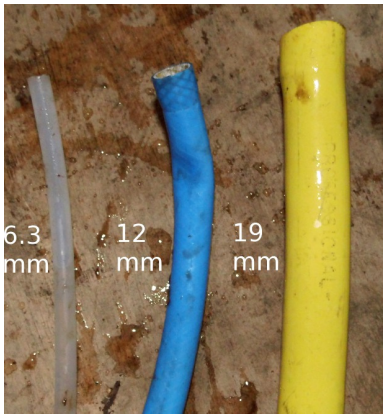
A moderately interesting article about

HOSEPIPES

by Tony Martin

You know when you suggest something a bit unusual, and your friend turns to you and gives you that 'you cannot be serious' look? Well, when I phoned up the editor and told him about this article, he gave me the audio equivalent, a silence that seemed to actually absorb sound.

Yes, hosepipes, what can be so interesting about hosepipes that can take up more than two lines, you may ask? Basically size and length matters, especially as many of us would rather use captured or stream water for irrigation than tap water. Not just for cost or energy reasons (storing, pumping and filtering water takes vast amounts of energy), but because our tap water is regularly laced with a cocktail of chemicals. Take a moment to look up the Wikipedia article on the 1988 Camelford water pollution incident. The purpose of the aluminium sulphate used in that incident? To make the water easier to filter – but it was not essential for making it safe to drink.



Tap water is delivered to your house at a pressure of between two and five bar (30-75 psi). If you have your own water supply, unless you are using a pump (which takes energy and costs more), then you will have significantly lower pressure. One bar is the same pressure you would get from having your water supply ten metres (33 feet) higher than where you are using it. So, unless your storage tank or supply is high up on a hill, you are likely to be working with a lot lower pressure, and this will greatly reduce the flow in your hosepipe relative to mains water.

Now, if you use the time spent watering for meditation (not a bad thing by any means), then this article may be of no use to you. If, however, like me you have lots to do and a large number of plants to water, then determining a suitable size for your hosepipes may save you both time and money.

Factors that affect how much water flows

Length of pipe How long will your pipe need to be to reach the furthest point? The longer the pipe the more resistance it has to the flow of water.

Pressure This will depend upon how high your water source is above where you want to use it (the 'head' of water). As an example, a barrel collecting water from your roof may be situated 0.4m above the ground and be around 1m high. So the maximum pressure (when the barrel is full) will be 1.4m of water and the minimum (when nearly empty) just 0.4m of water.

So, at best, your hosepipe connected to this barrel will only have around 3 to 7% of the pressure that it would have if connected to your mains water supply (assuming an open pipe with no nozzles or taps fitted).

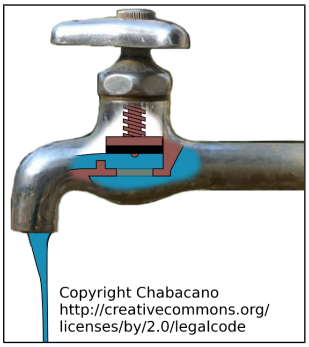
Hosepipe junctions Hosepipe junctions work by having a small tube that fits into each section of hosepipe. Different joiners have different tube thickness and can cut down flow significantly – the more junctions the more resistance.

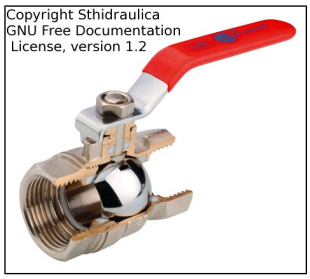
Type of pipe A smooth pipe will allow the water to flow easily, however a ridged pipe will make the water churn around and will increase the resistance.

Sediment If you are drawing water from a 'dirty' source then sediment can build up in the pipes, blocking them. Large particles, leaves, grit, etc need to be filtered out in case they block junctions or spray nozzles.

Spray nozzles and sprinklers These restrict the flow greatly and need a significant pressure to allow large amounts of water to flow.

Taps Standard taps use a screw thread to push together a metal plate and washer to block the flow, which causes a lot of resistance and makes them less suitable for low pressure systems. Full bore ball valves allow the water to flow almost unimpeded, and are much quicker to turn on and off.





Pipe size So if you double the diameter of the pipe you get twice the water through, right? No, in fact the cross sectional area of the pipe is 3.14 x the pipe's radius squared ($\pi x r^2$). So, ignoring other factors, doubling the radius of the pipe will quadruple the water flow. Small bore pipes (4-10mm) may seem like a waste of time but they can be more easily routed or dug into narrow trenches, although they are more prone to blockages. Whilst clearly not useful for manual watering they can be used to trickle feed a bed, or to bring a continuous small flow of water from a stream to a holding tank. Remember a flow of just one litre every five minutes will, over a period of 24 hours, deliver 288 litres (over a quarter of a ton) of

water to your reservoir! As an example, this reservoir could then be used to 'flood irrigate' an area as and when needed.

Price of pipes

This varies considerably. Standard garden hoses can be picked up cheaply at car boot sales or on Freecycle.

Large 'commercial' grade hosepipes can be very expensive, around £1+/metre for the larger 19mm (¾") pipe (standard UK hosepipe is about 13mm or ½"). The sizes are the inside diameters of the pipes.

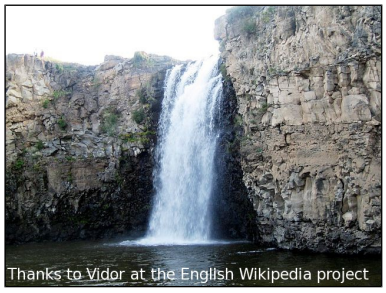
If like me you need a kilometre or so of pipes, then clearly anything you can do to minimise the length and size needed would be good.

You can sometimes purchase rolls of cheap small bore pipe (4-10mm diameter), such as used for pneumatics, or pond pumps. Note these will not usually be UV proof and so will need burying or protecting in some way from sunlight, and freezing may also be an issue.

What flow will I need?

As the old reply to an impossibly tricky question goes, "how long is a piece of string?" There are so many factors to take into account, but the most important question you need to first ask is "how can I reduce my water needs by using techniques such as hügelkultur beds, or by building simple ponds that capture excess water and release it as needed?"

So, now you have reduced your watering needs as much as possible, you need to consider what area will need watering, is it large or small? Are your crops very thirsty like marrows and potatoes, or are you planting cactusesssssss? What's a reasonable time to spend watering this area? Are you making use of existing pipes or are you planning on buying more, and if so what is your budget?



Flow Rates The chart below shows the water flow rates of different sized pipes (of 20 metres length), being fed by water at two different heights. The time shown in seconds is how long it took to fill a one litre container (a typical large watering can may contain 10 litres of water).

Water flow rates	Pipe inside diameter	Head of water 1m	Head of water 5m
Small pipe	6.3 mm	82 secs	29 secs
Standard hosepipe with joiner	9.4 mm	17 secs	7 secs
Standard hosepipe	12 mm	13 secs	6 secs
Commercial hosepipe	19 mm	4 secs	2 secs

Conclusion

There are too many variables to make a simple recommendation. However, taking into account the factors above, you should be able to make a more informed decision as to what types of pipes are appropriate for your situation. If in doubt, however, I would suggest that choosing a larger pipe will usually be the wiser choice. Whilst the initial outlay will be higher, the amount of time saved over many years will likely more than pay for itself.

Tony Martin runs a 5½ acre vegan organic permaculture forest garden smallholding in South Wales, where he grows and sells thousands of monkey puzzle trees. He and Aranya will be holding a full PDC (permaculture design course) at this venue from 30th May - 13th June 2015. For more details see www.tinyurl.com/tonypdc or call Tony on 01639 845144 or 07500 956022, or email tony@veronicathecow.co.uk