

The Basic Humic Acid Products

Over at least twelve years of actual field experience with an ample variety of humic acid formulations (some of them developed many years before) have given us a singular degree of expertise in Latin America and a few other markets. Among other things, we have learned to distinguish between humic acids of high biological value, and humic substances of little biological activity. We have found cases where the difference in biological activity was as much as ten to one, despite the absence of significant differences in the chemical analysis.

Our own investigations confirmed the ample published evidence regarding the singular biological activity of the North Dakota "leonardite", apart from its high average purity (often above 80%) and lack of soil toxicants. All of our products containing humic (or fulvic) acids use materials derived from the North Dakota Leonardite mines.

Our product development and evaluation work has been particularly prolific in this field, resulting in dozens of experimental formulations, most of which have been discarded along the way. Some new concepts have not only survived, but have also been subject to further development work, arriving at concrete new products that are being evaluated and test marketed in some cases. We know of no other entity in the world that has developed as much knowledge and experience in the humic acid field as our company.

The products described below are well-proven and traditional products of our line, although—occasionally—a glimpse may be offered regarding future trends.

Bi-O-80

This is the basic product of our humic acid line. It contains an average (dry basis) of 80% leonardite (North Dakota humic acids). Its biological activity is so high that a single application of one 50 lb. bag (22.7 kg) per hectare is enough to produce the expected benefits throughout an entire crop cycle (and usually well beyond), following a single application, usually in combination with the customary fertilizer (the dosage of which can be reduced by at least 30%).

Bi-O-80 is a sustained-release product, allowing the constant presence of active humic acids in the soil to provide the benefits described in Chapter 3.

In many ways, **Bi-O-80** is the cornerstone of the entire system, as it deals with the regeneration of soils, in part via the stimulation of the soil microorganisms, and by means of improving the soil structure. In addition, it provides immediate and direct benefits to the crop, contributing to its healthier and more robust growth. Several Bi-O-80 variants are being developed for specific indications, for instance to facilitate the blending with commercial fertilizers.

Any kind of soil will benefit from the application of Bi-O-80, and so will just about any crop grown on a soil treated with Bi-O-80. The following are the basic guidelines for the **application of Bi-O-80**:

- **Basic application rate:** One bag (50 lbs) per hectare. This applies reasonable condition and to short and medium cycle crops. Apply together with

fertilizer. If applied with chemical fertilizer, reduce NPK rate by 30%.

- Trouble soils (very low organic content, high compaction, etc.): Increase application rate to up to two bags (100 lbs) per hectare.
- Long cycle crops (like sugarcane): Apply two bags (100 lbs) at beginning of cycle, together with fertilizers. NPK rate can be reduced.
- Fruit trees, bananas, etc.: Depending on soil conditions, apply between one (50 lbs) and two bags (100 lbs) per hectare. In most cases 50 lbs is enough. Divide application rate by number of trees per hectare to obtain the proper rate per tree.

Bi-O-15

When the Leonardite containing around 80% of humic acids is submitted to an acid or alkaline (usually the latter) extraction process, a humic acid solution is obtained. Such solution, after filtering and sedimentation to remove all non-soluble particles, can theoretically contain up to 17% of humic acids, at which point the solution saturates. A 15% humic acid solution obtained in this fashion is **Bi-O-15**.

Since Bi-O-15 is totally soluble in water it can be used in all kinds of irrigation systems. It can also be applied directly to the soil to achieve immediate humic acid peaks. This is particularly useful right after application of Bi-O-80 to reinforce the latter's release rate.

Bi-O-15 is very useful for seed treatments resulting in a higher percentage of germination. The treated seeds will germinate faster and usually simultaneously.

Above all, Bi-O-15 is indicated for foliar applications. Not only are the soluble humic acids readily absorbed, but also do in fact speed up and increase the absorption of other compounds applied in conjunction.

Bi-O-15 is a fine product, providing all the benefits described in Chapter 3. However, by combining soluble humic acids with soluble seaweed extracts even better results are obtained. The resulting product, Bi-O-Mar-15, has replaced Bi-O-15.

Bi-O-Mar-15

Originally, Bi-O-Mar-15 was a solution containing Bi-O-15 (15% of soluble humic acids) and 3% of the North Sea seaweed extract (*Ascophyllum nodosum*). More recently, this product has been further improved by using 15% of fulvic acids instead of humic acids.

Fulvic acids are the humic materials of choice for foliar application and seed treatments. Their much lower molecular weight, apart from their solubility throughout the entire pH range, contribute to their rapid foliar (and seed) absorption and consequent translocation throughout the plant.

Chapter 3 describes the activity of humic and fulvic acids, and Chapter 4 does the same for the seaweed extract. It is generally accepted that there is a pronounced degree of synergism between humic/fulvic acids and *Ascophyllum nodosum* thanks to which the latter's activities are enhanced. It bears repeating that *Ascophyllum nodosum* is the source of over 60 naturally occurring major and minor nutrients and amino acids. These active ingredients include such trace elements as boron, molybdenum

zinc, manganese, silicon and cobalt, as well as chelating and complexing agents such as alginic acid and mannitol. The seaweed extract also contains naturally occurring growth promoting substances (phytohormones such as cytokinins) and their precursors, which enhance plant development, color and vigor.

Bi-O-Mar-15 is a superior **biostimulant** to promote faster and more robust growth of the plant and its root system, achieving greater resistance to disease and insect attacks and resulting in greater and higher quality yields.

While Bi-O-Mar-15 enables the plant to absorb greater quantities of nutrients from the soil or by foliar application, it should be remembered that it is not a fertilizer per se, and that care should be taken to apply the required nutrients, although usually at a reduced rate.

In a general way, Bi-O-Mar-15 is indicated for the following applications:

- Direct application to the soil or through the irrigation system: Typical application rate: Apply 6 liters per hectare and repeat every three or four weeks.
- Foliar application: Apply 1-2 liters per hectare, usually when the seedlings are in the 3-4 leaf stage. Repeat at onset of bloom. Applications can be made with foliar fertilizers, insecticides and fungicides. Add Bi-O-Mar-15 as the last ingredient in the tank mix.
- Seed treatment: Typical application: Soak the seeds in a 1% solution (10 ml Bi-O- Mar-15 in 1 liter of water) during up to one or two hours. Small seeds require less time. By using a stronger solution (say, 10%) a few minutes may be sufficient.
- Transplants, cuttings and rooting: Soaking in a 1% solution is normally sufficient. In the case of transplants, it is recommended to briefly dip the roots into the solution prior to transplanting. To further reduce the stress caused by transplanting it is recommended to make a foliar application of 2 liters per hectare. This application can be combined with a foliar fertilizer like Bi-O-Fol “24” or Bi-O-Fol “Start Up”.

Bi-O-Mar “80/20”

Bi-O-Mar “80/20” is the latest addition to the OIKOS Line of fine humic/fulvic acid based products. While its concept is essentially identical to Bi-O-Mar-15, containing fulvic acids plus *Ascophyllum nodosum* seaweed extract, the important difference is due to the fact that it comes in a totally soluble powder form.

The fulvic acid source is our new **Bio=Plex “86”**, an exclusive compound containing fulvic acids derived from North Dakota Leonardite, obtained through a proprietary process and spray-dried for instant solubility. It contains an average of 86% fulvic acids and may contain minor amounts of humic acids.

The foregoing fulvic acid compound is combined with **OikoKelp-AN**, a

premium blend of North Sea algae (*Ascophyllum nodosum*), harvested, treated and extracted to maintain maximum biological activity. This is also spray-dried for instant solubility.

Bi-O-Mar "80/20" thus contains:	Bio=Plex "86"	80%
	OikoKelp-AN	<u>20%</u>
		100%

Thanks to the new Bio=Plex technology it is now possible to offer a product in solid (powder) form with such a high degree of solubility that it can be diluted with water and almost instantly applied.

While Bi-O-Mar "80/20", once diluted with water in the proportion of approximately 1 in 6, will be more or less equivalent to Bi-O-Mar-15, and can indeed be used as a replacement of the latter, **Bi-O-Mar "80/20"** has been basically designed for the application in fertigation systems requiring the use of totally soluble substances.

Recommended application via fertigation systems: The standard application rate is 1 kg per hectare. As with all other substances, Bi-O-Mar "80/20" should be applied well diluted. One practical way of simplifying the application is to dilute Bi-O-Mar "80/20" in a standard quantity of water. For instance 1 kg in 10 liters of water. This would be the dose for one hectare.

It is not required that the entire dose be applied at once. On the contrary, it should be applied slowly; even over a period of two or three days. This is the approach that works best.

Frequency of application: For best results, repeat the application every three weeks. An even better alternative is to make the follow-up applications every 10 days, or so, but at the reduced rate of 1/2 kg of Bi-O-Mar "80/20" per hectare. The idea is to have a constant humic/fulvic acid and seaweed activity in the soil around the plants.

Bi-O-Mar "80/20", applied via any kind of irrigation system, will bring maximum benefits to the soil and to the crop, because it works with nature to restore health.

The Humic/Fulvic Acid plus Seaweed Extract Concept

The use of humic or fulvic acids, preferably in combination with the OikoKelp seaweed extracts, is by no means limited to soil applications. In fact, such combinations are equally beneficial in the case of foliar nutrients to significantly enhance the foliar absorption, often permitting the reduction of the nutrients to about one half without reducing the actual amount absorbed.

This proven concept is the underlying principle of the **dynamic foliar fertilizers** and the **foliar biostimulants** of the Bi-O-Fol products described later in this chapter. Without the fulvic/seaweed substrate of such formulations, they would just be ordinary, albeit top quality, foliar fertilizers.

It is being emphasized throughout this publication that there cannot be any eco-agriculture (in fact, any agriculture worth mentioning), without the proper harmonious balance of soil microorganisms. Our humic/fulvic acid plus seaweed products do not contain soil microorganisms. But, and this is fact must be stressed, they provide the optimum environment for the beneficial soil microorganisms to grow and multiply.

Thus, Bi-O-80, Bi-O-Mar-15 and Bi-O-Mar "80/20" (plus a number of experimental formulations) are in fact essential for the well being of the soil microflora. However, in those cases where the soil microflora has been destroyed, or reduced to remnants and probable mutants of a once healthy microbial system, there is no other

choice but to reinvigorate the soil with carefully selected and healthy strains like those contained in the OikoBac and OikoRhiza lines of products.