

MONITORING YOUR BUCKETS FROM THE COMFORT OF YOUR OWN HOME

PART 1: THE BASIC SETUP.

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One of the simplest pleasures during the sugaring season are the trips out to the bucket to see if the sap has started running and/or how much sap is in the bucket. Seasoned sugarers probably don't make as many trips to the bucket as the newbies, but the information is just as critical to both in order to make sure the buckets don't overflow before you have the time to gather. If possible, I'm sure most of us would like to make more trips outside to check the buckets, but often daylight, weather, or that pesky work can get in the way of checking. How about if there was a way to do this without leaving the comforts of your own home [or the discomforts of work]? Fortunately, there is an easy and fairly inexpensive way to do it, and just like sugaring, there are also more complicated and expensive ways to do it. The key to the process is a simple rain gauge. Not the old-fashioned measuring cup style, but the high-tech digital rain gauge. Luckily, these days, high-tech doesn't mean expensive, and the basic models, one of which is used here, are about \$30 on amazon.com. If you have a hard time justifying the \$30, remember, the rest of the year it's a perfectly good rain gauge.

Before getting into the details, let me clarify...you just need one sensor and not one per tap. Just like visiting the tree, you don't need to check them all to know if the sap is running, or how full the buckets are. In this case you would choose to monitor an "average" tree or maybe one of your high runners, and use this information to see if the sap is running and to judge when you should gather. It's also easy to move between trees if you picked the wrong one.

Why use a rain gauge, and how does it work? Rain isn't much different than sap running, it just comes from the sky instead of the tree. If you put a sap bucket in your yard when it's raining, it fills up, just like it would on the tree. Essentially, if you were to look in your bucket after

a rain storm, and there was one inch of water in it, then you would know it rained 1". That's the basis for this technique, but it's not exactly that simple. Digital rain gauges use a different technique to measure the amount of rain than the old-fashioned one I described above.

Digital rain gauges, like the one shown, have a funnel-



type top with a small opening in the center which funnels the rain to a small tipping bucket on either end of a lever, similar to a see-saw. Once the tiny bucket fills with enough water [or sap in our case] it drops, spilling the water out until the other bucket fills and causes it to go back up. The amount of liquid in the tipping bucket can be measured and calibrated, and you simply need to count how many times it drops to determine the rain and rain rate. When the rain gauge drops, the water is simply dumped out through the bottom, and back onto the ground [or in the sap bucket in our case]. That's why this style of gauge is referred to as self-emptying. In the old-style rain gauges, after a rain storm, you would have to empty it before the next one, in order to see how much rain there is.

Now, let me start with some of the features of the basic rain gauge used here, the AcuRite 00899...more on the installation later. First, and probably the neatest feature, is an alarm that sounds when the sap starts flowing. Not

everyone in the family might like this feature, so it can be disabled. Next, there are several different time intervals measured, “Event” the last 24-hours, the last week, or two resettable time-frames. The “Event” option is very handy for sugaring since it measures the amount of sap for the duration that it runs [whether it’s an hour or days]. Once it stops for 8-hours, the event is stopped and saved until the next run. The last seven runs are stored in memory. The 1-day and 1-week settings are probably least useful since the sap often runs for more than one day and less than one week. Maybe the most useful setting is the custom setting, which you can reset after each gather, making it easy to monitor when the bucket needs to be emptied again. It would be nice to use the other custom setting for the season sap total, but that would over-range the gauge, however you could always write down the amount for each gather. The biggest disadvantages of these inexpensive gauges are that they don’t indicate rain/flow-rate and they aren’t internet connected. More on managing these disadvantages later.

As mentioned earlier, there are also high-end systems available, which address the disadvantages of the inexpensive models, but the costs are \$70 and up. The system we use at howsitrunning.com is from [ecowitt](http://ecowitt.com). It monitors temperature, humidity, rain, and rain-rate over any time interval. The data can also be followed on-line, in real-time, with any web browser. It also has several advanced features, such as additional sensors [for measuring sap or ground temperature], and access to the raw-data which allows you to calculate the sap flow rate in drops/sec or gallons/hour, in addition to the amount of sap in the bucket displayed in gallons.

Setup and installation can be very simple depending on your current setup. For those of you who use a tap with a drop-line into a pail on the ground, installation is very easy. Assuming you’re using a 5-gallon bucket, you simply shape a coat-hanger to hang the sensor inside the bucket, just below the lid and make sure the drop line goes into the sensor, see the photo below:



Warning, if you use this technique, you should drill a hole into the side of the bucket, just below the sensor, in order to assure that the sap doesn’t drown and short-out the sensor. If you don’t want to place the sensor into the bucket, you can custom make any sort of setup that keeps things dry. The key is that the sensor is fairly level, and over the bucket, since the sap drops out of the bottom of the sensor. The housing we use at howitrunning.com is shown below [without the roof].



For those of you who use a traditional bucket that hangs from the tap, you would have to convert one tree to the method mentioned above. For those who may be concerned about monitoring just one tree, you can also use a mini-pipeline of up to 5 trees before overwhelming the sensor.

From here, you can follow the instructions in the manual to setup and configure the device. One note on this installation is that the location of the sensor must be 100' or less from the base unit. I found this to be a fairly good estimate. It's best to pick a tree near the edge of the woods near the house, and have the base unit on a window sill with a line of site to the sensor. There are other devices with more range if necessary.

Once everything is installed, you're ready for the sap to run. Once it starts running, if you have the alarm enabled, it will beep for a minute or until you press a key, otherwise you will simply see the display change from 0.00" [note, if the display isn't 0 due to the installation process, you can press clear to reset it]. As previously mentioned, I would use a custom setting to keep track of the value until you gather, then note that amount and reset it until the next gather. One very important point, is how the number on the display relates to the amount of sap in the bucket. Since we aren't measuring rain, and you could be using any type of bucket, when it says 3.5" of rain, your bucket doesn't have 3.5" of sap in it. The best measure of the value on the display to the amount of sap in the bucket is that about 27" of rain is equal to 1 gallon of sap. I round that down to 25", but you could also adjust the

calibration accordingly, but I don't think we need to be perfect. It's also a good check to note the amount on the display to see if it's close to what's in the bucket when you gather. If the sensor isn't very level, it could be different, but I don't think it would be noticeable. In my case, I use a 5-gallon pail to monitor the sap, but all of my buckets are 3-gallons, so when the sensor indicates 50" or so, it's about time to gather. It's also important to know that the maximum amount the sensor can measure is 100", which is about 4-gallons of sap, so if all of your buckets are 5-gallons, you should empty around the 100" point, once it hits a hundred, it resets to 0.

As mentioned earlier, there are a few disadvantages to the inexpensive gauges. First, it doesn't show how fast the sap is running, but we can figure it out. This sensor updates every 60 seconds, so if you calculate the change in the next measurement, a change of 0.05" would indicate about 1 drop of sap per second, or a good run. The other key disadvantage is that you have to be at the sensor to see it, since it's not internet connected. A crude workaround for this would be to place the sensor in front of a security camera or webcam, which you can monitor online or from an app.

At this point, you should be able to monitor your sap flow from the comforts of home. For those who would like more information on the advanced setup, look for part two of this article. For those with comments and/or questions, you can visit www.howsitrunning.com or at howsitrunning on FaceBook.