Laboratory Results: Application of Septic Medic (*Regular Strength, Liquid Formula*) To Test and Control Septic Tank Systems

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EXPERIMENTAL SUMMARY

A comprehensive, test vs. control laboratory study was conducted to confirm the superior results attainable in standard residential septic tanks using Septic Medic (Regular Strength, liquid formulation). This rigorous test was performed for 90 consecutive days in a laboratory setting using Septic Medic treated (TEST) and untreated (CONTROL) septic systems. The results were excellent:

- ***Discharge quality was at least 28% improved in Total Suspended Solids (TSS) with Septic Medic.***
- ***Discharge quality was at least 18% improved in Chemical Oxygen Demand (COD) with Septic Medic.***
- ***Discharge quality was at least 12% improved in Oil and Grease (a measure of fat content) with Septic Medic.***

These improvements, though large and exciting in themselves, do not tell the full story. These numbers were calculated from the beginning through the end of a 90-day laboratory study. However, the results as taken over the last 30 days of the study were even more impressive in Septic Medic's favor.

However you look at it, these impressive improvements in pollution control mean dramatically cleaner discharge from your septic tank. And with this improved septic tank efficiency, your septic system will run more efficiently for many years. And that is good for both the environment AND your bank account!

Please continue to read about this exciting laboratory study in the pages that follow, and you will see just why we are so excited about Septic Medic!

I. Introduction

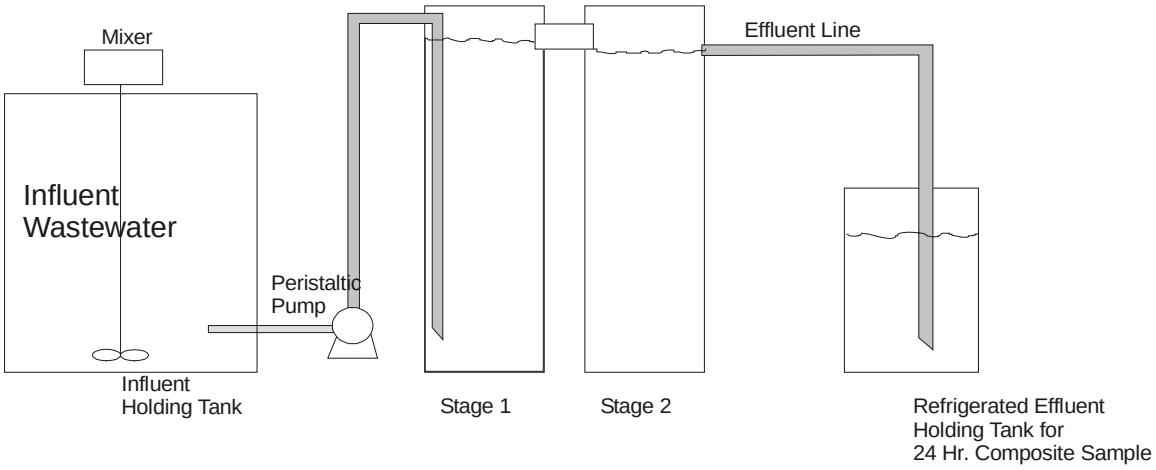
This study was performed to demonstrate the superior efficacy of Septic Medic in the septic tank environment. A key consideration was to design the laboratory system with the capacity to simulate some of the expected variations in load that are typical with real septic tanks.

After all, household septic tanks regularly receive large variances in flow, types of chemicals, pharmaceuticals, etc. To account for this, the experimental systems were designed for both continuous and intermittent influent flow.

To ensure that the study met standard scientific procedures, two parallel, identical systems were set up. This way, one would act as a test (treated with Septic Medic), while the other would act as a control (without product added).

A schematic of one of the two identical systems is presented below:

Schematic of Septic Tank Pilot Plants



The dimensions of each of the main tanks (Stage 1 and Stage 2) was 38"x11"x11", with a total volume of about 20 gallons. Two stages were used to act as a baffle (as you would have in a real septic tank) despite the small volumes involved. The intent was that Stage 1 would accumulate most of the solids, grease, and scum, while Stage 2 would be relatively free of solids accumulations.

As stated above, one system was used as a test tank while the other was used as a control. A common holding tank was used for mixing and dispensing synthetic wastewater to the laboratory tanks. Treated wastewater from each laboratory system flowed to a refrigerated holding tank so that 24-hour composite samples could be taken.

After a thorough literature search, we decided to make a synthetic wastewater that would be representative of wastewater that typically enters a residential septic tank. For the duration of this experiment, the synthetic wastewater was used for the study. The formulation is given below:

Component	Quantity per 50 gallon Batch
Grease (Heavy Whipping Cream)	17.5 grams
Protein (1% Fat Cottage Cheese)	26 grams
Cellulose (Powdered)	175 grams
Pectin	2 grams
Glycerin	5 grams
Isopropyl Alcohol	1.25 grams
Sodium Acetate	1 gram
Peptone	6 grams
Ethanol	3 grams
Soluble Starch	5 grams
NH4Cl	9.25 grams
K2HPO4	1.25 grams

The above nutrients were mixed into 50 gallons of tap water. The influent wastewater had the following average composition:

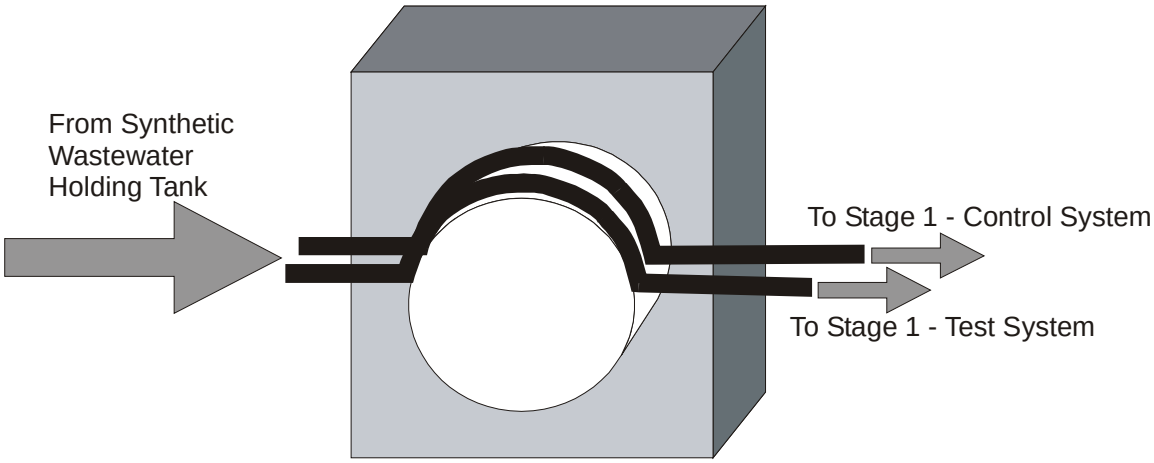
Average Influent Wastewater Composition

Parameter	Average Value
Suspended Solids	925 mg/l
Soluble COD	225 mg/l
Total COD	1400 mg/l
pH	6.75 pH units
NH3	10.5 mg/l
PO4	5.25 mg/l
Oil and Grease	45 mg/l

II. Equipment Operation

Wastewater was fed to the laboratory systems two ways: continuous and batch (intermittent). A peristaltic pump was used to continuously add 6 gallons of synthetic wastewater per day to each system. Batch addition was performed by adding 3 gallons per day, twice per day, to Stage 1 of each laboratory system. With a total batch addition of 6 gallons per system per day (3 gallons twice per day), and with 6 gallons per day being fed to each system continuously, the total hydraulic load on each system was 12 gallons per day of synthetic wastewater. The actual working volume of Stage 1 plus Stage 2 was 36 gallons, so that the hydraulic residence time was 3 days. This is very important, as we wanted to come reasonably close to the expected holding time of a residential septic tank. A residential tank with a volume of 500 to 1000 gallons may have anything from 1 to 5 days of residence time (depending on the number of people living at the residence and the rate of water use). Therefore, the experimental set-up did a good job of mimicking a real septic tank. The peristaltic pump used for

continuous feed consisted of a single drive with two discharge lines (one for each system) as shown in the drawing below:



(Note dual feed system for ensuring identical wastewater feed to test and control)

The pump is designed as a dual-feed, identical flow rate system. With this equipment, the test and control septic tanks received identical wastewater flow each day.

III. Experimental Procedures

A. Start Up

To start the system up, each laboratory train was filled with 34 gallons of synthetic wastewater (split between Stage 1 and 2). Two gallons of anaerobic digester sludge from a local wastewater treatment plant (WWTP) was added to the 34 gallons of synthetic wastewater. The mixture was undisturbed for three days to allow for initial degradation and acclimation. The purpose of the anaerobic digester material from the WWTP was to establish a functioning biomass that would be found in a well-operating septic system. As septic tanks are mostly anaerobic systems (without oxygen), the sludge from a functioning anaerobic digester is ideal to start up a septic tank with full biochemical function.

B. Operation

After three days of acclimation, influent feed was initiated. The peristaltic pumping system was used to add continuously at the rate of 6 gallons per day. Batch addition of 3 gallons per system, twice per day, was also started. The batch additions took place at around 8:00 A.M. and 5:00 P.M. each day. The total addition per day per system was therefore 12 gallons, giving a hydraulic resident time of 3 days.

C. Test Procedures

Effluent from each system flowed to a refrigerated holding tank, so that 24-hour composite samples could be conveniently taken. At the end of each 24-hour period, the holding tank contents were blended to give uniform samples for testing. System influent and effluent were tested Monday through Friday for each of: Total Suspended Solids (TSS), Chemical Oxygen Demand (COD), and Oil and Grease. Triplicate tests were performed according to standard methods for each of the parameters.

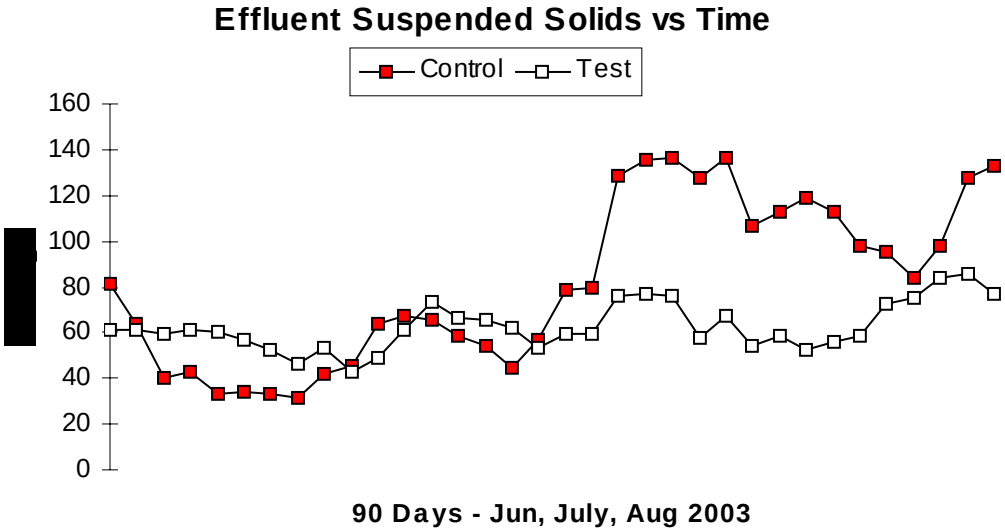
D. Septic Medic Addition

Septic Medic was added using standard Septic Medic procedures. Regular Strength Septic Medic should be dosed at 16 ounces for a standard residential septic tank (500 gallons). Therefore, with a tank volume of 36 gallons, the dose rate was 1.2 ounces of Septic Medic (35 cc), performed once every 7 days, starting with day 1 of operation.

As with the regular Septic Medic dose (straight to the commode or toilet), the product was added directly to Stage 1 of the Test experimental set-up.

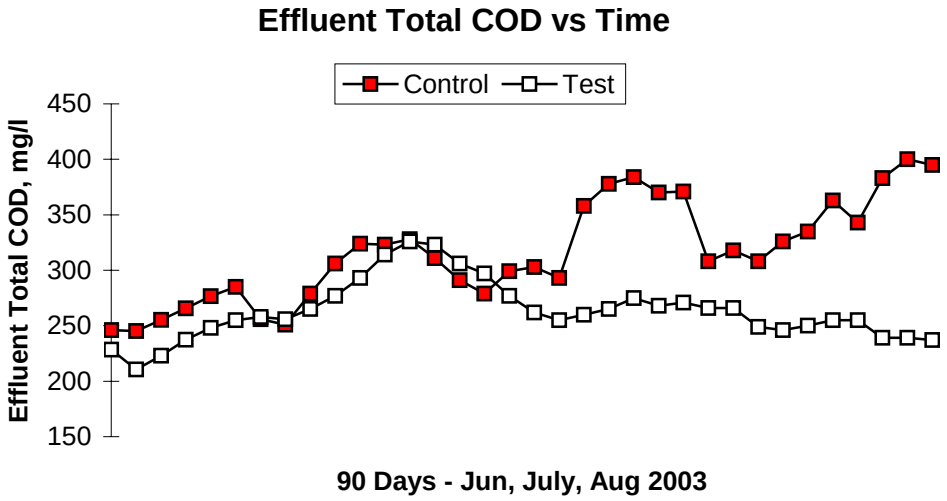
IV. Results

The chart below is a summary of effluent suspended solids vs. time for the test and control laboratory systems. The chart shows continuously improving performance on the Septic Medic treated side:

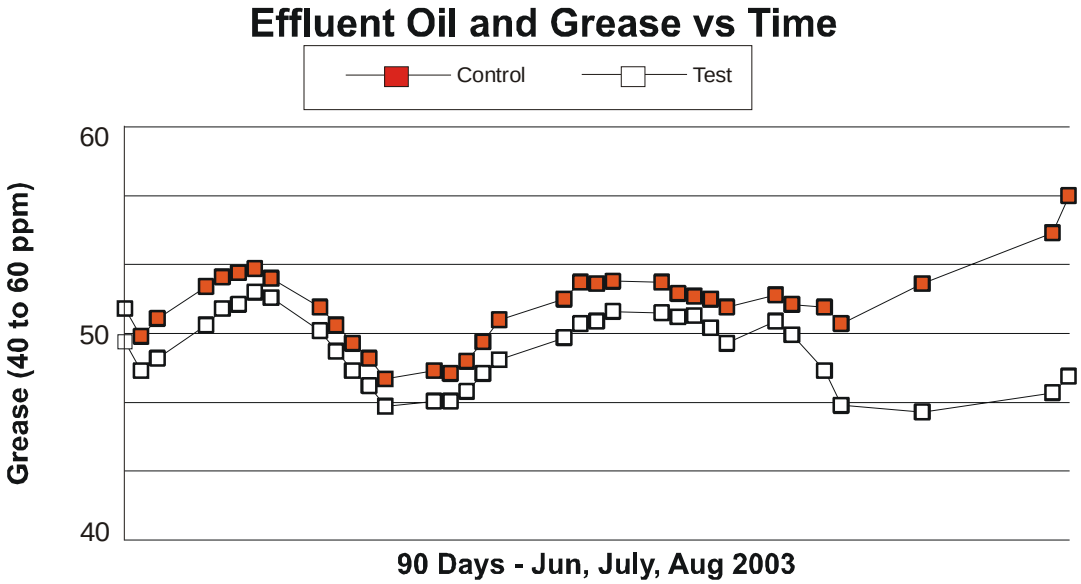


The next chart is a summary of effluent Total COD vs. time. As with effluent SS performance, the two sides (test and control) exhibited similar performance during the beginning of the run (the first 4 weeks). After that, it is

clear that the treated side continued to perform better and better compared to the untreated side.



Effluent Oil and Grease results are shown in the next chart. As with the other two charts above, the Septic Medic results continued to improve compared to the control results as the test proceeded. This is particularly important in considering the likely effect of Septic Medic on long term drain field operation and efficiency.



V. Discussion

From the various charts, it is clear that the Septic Medic treated system had significantly better effluent performance than did the control system. The table below is a summary of the key parameters:

Average Effluent Performance

	Test	Control
Total Suspended Solids (TSS)	60	83
Chemical Oxygen Demand (COD)	262	318
Oil and Grease (Fats, etc.)	53	47

These data prove that use of Septic Medic has a beneficial effect in the septic tank environment. The reduced pollutant content of the effluent will have several advantages, including reduced load on the drain field, reduced odors, less puddling. The bottom line is that with Septic Medic use, your septic tank will discharge cleaner water to the environment than it would otherwise.

Further, it is clear in each of the three charts that the relative performance of the Septic Medic tank improved compared to the control tank as the experiment continued. The data above show averages for the entire run. However, as the Septic Medic data were clearly improving towards the end of the experiment, the results can be interpreted as the low end of expected improvement. Just as the experiment continued to improve toward the end of the 90-day run, so will your own experience with Septic Medic.

For further information or answers, please contact us at 908-625-7366

Authorized Distributor
Organic Earth Solutions LLC
12 Payne Rd,
Lebanon, NJ 08833
Wayne Wojcik
President.
www.organicearthsolutionsllc.com