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Microbial Philosophy

The process of microbial growth and bioremediation can be thought of in as simple or complex a manner as the individual chooses. For the practitioner seeking simplicity, bioremediation is simply gardening. By managing the remediation project as one would prepare, fertilize and seed a garden the mystery of microbiology is removed to a common sense, practical level. Vegetative plants are replaced with vegetative microbial cells and nature's process, along with a little helpful watering, produces our harvest.

Science is unable to completely explain biological processes, including the growth of plants, yet we are able to feed ourselves with success. Likewise, by making informed decisions about the use of microbes, we can employ their abilities without a comprehensive understanding of their methods. The natural world, with all of its wonders, retains its mystery. Keep it simple.

Picking your seeds

Just as there are a wealth of gardening seed companies, so are there many microbe companies. The quality of the products range from snake oil to superb, although the snake oil vendors definitely outnumber all others. Buying "bad bugs" is a forgivable offense...after all, how do you judge a product you cannot see? As a gardener interested in raising high crop yield, quality produce, a conversation with a seed specialist may be the difference between an average harvest and a bounty. Here are a few tips for picking your seeds:

Do you really need to buy seeds?

Since the soil already has indigenous microbes in it, why can't we just fertilize and till/ the answer is that you can do just that; using our gardening analogy, you will effectively grow weeds, i.e. Microbes which are not capable of hydrocarbon degradation. Even at sites where the proper species are present, the lag phase between fertilization and abundant cell numbers takes several months. If time is not a factor in the project, indigenous microbes may eventually do the job.

Blends are best

In gardening circles it is called "companion planting", planting different crops next to each other for cooperative benefit. Likewise, microbes also work better with cooperative companions. In fact, microbes have a capacity to work together synergistically as a community that science is still unable to decipher. We do know that currency in a microbial community is in terms of metabolic byproducts transferred from one species to another. It takes many diverse species working together to fully utilize typical remediation target compounds. For these reasons, the use of lab tested and blended multi species inoculate containing high numbers of proven hydrocarbon degraders is suggested.

Numbers

Evaluating microbial products is a numbers game, i.e. Numbers of viable cells. In our garden we want the highest number of desirable plants we can grow in our allowable space or plot. For currently available microbial products, populations range from over 1.5 billion cells per milliliter down to several hundred thousand cells per milliliter. From a purchasing standpoint, buying microbes solely concerned with cost per gallon can inadvertently mean fewer cells at a higher price.

Seeding a remediation site with microbes is also a number's game. Microbes are the Chinese Army of biological world, by outnumbering the opponent with bodies, in this case, cells.

Peak of freshness

To understand the importance of freshly grown microbes and their expected quality, simply observe the difference between a homegrown tomato and one of those pink vinyl substitutes shipped in from crow-country. One is produced for quality. The other is produced for shipping. The difference in quality is determined by the type of species and the way they are grown. In a laboratory devoted to the science of microbiology, organisms are isolated, grown in volume to high concentrations, centrifuged to dewater, and then freeze-dried. These freeze-dried microbes are stored indefinitely until needed, at which time they are carefully rehydrated and regrown for immediate use. The use of microbial products for commercial application should stay as near to the science and methods of microbiologists as possible.

Shelf life kills

One of the biggest concerns of microbial product vendors is shelf life of their microbes. Once a microbial culture is produced, the population begins to slowly decline due to nutrient and oxygen limitations. A similar experiment is to put your favorite house plant in the closet and see how long it survives. To address the desire for long term storage, microbe companies invented powdered products.

Magic powder

Powdered microbial products are far removed from the science of microbiology. Microbes for all their ingenious abilities, simply cannot be expected to live for an extended period with no water, food, or oxygen. A small number of species are capable of spore formation, whereby they encapsulate themselves in a hard, seed-like coating and become completely dormant. Under the proper conditions sporeformers can then revegetate themselves and become active. The two critical issues of sporeformers is their tendency to encapsulate rather than compete, and the need to carefully regrow them before the product can be used.

Simply dissolving a packet of powdered microbes in water and spraying a contaminated site is only partially more effective than relying on indigenous microbes to do the job.