EXTENSION

Planting on Septic System Drain Fields

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Around 50 percent of houses built in Oklahoma since 2002 have septic systems and on average, 5,420 new systems were installed annually from 2018 to 2021 (Abit, 2022). With more people wanting to reside in areas that are outside the coverage of centralized wastewater treatment plants, the use of septic systems is expected to further increase.

Septic systems ideally require flat open areas with a thick soil profile that allows effective infiltration and percolation of water. Ornamental and vegetable plants also ideally require the same qualities for a garden area. Septic systems require the soil in the area for final treatment of wastewater, while plants need it for anchorage as well as for access to water and plant nutrients. It is common to have situations wherein the only location that can be used for a garden within a property (open surfaces that receive at least six hours of sunshine daily) is where the septic system is also installed. Sometimes, the drain field is even located in the front yard where the homeowner usually wants to plant trees, shrubs, and flowering plants. So, in essence, gardens and septic systems could "compete" for the same piece of real estate! The question then becomes: Can plants and septic systems coexist? We will answer this question as we move along in this fact sheet but first, let us focus on septic systems in Oklahoma.

Septic System in Oklahoma

Septic systems are composed of two main parts:1) the septic tank and 2) the drain field (Figure 1). Separation of the solids, the grease and the effluent in sewage happens in the septic tank while the final treatment and dispersal of the wastewater takes place in the drain field. There are two main types of septic systems in the Oklahoma: 1) the conventional system and 2) the aerobic treatment unit/system (ATU). Septic tank effluent from conventional systems is dispersed through a system of pipes installed in subsurface trenches and above-ground plant parts normally do not come in contact with the effluent. In ATUs, effluent that is partially treated in the tank is applied to the drain field either by surface spray (more common dispersal method) or by subsurface drip application. When sprayed at the surface, septic system effluent will come in contact with above-ground plant parts. Although the surface-sprayed effluent is pre-treated with a

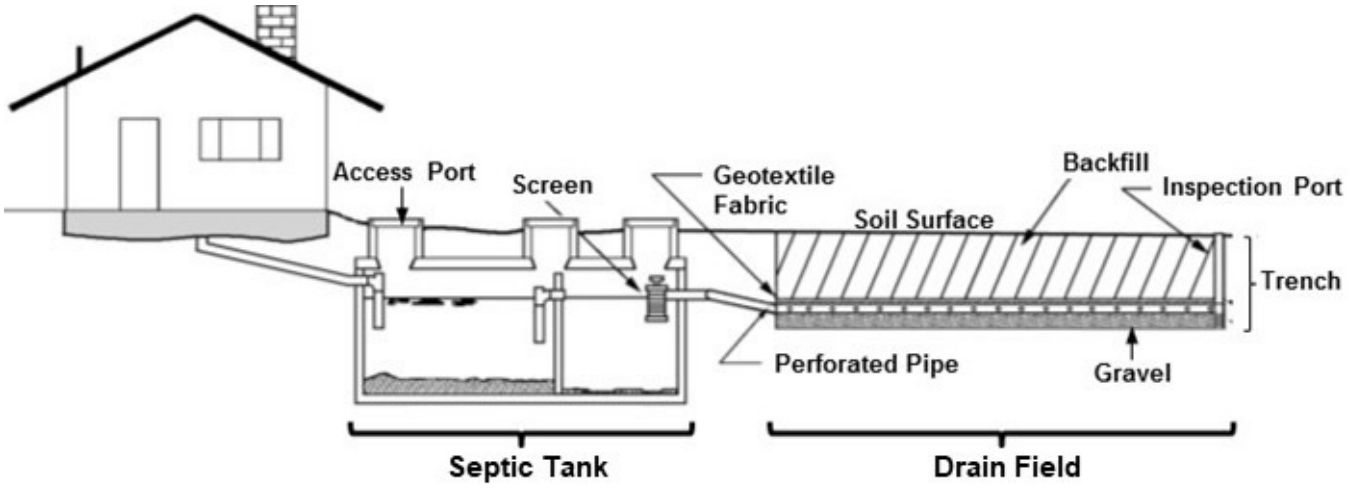

Figure 1. Diagram of a conventional septic system. In ATUs, the drain field could either have spray heads for surface application or a drip system for subsurface dispersal of effluent. (Illustration by SM Abit, adapted from CIDWT.)

bleach solution (as disinfectant), one can never be sure that it is devoid of any pathogens. Besides, it is still expected to contain chemical contaminants that are not degraded by the pre-treatment inside the tank. You can refer to fact sheet PSS-2913 (Onsite Wastewater Treatment Systems Permitted in Oklahoma) for details of all septic systems permitted for installation in Oklahoma.

Two things should be emphasized here:

1. The drain field is very important! If it cannot effectively perform its function of treating the septic system effluent, then human health and environmental problems could arise.
2. Anything, including plants, that will interfere with the surface infiltration and subsurface percolation of the effluent in the drain field, as well as the proper functioning of the spray heads at the surface or the subsurface dispersal system, will cause the septic system to fail. This can cause disruption in the household (imagine not able to flush your toilet!) and could require hundreds of dollars in repair cost.

Are Plants at the Drain Field Necessary?

Plants are needed at the drain field. Plants take-up water, thus preventing ponding of surface-applied effluent and promote infiltration of subsequent effluent applications. They aid in the actual treatment of wastewater by absorbing plant nutrients and even some harmful dissolved contaminants. Having plants on the surface will also enhance the development of soil physical properties that encourage infiltration and percolation of the wastewater. In addition, plants promote a healthy community of soil microorganisms that aid in the treatment of the wastewater. Equally important is the ability of the plants at the drain field to prevent soil erosion. At a minimum, the drain field should be planted with a healthy cover of turfgrass that provide these important benefits.

Selection of Plants for the Drain Fields of Various Systems

For any type of system, the best vegetation for drain fields are shallow-rooted turf grasses. Not only do they effectively prevent soil erosion, their roots also do not interfere with the effective functioning of any subsurface components of the septic system. Their dense fibrous root system also effectively takes-up water and excess nutrients and promote a healthy soil microbial community that aids in effluent treatment. They are also adapted to frequent mowing (more discussions of the importance of mowing later).

Conventional System:

In conventional systems and similar systems that require subsurface dispersal of effluent (again, refer to fact sheet PSS-2913), any vegetation that is deeply-rooted (>6 inches of rooting depth) should not be planted at the drain field. The separation distance between the soil surface and the subsurface gravel layer in the trenches (where the distribution pipes are located) could be as thin as 6 to 8 inches (see Figure 2). This means that the roots of deeply-rooted vegetation can easily reach the pipes and potentially clog the perforations on them. The roots can even grow into the pipe thereby restricting water flow or worse, even break the pipe. Roots of deeply-rooted woody plants (shrubs and trees) are particularly capable of breaking the distribution pipes and can also grow extensively into the voids/pore spaces of the gravel layer thereby reducing its effluent storage capacity. A reduction in storage capacity of the

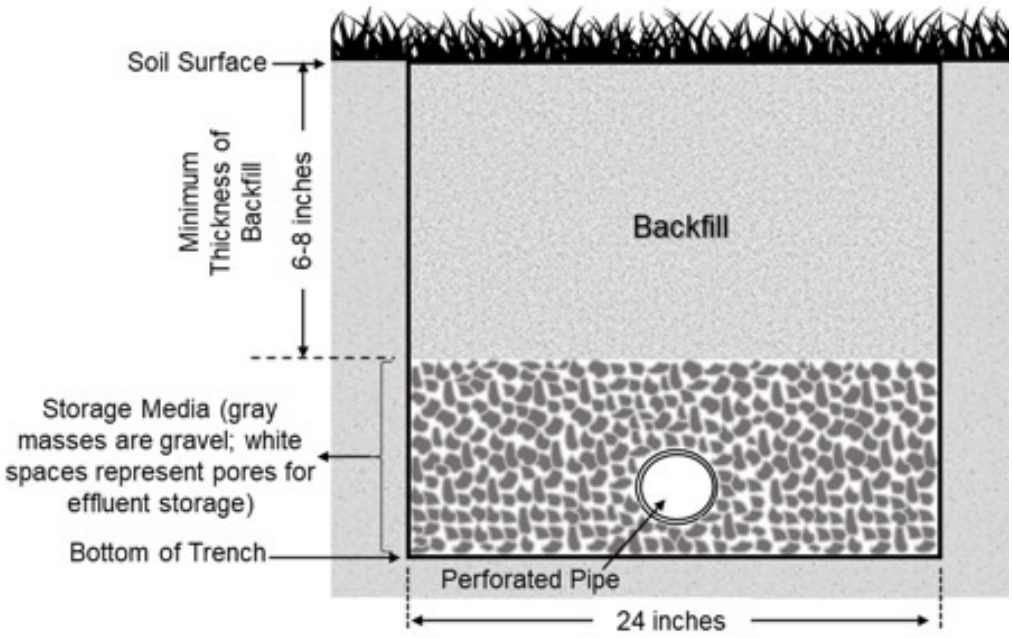

Figure 2. Diagram of a cross-section of the subsurface trench of a conventional septic system. Effluent is temporarily stored in the voids in between pieces of gravel until it totally percolates through the soil at the bottom of the trench. Note: Not drawn to scale.
(Illustration by SM Abit)

gravel layer will increase the likelihood that the contaminated effluent will show up at the surface and become a health and environmental risk.

Apart from turf grasses, herbaceous shallow-rooted plants such as flowering perennials and annuals, and shallow-rooted native prairie vegetation (grasses and sedges) are unlikely to damage the lines. As an extra precaution, avoid planting ornamentals right above the trenches. Specifically, choose plants that do not require moist or wet soils because these plants seek additional moisture and will have roots that aggressively grow towards subsurface locations (such as the trenches) that have consistent supply of available water. Picking flowers and bringing them inside the house is strongly discouraged because there is always the possibility that the septic system effluent, though applied directly to the subsurface, can be wicked-up to the surface via capillary action and contaminate the flowers with sewage.

ATU with Spray:

In the drain field of an ATU with spray application, deeply-rooted vegetation such as grasses and sedges, including native prairie vegetation, could work. However, choose plants that can easily be regularly mowed to only a few inches because in this system, the effluent is sprayed on the surface. Above-ground plant parts that grow tall and difficult to mow will interfere with the effective spreading of the effluent that is sprayed daily. Shrubs and ornamental herbaceous plants that cannot or are not normally mowed regularly are also not recommended because they could grow tall enough to prevent the spray heads from effectively spreading the effluent.

ATU with Subsurface Drip:

Drain fields of ATUs with subsurface drip application (driplines are installed at 8 to 10 inches from surface) should not be planted with deeply-rooted vegetation as the roots can also plug the orifices of the driplines. However, shallow-rooted herbaceous plants, including ornamentals, can be planted on the drain field if:

a) The absolute location of the subsurface driplines can be determined and marked. Avoid planting ornamentals (even the shallow-rooted ones) right above the driplines as an extra precaution against the roots reaching the driplines.

b) Planting does not involve deep tillage. Deep digging/tilling can potentially cut the driplines.

c) Tillage does not require heavy equipment/implements as this can cause compaction of the drain fields.

d) Irrigation/Water application to the plants must be controlled. The drain field is specifically sized to treat a particular volume of effluent every day. Excess irrigation from the watering of plants can lead to soil saturation which will negatively impact the ability of the soil in the drain field to treat the septic system effluent. Better yet, use plants that do not require frequent water application.

Just like with drain fields of conventional systems, picking flowers and bringing them inside the house is strongly discouraged.

What Not to Plant?

a) Edible Plants: Regardless of the type of system, one should never plant vegetables or root crops in the drain field because of the risk of microbial contamination and the health risks associated with it. This includes plants with edible flowers.

b) Shrubs: Shrubs with aggressive root system should never be planted any closer than 15 feet from the boundary of the drain field.

c) Trees (adapted from Day and Silva, 2013): Plant trees as far away as possible from the drain field or at least 10 feet farther than their estimated root spread at maturity. One way to estimate this is by the ultimate height of the mature tree. For example, a tree that is expected to grow about 25 feet tall is expected to have roots that grow 25 feet laterally. In this case, the tree should be planted at least 35 feet from the boundary of the drain field.

How Does the Effluent Affect Plant Growth?

Even in well-functioning systems that apply effluent directly to the subsurface, some of the effluent can be wicked-up towards the surface and could potentially alter the pH and salinity of the soil. Obviously, changes in soil pH and salinity of the surface layer are more likely in drain fields that are sprayed by septic system effluent. Chemical properties of septic system effluent vary with what goes down the drain. However, septic system effluent generally has a pH of near-neutral (6.5) to the highly alkaline range (9.5). The salinity of the effluent is expected to be higher than that of tap water. This means that vegetation sensitive to saline and alkaline conditions will potentially grow poorly in drain fields. Possible adverse effects due to high soil pH and salinity of soils are more likely in areas that receive limited rainfall. It would be beneficial to periodically test the soil at the drain field to assess the need to have the pH and salinity adjusted, or so plants that are adapted to the properties of the soil could be appropriately selected and planted.

How About Plants on the Septic Tank?

Planting anything deeply-rooted (>6 inches of rooting depth) on top of where the septic tank is installed is not recommended. While not common, some tanks would have leaks. Roots can grow into the leaks/cracks and could make the problem worse by increasing the size of the cracks. Particular attention must be given to lids of tanks because some of them may not be completely sealed allowing roots of even shallow-rooted vegetation to grow through small openings.

Take-home Points

So, can plants and septic systems coexist? Plants use nutrients and water from the septic systems, and the drain field benefits from having some vegetative cover. However, the answer to this question is “it depends”. There are plants, like tall and deeply-rooted shrubs and trees, that should never be

planted on the drain field. In some instances, shallow-rooted grasses and herbaceous plants can be planted on the drain field but it really depends on the type of septic system that is installed. It is important for the homeowner to be familiar with the various parts, functions, and the specific installation location of the effluent distribution components in the drain field. Flowering plants could be planted in certain situations, but the flowers should not be harvested and brought inside the house. Lastly, vegetables and root crops should never be planted at the drain field.

References

Abit, S.M. 2022. Updated Septic System Trends in Oklahoma. Oklahoma Cooperative Extension Bulletin PSS-2919.

Day, S.D. and E. Silva. 2013. Planting on Your Septic Drain Field. Virginia Cooperative Extension Publication 426-617

Videos:
"Landscaping around Septic Tanks"
https://youtube/k_c0IXzsuZQ

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