PURDUE UNIVERSITY

PURDUE EXTENSION

HENV-13-W

Home & Environment

Septic System Additives

Brad Lee, Don Jones, and Ron Turco
Department of Agronomy and Department of Agricultural and Biological Engineering
Purdue University

Septic system additive vendors often market their products as necessities that improve septic system performance or repair failing systems. Rather than address specific products, this publication examines general categories of these additives. This publication also describes the treatment functions of septic systems and the available scientific data regarding the effectiveness of septic system additives.

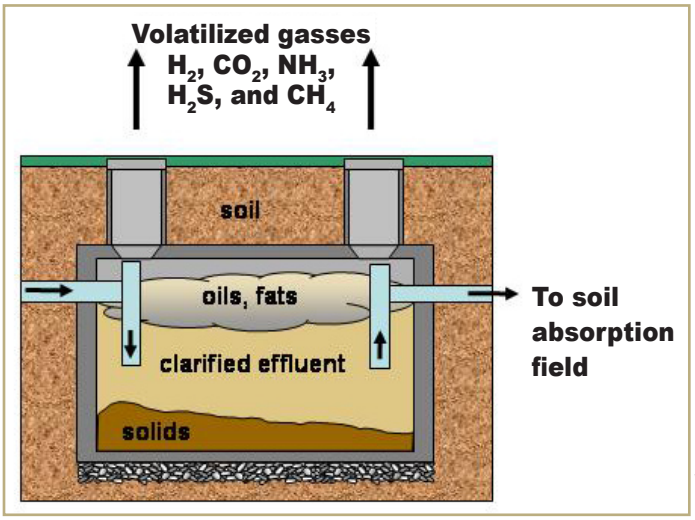
Treatment Functions of Septic Systems

Septic tanks have a number of important functions, including:

- **Removal of oils, fats, and settleable solids.** Septic tanks are designed to provide quiescent conditions over time to allow settleable solids to sink to the bottom of the tank (sludge) and floatable solids (scum — e.g., oils and fats) to rise to the surface (See Figure 1). The result is a middle layer of relatively clarified effluent that exits the tank and enters the soil absorption field.
- **Storage of settleable and floatable material.** Tanks are generously sized according to projected wastewater flow and composition in order to accumulate sludge and scum at the bottom and top of the tank, respectively. Tanks require pumping at infrequent intervals (e.g., 1 to 7 years), depending on sludge and scum accumulation rates.
- **Digestion/decomposition of organic matter.** In an anaerobic environment (without oxygen), bacteria reduce most organic matter to soluble compounds and gasses, including hydrogen (H_2), carbon dioxide (CO_2), ammonia (NH_3), hydrogen sulfide (H_2S), and methane (CH_4). This significantly reduces the volume of sludge that must be stored in the tank.

Soil absorption fields also have important functions, including:

- **Absorption and dispersal of wastewater.** In a typical residence, 50 to 90 gallons of wastewater are produced per person per day, depending on water use habits and water use efficiency of fixtures and appliances. In a properly operating system, the soil absorption field accepts septic tank effluent at the same rate it is generated in the home.
- **Removal of contaminants from wastewater.** Soil provides the final stage in treatment. It must effectively treat wastewater effluent through chemical, physical, and biological processes.
  - — Chemical treatment in the soil involves the interactions of contaminants with soil mineral surfaces. For example, phosphate, common in household wastewater, is readily adsorbed to the surfaces of soil minerals and does not migrate to groundwater easily.



Brad Lee

Figure 1. *Degradation of solids in waste products results in volatilization of gasses, including hydrogen (H_2), carbon dioxide (CO_2), ammonia (NH_3), hydrogen sulfide (H_2S), and methane (CH_4). The remaining solids separate in the tank into those less dense than water (oils and fats) and those that are heavier than water (poorly degradable solids).*

— Physical treatment of wastewater in the soil relies on the soil fabric, the relation of minerals, and pore space. Contaminants and solids in the effluent are trapped in the pore space between soil particles much like a filter traps contaminants.

— Biological treatment occurs as microorganisms in the soil feed on and degrade organic contaminants in the effluent, effectively removing them from wastewater.

Types of Additives and Effects on Treatment Processes*

*Modified from USEPA fact sheet, 2002.

There are three general categories of septic system additives that are typically marketed to consumers today:

- **Biological additives.** Composed of bacteria and extracellular enzymes mixed with surfactants or nutrient solutions, products in this category of additives do not significantly enhance normal biological decomposition processes in the septic tank. However, some have been found to degrade or dissipate septic tank scum and sludge.
  — Human waste contains abundant bacteria that are remarkably resilient. There is no need to supplement the bacteria supply in a septic tank.
- **Odor control additives.** Products in this category contain formaldehyde, paraformaldehyde, quaternary ammonia, and zinc sulfate. They are advertised to control septic odors by killing bacteria, but this objective is counter to the purpose and function of septic tanks (which rely on bacteria to decompose the solids and contaminants in wastewater).
  — If odors are a concern, then the odor's source should be investigated. Odors can result from sewage surfacing in the absorption field area, a ruptured sewer line, a plumbing vent problem in the home, or some other, usually correctable, problem. Properly functioning septic systems should not produce odors in the home.
- **Solid reducing additives.** Known as "flocculants," companies market these products as a way to reduce the concentration of suspended solids in septic tank effluent. Theoretically, the clumping and settling of suspended solids would result in cleaner effluent discharges into the soil absorption field.
  — Research has not conclusively demonstrated the value of septic tank flocculants. It may be that extremely large, uneconomical doses of such products are required to make a significant difference.

Other Chemicals Found in Septic Tanks

Other chemicals that are occasionally and inadvertently added to wastewater are described below:

- **Inorganic compounds.** These chemicals usually contain strong acids or alkalis and are marketed as ways to rapidly open clogged drains. Popular commercial drain cleaners often contain ingredients such as sulfuric acid or lye.
  — Occasional and minimal inorganic additive use will probably have little effect on septic systems. However, overuse can adversely affect biological treatment and even result in structural damage to plumbing, septic tanks, and other treatment system components.
- **Organic solvents.** Products in this category often contain chlorinated hydrocarbons (such as methylene chloride or trichloroethylene) that are commonly used as degreasers. However, some organic solvents are mobile in soil environments and can contaminate groundwater and harm the biological wastewater treatment process.
  — Organic solvents can destroy productive microorganisms in the treatment system. Disposing organic solvents in wastewater entering an onsite treatment system is banned in many states. If groundwater is contaminated, the homeowner may even be held liable for the damage.

Modifying User Habits

Chemical additives have little positive effect on septic system performance, and in some cases may actually have a negative effect. These products can also be expensive. However, homeowners can inexpensively improve septic system performance by improving user habits:

- Avoid "every flush" or "automatic" toilet bowl cleaners. Often, these products are solid blocks dropped into the toilet's water reservoir or clipped to the rim of the bowl. These blocks dissolve slowly over several months, releasing bleach and other chemicals.
- Minimize drain cleaner use by reducing the amount of hair, grease, and food particles that go down the drain (e.g., use a strainer over the sink drain).
- Use less cleanser and scrub more to minimize the amount of chemicals entering the septic system.
- Use the minimum amount of soap, detergent, or bleach necessary to do the job.
- Use minimal amounts of mild cleansers and only as needed.
- Do not drain chlorine-treated water from swimming pools and hot tubs into septic systems.

- Dispose of solvents, paints, antifreeze, and chemicals through local recycling and hazardous waste collection programs.
- Do not flush unwanted prescription or over-the-counter medications down the toilet.

For more on practices that reduce water use and improve septic system performance, see Purdue Extension publication HENV-9-W, *Water Use and Septic System Performance*, http://www.ces.purdue.edu/extmedia/HENV/HENV-9-W.pdf.

Summary

According to the Environmental Protection Agency, there are no conclusive studies to date showing significant benefits from septic system additives. Given the lack of common conclusions or recent unbiased testing about the effects of septic system additives, our best advice remains to have septic tanks pumped every 3 to 5 years. Also, consider how the annual cost of additives could be better spent on improving your wastewater system.

References

Schultheis, R. 2004. Septic tank additives debated. University of Missouri Extension.

U.S. Environmental Protection Agency. 2002. Onsite wastewater treatment systems manual. Office of water and office of research and development. Publication number EPA/625/R-00/008.

Other Purdue Extension bulletins in this series

HENV-1-W, *Septic System Failure*, http://www.ces.purdue.edu/extmedia/HENV/HENV-1-W.pdf.

HENV-2-W, *Increasing the Longevity of Your Septic System*, http://www.ces.purdue.edu/extmedia/HENV/HENV-2-W.pdf.

HENV-3-W, *Turfgrass Color: Indicator of Septic System Performance*, http://www.ces.purdue.edu/extmedia/HENV/HENV-3-W.pdf.

HENV-4-W, *Septic System Distribution Boxes: Importance of Equal Distribution in Trenches*, http://www.ces.purdue.edu/extmedia/HENV/HENV-4-W.pdf.

HENV-5-W, *Septic Tanks: The Primary Treatment Device of Your Septic System*, http://www.ces.purdue.edu/extmedia/HENV/HENV-5-W.pdf.

HENV-6-W, *Grandfathered Septic Systems: Location and Replacement/Repair*, http://www.ces.purdue.edu/extmedia/HENV/HENV-6-W.pdf.

HENV-7-W, *Indiana Soils and Septic Systems*, http://www.ces.purdue.edu/extmedia/HENV/HENV-7-W.pdf.

HENV-8-W, *Gravel and Gravelless Trench Soil Absorption Fields*, http://www.ces.purdue.edu/extmedia/HENV/HENV-8-W.pdf.

HENV-9-W, *Water Use and Septic System Performance*, http://www.ces.purdue.edu/extmedia/HENV/HENV-9-W.pdf

HENV-10-W, *Septic Systems in Flooded and Wet Soil Conditions*, http://www.ces.purdue.edu/extmedia/HENV/HENV-10-W.pdf.

HENV-11-W, *Obtaining a Septic System Permit*, http://www.ces.purdue.edu/extmedia/HENV/HENV-11-W.pdf.

HENV-12-W, *Seasonally High Water Tables and Septic Systems*, http://www.ces.purdue.edu/extmedia/HENV/HENV-12-W.pdf.

Authors:

Brad Lee, Assistant Professor and Soil and Land Use Extension Specialist, Department of Agronomy, Purdue University

Don Jones, Professor and Agricultural Engineering Extension Specialist, Department of Agricultural and Biological Engineering

Ron Turco, Professor of Soil Microbiology, Agronomy Department, Purdue University

Visit the Home & Environment Web site for science-based information about homes and the home environment: http://www.ces.purdue.edu/HENV/index.htm.

Purdue Extension
Knowledge to Go
1-888-EXT-INFO

EXPERT REVIEWED

4/05