

Rurallife Magazine

Choosing a Water Filtration System

In the country, crisp clear water might take a little 'help.'

(9/22/2008)

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No matter where you live, there's no resource more vital than a steady supply of clean water. But even in the most pristine country, water sometimes needs filtration - whether it's to avoid the hassles of clogging up sprinkler heads or to protect your family's health.

There is a wide variety of approaches to water filtration, from passing the water through sand or charcoal to running it through high-tech screening systems. Each type of filter has strengths and weaknesses, so choosing the right system - and the right sized filter - takes some thinking.

"Just as if you were investing in a new tractor or shop tool, you'll want to consider what you want to accomplish, how much you'll need to handle, and what conditions you're working with," says Jim Lauria, vice president of sales and marketing for Amiad Filtration Systems in Oxnard, Calif.

Size and Shape: All filters are not created equal, and neither are all particles in the water. The size of the particles, as well as their shape and hardness, can influence your filtration choices.

Sand tends to be crystalline and abrasive. Clay is made up of smaller, plate-shaped particles that lock together to form tough clumps. Bacteria and algae are deformable, or flexible, enough to squeeze their way through some filters that would easily trap soil particles of the same size.

Some particles or chemicals - often small and water-soluble, so they're called dissolved solids - can confer an off-taste or strange color to water.

What you plan to do with the water is also important. If it's for irrigation, off-flavors or color aren't a problem - you will probably be more concerned about keeping nozzle-plugging particles like clay, sand or algae out of your system. On the other hand, drinking water travels through larger pipes and valves that might be able to handle a little sand, but dissolved solids and microbes are a concern.

There are some basic assumptions to start with, says Lauria. "If the water is from a pond or lake, there's probably algae," he notes. "If the water is from a well, there is probably suspended mineral material. In either source, you may also find pathogens such as bacteria, cysts, and/or viruses."

Lauria recommends sending a sample of your water to a water quality testing laboratory to find out what sorts of particles, organisms, and minerals are in it. Also ask for a particle size distribution by volume and count, which will identify how many particles are in the water and how large they are, indicating the degree of filtration you may need.

The degree of filtration refers to the smallest particles that the filter is designed to capture. If the particles in your water are 40 microns in size, even the best filtration technology won't do the job if you select a 60-micron degree of filtration. Fortunately, most filtration technologies provide owners the flexibility to select from a number of degrees of filtration.

Another size issue is determining how much water flow you need to maintain. A tap water system may only require 10 gallons per minute (gpm) and relatively low pressure to keep a household running smoothly, which can be achieved by a relatively small filtration system. But an irrigation system may require 150 to more than 1,500 gpm and water pressure ranging from 15 to more than 150 pounds per square inch (psi). In order to keep that much water flowing through the filter to your sprinklers, you will need to select a larger system than what you'd need to keep your sink and shower running.

Filter Technology: Regardless of the size of the unit, there are four basic types of filtration systems, says Lauria:

- * Media filters pass water through canisters of fine particles, or media, such as sand or activated charcoal. Water finds its way through the microscopic spaces between the particles, while solids in the water get trapped in contact with the media. Large sand media filters are common in some water treatment plants and farm irrigation setups; activated charcoal is commonly used to purify tap water.

- * Disk filters are stacks of finely grooved plastic disks stacked tightly on top of one another. As water travels from the outside of the stack to the inside, suspended particles adhere to the grooves. Because they have a great deal of surface area, disk filters are especially good at picking up deformable, organic particulate such as algae.

- * Screen filters work like super-fine strainers, capturing particles too big to fit through their mesh. Screen filters are excellent at removing inorganic material such as suspended sand.

- * Thread filters have a very high degree of filtration, using tightly wound threads to capture particles as tiny as bacteria and cysts.

- * Reverse osmosis filters pass water across a membrane that captures even the finest particles and most dissolved solids. Energy intensive and expensive, reverse osmosis filters are the gold standard when it comes to removing dissolved solids such as salt.

Some applications, such as household drinking water, may even benefit from two different kinds of technology, says Lauria. For instance, an activated carbon filter is great for removing chemicals (such as chlorine) and off-flavors, but sand, clay or algae would plug it up very quickly. "You don't want to use carbon as gross filtration," he says. "You want to use it for what it was designed for - to remove dissolved solids, not suspended solids." He points out that the money and headaches saved by straining out particles before they reach the activated carbon quickly pays for the cost of a screen or disk pre-filter.

Installation and Maintenance: Of course, filters take up space, and so do the pipes or hoses that feed them. They also require outlets for the water used to clean the filter screens, disks or media. Make sure you set aside enough space for your filter and manifold or inlet/outlet/drain system, and consider pouring a concrete pad under the filter system area so you have a work space that is clean and accessible in any type of weather.

Locate your filtration system where you can conveniently check on it and perform any necessary maintenance. The amount of maintenance depends on several factors:

- * Whether the filter is automatically self-cleaning or manually cleaned.
- * The size and type of particles in the water.
- * The size of the filter medium (screen, disk, sand media, etc.)
- * How much time the filter is in operation.

Pay close attention to local conditions, Lauria adds. Summer storms can stir up sediments in creeks or canals. Hot weather and slow-flowing water can experience algal blooms. Either one could overload your filter in a hurry, even if it is usually capable of going for quite a while between cleanings.

Even different particles of the same size require different cleaning schedules, Lauria points out. "If you have a 10-micron sand particle and a 10-micron clay particle, they're the same size and same deformability, but for a given filter area, you're probably going to flush more with clay than with sand because flat clay particles tend to stack up like tiles and orient themselves to blind the screen more quickly," he says.

Consider your willingness or availability to maintain your filter, Lauria suggests. The simplest filters need to be periodically opened and their screens or disks removed and sprayed with a hose or power washer. Some filters are equipped with cranks that allow owners to manually brush or siphon out debris without opening the filter housing.

The next level uses a solenoid-governed valve that releases a stream of flush water to clean off the filter screen at a specific time - for instance, for the first two minutes of a timed irrigation cycle. The most sophisticated systems clean themselves automatically on a timed interval or when they sense a pressure differential on opposite sides of the screen.

"If your water is relatively clean and you're watering a pasture rather than your prize rose bushes or vegetable garden, and if you are available to clean the filter by hand when needed, a manually cleaned filter might be fine," says Lauria. "If your drinking water or favorite flower beds are on the line, you may want to look at an automatic self-cleaning system. Whatever you prefer and whichever technology seems to suit your situation best, it's worthwhile to consult with irrigation professional to make sure you get the size, technology, and degree of filtration you need."