



BorreGro HA-I

A New, High Performance Proprietary Potassium Humate

As both an acid and alkaline soluble potassium humate, BorreGro HA-I is truly unique. Unlike any other available humate, BorreGro HA-1 completely dissolves when added directly to fertilizer, micronutrient, or pesticide formulations of any pH. It allows the user to apply this humate in direct tank mix, drip irrigation or acid soil applications unacceptable for conventional products.

BorreGro HA-1 Advantages over Conventional Humate

Full Water Solubility over a Broad pH Range

Both acid & alkaline soluble - pH < 0.5 to pH 14.0
HA-1 solutions will not precipitate in phosphoric acid

Versatile Product Form

Available as a completely soluble powder

High Bio-available Humic Acid Assay

Proprietary extraction and modification process maximizes humate content
High % humate content provides superior performance on a pound per pound basis.
Low solution viscosity at high humic acid concentrations provides for easy mixing and pumping

Superior Re-dissolving Properties

High solubility prevents build up of insoluble sludges that normally clog lines under low flow Rapidly re-dissolves and wets out without leaving insoluble clumps Dissolved powder performs equivalently to liquid product.

Excellent Salt Tolerance

Superior compatibility in all types of fertilizer and pesticide formulations does not precipitate out of solution like conventional humates. Effective component in a wide-range of NPK, nutrient or combination fertilizer formulations.

High Ion Exchange Capacity

Better stability under varying soil pH conditions better at complexing metals. Makes micronutrients more readily available to plants.

Complexes Micronutrients

BorreGro HA-1 solution will complex 10% Zn, 7% Mn, 5% Cu, 5% Fe, 5% Ca, and 4% Mg nutrient solutions.

BorreGro HA-1

Composition

Potassium Humate

Function

Complexing

Typical Application

Agriculture

Typical Analysis

(Solids Basis)

Chemical Data

9.0 pH
0.4 Total Nitrogen
-- Phosphoric Acid
17.6 Soluble potash
6.8 Total sulfur
1.5 Calcium
0.35 Iron
52.5 Carbon
11.7 Oxygen

Physical Data

Color: Black

Powder: 10% max. moisture

98% (min.) solubility in water

General Specifications

	<u>Minimum</u>	<u>Maximum</u>
Powder: pH 10% solution	8.0	10.0
% Humic Acid	70.0	

Storage Stability: Stable under dry conditions.

Packaging: Powder is packaged in 50 lb. Net weight multiwall kraft bags or in Non-returnable bulk bags.

Quality Control Methods: Available upon request

MSDS: Available upon request

General Instructions: To formulate a 15% minimum Liquid solution of BorreGro HA-1, dissolve 2 lb. Powder per gallon. Test compatibility prior to use.

Lead time: 6-8 weeks

BorreGro HA-1

(Acid Soluble Potassium Humate)

Description:

BorreGro HA-1 is a modified potassium humate derived from leonardite. Made by a patented process (U.S. Patent #5,663,425), BorreGro HA-1 has superior solubility in low pH systems.

Typical Analysis:

9.0	pH	17.6%	Soluble potash	6.8%	Sulfur
52.5%	Carbon	11.7%	Oxygen	3%	Hydrogen
70% Organic acids (BaCL ₂ Method) 50% derived from Humic acids, 20% from Fulvic acids					

Benefits:

- | | |
|---|--|
| <ul style="list-style-type: none"> - Improves soil structure - Stimulates microbial action - Stabilizes pH - Increases root penetration | <ul style="list-style-type: none"> - Increases nutrient exchange and retention - Improves nutrient absorption - Increases stress tolerance - Improves seed germination |
|---|--|

BorreGro HA-1 vs Conventional Liquid Humates:

PROPERTY	BorreGro HA-1	Conventional Humate
Alkali soluble	Yes	Yes
Acid soluble	Yes	No
Water solubility	Complete	Varies
Fertilizer compatible	Yes	Varies

Versatility

The unique nature of BorreGro HA-1 makes it one of the most versatile potassium humates available today. BorreGro HA-1 can be mixed and applied with most types of fertilizers (including acidic fertilizers), pesticides, seed treatments and micronutrients. BorreGro HA-1 is readily bio-available and is packaged as a soluble powder.

Recommended Dosages

Garden vegetables & strawberries – 1 lb. powder per acre per treatment; 3 treatments per year in irrigation water.

Fruits – 1 lb. powder per acre per treatment; minimum of 3 treatments per year in irrigation water.

Citrus - 1 lb. powder per acre per treatment; 2-3 treatments per year in irrigation water.

Banana – 10 lbs. powder per acre per year; 5 treatments per year in irrigation water at equal intervals.

Vineyard Grapes – ½ lb. powder per acre; 3 foliar treatments per year.

Corn – 1-2 ½ lbs. powder per acre, 2 treatments per year in irrigation water

Olive – ½ lb. powder per acre; 2 foliar treatments per year.

Sorghum – 1-2 ½ lbs. powder per acre; 2 treatments per year in irrigation water

Ornamentals – 3 lbs. powder per acre; weekly treatments in irrigation water

Drip Irrigation – 3 lbs. powder per acre; weekly treatments

Soil Fertilizers – 1 lb. powder per acre to promote absorption

Foliar Fertilizers – ½ lb. powder per acre to promote absorption

Physical Properties:

98% Solubility in water, 10% Maximum moisture, Color: Black

Packaging:

50 lb. multiwall kraft bags or non-returnable bulk bags.

BORREGRO HA-1 – MIXING AND APPLICATION

MIXING

The objective of mixing dry BorreGro HA-1 powder with water is to make a solution which is capable of delivering the maximum concentration of humic/fulvic acids possible in one gallon of liquid, particularly for manufacturing and shipping. The concentrated solution may then be diluted by the manufacturer and ultimately will be diluted by the user prior to application. Mixing at lower concentrations will require proportionately less dilution for application.

Mixing the concentrated liquid

The concentrated liquid form of BorreGro HA-1, when completed, will contain approximately 25% by weight solid BorreGro HA-1. The remainder of the solution will be ordinary tap or well water.

Mix according to the table below:

1. Use an oversized container
2. Add water
3. Add BorreGro HA-1 under continuous agitation or circulation
4. Stir or agitate until thoroughly mixed, i.e. no clumps or even small bits of solid

Target Min. Percent Humic + Fulvic Acids	Lbs BorreGro HA-1	Gallons of Water	Fl. Ounces of Water	Total Weight/Gal
17.5	2.31	0.834	106.7	9.230
15.0	2.01	0.860	110.0	9.152
13.6	1.82	0.877	112.3	9.100
12.0	1.55	0.903	115.6	9.048
6.0	0.775	0.989	126.6	8.674

Caution: Dust hazard. Use eye protection & particulate respirator when handling dry material.

Mixing Tips

BorreGro HA-1 is best mixed under continuous, mild to medium, agitation or circulation. The ideal method for mixing is to dump the dry powder slowly into an inductor, being careful not to plug the opening. If the dry powder is put into the tank on top of the water, it will tend to be hydrophobic. For circulating systems, it is then best to have the circulated liquid discharge onto the top of the tank in order to disturb un-dissolved powder. If this cannot be done, the powder should be disturbed manually to get it wet enough to dissolve. For agitating systems, the ideal is to create a vortex which pulls the powder into the liquid. In all cases, be sure to add powder slowly such that clumping is avoided. When the solution is thoroughly mixed, i.e. 10-15 minutes or more beyond disappearance of dry powder, it is always a good practice to probe the bottom of the vessel for any un-dissolved powder prior to offtake.

Dilution for spray application:

Although BorreGro HA-1 can be sprayed at full strength (17.5% humic + fulvic) we do not recommend it. Most applications will require additional liquid in order to obtain coverage. We recommend that BorreGro HA-1 at full strength be diluted by at least a factor of 10, preferably 15 or higher. Additional circulation or agitation will not be required, even at very high dilution rates.

Cleanout

In order to remove traces of BorreGro HA-1 from tank bottoms, lines, nozzles etc. it is recommended that the system be flushed / circulated with clear water for approximately 5-10 minutes after the last application of the day. The thin film of BorreGro HA-1 will not "pack" in the system or plug nozzles or screens but may remain as minute loose particles in areas of low velocity as treatment comes to an end. Flushing will remove these traces and leave tanks clean and ready to use for your next application.

APPLICATION RATES

Foliar application

See technical data sheet for application rates for various crops.

Foliar application 2 – 3 times per growing season is recommended for row crops and forages. Plants need to be just past the seedling stage - about 25% coverage of the ground before the first application. Second application is usually just before flowering, or just before the onset of the reproductive stage of the crop.

The 3rd application would be early in the grain fill or fruit/vegetable sizing stage.

For forages which are cut more than once per year; a foliar treatment in the spring and after each cutting should occur when the plants have grown back to cover 1/4 to 1/3 of the ground (alfalfa, clovers), or when grasses reach about 7 cm in height.

For ornamentals and high cash value vegetable crops, foliar treatment intervals from 2 - 4 weeks are effective.

For lawns, a treatment every 4 - 8 weeks is recommended (3 – 6 ozs. / 1,000 sq. ft.) diluted up to 40 times for coverage.

Applying with Liquid Fertilizers

BorreGro HA-1 is completely pH stable and thus mixes well with all liquid fertilizers, including urea-ammonium nitrate (UAN) and ammonium polyphosphate (10 -34 - 0), and can be applied in a band with the liquid fertilizer at planting to maintain the solubility of the nutrients. The rate would be the same as for foliar applications.

BORREGRO HA-1 FIELD TRIAL DATA

PROJECT 202 – PHOSPHATE UPTAKE IN WATERMELON - YIELDS

YEAR	NO. 1	NO. 2	NO. 3	TOTAL	Wks. Of Harvest	
2000	34,000	2,000	N/A	36,000	4	Control
2001	53,000	2,000	N/A	55,000	5	<u>HA-1</u>
2002	39,000	2,000	2,000	43,000	7	<u>HA-1</u>

Mid-season Year 2000 cooperation was initiated with Wayne Reavis of Reavis Farms, Inc. As the season progressed there was a steady decline in petiole phosphate levels. Yields were 50% higher than any previous yields made by this grower.

Year 2001 was good growing year weather wise. Phosphate levels were generally maintained at acceptable levels. Yields and quality were improved over the previous year. The vines tolerated the foot traffic of the harvest crews better than usual and were able to harvest one week longer than normal.

Year 2002 was one of the worst melon growing years ever. In February and March cold fronts were much colder and windier than normal. Record high temperatures and constant high winds were experienced in April. Many fields in the area were lost due to blowing sand. Fields that were treated with HA-1 tolerated temperature, wind and harvest stresses much better than other fields and we were able to harvest 3 weeks longer than normal. Many fields in the area that were not treated with HA-1 were harvested only 2 to 3 times yielding +/- 20,000 lbs./ac.

Use of HA-1 resulted in rapid vine recovery after each harvest. There were more and better vines after a month of harvesting than when harvest started, which is very uncommon and speaks to the overall health and vigor of the plants. Harvest continued 2-3 weeks longer than normal because the vines remained healthy. Yields in 2001 improved 56% over 2000 when HA-1 was not used. Despite extremely poor weather conditions in 2002, the yield was 20% higher than in 2000.

YIELD RESPONSE OF HUMATE PRODUCTS AND CALCIUM LIGNOSULFONATE IN IRRIGATED SWEET CORN

Introduction

Adding humate and calcium lignosulfonate to fertilizer or low organic matter soil should increase the uptake of nutrients into the plant, leading to higher yield. To test this hypothesis we used sweet corn; a common crop for the area, liquid fertilizer, both soil applied and foliar and conventional tillage practices. The results were substantial.

Materials and Methods

The study site is located in the northeast corner of the north research farm of the KARC at Weslaco, Texas. This soil is a Hidalgo sandy clay loam with an organic matter content of 0.55%, and pH of 7.4. Nitrogen was low with marginal P205, with adequate Potassium, and marginal to high salt cations.

The field is flat and flood irrigation was used. The field was divided into 24 subplots 15' wide by 75' long. Six different treatments were used and replicated 4 times. The first two reps were planted Sept. 7 to a depth of 1.5 inches. We planted 27,000 seeds/acre of NK G90 on 30" rows. Reps 3 and 4 were then planted Sept. 19 at the same setting. Six different nutrient treatments were included in the test work.

Treatment 1 was our Control which consisted of 25lbs./acre of 11-37-0 diluted with 25 lbs./acre water applied on the seed trench plus 160 lbs of N32 applied with the planter 4" deep and 4" to the side of the seed trench. 30 days after planting, (DAP) we applied another 80 lbs. N32 side dress with a spoke wheel applicator. 50DAP, at the pollination stage, we applied 2 lbs. Urea in 10 gals of water as a foliar application and then again 70 DAP, at the ear fill stage.

Treatment 2, Gran, included control plus 200 lbs./acre of a coarse granular humate broadcast and incorporated 30 days before planting.

Treatment 3 (HA-1) consisted of adding BorreGro HA-1 all-purpose water soluble humate HA-1 to the control fertilizer at the rates of 2/3 lb. with the 11-37-0 on the seed, 1 1/3 lb. with N32, another 1 lb. with side dress N32 and 1 lb. each with the two foliar treatments for a total of 5 lbs/acre.

Treatment 4 (Borrechel) consisted of mixing calcium-lignosulfonate (Borrechel) with the control fertilizer at the rates of 2/3 lb. with the 11-37-0 on the seed, 1 1/3 lb. with N32, another 1 lb. with side dress N32 and 1 lb. each mixed with the two foliar treatments for a total of 5 lbs/acre.

Treatment 5 (HA-1 + Borrechel) is a combination of treatments 3 and 4.

Treatment 6 (Gran + HA-1) is a combination of treatments 2 and 3.

Plant growth measurements were taken at 4 leaf stage and full bloom stages. Tissue samples were taken at early growth and ear fill. Soil samples were taken before and after the study to examine any effect left in the soil for the next crop. No measured taste test was applied; however all who participated in an informal test said it was exceptionally good and sweet.

Results and Discussion

There was a 20 - 34 % yield increase when the products were applied compared to control on a lbs./acre basis. Final population was best with Treatment 5. HA-1 +Borrechel, followed by 2,3,4 and 6, then significantly lower control. Early plant growth measurements were not significantly different than control, however full bloom growth measurements showed increased height and stage development. From the plant tissue samples we see no consistent differences in macro or micronutrient content. Visually we saw more vigorous plants with the treatments in early growth and, less calcium and micronutrient deficiencies in the mature plants compared with control. Soil tests did not show any changes.

	Ears/ac.	\$0.10/ear	Advantage	Lbs./ac.	\$0.03/lb.	Advantage
1. Control	4,575	457.50		5,261	157.83	
2. Granular	5,625	562.50	\$105.00	8,098	242.94	\$85.11
3. HA-1	5,162	516.20	\$58.70	7,251	217.53	\$59.70
4. Borrechel	5,331	533.10	\$75.60	7,871	236.13	\$78.30
5. HA-1 + Borrechel	5,619	561.90	\$104.40	7,760	232.80	\$74.97
6. Granular + HA-1	5,450	545.00	\$87.50	7,660	229.80	\$71.97
Averages			\$86.26			\$74.01

Conclusion

In this study HA-1, Borrechel, and Granular Humates, and their combinations increased yield much more than we anticipated. These products seem to improve plant growth efficiency and provide more energy to the plant for reproduction. It seems that these products improve nutrient uptake efficiency and this could result in lower fertilizer requirements. On this soil type and in these growing conditions the addition of these products appears to be beneficial to healthy plant development and increased yield.

YIELD COMPARISON IN POTATOES WITH BORREGRO HA-1 & FULVIC ACID

Introduction

It has long been known that because of the affinity of plants for humic acid compounds there is an enhanced uptake of fertilizers complexed with humic acid and/or its fractions Fulvic and Ulmic acids. Fulvic acid is sold as a promoter or optimizer for nutrient uptake of fertilizers for agricultural crops. This test was designed to repeat test work performed in 2002 to compare the performance of BorreGro HA-1 (HA-1) a modified potassium humate product containing Humic and Fulvic acid with a Fulvic acid product as measured by potato tuber yield.

Procedures

The test location was on the J. W. Farms, Ltd. farm in south Texas 13 miles northwest of the city of Edinburgh. The soil is a non-calcareous fine sandy loam with a neutral pH. The crop was irrigated with a center pivot system (#17). The test design was a typical research design of paired comparisons with three replications. Both the HA-1 and Fulvic acid were applied at planting, knifed in under the seed pieces, mixed with 40 gal./ac. of 11-37-0 liquid fertilizer. The HA-1 and Fulvic acid were applied at 2 lbs./ac. and 2 qts./ac. respectively. At these rates the cost is comparable. The variety was a numbered Frito Lay variety, a 110 - 120 day type. Planting date was 15 Jan 03 and harvesting date was 1 May 03.

Results

The HA-1 plots yielded 8.7% more tubers in number and 9.6% more in weight than the Fulvic acid plots. Yields were taken from three replications of paired comparison plots of 1/1000 acre each. Minimum tuber size that was weighed and counted was 2 inches in diameter as per the grower's contract. The economic evaluation indicates a net increase of \$145.00 per acre with the HA-1. USDA-ARS Remote Sensing aerial photography indicates a difference in treatments. At harvest there was a visual difference between treatments. The grower stated that he was positively impressed with the increased growth in the HA-1 treated areas.

Conclusion

The HA-1 plots produced 8.7% more in weight of tubers and 9.6% more in number of tubers. This is consistent with other research that demonstrates that humic acid increases root growth and tuber production. This test indicates that HA-1 is superior to Fulvic acid as indicated by the number of tubers and weight produced and the economic evaluation.

For More Information call: 877-4BIOSCI