

HUMATE products and the benefits of their application in modern agriculture

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Food and Agriculture
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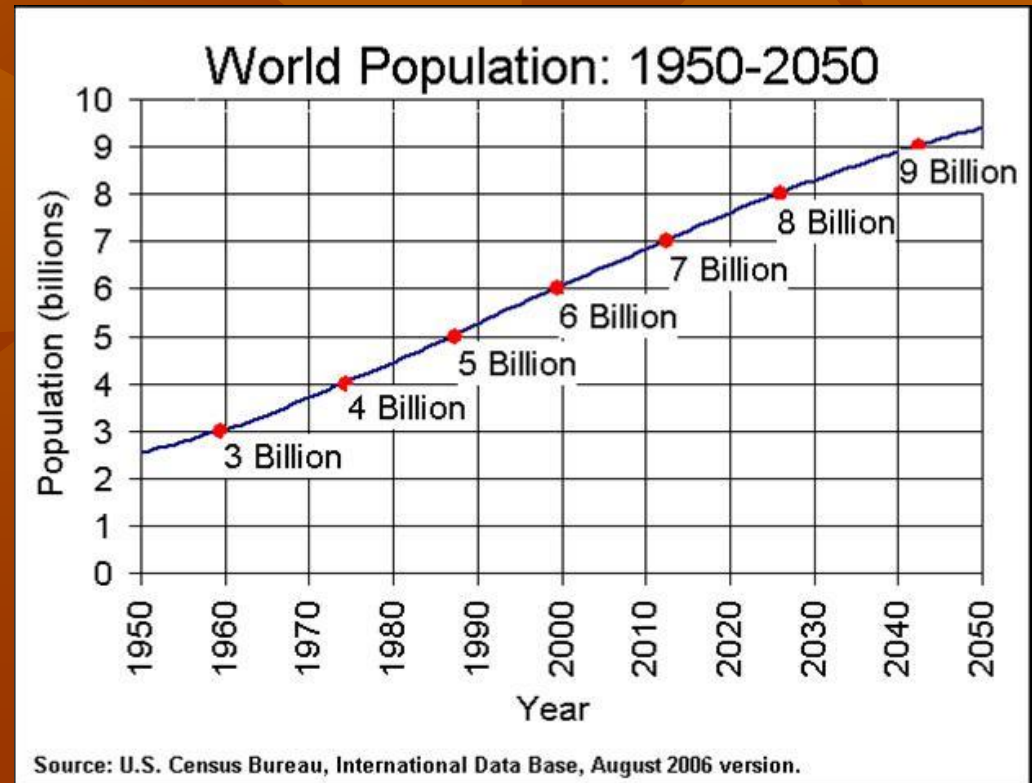
FAO:

- **To feed a growing world population, we have no option but to intensify crop production. But farmers face unprecedented constraints. In order to grow, agriculture must learn to save!**

The coming famine:

Food and commodities prices likely to remain high!

- Constraints to global food production in an overpopulated, affluent and resource-scarce world: the scientific challenge of the era. Constraints to global food production in an overpopulated, affluent and resource-scarce world: the scientific challenge of the era.





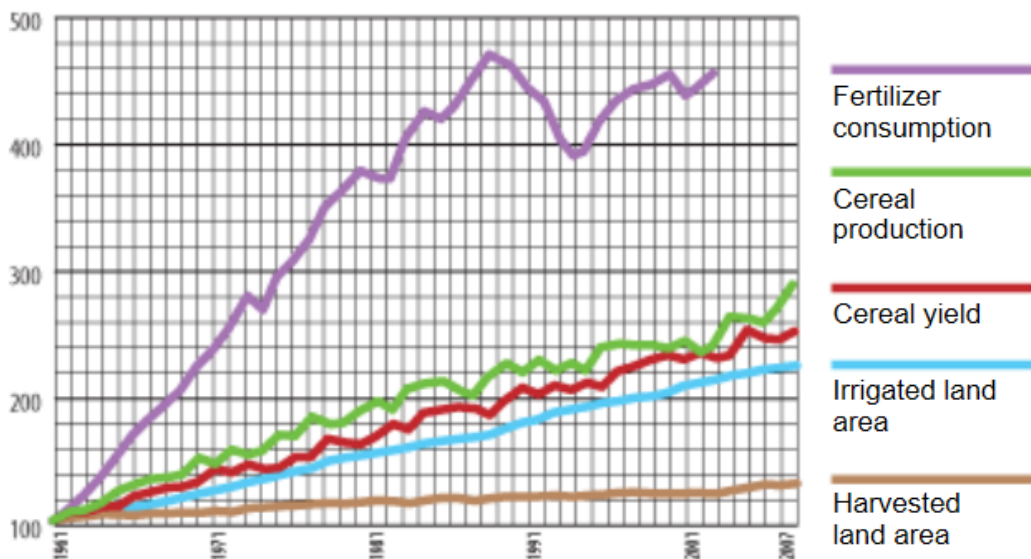
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Global crop production and fertilizer consumption:

Indicators of global crop production intensification, 1961-2007

Index (1961=100)



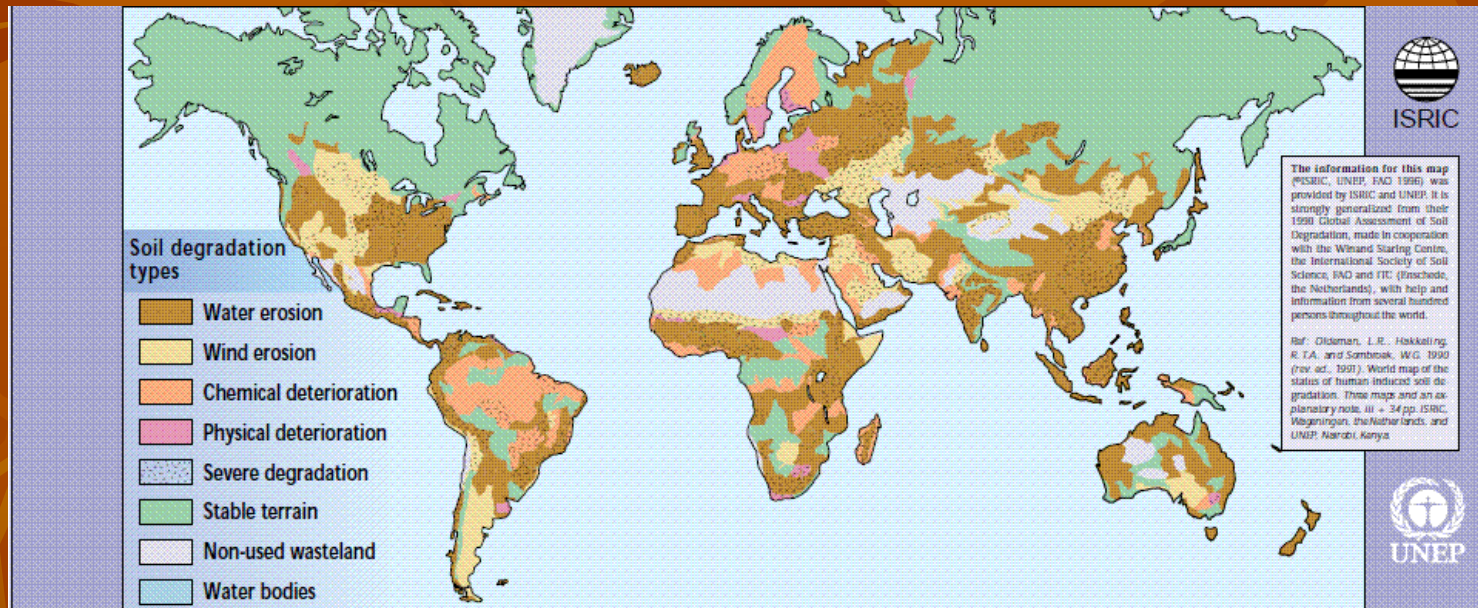
The PROBLEM:
**Mineral fertilizers and soil
degradation**

- Excessive use of mineral fertilizers in many regions of the world led to almost complete elimination of soil micro-flora. As the result, soil organic matter is degraded.

The challenge:

- It is now recognized that those enormous gains in agricultural production and productivity were often accompanied by negative effects on agriculture's natural resource base. Negative impact of intensification include land degradation, salinization of irrigated areas, over-extraction of groundwater, the buildup of pest resistance, deforestation and the erosion of biodiversity.

Soil erosion is one of the world's most widespread environmental problem!





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FAO: Another paradigm shift

- **Sustainable crop production intensification (or SCPI) is FAO's first strategic objective.**

In order to achieve that objective, FAO has endorsed the “ecosystem approach” in agricultural management. Essentially, the ecosystem approach uses inputs, such as land, water, seed and fertilizer, to complement the natural processes that support plant growth...

Are we in situation of despair???



NO!

**Because we
have**

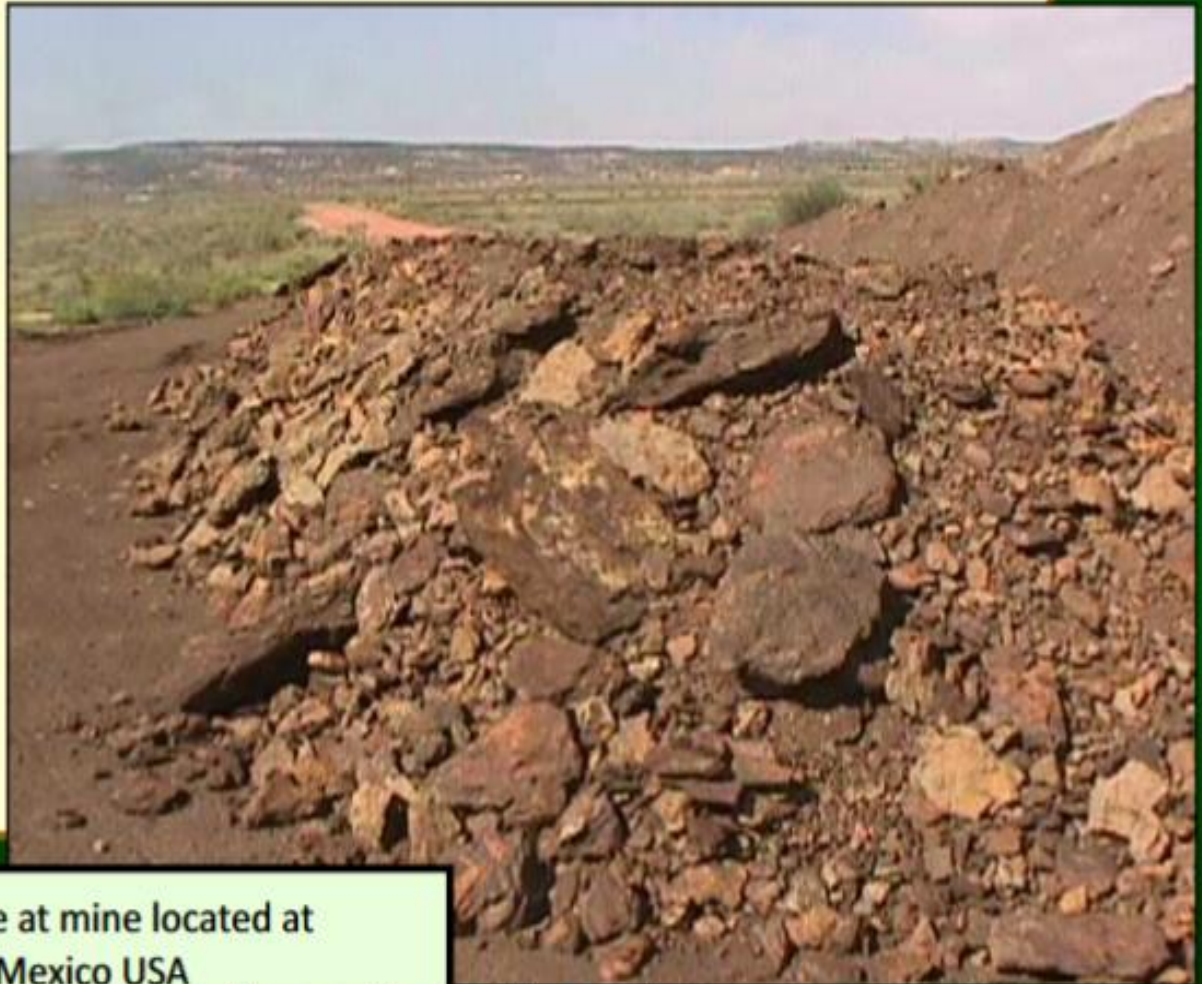
HUMATE



What's "Humate"?



- Highly heterogeneous mixture of lignite-like organic material, along with small amounts of humin, clay, and silicates.
- Originates from the diagenesis of terrestrial, marine, or lacustrine organic matter.
- 60 – 90% humic and fulvic acids
- Est. U-Mate reserves:
10 M tons



Unprocessed humate at mine located at
Gallup, New Mexico USA

New-Mex U-Mate® OMRI Listed



OMRI Listed®

The following product is OMRI Listed. It may be used in certified organic production or food processing and handling according to the USDA National Organic Program Rule.

Product
New Mex U-Mate®

Company
U-Mate International, Inc.
Mr. Dennis Yellowhorse
P.O. Box 4131
Scottsdale, AZ 85261

Status
Allowed

Category
Humates

Issue Date
21-Jul-99

Product number
umi-9053

Class
Crop Fertilizers and Soil Amendments

Expiration Date
01-Sep-2012

Restrictions
None

Peggy Mians
Executive Director

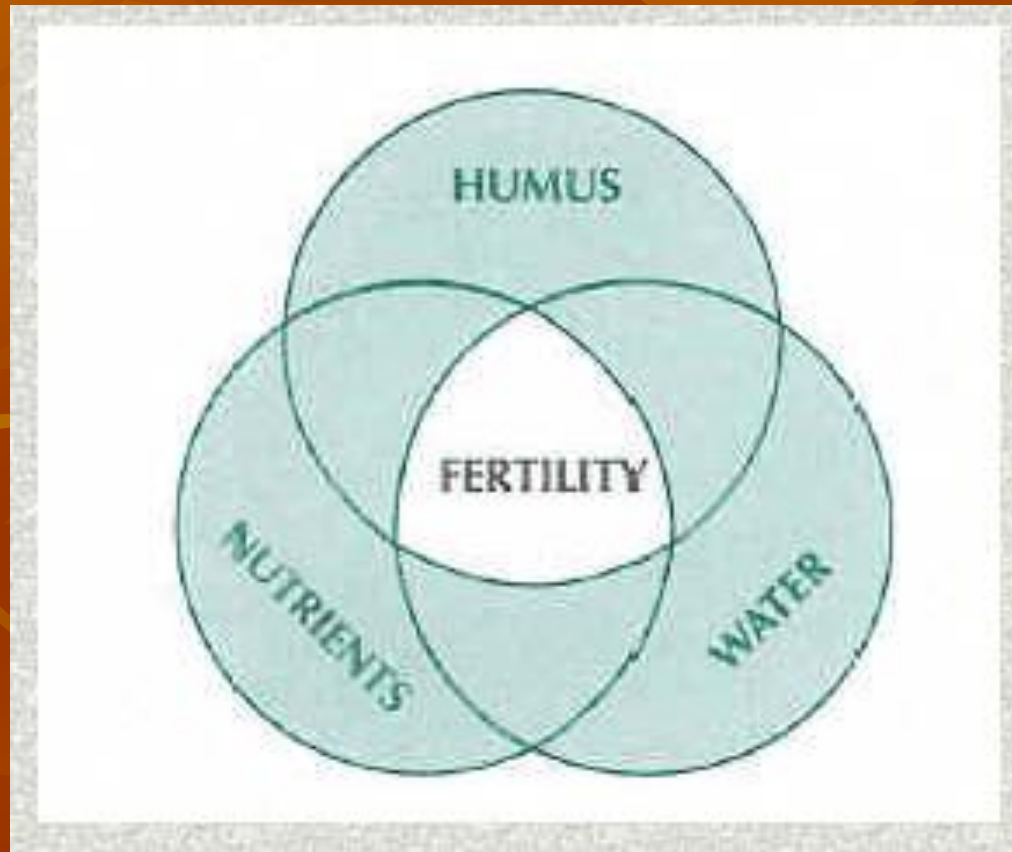
Product review is conducted according to the policies in the current OMRI Policy Manual and based on the standards in the current OMRI Standards Manual. To verify the current status of this or any OMRI Listed product, visit the most current version of the OMRI Products List at www.omri.org. OMRI listing is not equivalent to organic certification and is not a product endorsement. It cannot be used as such. Final decisions on the acceptability of a product for use in a certified organic system are the responsibility of a USDA accredited certification agent. Visit the operator's responsibility to properly use the product, including observing any restrictions.

OMRI
Listed

Organic Materials Review Institute
P.O. Box 11558, Eugene, OR 97440-3758, USA
541.343.7500 • fax 541.343.8971 • info@omri.org • www.omri.org

- **Our product- HUMATE belongs to Humic substances (or “Humates” in brief). They are the major organic constituents of soil (humus).**

Three fundamental blocks of the soil fertility:



What are the humic substances?

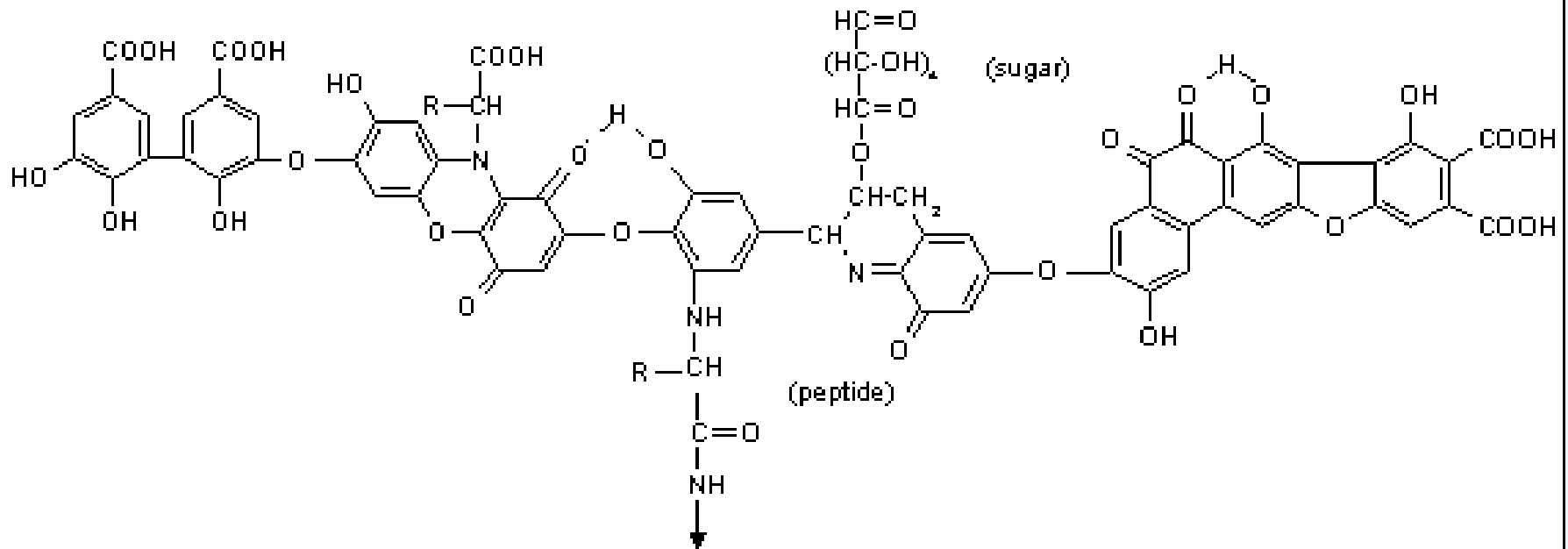
- **Humic acid** is a principal component of humic substances, which are the major organic constituents of soil (humus), peat, coal, many upland streams, lakes, and ocean water.
- It is produced by biodegradation of dead organic matter.

What are the humic substances?

Among the various sub-fractions of the organic matter the division between **humic** and **fulvic** fractions is of most practical importance.

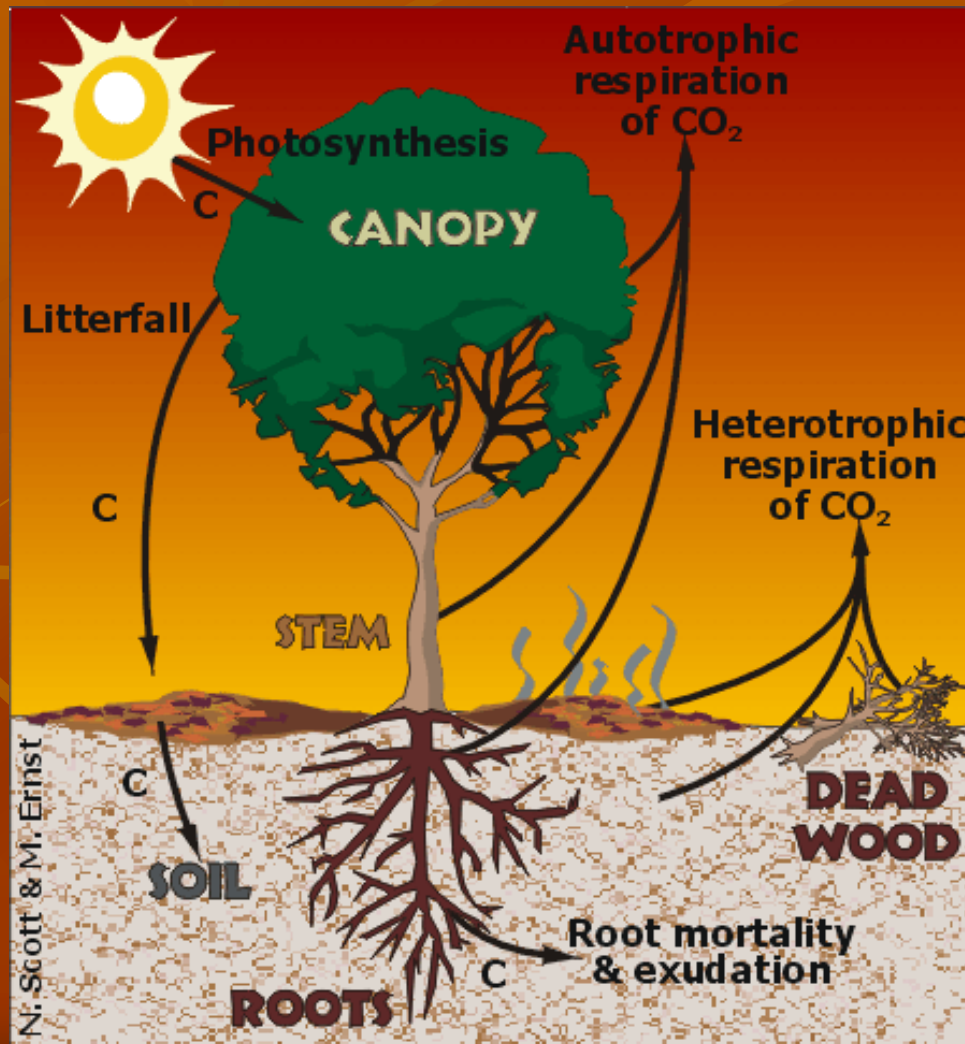
- **Humic acids** are naturally present in soil organic matter, they are a large family of organic compounds with similar characteristics. **Humates** are the salts of humic acids and come from the remains of plant and animal life.
- **Fulvic acids** are generally more plant active because of their higher oxygen content, and because of the abundance of carboxyl (COOH) groups.

Molecular structure of humic acid

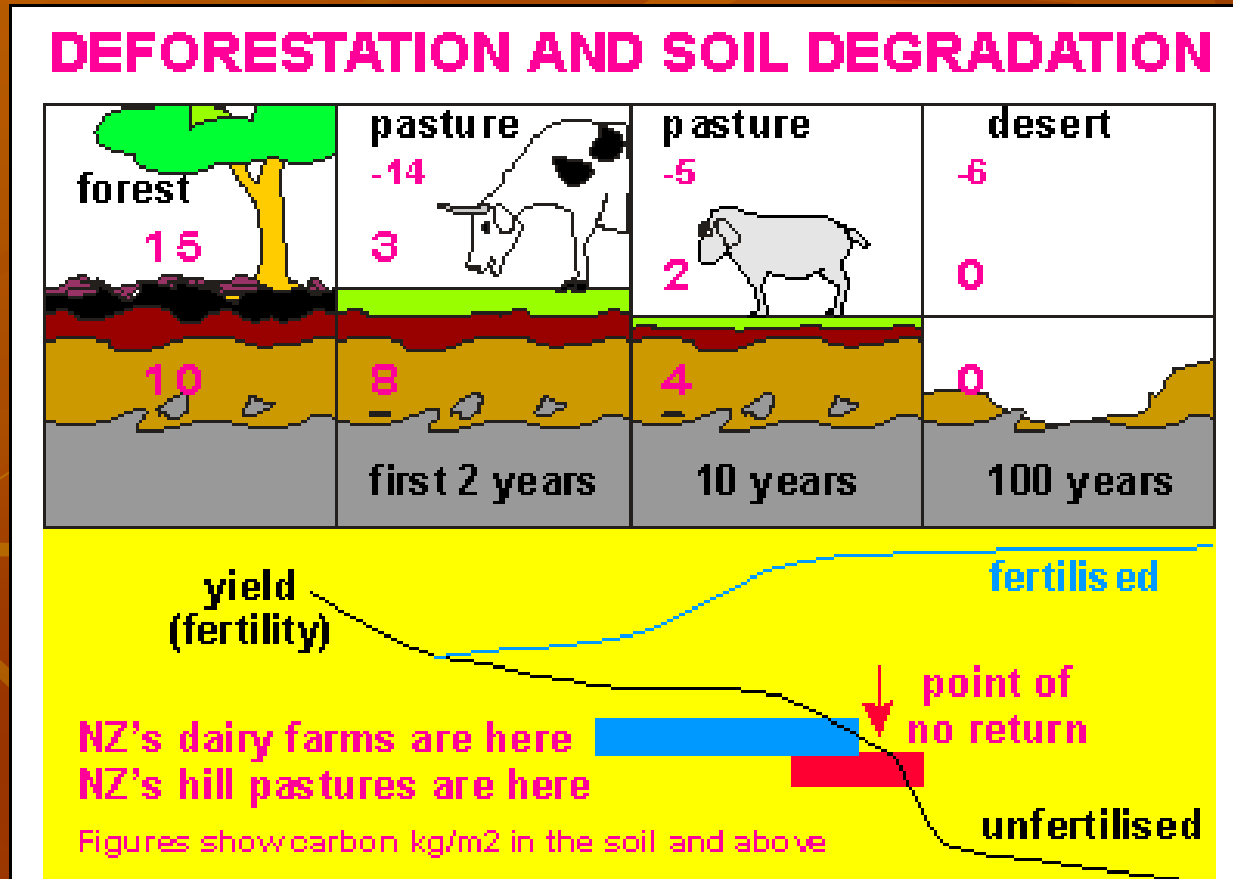


Model structure of humic acid

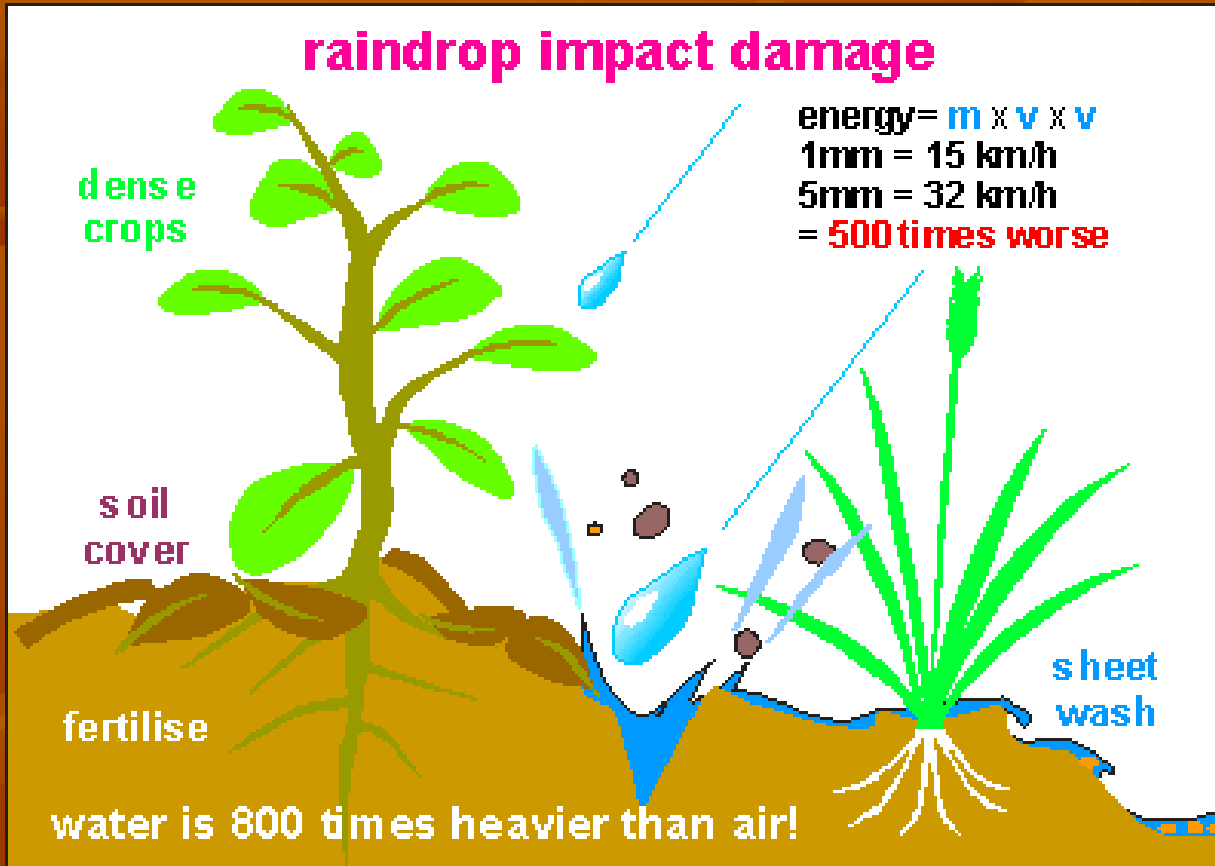
In natural eco-systems humus and humates are produced by biodegradation of dead organic matter:



In many agricultural systems HUMATE and organic matter are not produced by biodegradation of dead materials



The most damage is done during the heaviest rains!



- Notice the amount of carbon held in soil organisms and humus and how this is lost gradually, almost unnoticeably. Then suddenly comes the point of no return, where the top soil disappears suddenly, with rapid loss of the loams underneath (mud).



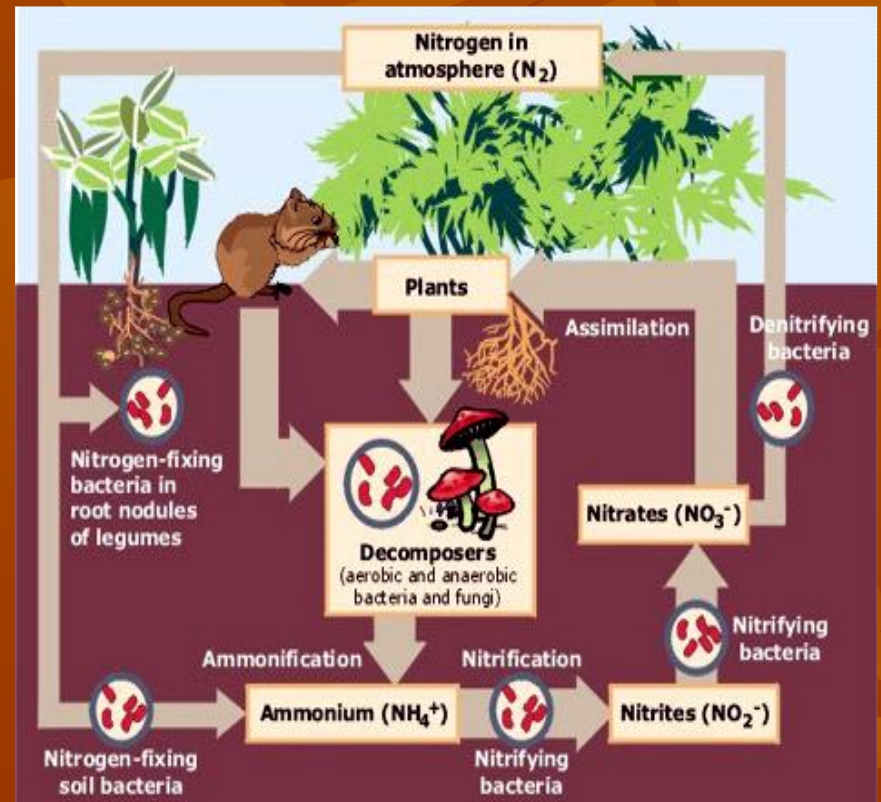
- **A vibrant, healthy soil takes years to achieve, however...**

Application of HUMATE is the only effective process of fertility restoration for depleted soils!

- Applying humates to soil activates organic matter decomposition and replenishes soluble forms of humic acids that plants and microbes are missing. **That is why treatment with humates is the only effective process of fertility restoration for soils depleted by intensive cultivation or initially poor with humus.**
- An application of 800- 900 lbs per acre of powdered (raw) humate increases yield to 1.56 times or 156%. However, it is possible to reach almost the same effect by reducing rate of application 3 times and even up to 5 times (so close to 150- 200 lbs per an acre) and using blends of raw humate with water soluble potassium humate, other organic sources and cultures of microorganisms.

HUMATE and Soil Organic Matter

... When it decomposes to the point it is no longer recognizable it is called soil organic matter. When the organic matter has broken down into a stable humic substances that resist further decomposition it is called humus.



What are the benefits of HUMATE?

■ N1. Carbon-building:

HUMATE contains up to 70% of organic carbon, but their carbon-building capacity is largely based on their bio-stimulating capacity. An activated, thriving, microbial population can convert crop residues to organic carbon (humus) at a much faster rate.

The benefits of HUMATE, N 2

- **Biological Stimulation:**

HUMATE are powerful microbial stimulants. Humic acid feeds and stimulates the Fungi component of soil-life, while fulvic acid is a bacterial stimulant;

The benefits of HUMATE:

- **N 3: Improved efficiency of fertilizer:**

When humic acids are combined with any fertilizer that fertilizer will become much more stable in the soil. Leaching and lockups are virtually eliminated. When combined with humic acids, a nitrogen fertilizer such as urea becomes a stable, slow release nitrogen source (the release pattern is extended by 60 to 80 days;

The benefits of HUMATE, N. 4

- Disease and pest management:

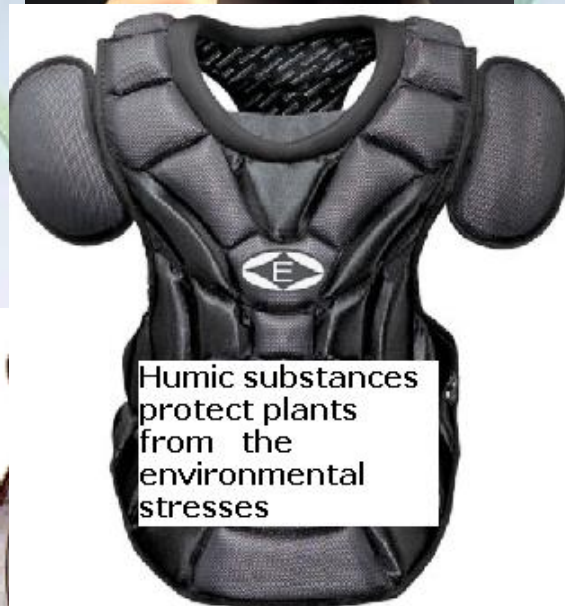
When beneficial fungi and bacteria levels are increased by humate stimulation, then the microbial pathogens that cause disease are reduced by a process called “competitive exclusion”;

The benefits of HUMATE, N 5

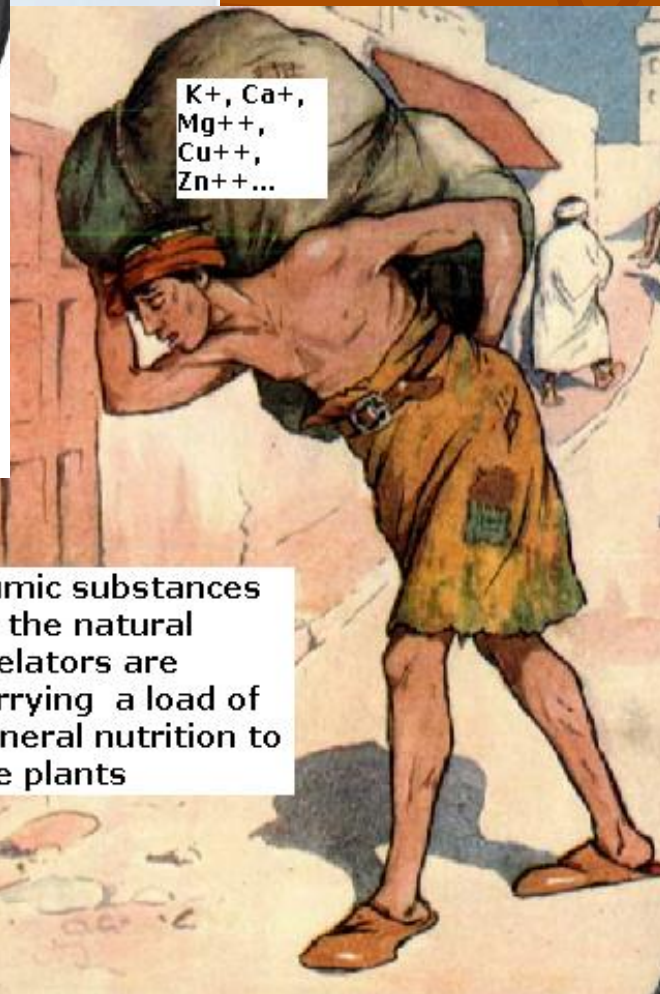
- Hormonal stimulation and environmental stress protection:

Natural hormones play a large role in ensuring good germination, vigorous, healthy growth and prolific flowering. Humates contain a natural, auxin-like hormone, which assists in these plant functions, and they also stimulate beneficial micro-organisms like Azotobacter, which produce three other growth-stimulating hormones.

What do the HUMATE does?

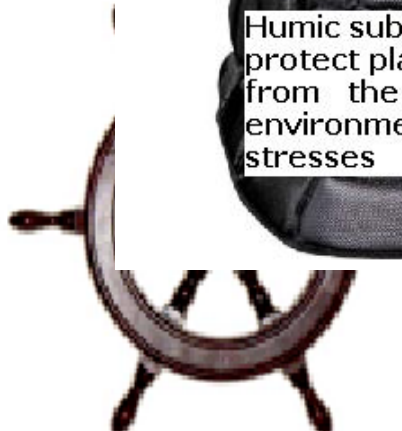


Humic substances protect plants from the environmental stresses



K+, Ca+,
Mg++,
Cu++,
Zn++...

Humic substances as the natural chelators are carrying a load of mineral nutrition to the plants



Humic/ fulvic acids as "Navigators of the nutritional elements



Application of HUMATE and it's modified products:

I. Raw HUMATE is natural, mined) II. Humates from composts ("artificial", but may be certified organic)

They can be used against soil degradation, depletion (loss of humus) and soil remediation (neutralization of heavy metals and organic pollutants), in seed enhancement and water purification, etc.

III. Water soluble humates (potassium humates, sodium humates, etc.). They stimulate plant growth, increase yield and protect plants against environmental stresses.

IV. Slow released humate-coated fertilizers (humate-coated urea, superphosphate, etc.)- prevention of leaching of nutrients from soil.

V. Blends of HUMATE with soil beneficial microorganisms (bacterial cultures and fungi) and minerals;

VI. HUMATE as supplements in animal diets;

VII. Healthy drinks and beverages with HUMATE.

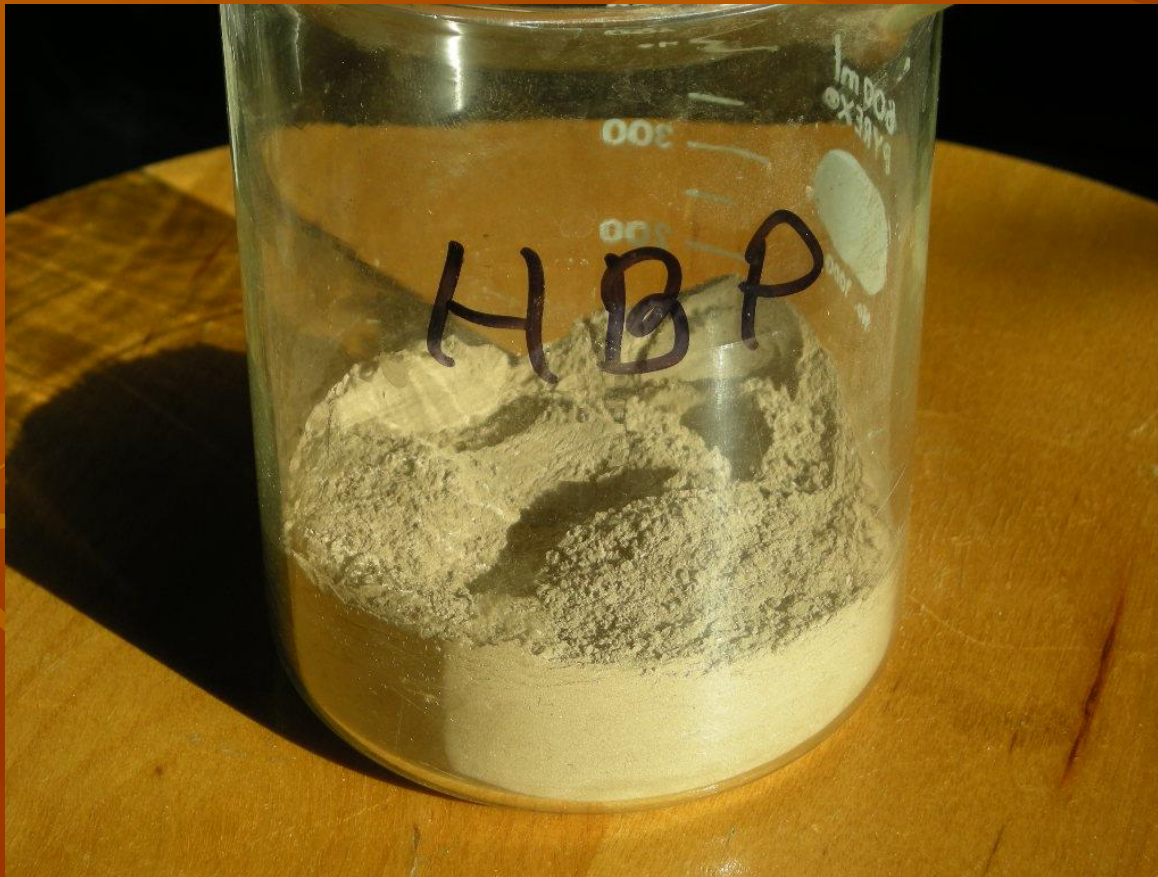


New HUMATE-based Fertilizers and Soil Amendments

HUMATE blends for all types of soil can contain the following microorganisms:

- ***Bacillus subtilis***. A member of the genus *Bacillus*, *B. subtilis* has the ability to form a tough, protective endospore, allowing the organism to tolerate extreme environmental conditions;
- ***Pseudomonas putida***- It demonstrates very diverse metabolism, including the ability to degrade organic solvents such as toluene. This ability has been put to use in bioremediation, or the use of microorganisms to biodegrade oil;
- ***Azobacter***. Azobacter is an organism, is a free-living soil bacteria, they are capable of fixing nitrogen, if they are provided carbohydrate material;
- ***Actinomycetes*** - They include some of the most common soil life, playing an important role in decomposition of organic materials. Thus replenishing the supply of nutrients in the soil and is an important part of humus formation.
- ***Enzymes producing bacteria***—Enzymes are proteins that catalyze (*i.e.* accelerate) chemical reactions. In enzymatic reactions, the molecules at the beginning of the process are called substrates, and the enzyme converts them into different molecules, the products.,
- ***Sub-cultures***

HUMATE- mineral blends with microorganisms:



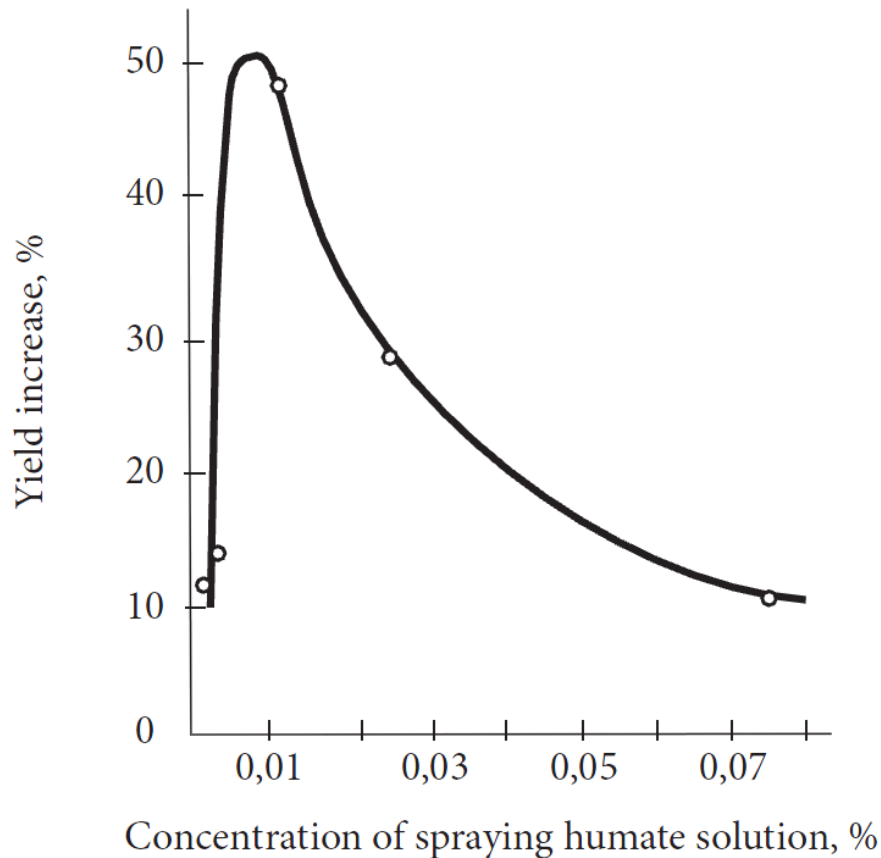


**Pelletized fertilizers: Trials at
CAVENDISH FARMS (P.E.I., Canada):
Humate blend with hen manure**



**Applying pelletized chicken manure (4-1-2) as an
organic fertilizer to potato plots**

Relationship between carrot yield increase and concentration of HUMATE solution used for watering:



Application of a very low dosages (around 0.01%) of water soluble humates is very efficient and economical!

Huma-Vit.

The best nutritional products for
hydroponics

What is Huma-Vit?

- Humic and Fulvic acids and their salts (humates and fulvates) contain valuable plant nutritional substances as well as plant growth stimulants (that acts like phyto-hormones) .
- Huma-Vit is the excellent product for hydroponics with Bio Available Liquid Minerals chelated (partially bounded) by Humic and Fulvic acids.
- An application of very small amount of Huma-Vit in hydroponic water nutrient solution results in dramatic increase in plant's productivity (yield)

THE MISSING MINERALS

In the beginning, our soils contained adequate amounts of Humic Acid and Fulvic Acid produced by naturally occurring microbes within the soil. They delivered the essential nutrients and minerals to plants, which made them flourish.

Over time and continued farming our soils have been depleted of the essential microbial life, minerals, and nutrients needed to produce vigorous healthy plants and crops. Today modern agriculture's goal is to produce quantity not quality and deliver abundant saleable products. To produce higher yields and control disease excessive amounts of nitrate fertilizers are applied to the soil.

Such practices stun and destroy the indigenous microbial life within the soil, which in turn destroys vital humic and fulvic acids.

Huma-VIT and it's benefits

Huma-VIT contains high levels of organic, bio-available Humic and Fulvic minerals, the two essential compounds that result from nature's own process of recycling the elements of life. Humic and Fulvic minerals have been found to play an important role in cell metabolism, acting as carriers of essential nutrients into the cells and metabolic wastes out of the cells. They also act to convert some waste products into useful materials within the cell.

. Huma-VIT is pure extracted Humic substances and Minerals from humate, which has been referred to as a "fountain of youth" because of its role in plant and animal nutrition.

The Missing Links

Recent scientific research has revealed that Humates resulting from natural decomposition contain all the essential nutrients necessary for proper metabolism. These "lifegiving" nutrients are now bio-available.

Fulvic acid is thought by leading natural health experts to be one of the most important "**missing links**" in the modern food chain. Medical and agricultural research continues to conclusively point to one fact: fulvic acid either directly or indirectly holds the keys and solutions to many of the world's health problems.

Liquid minerals are superior to powders and pills as transporters into the blood stream. The world's first organic, plant derived, cold processed, pH balanced, bio-available, minerals in liquid form is now available.

Huma-VIT complexes are the world's finest electrolyte!

Application of HumaVit – a blend of Humic and Fulvic acids with nutritional elements in hydroponics gives up to 37% savings to the growers!

Application of Huma-Vit in hydroponics results in 37% yield increase

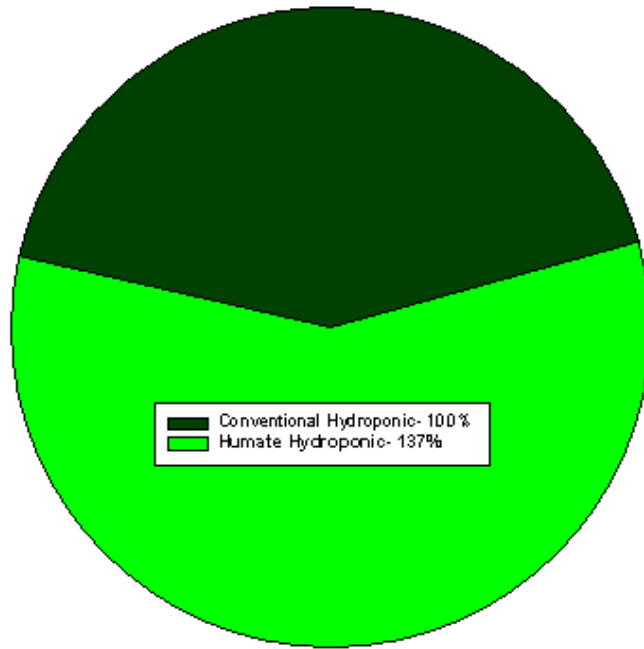
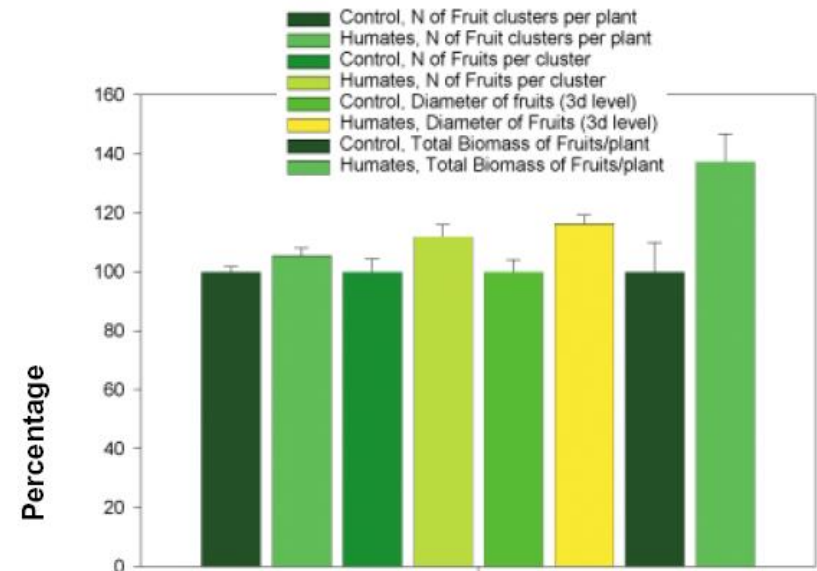


Fig. 1 — Effect of humates on yield of tomato 'Rhapsody'
(Hydroponic growth, trials of February 2001 at 'Pioneer F&V')



Australian magazine: "Practical Hydroponics & Greenhouses", V.Vasilenko: "Humates for seed enhancement and hydroponic production"



Humates for Seed Enhancement and Hydroponic Production

New research into humates show increased stem growth and biomass, as well as improved seed germination and yields in tomato plants, with significant savings in resources.

by Dr Vladimir Vasilenko

Overview

The author's research showed that derivatives of humate products, particularly the fulvic acid fraction, increased the percentage of germination of tomato seeds. Stem heights and diameters of the tomato plants studied also increased as a result of humate application in hydroponic harvesting.

A positive effect of humic substances upon chlorophyll content in leaves correlates with higher yield of treated plants. The humates substantially increased the average diameter of fruits and number of fruits per cluster. The total biomass of fruits of treated plants exceeded control up to 38-42% (see Fig 2). New technology of humate application can prove lucrative for hydroponic and seed enhancement even today.

Background

Humates are the salts of humic acids derived from the remains of plants and animals from millions of years ago. Humic acid are naturally present in soil organic matter; they are a large family of organic compounds with unique characteristics. Among the various sub-fractions of the humates, the division between humic acid and fulvic acid fractions is of most importance. Fulvic acids are generally more plant active because of their higher oxygen content, and because of the abundance of carboxyl (COOH) groups.

Humic acids are generally considered more important for soil remediation. The lay public generally refers to humic and fulvic acids as simply humic acids. While both fulvic acids and humic acids are both complex organic molecules, humic acids are recognised to

have greater molecular weight. The molecular structure of these molecules has been identified by U-Mate International Inc. (Scottsdale, Arizona). To the organic chemists, the unique atomic groupings suggest a multiplicity of uses and reactions.

What do humic acids do? First of all, they physically modify and improve the soil and biologically stimulate the plant. They can increase the rate and percentage of seed germination and stimulate plant growth by accelerating cell division, increasing the rate of development in root systems, and increasing yield of dry matter. They have no detrimental effects on the quality of products.

The humates used for these trials were provided by U-Mate International Inc. of New Mexico. Importantly, their humate products have been certified organic by the Organic Material Review Institute of Eugene, Oregon. Humic acids can improve the uptake of phosphates from banded fertilisers. An added benefit of applying humic acids with liquid fertilisers is their ability to buffer the acidity and toxicity of fertilisers.

Experiments conducted on wheat (Vaughan and Malcolm, 1985) using distilled water and Hoagland Solution, respectively, demonstrated that humic acids improved Hoagland Solution and increased root and shoot biomass in distilled water as well. Sladky (Sladky Z, 1959) demonstrated that humic acids improved not only the vegetative growth of tomato plants grown in nutrient solution, but increased the respiration rate and the chlorophyll density of these plants.

Purpose of Research

The purpose of the research was to investigate the possible benefits of supplementing seedling plant fertilisers with humic and fulvic acids derived from humates and, in addition, to look at the practicality of using humates in commercial and agricultural settings. Moreover, the research will show the extent to which positive trial data could be used by today's agronomists, field persons and growers. Furthermore, trial results could show improved yields and corresponding farm profitability.

Research results

Our research on humic substances was conducted in conjunction with U-Mate International Inc. which provided a source of humic and fulvic acids, Anvanta Earth TM, and with Pioneer Fruits & Vegetables (Leamington-Ruthton, Ontario) where the trials were done on hydroponic tomatoes. Microbiologically activated working solutions of humates and fulvates (the salts of fulvic acids) were

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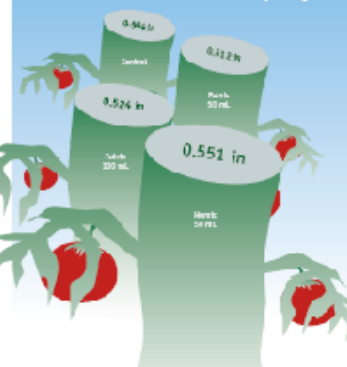
humic acid fulvic acid derived from humates. It's necessary to evaluate the practicality of using humates in commercial agricultural settings. Today's agronomists and growers need positive trial data in order to determine if the addition of humates will show improved yields and corresponding farm profitability.

Another study was conducted with Anvanta Earth humic substances (U-Mate International, Inc., Scottsdale, Arizona). These humate products have been certified organic by the Organic Material Review Institute in Eugene, Oregon, which is a plus for growers who are attempting to develop sustainable organic hydroponic production models. The research was conducted in conjunction with Pioneer Fruits & Vegetables, based in Leamington, Ontario, a grower that carried out the trials on hydroponic tomatoes. These trials were conducted under real, everyday environmental conditions growing "Rhapsody" tomatoes.

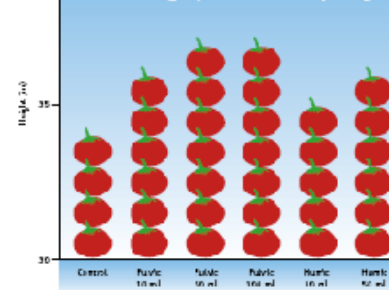
A batch of 3-week-old plants were transplanted to the Pioneer Fruits & Vegetables greenhouse a few days before the trial. Solutions of humates and fulvates were added to the rockwool blocks at two distinct stages of growth—once when the plant was 1 month old and again at a fruit-bearing stage when the plant was approximately 7 months old. Five different concentrations of solutions were tested with 10, 15, 30, 50, and 100 mg/L in water (BU, organic acid, humic acid) per plant. BU figures were measured by spectrophotometric analysis. Data was collected from approximately 100 independent measurements. 10, 4 days after the application of humic substances.

It was determined that humic substances again changed the growth pattern of treated tomatoes. Stem height and diameter

Effect of Humate Substances on Stem Diameter of Tomato "Rhapsody"



Effect of Humate Substances on Plant's Height Tomato "Rhapsody"



increased, as did the amount of chlorophyll in the leaves. However, the scope of these effects varied depending on what kind of substance was applied and its concentration. In general, fulvates were more effective in the stimulation of plant height. Tomato plants showed a positive response to low concentrations of fulvic acid (10 BU), whereas the plants had virtually no response to the more concentrated of humic acid. The control group reached an average of over 34 inches (87 cm) and plants that featured the addition of 100 BU of fulvate reached just under 37 inches (93 cm). Humates proved to have an even better effect on stem diameter. The control stem reached just over 0.5 inch (1.27 cm) and a plant fed with 50 BU of humate reached 0.56 inch (14.1 mm), which translates into 11 percent more stem diameter. As a result, the stem becomes thicker and more resilient to mechanical damage. A dose of 10-15 BU was often not sufficient enough to produce a significant effect. Conversely, the application of 100 BU per plant sometimes resulted in growth suppression.

There is a close correlation between chlorophyll quantity, the rate of photosynthesis in leaves, and

Healthy Beverages with HUMATE, Minerals and pure Glacial water

**New discoveries in
the area of humic
substances and
minerals make solid
background for
introduction of new
healthy drinks to
the market in the
USA & Canada**



Healthy Beverages with HUMATE, Minerals and pure Glacial water are beneficial for health because

- **They have Major Minerals found in the Human Body**
- **The crystalline structures of water or «energized ice water»**
- **Many natural vitamins and anti-oxidants with anti-carcinogenic activities**
- **The possess anti- viral anti-inflammatory activities**
- **They substantially reduce the risk of obesity**



**The development of new
technology for seed
enhancement with
HUMATE**

- **HUMATE and their blends may be applied to the seed, directly to soil, either in the furrow or below the seed, or may be watered onto the soil at or after planting.**



Wheat and Rice seed coated with the Humate- Mineral Powder:





HUMATE COATED UREA

“The thick- coated urea”

New formula of Dr. Humate- “the thick-coated urea” has raw humates and urea. It also contains soluble kelp as a reach source of micronutrients, binding material and very small amount of soluble humate as an “accelerator” and “glue”)



Q? IS HUMATE- COATED UREA BETTER THAN UREA FOR GROWING CROPS?



General view of experimental plots at the day of application of fertilizers (May 30th, 2009):



The stakes mark experimental rows

Prills of urea and humate coated urea spread on the surface of soil near the plants of maize in two doses- 10 g/plant ("0.5 dose") and 20 g/plant ("1.0 dose"):



The experimental plots



Immature corn cobs: there is visible difference of maize cobs taken from "urea" and "humate coated urea" plants:

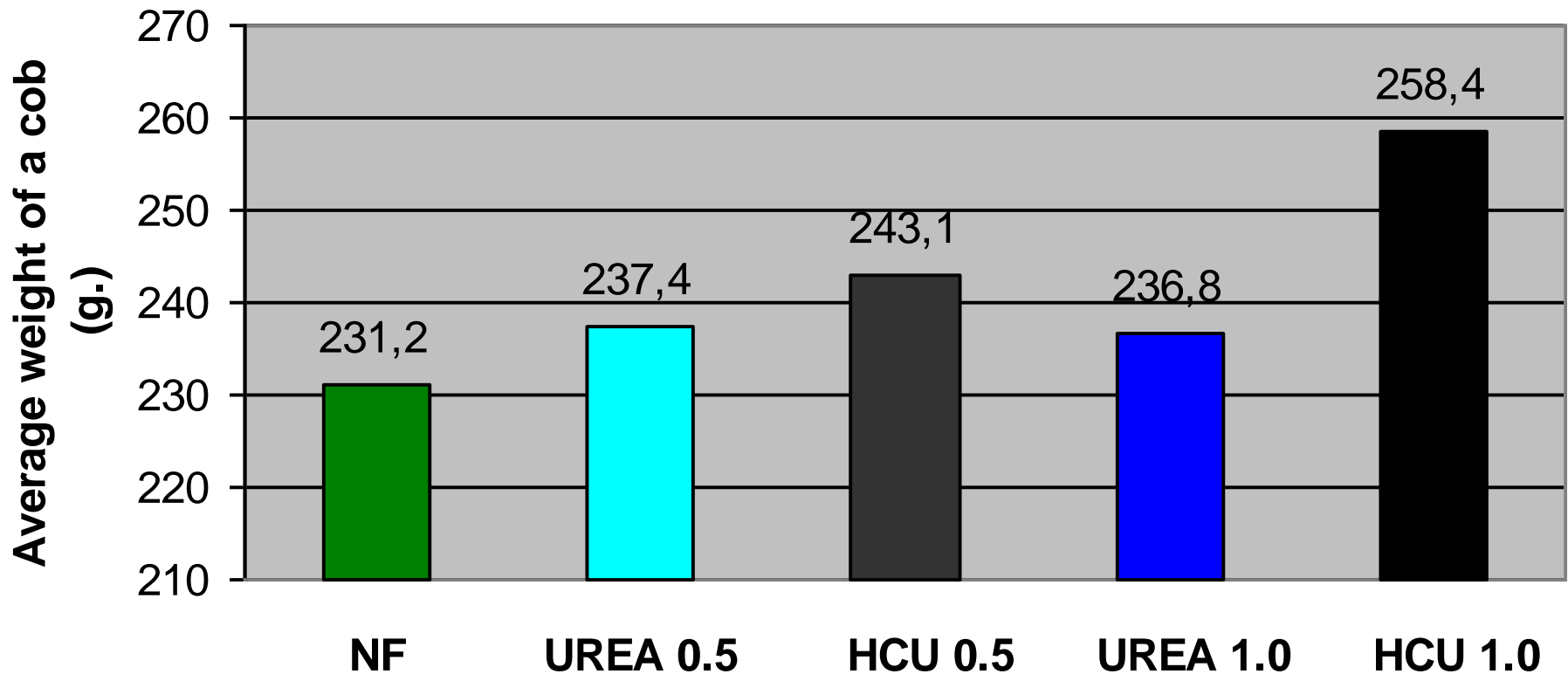


The dried cobs (M.C. \sim 21%) randomly selected from "urea" and "HUMATE-coated urea" plants:



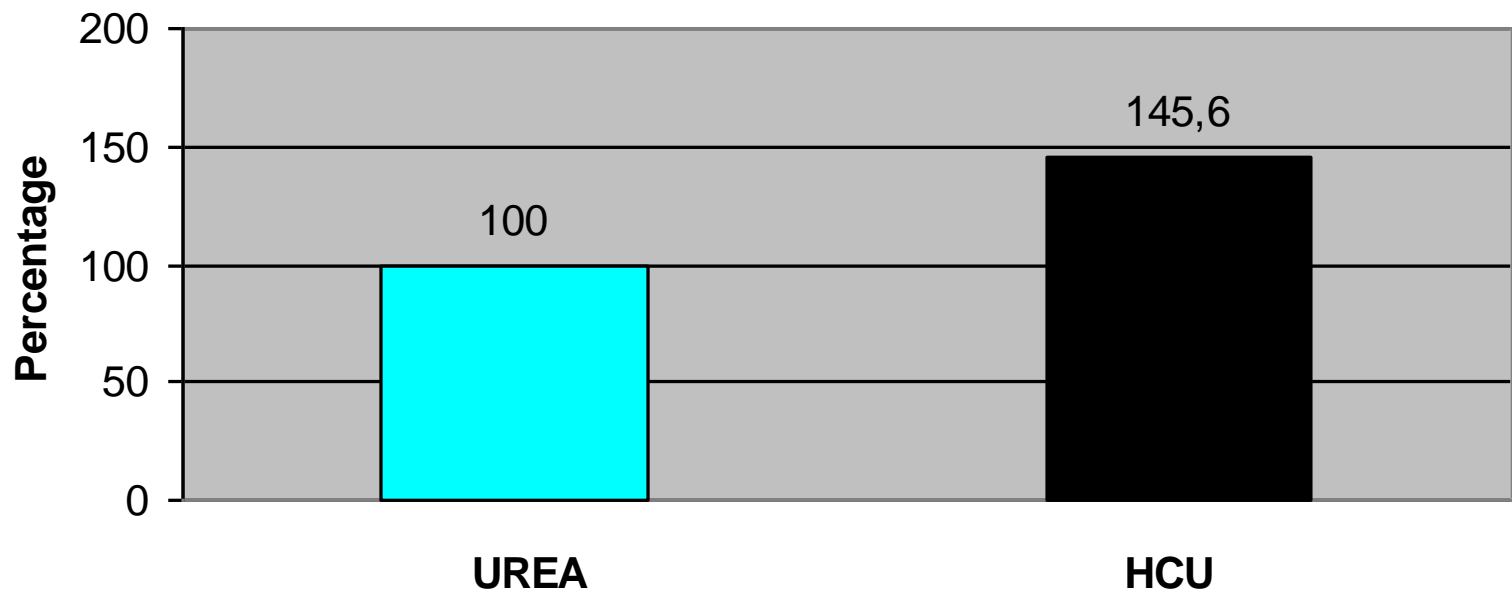
The full dose of application of HUMATE-coated urea was able to increase weight of corn cobs up to 12%.

Weight of freshly harvested maize cobs



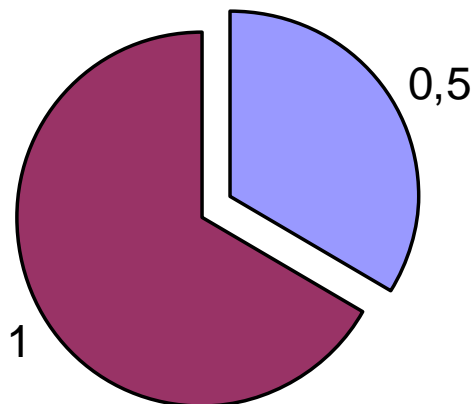
Humate Coated Urea outperformed Urea in the trials (an average 46% increased of the yield of potatoes)!

Average increase (%) of the yield of potatoes as result of application of Humate Coated Urea:

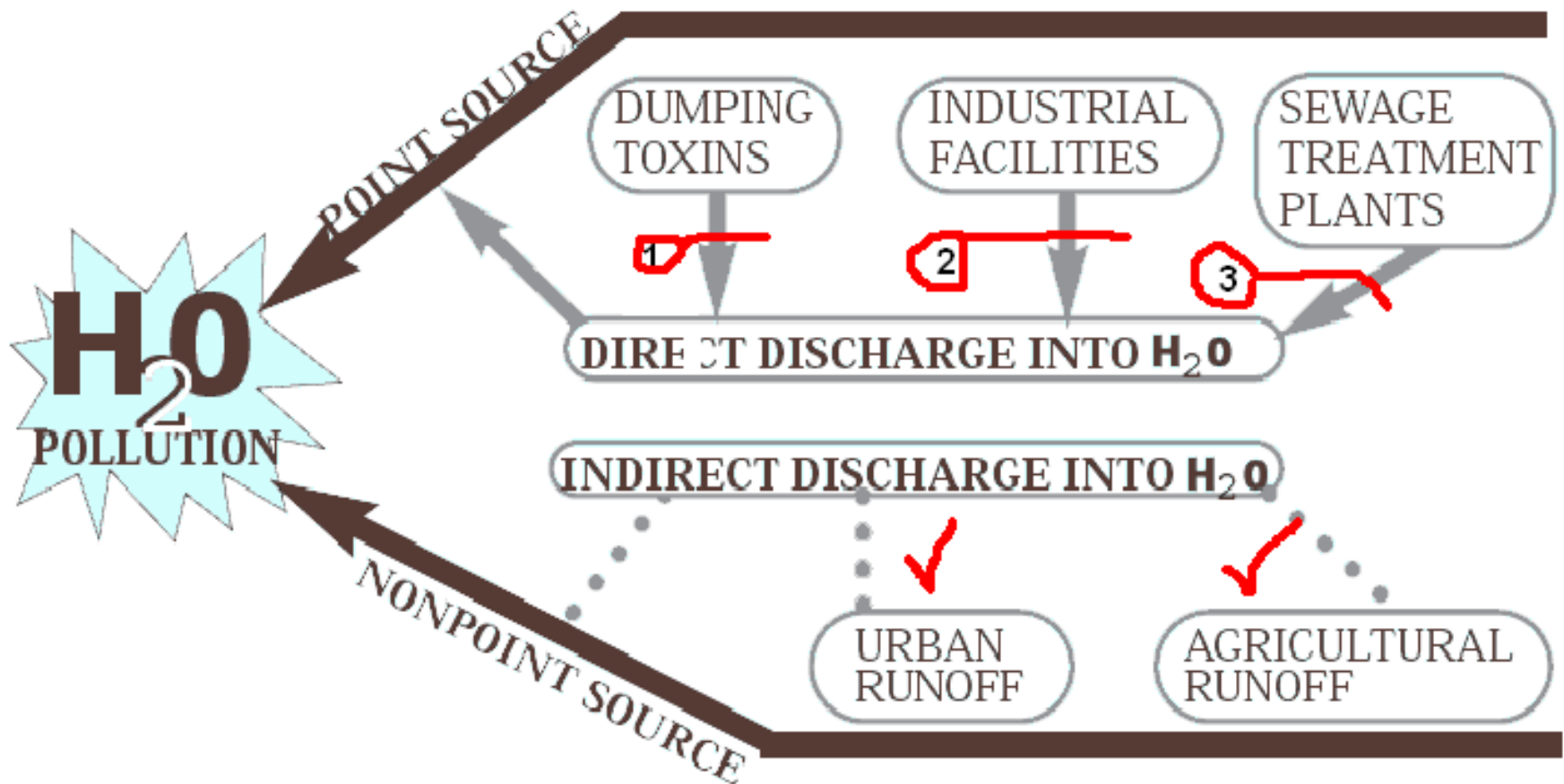


HCU- Test results: it is required from 40 to 60% less Urea to obtain the same or better results (as the yield or biomass of tubers) for growing potato plants!

Humates may reduce the amount (and cost) of Urea because humates make Urea more efficient in application for growing potatoes- an estimated cost of fertilizers in production of potatoes with Humates (Blue) and without Humates (Purple):



HUMATE's application against water pollution



Water treatment with HUMATE

- Humic substances can be used during treatment of wastewater and groundwater, in which these natural macromolecules can substitute more expensive, organic and inorganic adsorbents.
- Toxic organic compounds (dioxins, etc.) can, once immobilized on the humates, become inactive due to their incorporation into the humate chemical structure.

Effect of Liquid HUMATE on Heavy Metal Concentration (% of reduction)

Element	Symbol	1% Liquid Humate	2% Liquid Humate
		Addition	Addition
Antimony	Sb	11.7%	19.0%
Arsenic	As	3.6%	4.9%
Cadmium	Cd	10.2%	16.9%
Chromium	Cr	15.8%	26.2%
Cobalt	Co	1.5%	2.2%
Copper	Cu	22.7%	35.8%
Lead	Pb	61.6%	73.3%
Nickel	Ni	3.3%	8.0%
Silver	Ag	33.6%	26.7%
Tin	Sn	35.0%	46.1%
Titanium	Ti	25.8%	42.1%
Vanadium	V	2.7%	6.9%
Zinc	Zn	10.9%	14.3%
Iron	Fe	22.4%	33.0%



Address and contact information:

UMate International New Mex Humate

Lee Freeman | CBO / Sales

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E.mail: sales@umateint.com



Walking For A
Better
Future