COMAND®



STABILIZED ORGANIC MATTER

ENHANCED SOIL STRUCTURE

IMPROVED PLANT PERFORMANCE

OPTIMIZE BENEFICIAL MICROBES

BETTER WATER MANAGEMENT

Naturally Improving the Environment Through Soil Building

LifeSoils

WE BRING SOIL TO LIFE

WHO ARE WE?

LifeSoils

RECOGNIZED INNOVATOR

- Respected leader in organics recycling & compost utilization.
- Supply highest-quality products through superior service, knowledge & technology use.
- Increasing soil organic matter to conserve water resources.
- Managing and marketing over 175,000 tons of compost in Florida annually.
- Rapidly expanding markets creating high demand for additional capacity.

TECHNOLOGY PARTNER

- HARVEST QUEST - Proven Technology (since 1990)
- Biotech environmental solutions provider.
- Unique proprietary technology creates powerful inoculants.
- Accelerates composting, mitigates environmental impacts.
- State and Federally recognized MSAP Composting Methodology.
- Decades of experience managing over 100 projects worldwide.
- Inoculant provides microbially enriched finished compost.

Part of the Organics Management Holdings Group

Organics Management Earth's Helping Hand

Harvest Quest

WHAT MAKES COMAND UNIQUE?

The answer to this question lies in the use of precise proprietary blends of enzyme-producing microbes, some unique composting methodology, and inventive methods of maximizing beneficial microorganisms in the finished product. COMAND is truly a bio-engineered, yet completely natural product.

PROPRIETARY INOCULUM - Through many years of research, Harvest Quest (HQ) developed an inoculum, which accelerates and uniquely enhances the natural biological process of composting.

COMPOSTING METHODOLOGY - The HQ methodology, known as the Modified Static Aerobic Pile (MSAP) process, relies on the use of the unique inoculum to bring about a phenomenon, which reverses the physics of the temperature generation in a compost row.

UNIQUE PILE DYNAMICS - Instead of the rows generating temperatures in the center of the piles, the microbes introduced through inoculation, first populate the outer edges of the rows, and then progress towards the center. The temperature front moves inwards and the windrow decomposes from the outside in. This unique attribute enhances the windrows natural chimney effect enabling aerobic conditions to be maintained without regular turning.

PROLIFIC & DIVERSE BIOLOGY - The use of the inoculum speeds up decomposition rates by a minimum 30% and coupled with significantly less turning, results in a very dramatic and highly visible proliferation of microbes during composting. The finished compost from an MSAP process has elevated levels of Actinomycetes (often a 100X higher) and aerobic bacteria, which enhance nutrient cycling in the soil.

ENHANCED CURING & REINOCULATION - To enhance the COMAND product further, our focus on microbiology has been enhanced through carefully controlled curing procedures and re-inoculation with mesophilic (ambient temperature) microbiology.

DEVELOPING A PROGRAM - The aim is to continue to develop programs using our microbially rich and diverse COMAND product and supply additional complimentary products, such as, liquid extracts, humates, and energy substrates to continue to feed soil microbiology.




BENEFITS OF UTILIZING COMAND

COMAND possesses excellent soil building attributes, greatly improving the soil physically (structurally), chemically (nutritionally), and biologically.

- ✓ Supplies stabilized high quality organic matter (soil carbon)
- ✓ Improves soil structure and porosity, thus creating a better plant root environment.
- ✓ Increased root density and length
- ✓ Increases moisture infiltration and permeability, thus helping to maintain percolation rates and relieve compaction.
- ✓ Improved water holding in light soils, providing greater drought resistance and more efficient water utilization.
- ✓ Increased soil cation-exchange capacity (CEC), thus improving the soil's ability to hold nutrients.
- ✓ Supplies beneficial microorganisms.
- ✓ Aids the proliferation of soil microbes, which assist in Thatch reduction.
- ✓ Contains humus, assisting in soil aggregation and making nutrients more available to plants.
- ✓ Improved wear tolerance promotes faster turf establishment and recovery rates.
- ✓ More even turf density and color, green-up without excessive top growth
- ✓ Complimentary to other management programs, provides for more efficient utilization of fertilizers.
- ➢ COMAND can be incorporated into your turf establishment and maintenance programs all season long.
- ➢ Typically showing results within a few days; exhibiting green-up and new lateral growth.

TAKE COMAND® OF YOUR SOIL HEALTH

THATCH REDUCTION

Actinomycetes and fungi induce the breakdown of the turf's thatch layer. Thatch restricts the percolation of water and movement of air and coupled with compaction, can result in anaerobic conditions, leading to very shallow root systems, drought stresses, and disease pressures.

- Thatch is 'organic material' (largely undecomposed), whereas,
- COMAND is 'organic matter' (decomposed and stabilized)

In practical terms, the degradation of thatch and its conversion to humus (organic matter) and humic compounds (plant food) provides the turf manager with a host of practical benefits, potentially saving work time and costs whilst improving the playing surface.

BUFFERING pH

COMAND can balance pH, to make alkaline soils more acidic and acidic ones more alkaline. This can seem especially mind-boggling because, unlike most pH treatments, COMAND's pH is near neutral. Its ability to balance pH results directly from the fact that it boosts cation exchange capacity (CEC) of soil.

Soil pH, affects whether nutrients present in the soil, can be taken up by plant roots. Nitrogen is most available at a neutral pH because the microbes that convert nitrogen into the usable forms of ammonia and nitrate operate best at near-neutral pH levels. Phosphorus is most easily available at pH values between 6 and 7. In alkaline soils (pH values above 7), it bonds with iron and aluminum. In acidic soils (pH values below 6) it bonds with calcium, forming chemicals, which are insoluble and therefore unavailable to plants. Other essential nutrients, such as, manganese, iron, copper, zinc, and boron are also affected by soil pH.

Technically, pH measures the level of free hydrogen ions (positively charged ions) in a water solution. The more hydrogen ions, the more acidic the solution and the lower the pH. Most pH treatments are themselves either quite alkaline or acidic. They will only shift the pH in one direction. Loosely speaking, an acidic amendment provides free hydrogen ions, while an alkaline one absorbs them. More precisely, they interact with other soil chemicals in ways that either release or attach hydrogen ions.

COMAND, by contrast, has a nearly neutral pH. Most soil amendments designed to adjust soil pH have very simple molecules. However, COMAND consists of large, complex, and diverse compounds that provide both negatively charged attachment points and numerous hydrogen atoms. Which of these comes into play depends on the pH of the soil into which COMAND is placed.

Acidic soil suffers from an overabundance of positively charged hydrogen ions. When COMAND is added, its many negatively charged attachment sites attract and bind the hydrogen. When enough hydrogen ions are taken out of solution, the pH level of the soil rises.

In alkaline soil, COMAND's complex, hydrogen-rich molecules provide a source for hydrogen ions. Many get stripped away, leaving their electrons behind them, which means, that they have become positively charged ions. When enough ions are released into the soil solution, the pH falls. The negatively charged sites on the COMAND molecules (the ones that used to be occupied by hydrogen atoms) are now available to bind other positively charged particles, which includes various soil nutrients.

PRODUCT APPLICATIONS

NEW CONSTRUCTION

COMAND can be utilized as the organic component of a sand-based rootzone media for golf course and sports field construction. The product can also be incorporated into existing soils to greatly improve characteristics and accelerate turf establishment for parks and home lawns.

MAINTENANCE

COMAND can be utilized for topdressing fairways, tees, greens, sports fields, lawns, and as a component of divot mixes. It will encourage consistent growth and regeneration of damaged turf, boost performance in weak areas, improve strength and rate of germination when overseeding, can accelerate transition from winter dormancy, and will hold moisture in potentially problematic dry areas, such as mound tops and bunker faces.

PEAT REPLACEMENT

COMAND provides a superior replacement for peat in a rootzone mix and far exceeds the highest standards for a rootzone amendment. It provides stabilized organic matter, excellent water-holding capabilities, and dynamic microbial populations. Furthermore, it has a Carbon: Nitrogen (C: N) ratio close to 10:1.

Why is the C: N ratio important?

The C: N ratio of soil is a measure of the intimate relationship between organic matter (carbon) and nitrogen content and most healthy productive soils typically have a C: N ratio of 10:1. Therefore, COMAND closely matches this critical ratio (10: 1), which is a reflection of the dynamic equilibrium that results from the dominating presence of strong microbial populations, the ratio being similar to the average chemical composition of microbial cells.

The C: N ratio in soil organic matter is important for two major reasons:

i. Keen competition for available nitrogen results when organic residues of high C: N ratio are added to soils (peat is typically 58:1) and
ii. Because this C: N (10: 1) is relatively constant in soils, the maintenance of carbon and hence soil organic matter is dependent to no small degree on the level of soil nitrogen.

In essence, the C: N ratio obviously has practical implications on the availability of nitrogen in soils as well as in plants. Adding organic materials with a high C: N ratio (20:1 or higher) results in

increasing populations of heterotrophic microorganisms and production of $C0_2$. Under these conditions, nitrate nitrogen (NO_3-N) disappears from the soil because of the urgent needs by the microorganisms.

Since carbon and nitrogen are reduced to almost a definite ratio, the amount of soil nitrogen largely determines the amount of organic carbon present when stabilization occurs. Thus, the greater the amount of nitrogen present in the original organic material, the greater will be the possibility of an accumulation of organically bound carbon.

The importance of stable humus directly relates to the fertility it provides to soils in both a physical and chemical sense, while some agronomic experts put a greater focus on other features of it, such as its ability to suppress disease. COMAND is carefully prepared to optimize the physical, chemical, and biological functions of the soil. It helps the soil retain moisture by increasing microporosity, and encourages the formation of good soil structure. The incorporation of oxygen into large organic molecular assemblages generates many active, negatively charged sites that bind to positively charged ions (cations) of plant nutrients, making them more available to the plant by way of ion exchange. COMAND contains effective humus and stable humus, both are additional sources of nutrients for microbes: the former provides a readily available supply and the latter acts as a longeval storage reservoir. COMAND allows soil organisms to feed and reproduce and is the "life-force" of the soil.

How Does COMAND Differ from Biochar?

Biochar is typically derived from woody biomass, which is thermally decomposed in the absence of oxygen (to prevent combustion) and results in a charcoal product. Biochar adds carbon to the soil, which stays around for decades. However, this type of carbon is not biologically available and does not fuel the all-important replication of soil bacteria and fungi, which need biologically available carbon (humus) to thrive. Hence, some biochar producers and suppliers have selected to blend their products with compost.

Biochar, being microporous, does provide good accommodation for microorganisms and is effective at holding on to water and nutrients (good CEC). On the other hand, because of its high adsorption capacity, biochar may reduce the efficacy of soil applied chemicals needed for weed and pest control. More research into the long-term effects of biochar addition to soil is needed.

The creation of Biochar is a relatively expensive process and costs can therefore restrict application rates. Typical recommended application rates are 35 lbs per 1,000 square feet for straight biochar and 60 to 80 lbs per 1,000 for those blended 50:50 with compost. Are these rates sufficient to change the soil profile and make an agronomic difference?

COMAND, when utilized in a construction mix, has a price point comparable to, or below, sphagnum peat and can be utilized as a direct replacement. Therefore, a traditional 85:15 sand/amendment ratio can be employed with all the additional benefits that COMAND provides.

In summary, biochar improves water holding capacity and increases the cation-exchange capacity of soils. COMAND also provides these important benefits. Biochar is best utilized in conjunction with compost as biochar does not provide biologically available carbon. COMAND provides the highest quality humus, fueling and supplying beneficial microbial populations.