# Humic Substance Label Claims
## for Agricultural Crop Production

Consistent with AAPFCO Guidelines

### AAPFCO Humic Substance Definition

Humic Substances are the major organic constituents of soil organic matter and the aquatic environment, consisting of complex heterogeneous mixtures of carbon-based substances formed by biochemical reactions during the decay and transformation of plant and microbial remains. They are primarily composed of three main fractions, called humic acids, fulvic acids, and humin, which are operationally defined by their solubility in dilute alkali and acid solutions. High concentrations of humic substances are commercially harvested from terrestrial deposits of Leonardite, oxidized lignite, oxidized sub-bituminous coals, humalite, carbonaceous shales, peat, and sapropel.

### Background

Humic substances affect physical, chemical and biological properties of soils, soil productivity, water retention, soil stability, and natural disease resistance. Approximately 75% of the stable carbon components of soils under equilibrium conditions consist of humic substances, found everywhere in soil and water environments as the bi-products of decayed bio-matter. These humic materials have biologically and chemically recombined into extraordinarily complex heterogeneous recalcitrant natural organic matter via a process called humification.

Humic substances are comprised primarily of three commonly known fractions: humic acids, fulvic acids, and humin. They may also include other fractions that are yet to be determined. These fractions are biochemically active and can have positive effect on soil properties and fertility. Commercial humic products typically contain humic and fulvic acids derived from geological deposits of humified plant materials. Humic substances are applied to approximately 11 million acres of agricultural soils per year in the United States with an estimated annual value of $75 - $90 million dollars.

### Benefits of Humic Substances

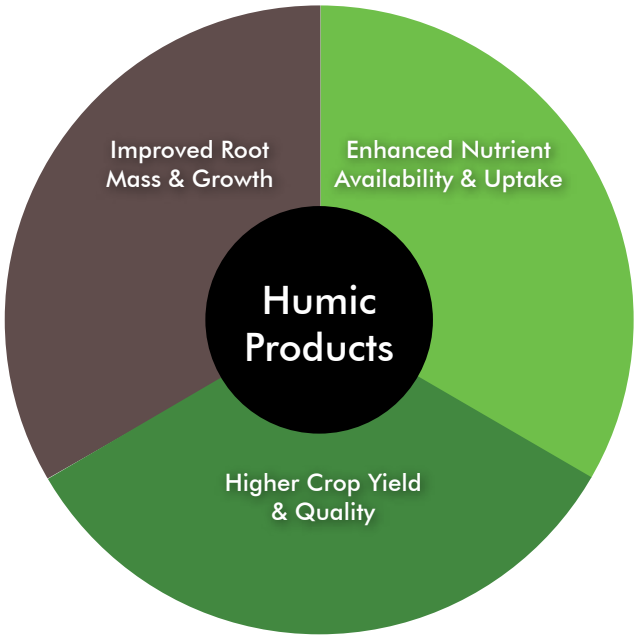
There are numerous studies showing the positive impact of humic substances on plant growth, increased root structure, better nutrient uptake from soils, and higher yields. The literature covers a broad range of conditions (nutrient solution, sand culture, greenhouse pot studies, calcareous and non-calcareous soils) and a diversity of crops, demonstrating beneficial uses of humic substances. The data obtained demonstrate the overall positive effects of commercial humic substances when used as either soil additives, foliar applications, or a combination of both.

The data gathered from various soil types demonstrates that humic substances applied to agricultural crops will often increase overall crop yield and quality as well as soil nutrient bioavailability*.

Most notably, increases in length and weights of shoots and roots, number of lateral roots, root initiation, increased flowering and fruit set, nutrient availability and nutrient uptake are positively impacted (especially nitrogen and phosphorus), which subsequently manifest as increased yields.

Commercial humic products provide the greatest yield response when applied to sandy soils, where organic matter content is extremely low. However, data also demonstrates a significant positive impact on crops grown in soils that contain moderate concentrations of organic matter and are moderately fertile. Commercial humic products have also been shown to increase the overall quality of crops grown on soils that contain sufficient organic matter and high fertility, especially in calcareous soils where the bioavailability* of many nutrients is very low.

**Approved Label Claims for Agricultural Application of Humic Substances:**




* The term "bioavailability" means the fraction of a nutritive substance or element in a particular medium that is absorbed into living plants and microorganisms.

Rates of application of humic substances to the soil and rates of foliar application of humic substances are typically determined by the farmer's cultural practices and in consultation with local agronomists. Application rates of humic materials resulting in final concentrations in nutrient solutions and soils ranging from 5 to 50 parts per million (ppm) generally increase root mass and uptake of nutrients. These crop responses have been reported in the literature during the last 50 years.

### Research Verification

The Humic Products Trade Association (HPTA) has compiled studies of the beneficial effects of humic substances intended for agricultural crop production that meet high standards of experimental design and statistical analysis. Table 1 summarizes the published scientific papers presented as proof of efficacy supporting these label claims. Claimed increases in quality refers to significant increases in parameters that are typically used to determine crop quality, such as crude protein content, specific gravity, grade, thousand grain weight, etc.

### Table 1. List of References Supporting Label Claims

| Reference | Claimed Increases |
|---|---|
| Saruhan et al. (2011) | Yield, growth, crop quality |
| Seyedbagheri (2010) | Yield, crop quality, and uptake of phosphate |
| Verlinden et al. (2009) | Yield, uptake of Nitrogen, Phosphorus, Potassium, Magnesium |
| Delgado et al. (2002) | Bioavailability of Soil Phosphorus |
| Tahir et al., (2001) | Growth, uptake of Nitrogen, Potassium |
| Adani et al. (1998) | Root growth, dry matter, uptake of Nitrogen, Phosphorus, Iron |
| Cooper et al. (1998) | Root mass, root length, Phosphorus uptake |
| Wang et al., (1995) | Bioavailability of Applied Phosphorus |
| Rauthan & Schnitzer (1981) | Yield and nutrient uptake (N, P, K, Ca, Mg, Cu, Fe and Zn) |

### Addendum

As some of the authors above discuss mechanisms responsible for the positive effects of humic substances on soils and crops, mechanisms are not discussed here. An in-depth discussion on mechanisms is beyond the scope and intent of this document.

### Analytical Method Endorsed By HPTA

On July 11, 2013, the AAPFCO Laboratory Services Committee approved the Single Laboratory Validation (SLV) of the HPTA Method. The HPTA Method is a standardized analytical procedure for the determination of humic acid and hydrophobic fulvic acids in commercial humic products. It also establishes the protocols to detect adulterants. On May 19, 2014 the HPTA Method was published in the Journal of the AOAC. (Lamar, R., Olk, D., Mayhew, L. and Bloom, P.R. (2014) Journal of AOAC International Vol. 97, No. 3, pp 721-730)

### About HPTA

HPTA has been organized by member companies which incorporate various types of humic substances in products they create for commercial sale. HPTA's objective is to be the "standard of excellence" in the humic trade. Member companies have agreed to live up to the Code of Ethics established by HPTA and utilitze best practices in their manufacturing processes and company procedures.

**For more information on HPTA visit www.humictrade.org or contact us at info@humictrade.org**

Humic Products Trade Association • PO Box 963 Spring Green, Wisconsin 5388 • info@humictrade.org • www.humictrade.org