor at the same point in space as the selected vertex. Now press F9 (Editing Buttons) and TAB into Object Mode. Now select “Center Cursor” in the Mesh Panel. This moves the pivot point center of the leaf to the position of the 3D cursor (which is the same as the bottom center vertex).



Any rotation we now do to the leaf object will pivot around that point.



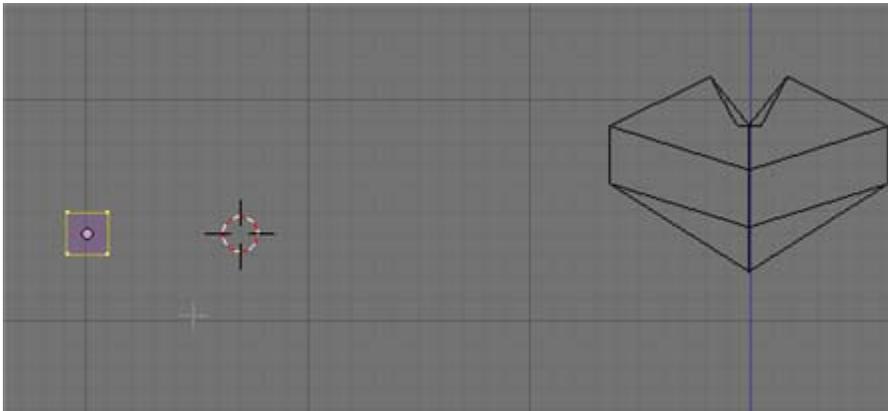
Finally, Change the name of the mesh in the Link and Materials panel to “Leaf Mesh”. This will allow us later to alter the mesh structure of leaves on an existing tree by simply replacing the mesh.



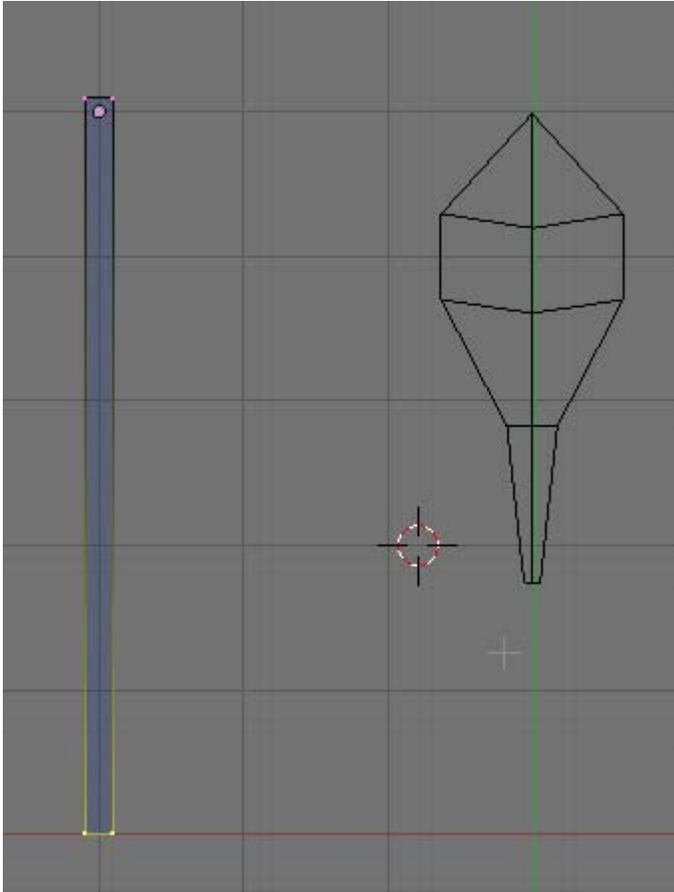
Save your Blender file as Tree01.blend.

Twig:

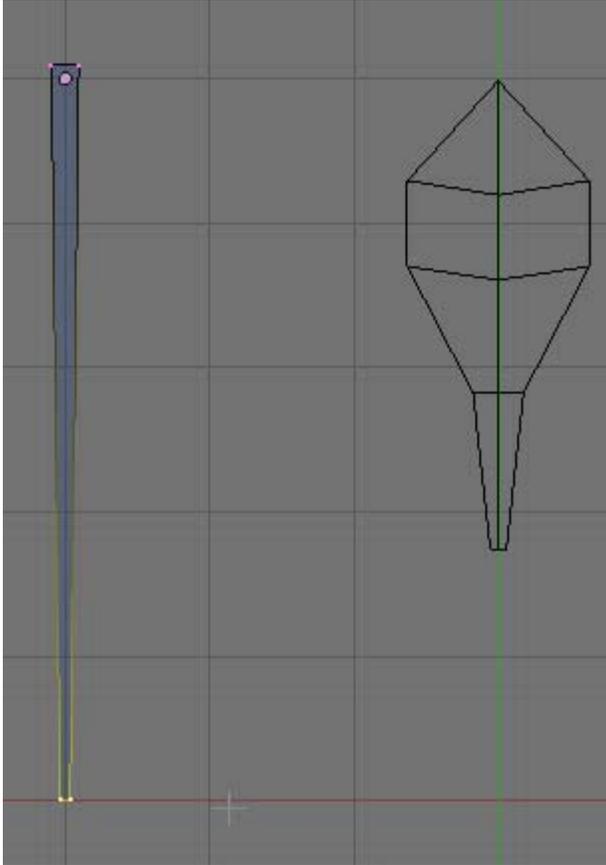
Switch to front view. Add a cube object and scale it down as shown below:



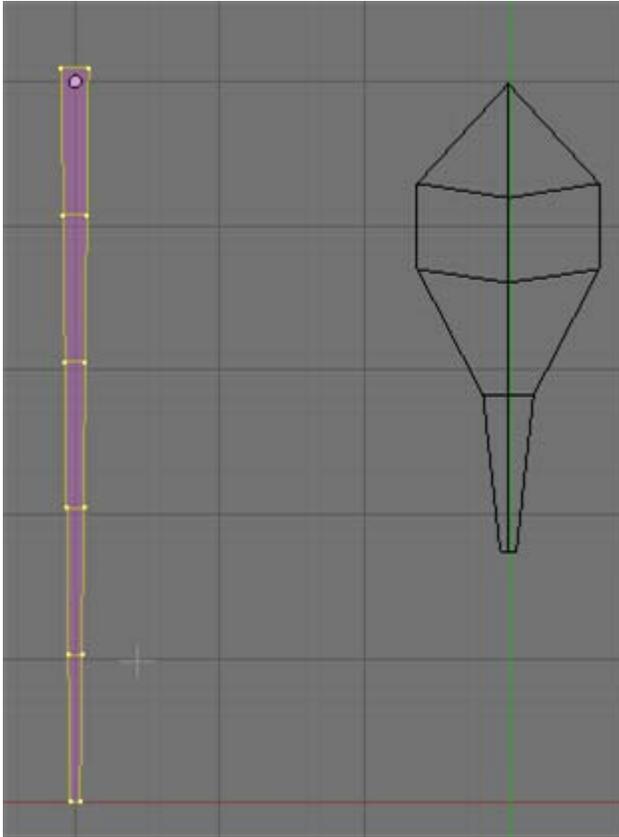
Switch to top view. Make sure you are in wireframe mode. Box select the bottom 4 vertices and move them down along the Y axis as shown below:



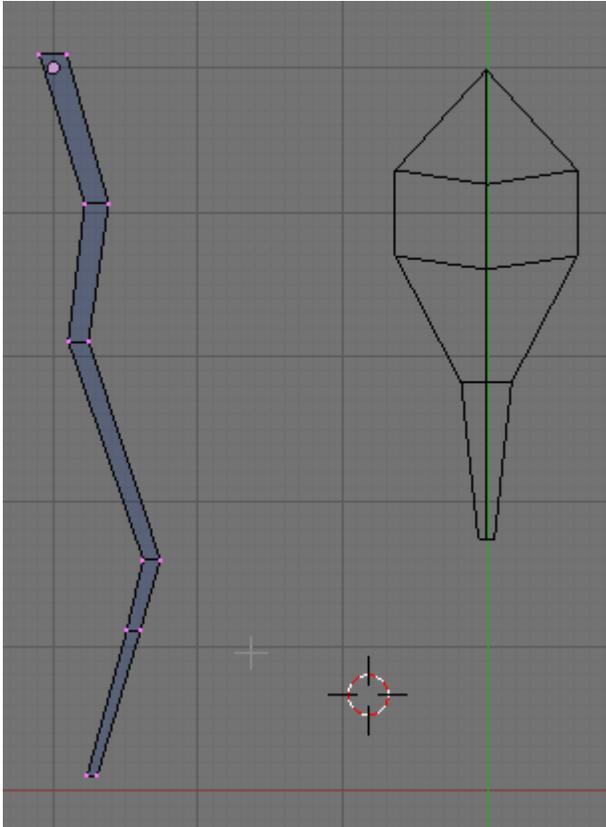
Scale the 4 vertices down as shown below:



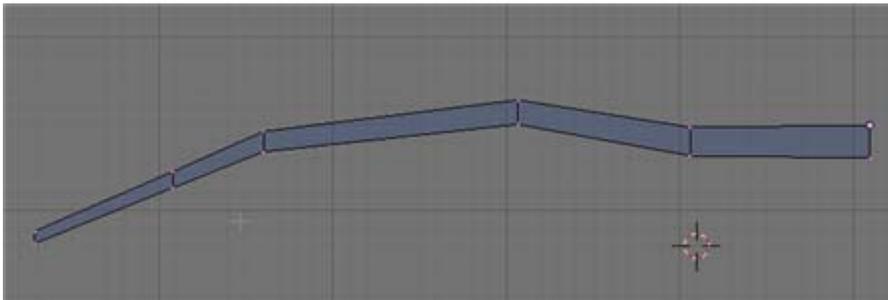
Select all of the vertices and press the KKEY. Choose “Multicut” (4 cuts). When the cursor turns into a knife icon click and drag horizontally across the cube then press enter. The cube should bow have 4 segments as shown below:



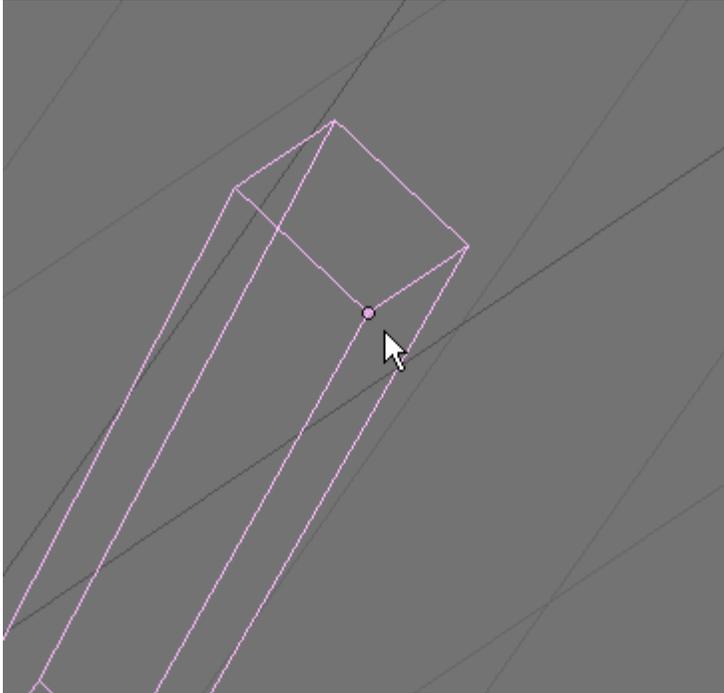
Box select each segment and move it to create an angled twig object as shown below:



Switch to side view and as we did with the leaf, manually adjust the vertices to add a bit of shape to the twig as shown below:



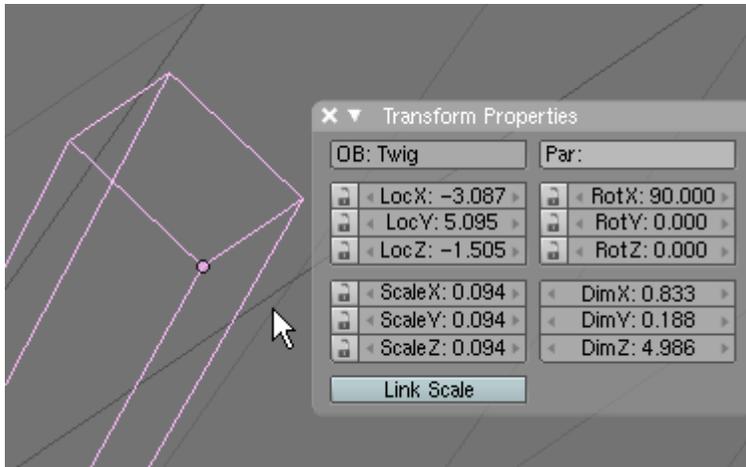
Use the same method as we did on the leaf to place the twig's pivot point center to one of the 4 thick end vertices.



Add a new material to the twig. Set the RGB sliders to a dark brown color. Name this material “Twig Brown”.



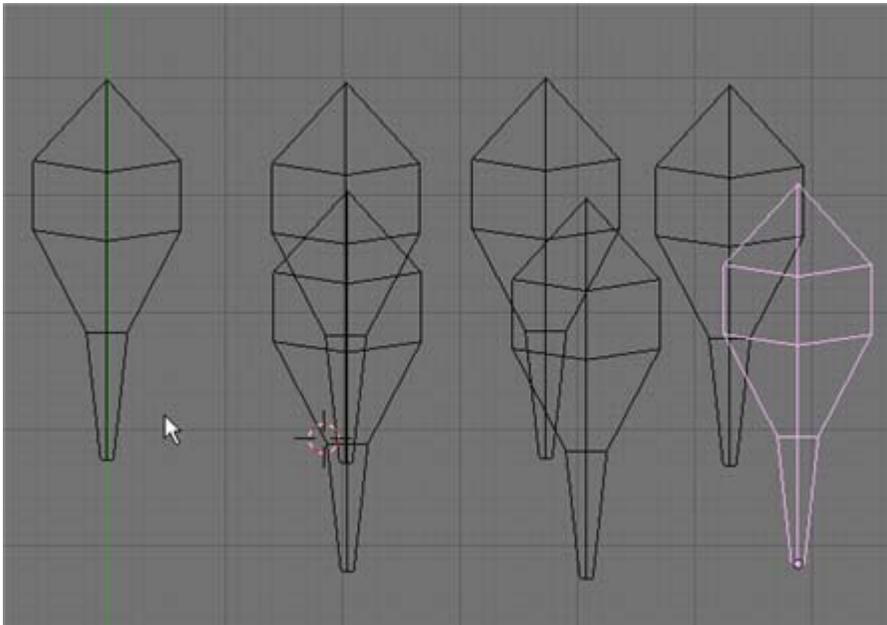
While in object mode press the NKEY (properties Panel) and name this object Twig.



Save your Blender file as Tree02.blend

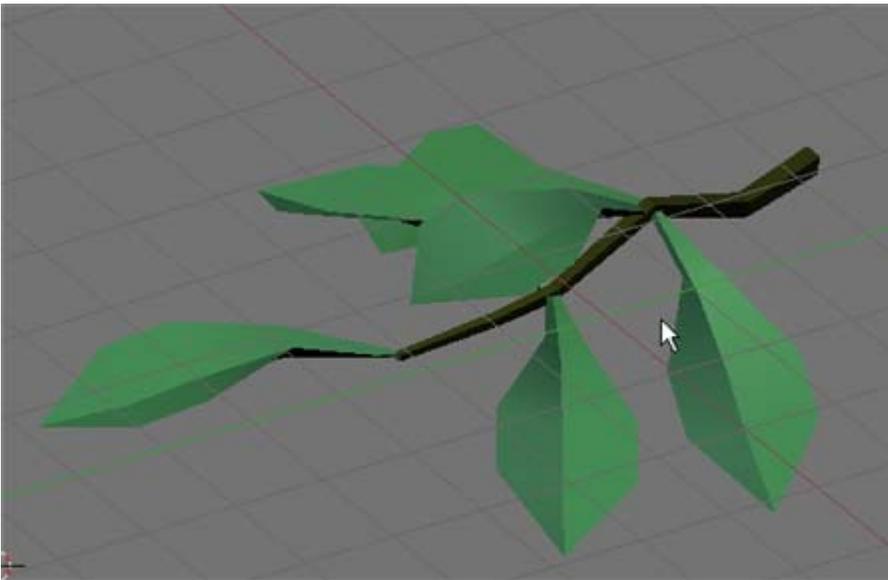
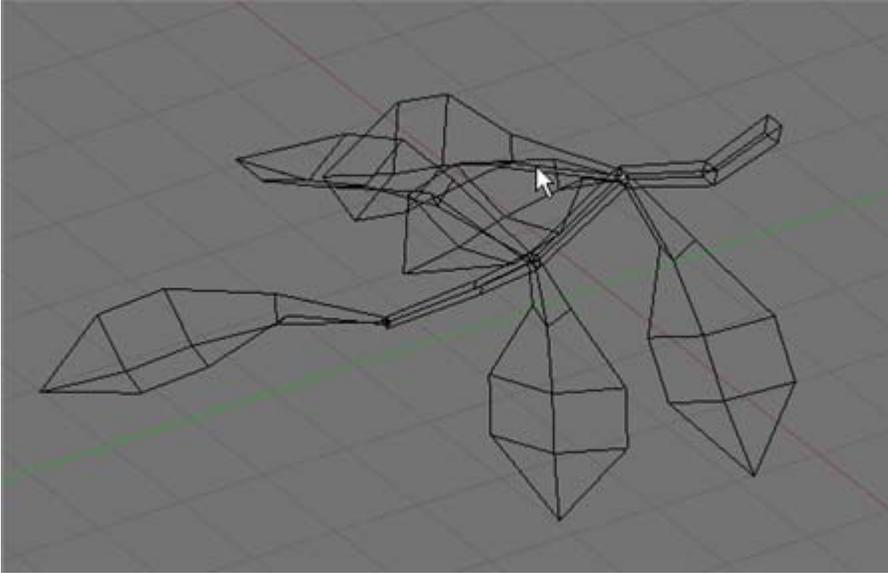
Twig/Leaf Assembly:

In object mode, select the leaf object and press ALT-D and drag the linked duplicate copy to the side. Re-select the original leaf, press ALT-D and make another copy. Repeat this process (always re-selecting the original leaf object), pressing ALT-D (Linked duplicate) and moving it to the side 6 times.

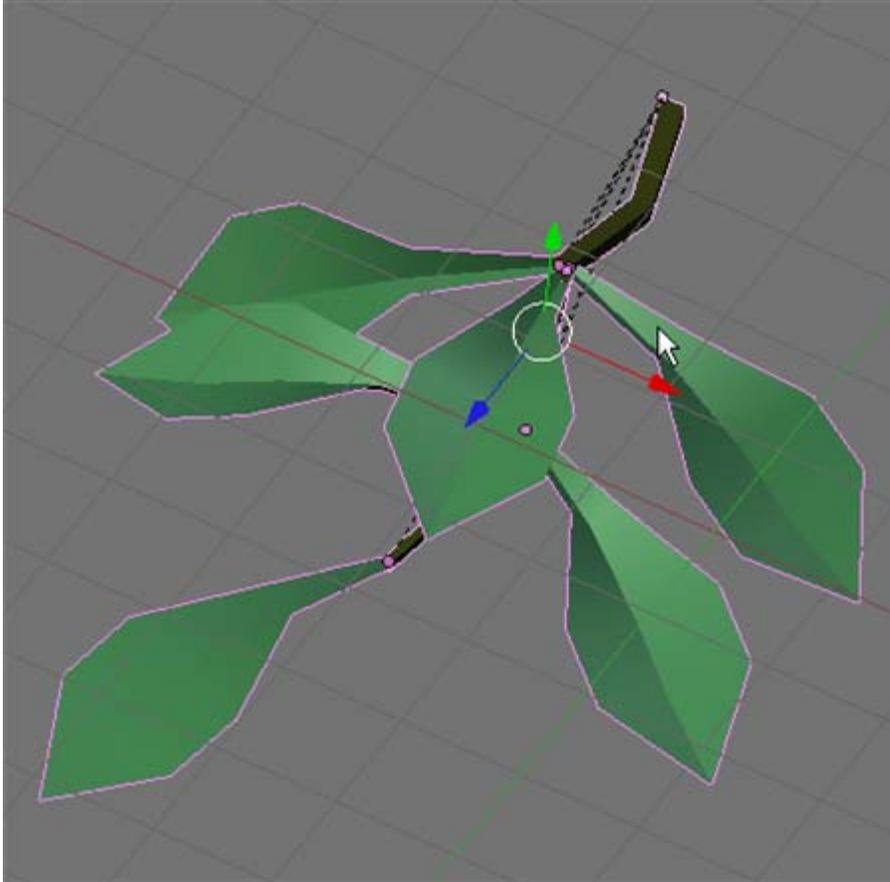


Each of our linked duplicate leaves are automatically named - "Leaf.001" to "Leaf.006". Any change we make to the original Leaf object will be reflected in the 6 linked duplicates.

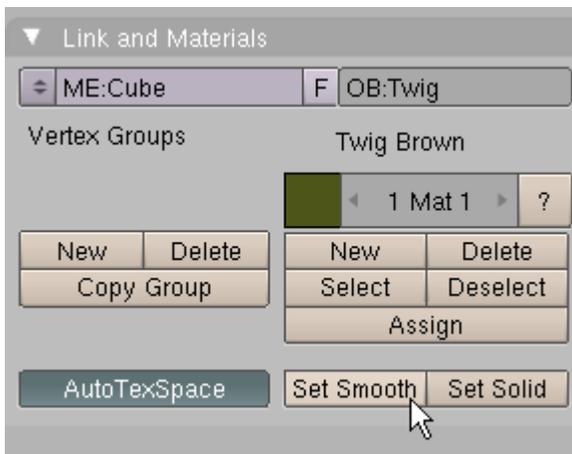
Arrange the 6 linked duplicate leaves around the twig. You can rotate/move any of the leaves to compose the twig. Make sure you do **not** use the original leaf object. When you are done, your twig/leaf assembly should look something like below:



Select each of the leaf objects in succession adding it to the selection. Finally add the Twig object to the selection (last) then press CTRL-P and make the Twig object a parent to all of the leaves.



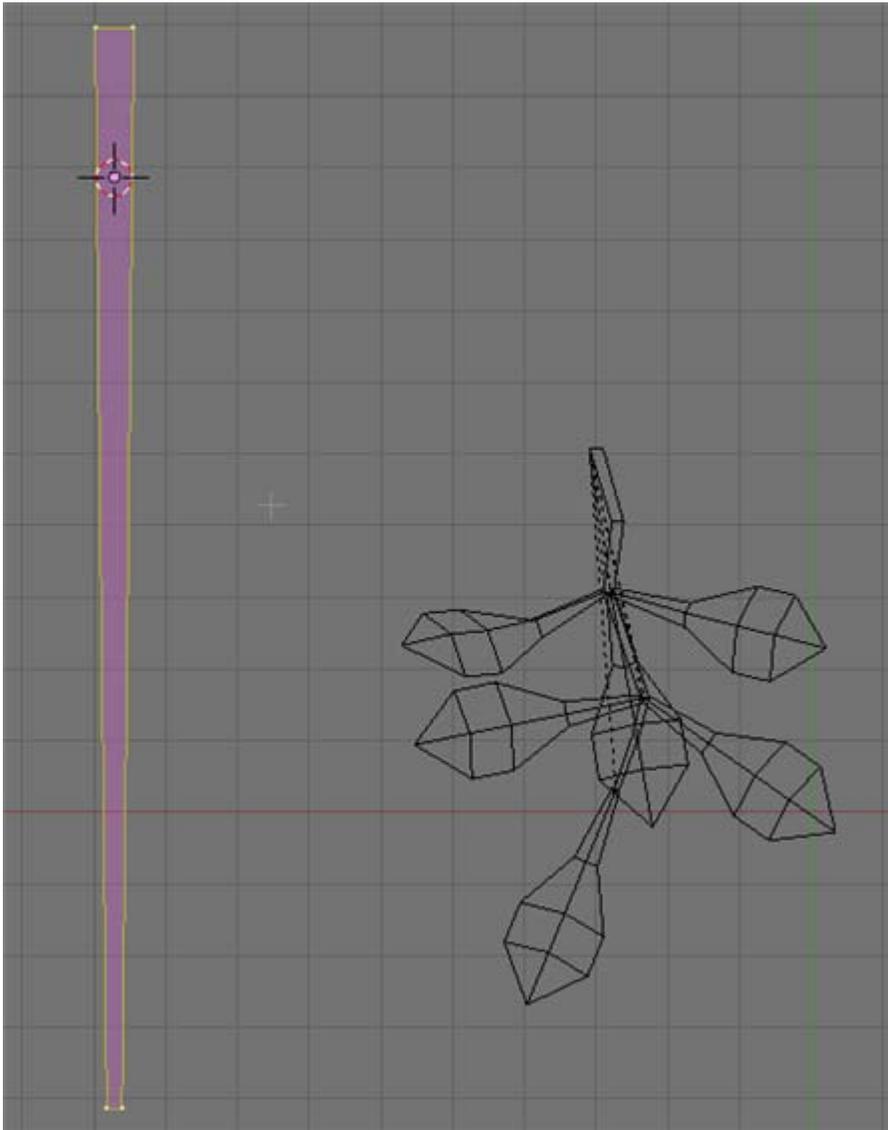
Select the twig object itself in object mode and then press “set smooth” in the Link and Materials Panel.



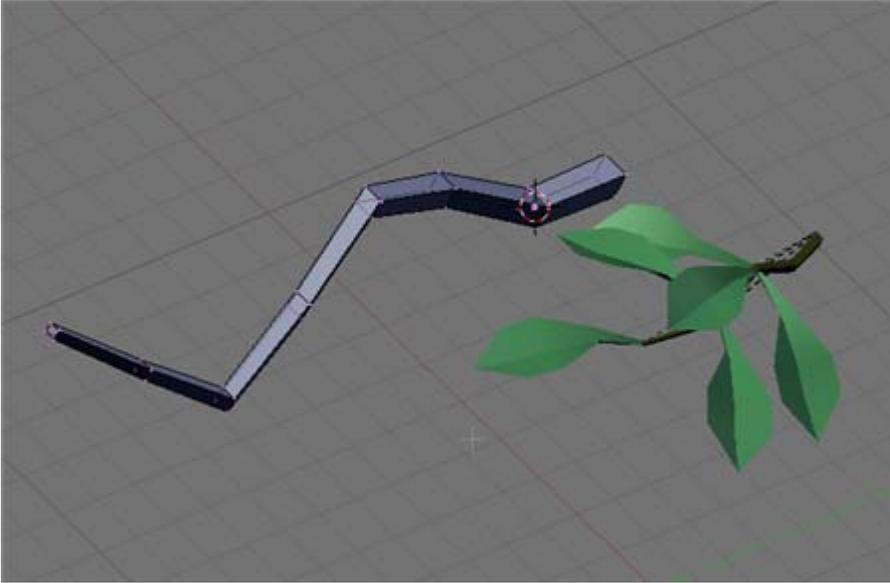
Save your Blender file as Tree03.blend

Sprig:

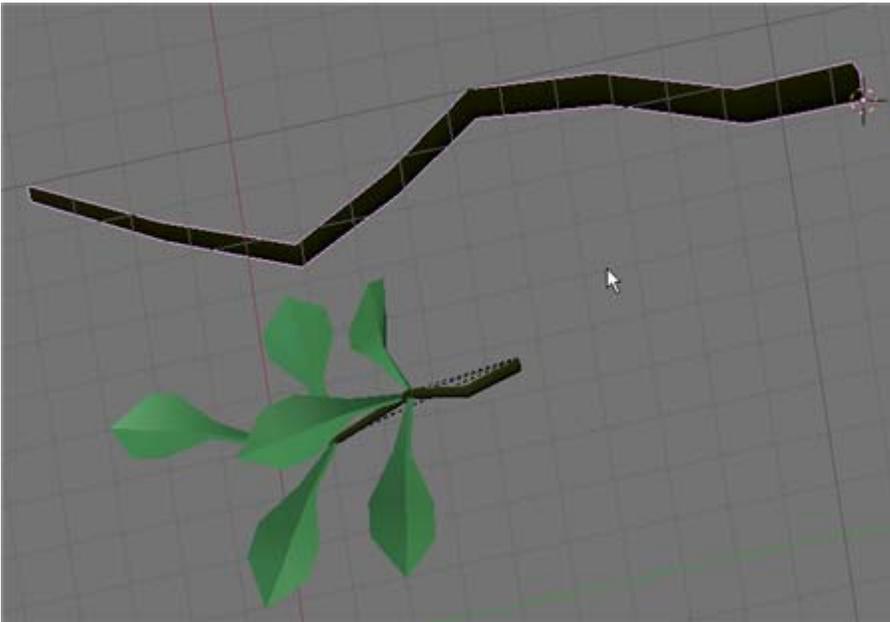
Add a cube in top view and scale it a bit larger than the twig cube. Extend the bottom vertices and scale them so that the object is about 3 times longer than the twig object.



As we did with the twig, use the KKEY and multicut (6 cuts) and manually shape the sprig object in the top and side views.



Name this object “Sprig”. Add a dark brown colored material to it and name the material “Sprig Brown”. Set the center pivot point to one of the 4 large end vertices. Finally select the sprig object in object mode and “Set Smooth” in the Links and Materials Panel.

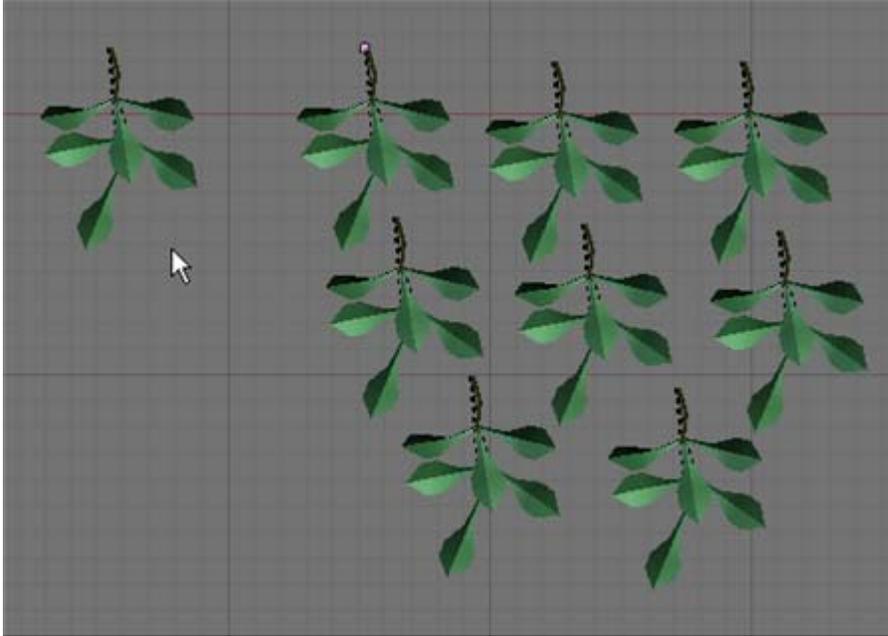


Save your blender file as Tree04.blend

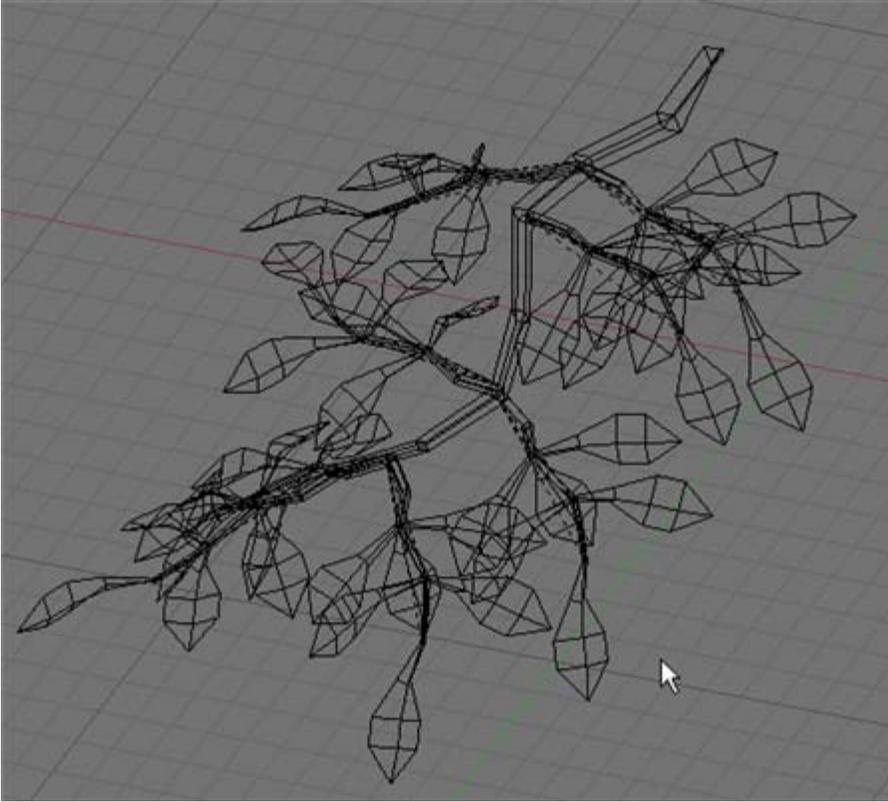
Sprig / Twig Assembly:

In object mode, box select the twig and leaves objects and press ALT-D and drag the linked duplicate copy to the side. Press the AKEY so nothing is selected. Box select the original twig and leaves, press ALT-D and make another copy. Repeat this process

(always re-selecting the original twig and leaves objects), pressing ALT-D (Linked duplicate) and moving it to the side 8 times. (Note: you may want more or fewer linked duplicate Twig/Leaves depending on the size and structure of your Sprig object).



Arrange the 8 linked duplicate twig/leaves around the sprig object (Remember since the twig is a parent to the leaves you can just move or rotate the twig object and the leaves will follow). You can rotate/move any of the twig/leaves to compose the sprig. Make sure you do **not** use the original twig/leaf objects. When you are done, your sprig/twig assembly should look something like below:

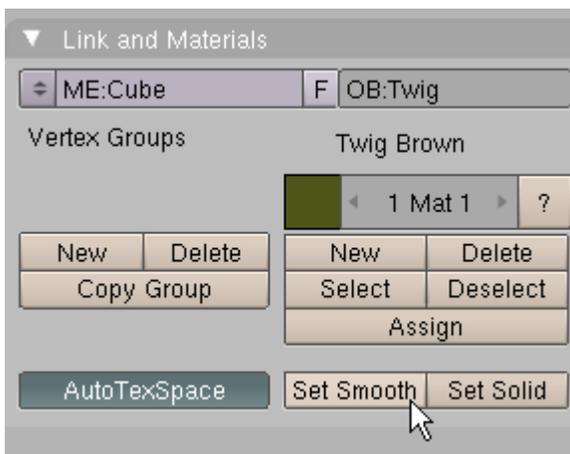


Select each of the Twig objects (not the leaves) in succession adding it to the selection. Finally add the Sprig object to the selection (last) then press CTRL-P and make the Sprig

object a parent to all of the Twig objects. You can now move/rotate the Sprig object and the Twig and Leaves will follow.



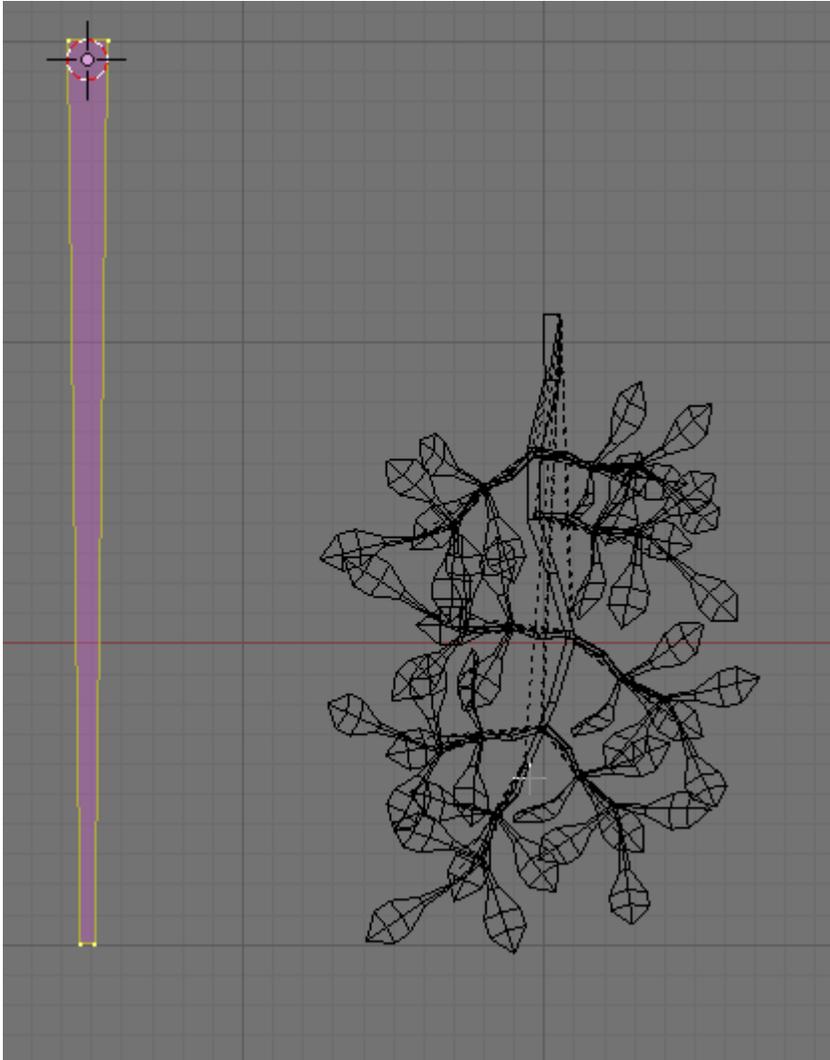
Select the Sprig object itself in object mode and then press “set smooth” in the Link and Materials Panel.



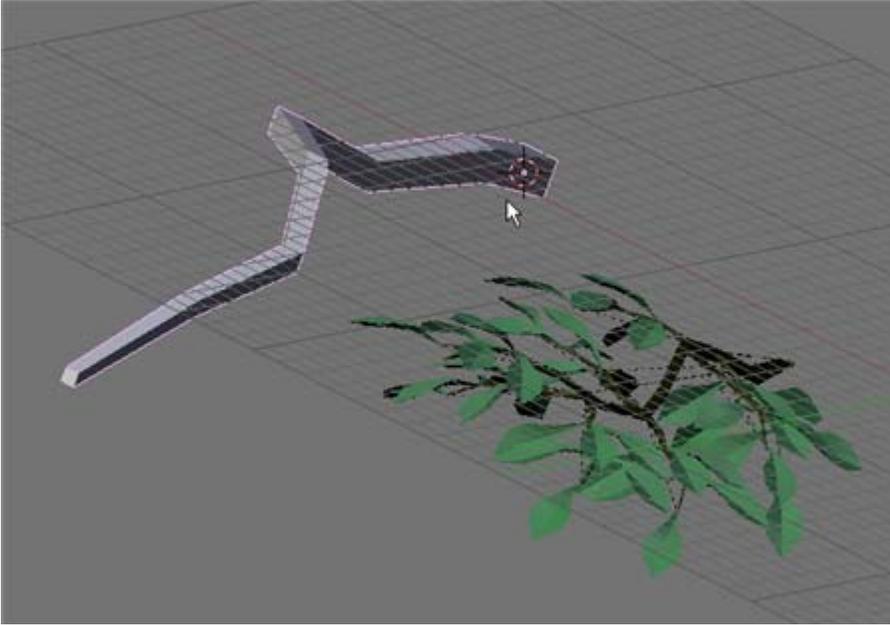
Save your Blender file as Tree05.blend

Branch:

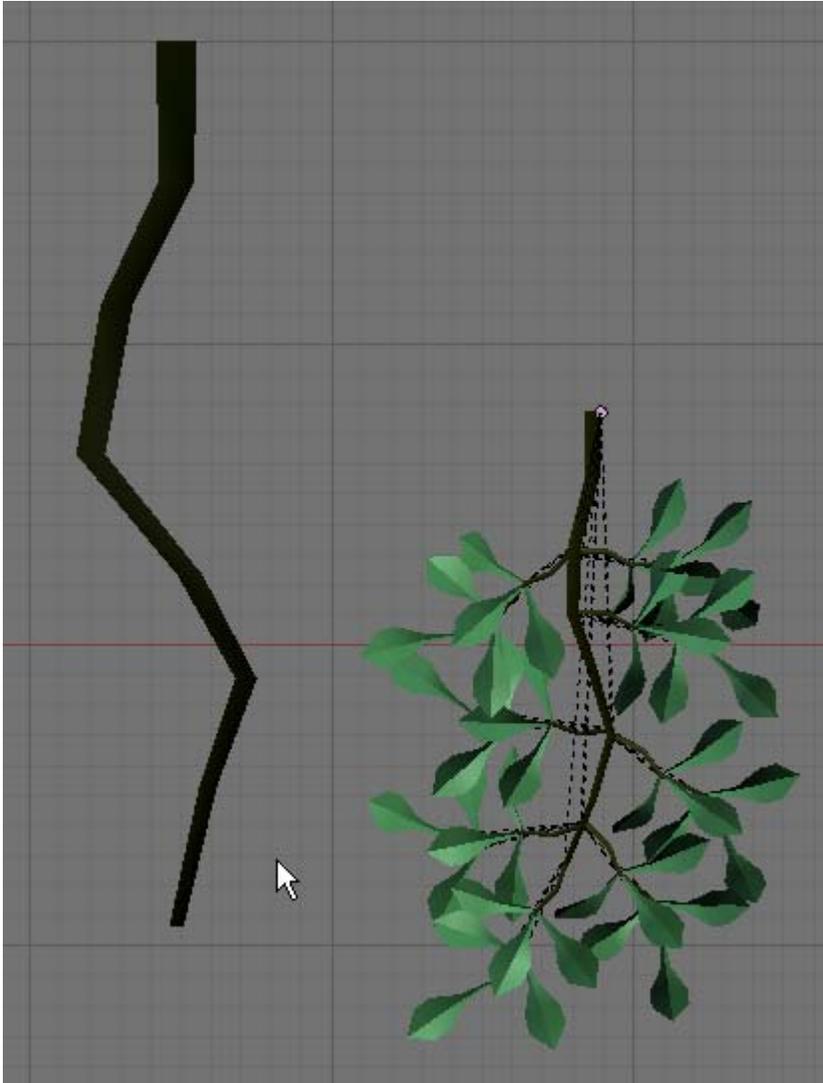
Add a cube in top view and scale it a bit larger than the Sprig cube. Extend the bottom vertices and scale them so that the object is about 3 times longer than the Sprig object.



As we did with the twig and the sprig, use the **KKEY** and multicut (6 cuts) and manually shape the sprig object in the top and side views.



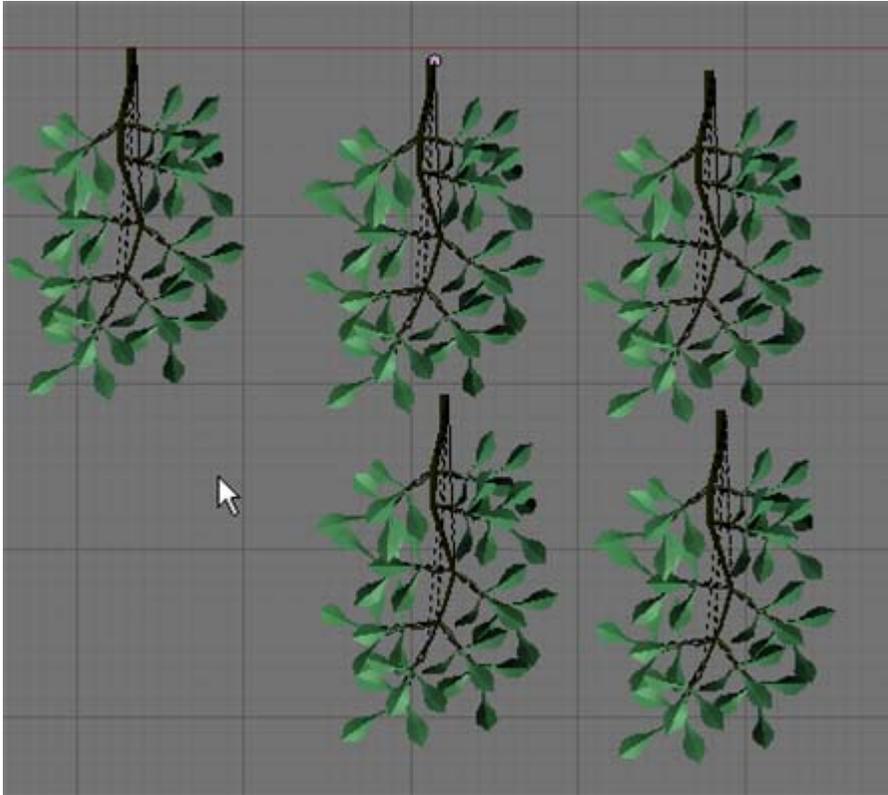
Name this object “Branch”. Add a dark brown colored material to it and name the material “Branch Brown”. Set the center pivot point to one of the 4 large end vertices. Finally select the Branch object in object mode and “Set Smooth” in the Links and Materials Panel.



Save your blender file as Tree06.blend

Branch / Sprig Assembly:

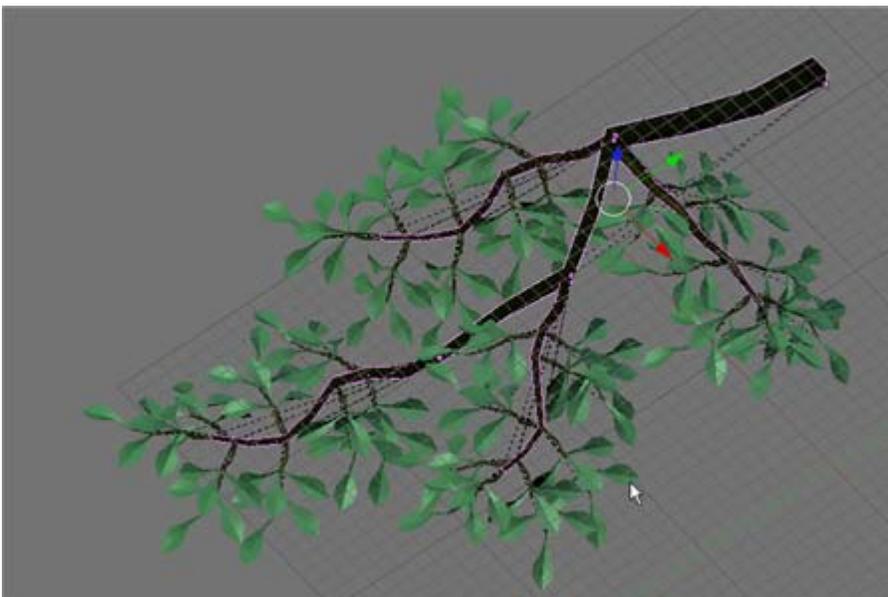
In object mode, box select the Sprig/Twig and leaves objects and press ALT-D and drag the linked duplicate copy to the side. Press the AKEY so nothing is selected. Box select the original Sprig/Twig and leaves, press ALT-D and make another copy. Repeat this process (always re-selecting the original sprig/twig and leaves objects), pressing ALT-D (Linked duplicate) and moving it to the side 4 times. (Note: you may want more or fewer linked duplicate Sprig/Twig and leaves objects depending on the size and structure of your Branch object).



Arrange the 4 linked duplicate sprig/twig/leaves around the Branch object (Remember since the sprig is a parent to the twig/leaves you can just move or rotate the sprig object and the twig/leaves will follow). You can rotate/move any of the sprig/twig/leaves to compose the Branch. Make sure you do **not** use the original sprig/twig/leaf objects. When you are done, your Branch assembly should look something like below:



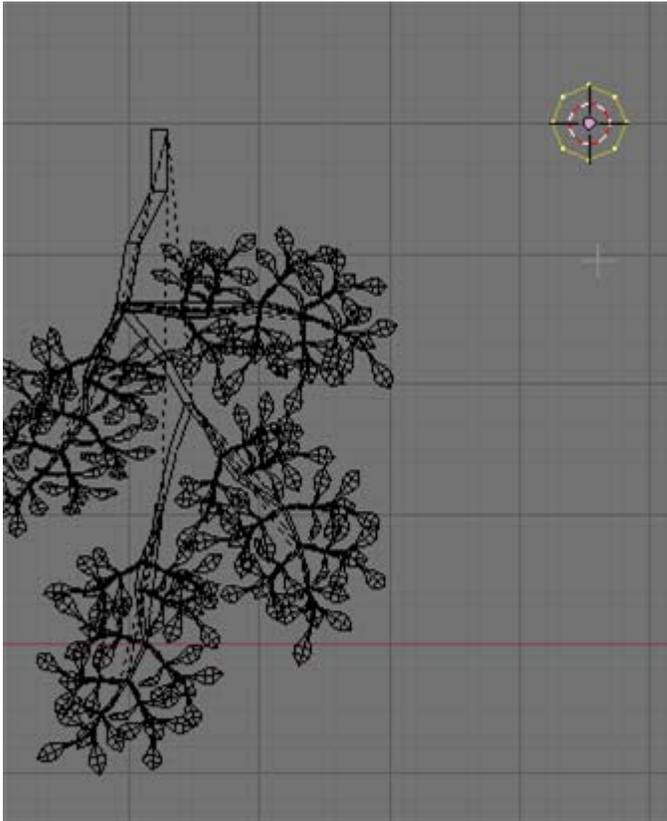
Select each of the Sprig objects (not the Twigs or Leaves) in succession adding it to the selection. Finally add the Branch object to the selection (last) then press CTRL-P and make the Branch object a parent to all of the Sprig objects. You can now move/rotate the Branch object and the Sprig, Twig and Leaves will follow.



Save your Blender file as Tree07.blend

Tree Arm:

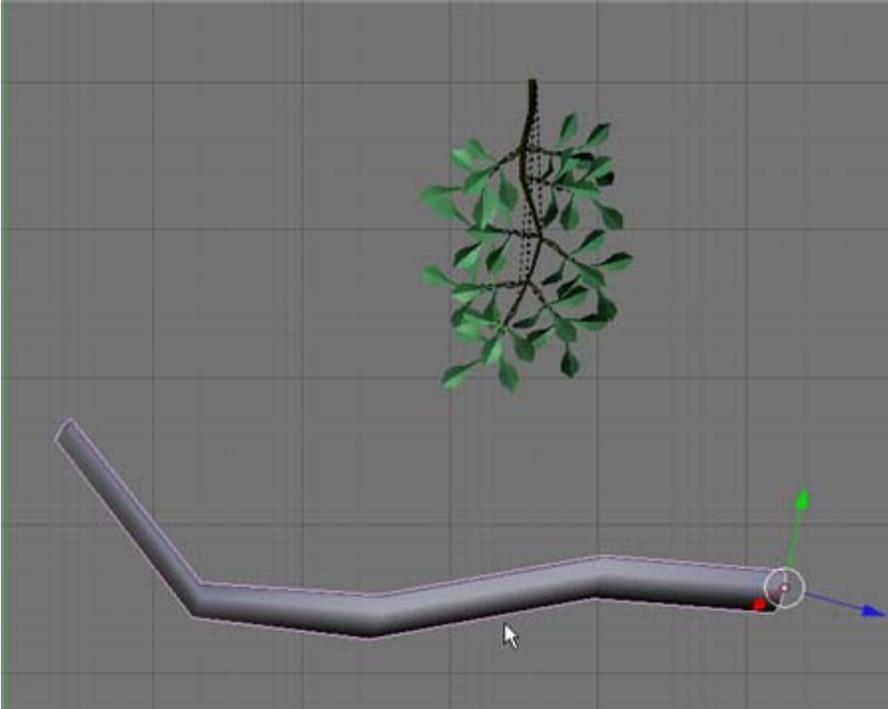
Add an 8-sided circle in top view and scale it a bit larger than the Branch cube.



Switch to front view. Extrude the circle edges and scale them so that the object is about 2.5 times longer than the Branch object.

As we did with the Branch, Sprig and Twig, use the KKEY and multicut (3 cuts) and manually shape the Tree Arm object in the front and side views.

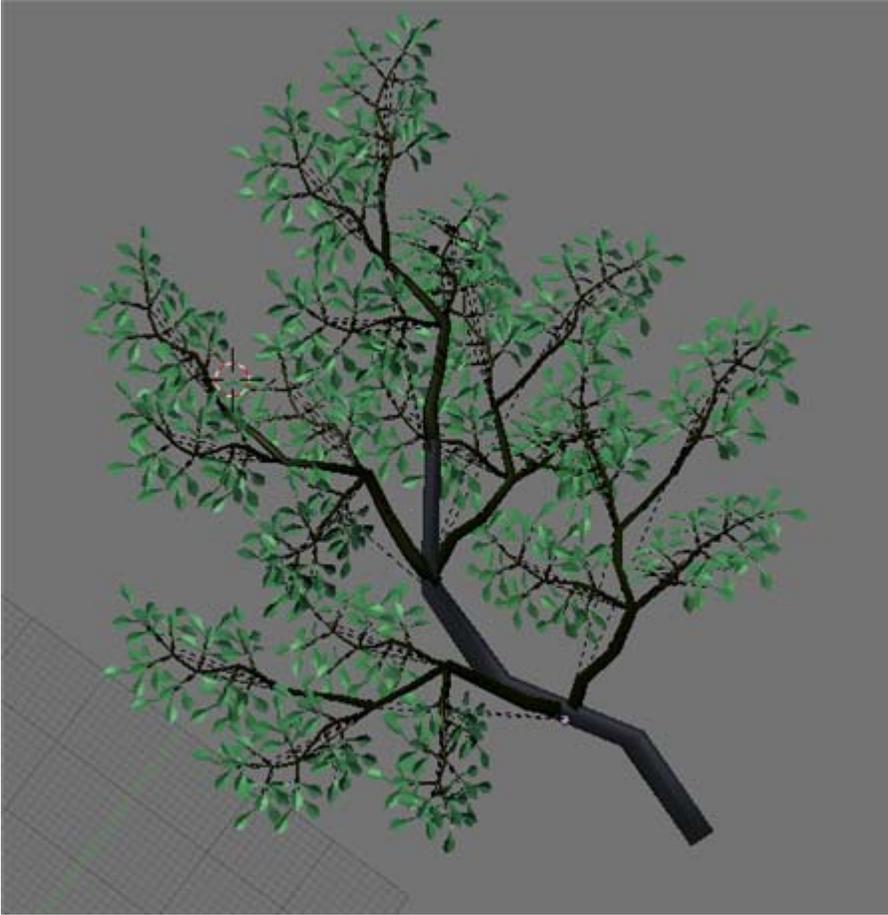
Name this object “Tree Arm”. Add a dark grey colored material to it and name the material “Bark”. Set the center pivot point to one of the 8 large end vertices. In edit mode, select all of the Tree Arm vertices and press CTRL-N and calculate the normals outside. This will prevent dark streaks in the shading. Finally select the Tree Arm object in object mode and “Set Smooth” in the Links and Materials Panel.



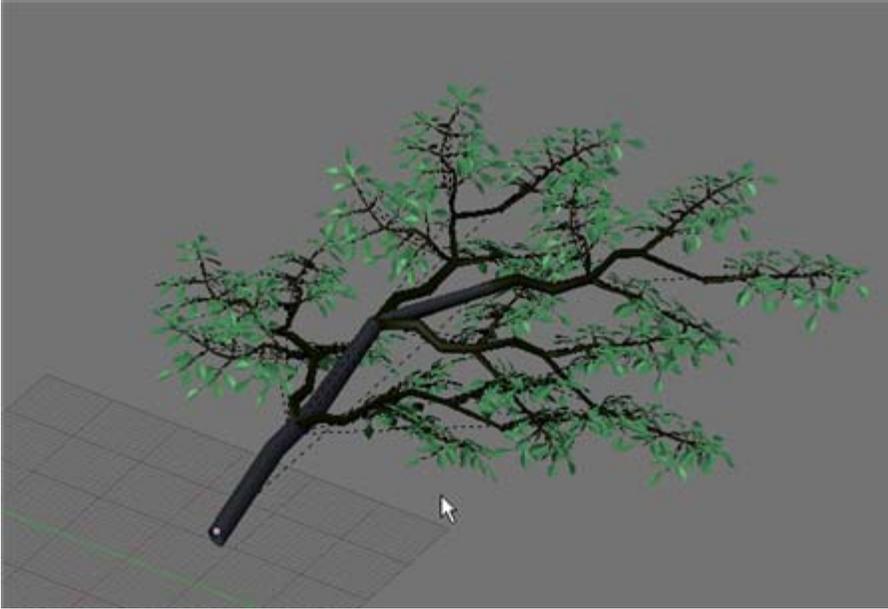
Save your Blender file as Tree08.blend

Tree Arm Branch Assembly:

In object mode, box select the Branch/Sprig/Twig and leaves objects and press ALT-D and drag the linked duplicate copy to the side. Press the AKEY so nothing is selected. Box select the original Branch/Sprig/Twig and leaves, press ALT-D and make another copy. Repeat this process (always re-selecting the original branch/sprig/twig and leaves objects), pressing ALT-D (Linked duplicate) and moving it to the side. Make as many linked duplicate copies as you need to fill out your Tree Arm object. Remember to look at it from all sides and rotate the branch/sprig/trig/leaf objects to suit your design. My Tree Am as shown below used 5 units. Remember to save the original unit for further duplication if needed.



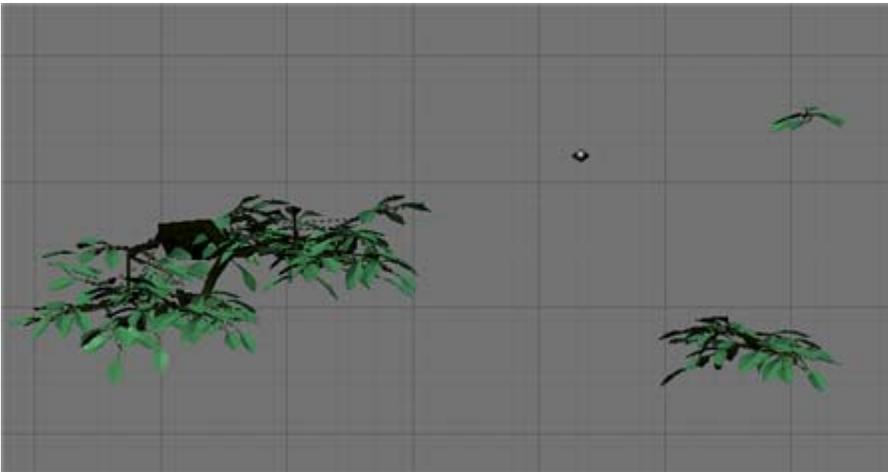
Select each of the Branch objects (not the Sprigs, Twigs or Leaves) in succession adding it to the selection. Finally add the Tree Arm object to the selection (last) then press CTRL-P and make the Tree Arm object a parent to all of the Branch objects. You can now move/rotate the Tree Arm object and the Branch, Sprig, Twig and Leaves will follow.



Save your Blender file as Tree09.blend

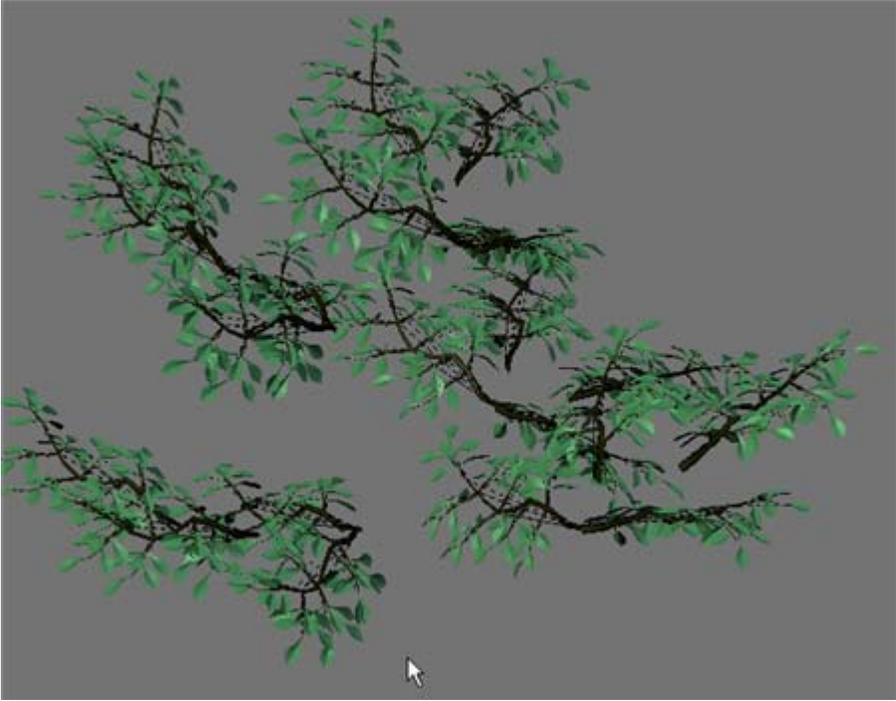
Tree Assembly:

Place the original Leaf, Twig, Sprig and Branch objects on layer 20 for safekeeping.

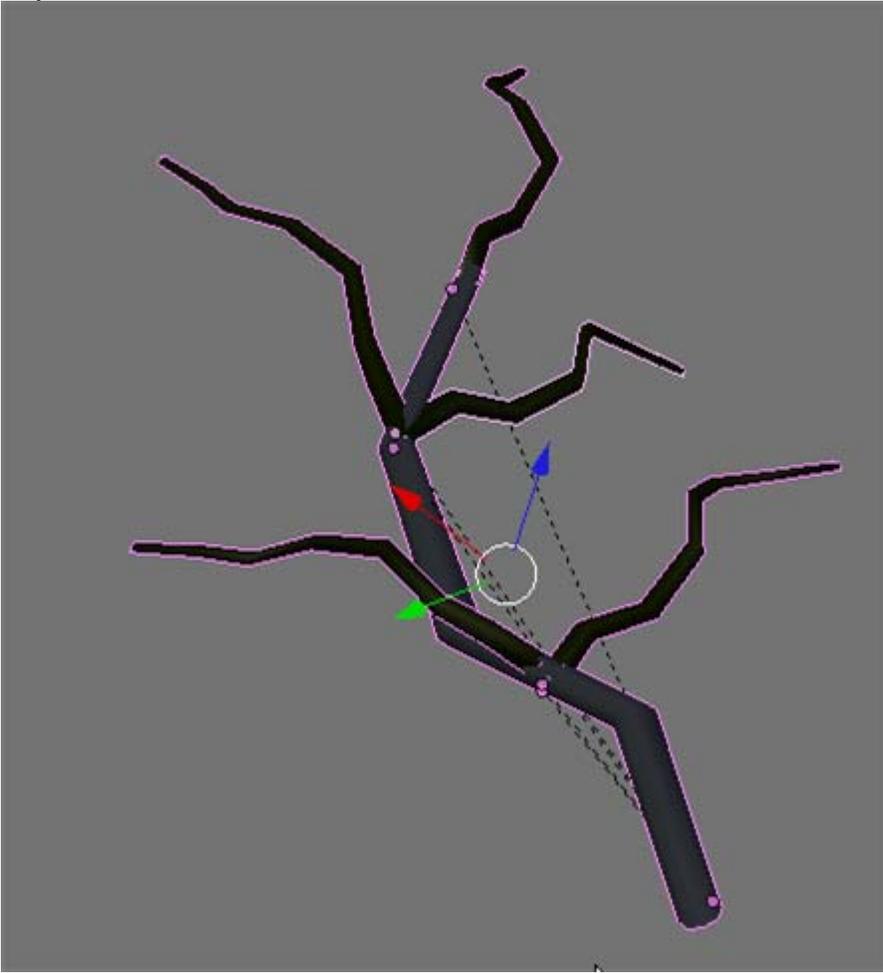


Place the Leaves, twigs and sprigs that make up the Tree Arm object on layer 1. Place the Tree Arm and Branch objects on layer 2. This will make it much easier to assembly our tree.

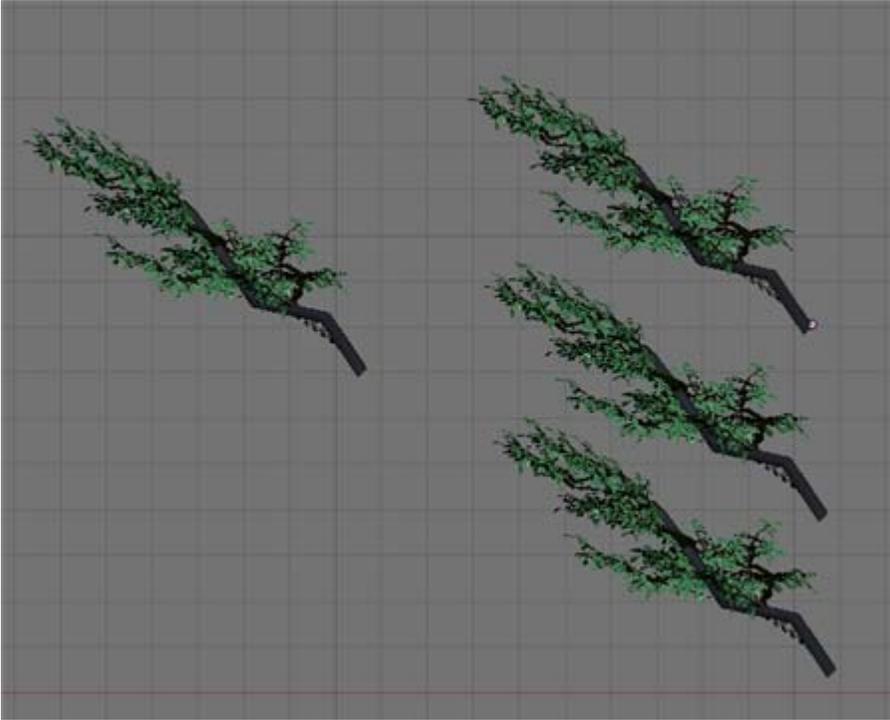
Layer 1:



Layer 2:



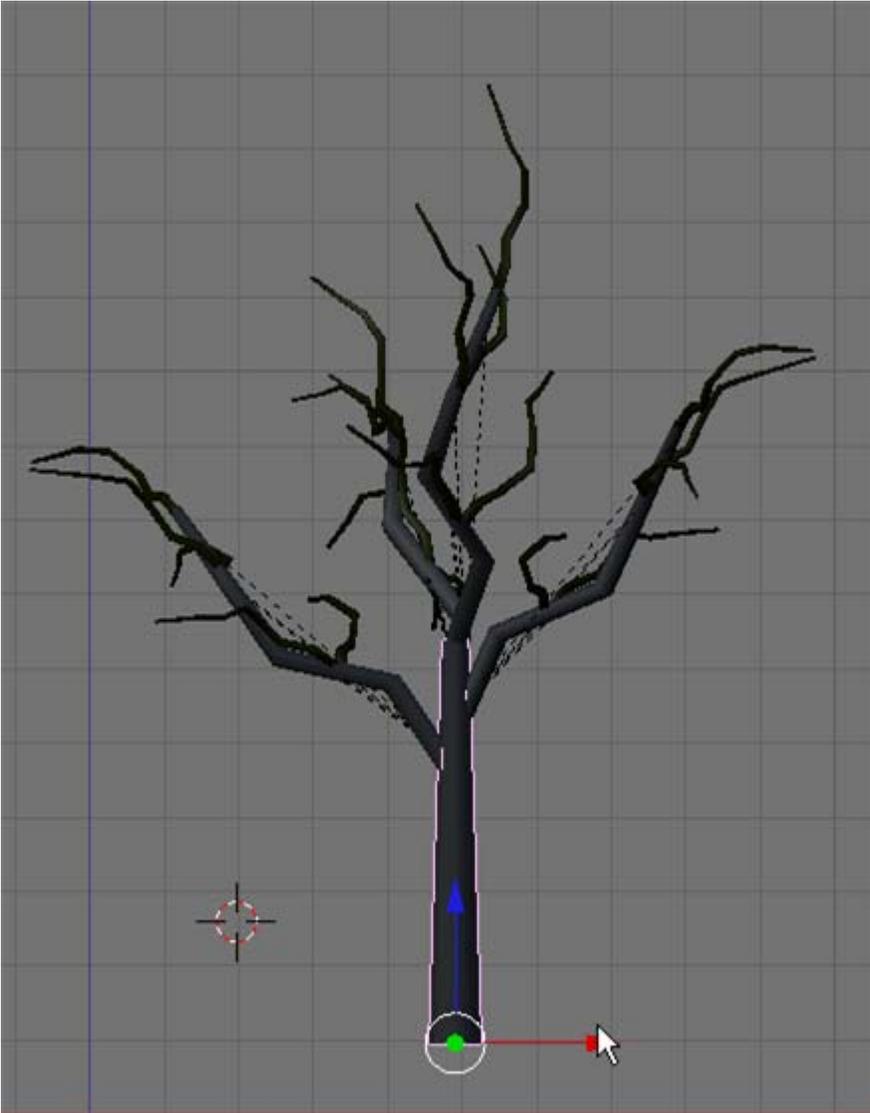
Turn on layers 1 and 2. Select the complete Tree Arm assembly (including branches/sprigs/twigs and leaves). Press ALT-D and make a linked duplicate copy and set it to the side. Re-select the complete Tree Arm assembly and press ALT-D and make another linked duplicate copy. Repeat making 3 linked duplicate copies.



Turn off layer 1 leaving only layer 2. Using front, side and top view arrange the 4 Tree Arm objects staggered in height and in a circular fashion as shown below. Note: we are using the original Tree Arm object as part of the assembly.



In top view, find the center of the grouping and add a circle object with 8 vertices. Scale it a bit larger than the widest part of the Tree Arm objects. In front view position then extrude the circle edges up along the Z axis. Scale down the top vertices a bit. Name this object “Trunk”; add the already created “Bark” material to it and “Set Smooth”.



Note: you may have to adjust the scale of the top and bottom vertices to suit the scale of your Tree Arm objects.

Set the center pivot point to one of the 8 large end vertices. In edit mode, select all of the Trunk vertices and press CTRL-N and calculate the normals outside. This will prevent dark streaks in the shading.

Turn on Layer 1 (along with layer 2). Make rotation adjustments to any of the elements until you are satisfied with your tree shape.



Select each of the Tree Arm object in succession adding it to the selection. Finally add the Trunk object to the selection (last) then press CTRL-P and make the Trunk object a parent to all of the Tree Arm objects. You can now move/rotate the Trunk object and the Tree Arm, Branch, Sprig, Twig and Leaves will follow.



Save your Blender file as DeciduousTreeComplete.blend A copy of this file is located in the DeciduousTress.zip file on our course site.

Variations:

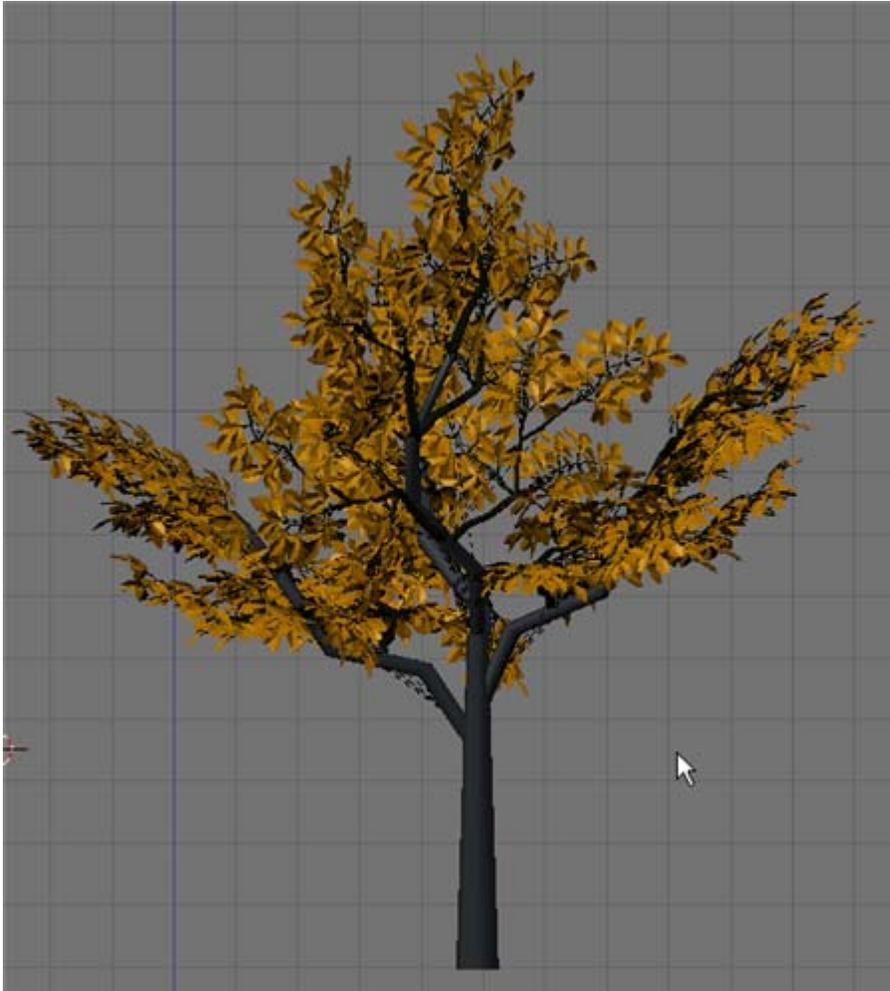
Turn on layer 20 and select the original leaf object. Move the leaf object to layer 2. Turn on layer 1 and 2.

Because we used “ALT-D” (Linked duplicate copies) we can adjust the original leaf mesh and all of the tree leaves will follow in kind. Select the original leaf object. TAB into edit mode. Press the AKEY to select all of the vertices. Press the SKEY and slowly scale the leaf up a bit. Notice that the tree leaves are scaled as well.



You can restructure the entire mesh making different types of leaves to suit your tree,

With the original leaf selected in object mode, go to the material buttons and change the “Leaf” material to a reddish-orange for autumn leaves.



Select the Trunk object and go to the material buttons. Change the “Bark” material by adding an image texture. Use the bark.jpg image (located in the DeciduousTreeComplete.zip file).



With layers 1 and 2 active, select the original leaf object. Tab into edit mode and make sure all of the vertices are selected. Scale them down until you can no longer see the leaves. You now have your tree in winter.



Scale the leaf object up just slightly. You now have your tree in spring.

