



# **The QuikSoil® BACS Process**

**Scientific Principals  
Part 1**

**Bio-Accelerated Carbon Stabilization**



## The Science of QuikSoil® BACS

**The fundamental force that drives biological decomposition is the pursuit of energy –**

- Energy to survive and grow**
- Energy to reproduce**



## The Science of QuikSoil® BACS

**Composting is the result of the bio-chemical digestion of organic molecules by living creatures in the pursuit of energy.**



## The Science of QuikSoil® BACS

- **Composting is the process by which substrates (compounds) are broken down through a series of reactions until an energy rich compound such as glucose is achieved.**
- **The glucose can then be digested to H<sub>2</sub>O, CO<sub>2</sub> and energy stored in ATP (Adenosine Tri-Phosphate).**



## **The Science of QuikSoil® BACS**

**Compost is the leftover material, composed of complex humic portions and inhospitable compounds, as well as any remaining undigested fraction of the original materials (such as small pieces of wood).**



## The Science of QuikSoil® BACS

- **Some substrates require minimal processing (a few reactions) to digest.**
- **Other substrates are more complex, requiring greater and greater numbers of reactions to digest.**



## The Science of QuikSoil® BACS

- **Because each reaction requires the bacterial production of specific enzymes, not all bacteria are capable of processing (digesting) all substrates.**
- **Bacteria are, in fact, highly specific in terms of substrate compatibility. Some can digest a few substrates, some dozens of substrates, and some can digest more than a hundred different substrates.**



## The Science of QuikSoil® BACS

**As a rule, faster, hardier, more competitive strains can digest FEWER varieties of substrates simply because they have not needed to learn to digest more. Their speed, motility, size, or other advantages grant them access to the foods which require the least energy (number of reactions) to digest.**





## **The Science of QuikSoil® BACS**

**Slower, less hardy strains have been required to develop greater processing abilities and more enzymes simply to survive - as they seldom have access to the most desirable\* foods.**

**\* Desirable means requiring the least expenditure of energy to digest.**



## **The Science of QuikSoil® BACS**

**As a result, decomposition and typical composting are highly sequential processes in the sense that one series of creatures is followed by another series and so on as differing sets of by-products and substrates become available.**



## **The Science of QuikSoil® BACS**

**To visualize this condition, imagine an antelope taken down by lions on the African plain. The lions eat their fill, followed by jackals, followed by vultures, followed by ever smaller and less particular creatures digesting less and less desirable portions of the antelope as their energy source.**



## The Science of QuikSoil® BACS

- **When a bacterium can decompose the more difficult substrates, it is not limited to those substrates. It can decompose any simpler substrate occurring along the way in the digestive sequence of that substrate.**
- **This means all these substrates are available to and digestible by this bacterium, whether they occur naturally or chemically in the decomposing mass, or as the result of previous digestive reactions by itself or another bacterium.**



## The Science of QuikSoil® BACS

- Therefore, a population composed of multiple substrate processing bacteria can digest wide varieties of available organic components - **SIMULTANEOUSLY.**
- This type of population greatly accelerates the process of decomposition and allows thorough digestion to greater stability in much shorter periods of time.



## **The Science of QuikSoil® BACS**

**Imagine the antelope on the plain again. How quickly would the carcass be gone if all the predators could take their portions at the same time?**



## **The Science of QuikSoil® BACS**

**However, since these broad spectrum digesting strains are normally not good competitors and not fast reproducers, an intentional methodology must be implemented to initiate and maintain growth and reproduction EARLY in the decomposition process rather than towards it's conclusion.**



## **The Science of QuikSoil® BACS**

**This is one function of BACS through the use of QuikSoil® additives. QuikSoil® 2300 and 2600 are founded on several key component technologies. One of these is SSCAR (Sequential and Simultaneous Carbohydrate Availability Response). SSCAR works by seeding the decomposing feedstocks with small amounts of particular substrates which are only viable energy sources to specific broad scale digesters.**





## The Science of QuikSoil® BACS

- **QuikSoil® additives also contain many of the enzymes these bacteria need to enable digestion. This allows these strains to begin growing and reproducing much more rapidly than they possibly could under normal circumstances,**
- **And it assures these strains an energy and nutrient source that will be theirs alone – unavailable to larger, faster, stronger, better competitors.**



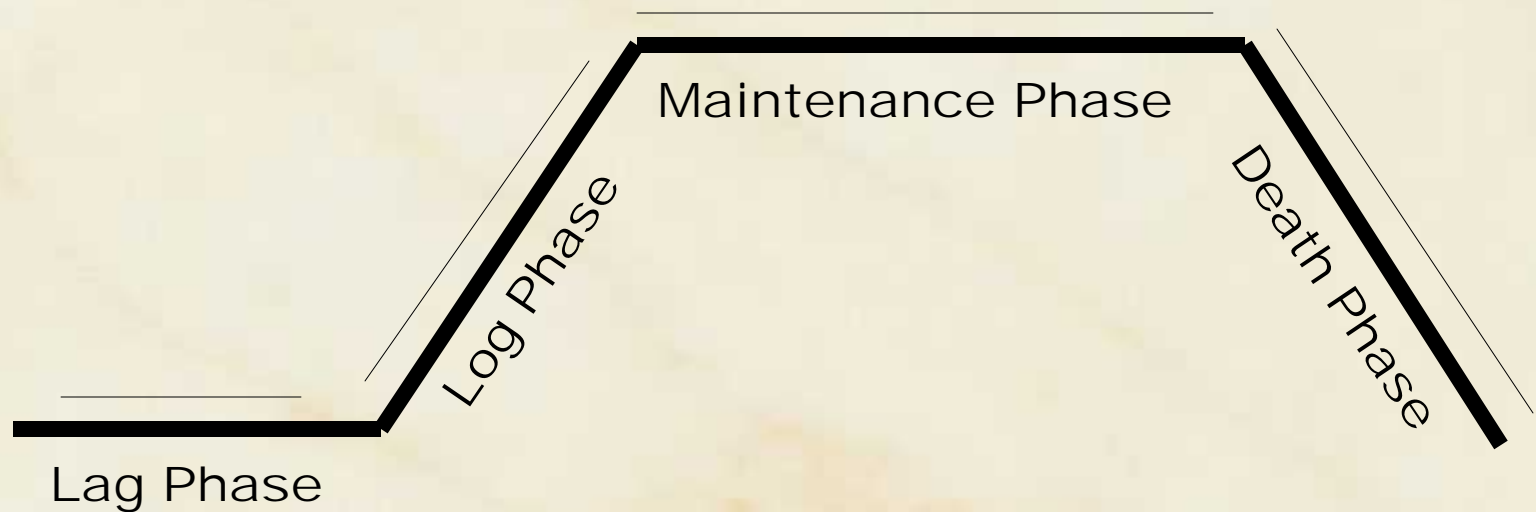
## **The Science of QuikSoil® BACS**

**This part of the process is fundamental to BACS. By accelerating digestion and stability of the organic compounds, long term Carbon retention is greatly improved, increasing the value of the end product for Carbon sequestration and soil recovery. This is essential in today's Carbon conscious world.**

## The Science of QuikSoil® BACS

# Bacterial Life Cycle

Variable Time Units (Minutes to Hours to Days)  
Depending on Stress Levels Encountered





## The Science of QuikSoil® BACS

- **The bacterial life cycle begins with what is called the “lag” phase.**
- **This period MUST be completed before growth and reproduction can begin.**
- **The lag phase may be delayed and extensive, or accelerated and brief depending on a number of factors.**



## The Science of QuikSoil® BACS

### ***Stress Factors Controlling Lag Phase:***

**Need to locate suitable substrates  
(food)**

**Need to locate or produce enzymes  
and necessary growth factors**

**Tissue repair (immediately after stress  
events such as shredding, turning, etc.)**

**Environmental stress factors  
(temperature, moisture, pH)**



## **The Science of QuikSoil® BACS**

**It is during the second phase,  
the log\* phase that exponential  
growth and most  
decomposition occurs..**

**\* Short for logarithmic**



## **The Science of QuikSoil® BACS**

**Therefore, the goal in controlled, accelerated decomposition is to create an environment conducive to the shortest lag phase and the longest log (growth) and maintenance phases for the greatest number of viable colonies of bacteria.**



## **The Science of QuikSoil® BACS**

**This is the first function of BACS and QuikSoil® - to shorten the “lag” cycle for a select group of multi-substrate digesting bacteria, and to promote their viability and successful proliferation from the very beginning of the composting process.**





**End Part 1**