Colorado's Leader in Organic Recycling

HydroLoc™ Mix, produced by A1 Organics, is a uniquely created and enhanced product of defined particle size distribution that contains stabilized organic matter (finished Class 1 compost), beneficial soil bacteria, and macro and micronutrients necessary for healthy soil and plant performance. The HydroLoc™ Mix is comprised of only natural products, including stable compost that meets EPA 503 and CDPHE regulatory requirements for unrestricted use and distribution. No synthetic chemicals are added to the product.

The beneficial soil bacteria used in the HydroLoc™ Mix is contained in a catalyst consisting of actinomycetes and fungal strains that are classified as 'saprophytes', which means they are only able to degrade dead cells. They obtain energy by breaking down non-living organic compounds and therefore constitute no risk to human or animal health. They are harmless to plants, aquatic life and beneficial soil organisms.

The HydroLoc™ Mix is also enhanced with additional proprietary volumes of beneficial constituents such as Gypsum ($CaSO_4$-$2H_2O$), Calcium (Ca), and Sulfate (SO_4-S) which enhance microbial growth and assist in improving the mobility of sodium and chlorides below the root zone via natural drainage functions.

HydroLoc™ Mix also includes the addition of a proprietary blend of supplemental bacteria from the *Bacillaceae* family (consisting primarily of *Oceanobacillus, Terribacillus, Virgibacillus, Bacillus, Salinicoccus, Halobacillus, Halolactibacillus, Marinilactibacillus, Thalassobacillus, Staphylococcus, and Streptococcus*), fungi (predominantly *Absidia, Aspergillus, Trichoderma, Trichurus and Yeast*), and actinomycetes (predominantly *Saccharomonospora, Planifilum, Thermoactinomyces, Saccharopolyspora, Streptomyces, Brevibacterium, Nocardiopsis, and Dietzia*).

Bacteria play a critical role in the biological nutrient cycle in breaking down complex sugars, proteins, and organic components into basic carbon, amino acids, and elemental chemicals. Diverse genera of bacteria are required to extract carbon from sugars or amino acids from proteins.

Bacillacae is a family of gram positive, heterotrophic (uses organic carbon for growth), rod-shaped bacteria that can produce endospores. An endospore is a dormant, tough, and non-reproductive structure. The name "endospore" is suggestive of a spore or seed-like form (*endo* means within), but it is not a true spore (i.e., not an offspring). It is a stripped-down, dormant form to which the bacterium can reduce itself. Endospore formation is usually triggered by a lack of nutrients or other environmental influences. When the environment becomes more favorable, the endospore can reactivate itself to the vegetative state.

Endospores can survive without nutrients. They are resistant to ultraviolet radiation, desiccation, high temperature, extreme freezing and chemical disinfectants. The inclusion of Bacillacae bacteria ensures continued viability of the Hydroloc™ Mix.

Bacillacae Bacteria can easily move compounds in and out of their cells. This makes them perfect processing units and they are capable of breaking down both simple and complex hydrocarbons. The bacteria effectively use hydrocarbons as a food source, or simply break hydrocarbons down, with no obvious use for them. The bacteria convert the hydrocarbons into methanol (a type of alcohol), water and carbon dioxide.

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Several of the Bacillacae strains added to the Hydroloc™ Mix *(salinicoccus, halobacillus, halolactibacillus, and marinilactibacillus)* are moderately halophilic (favor a salty environment) and perform well in the presence of sodium and chloride.

Fungi have evolved as nature's degradation machines and include molds and yeasts. Collectively they are responsible for the decomposition of many complex plant polymers in soil and compost. In a compost pile, fungi are important because they break down tough debris, enabling bacteria to continue the decomposition process once most of the cellulose has been exhausted. They spread and grow vigorously by producing many cells and filaments, and they can attack organic residues that are too dry, acidic, or low in nitrogen for bacterial decomposition.

Fungi can also metabolize hydrocarbons and are involved in three major modes of hydrocarbon metabolism, each involving its own distinctive enzymatic mechanisms: (1) partial transformation reactions; (2) complete degradation of hydrocarbons in the presence of a second compatible substrate; and (3) independent utilization of hydrocarbons as a sole carbon source for growth.

The actinomycetes contained within the HydroLoc™ Mix are capable of reproducing rapidly either by spore formation or hyphae fragmentation and are capable of producing many enzymes, some of which are highly specific in the reactions or groups of reactions they catalyze. This provides the ability to not only breakdown chemical contaminants, but in some cases, binding heavy metals as well. In an enzyme-catalyzed reaction the enzyme temporarily combines with the metal to form an enzyme-substrate complex. A reaction occurs and the product is released. This product is the transformed / oxidized or reduced metal. The enzyme returns to its original state and the process begins again.

Some non-sporulating Actinomycetes in the genera Nocardia and Dietzia, which are contained within the HydroLoc™ Mix are free-living aerobic bacteria that have broad metabolic capabilities. They can degrade even the most persistent man-made chemical compounds such as organochlorines, carbamates, and organophosphates.

In summary, the biological blend in HydroLoc™ is tailored to efficiently remediate / degrade petroleum hydrocarbons contained in treated cuttings.

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Reference Notation: The Biological Information contained in this document is provided with permission by Darren Midlane, Technical Director, Harvest Quest International.