

## **Building a Venturi Based Compost Tea Brewer:**

The attached sketch shows the design and principle behind the construction of a venturi for injecting air into water. The same principle applies for injecting a liquid into a liquid or I suppose a liquid into a gas.

I apologize for my very poor artistic talent and please be aware that the pipe reducer in the sketch is not drawn to scale. The parts I used for my 1200 gallon brewer need not be the parts you use but it demonstrates the basic principle which you can apply to what have you.

In the sketch; (A) the PVC Tee is a 1.5 inch regular plumbing Tee into which is shoved (B) 1.5 inch black poly pipe on the upstream (pump side) of the Tee with duct tape wrapped around it to make it stay in. This just happened to fit and the pressure I'm using with my 1.5 hp irrigation pump is so low it only pops off once in a while. When you are satisfied with your air injection you can use something more permanent like glued or screwed fittings. Into the upstream black poly is shoved a 1.5 x  $\frac{3}{4}$  inch poly insert reducer which is positioned so it is just at the entry point of the (C) downstream pipe which is also 1.5 inch black poly wrapped with duct tape shoved into the outlet end of the PVC Tee, which you can also make more permanent or beautiful.

(D) The PVC Tee outlet without a pipe is pointing vertically, making it easy to observe the positioning of the end of the reducer. (E) After assembling you can shove a short length of pipe (1 to 3 feet, illustrated by dotted lines in sketch) into the vertical of the PVC Tee to serve as an air stack and it prevents splash out. Note that we have a 1.5 inch air input as opposed to the  $\frac{3}{4}$  inch commercial venturis.

Now that you know the basics you can fine tune your air suction/injection by trying different sized reducers. As you decrease your reduction pipe size (aperture) you increase the pressure which in turn increases the air flow/vacuum/suction to a point. Once you restrict the flow too much you reduce the vacuum effect. For example you could try a  $\frac{1}{2}$  inch reducer instead of  $\frac{3}{4}$  inch. {{For the adventurous; you can introduce an adjustable valve to regulate the flow. If you turn the unit upside down you have a mazi injector for liquids}} Alternatively you can try positioning the reducer output closer to or further away from the downstream pipe input.

**HOW DO I TELL IF THERE IS MORE AIR FLOW?** Just like you do with your vacuum cleaner hose. Put your hand over the end and feel the difference. Or you can use a plastic film or bag and see how much becomes indented into the air stack, how quickly. Oh and I use a lady's nylon half stocking as a filter over the end of the air stack to keep out chunks and stuff.

Now your downstream pipe is spewing oxygenated air into your brewer/water tank. I recommend teeing this line one or more times (depending on your pump and brewer size) with one line or more going into your mesh extractor container(s) and one line or more emptying into the tank preferably suspended above the water surface so it is splashing into the water. This breaks the surface tension facilitating the gas exchange (CO<sub>2</sub> is released & O<sub>2</sub> is absorbed). You will need one or more regulatory valves to adjust the flow to each outlet. A simple way to have mesh extractor bags is to sew up landscape cloth, place your compost in there and your pipe end and tie the bag(s) off tight around the pipe. You may come up with other more suitable mesh extractors.

This system is fine for producing a compost tea which has plentiful bacteria and protozoa but you may have less success with production of fungal hyphae. Have fun!

That being said, the venturi system is an acceptable method of brewer design. My friend has used that system for years in a 5000 gallon brewer successfully for years. You may apply this design to almost any size of brewer making adjustments in size of pipe and pump.

## **Summary;**

**To build a brewer utilizing a venturi, you simply circulate your water via a water pump through the venturi which injects air into the water. Through the use of Tees and valves you have one return line suspended above the surface of the water to provide a splashing effect further infusing the water with air; additionally you have one or more return line feeding into one or more mesh extractor bags or baskets. You can decide this based on the size of pump, tank etc. My friend uses bags sewn from landscape cloth tied tightly around the return pipes at the opening of the bag. The bags then inflate with the oxygenated water and act as giant diffusers while pushing microbes through the mesh. I don't know what the mesh size is on the landscape cloth and realize it is not uniform but guess it ranges from 250 to 600 microns. I use 800 microns for my large brewer and 400 microns for my small brewer based on testing. You can decide for yourself what to build your extractor from. You may also supplement your oxygen needs with an air pump if you wish.**