

Agronomic Guide

Premium Liquid Fertilizers to
Maximize Crop Yield Potential



2023–2024

start
finish2

bio-K[®]
POWERED BY

NACHURS[®]





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About NACHURS®

NACHURS is a liquid fertilizer brand that has revolutionized farming practices since 1946. NACHURS offers high quality precision-placed, seed-safe liquid starters and the latest technologies to maximize crop potential.

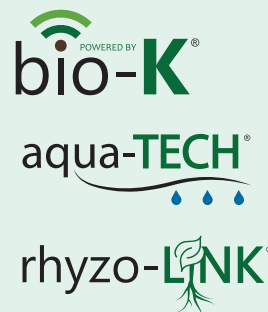
Flexible Applications from Start2Finish®

- In-Furrow
- Banded
- Fertigation
- Strip-Till
- Sidedress
- Foliar

7 Production Facilities

- Marion, OH
- Belle Plaine, SK
- Corydon, IN
- Garretson, SD
- New Hamburg, ON
- Red Oak, IA
- St. Gabriel, LA

Liquid Fertilizer Technologies



NACHURS products are an important part of a complete fertilizer program, they are not meant to replace but compliment your base fertility program.

The NACHURS team includes sales managers, agronomists, and a full support staff. Contact your Authorized NACHURS Dealer or District Sales Manager (DSM) to find out to find out which NACHURS products will give your crop the nutrients it needs for maximum yield potential.



Contact Us

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info@nachurs.com

U.S. Headquarters

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Marion, OH 43302

Social





Why Growers Choose NACHURS®

Since 1946 growers across the country have been reaping the benefits of NACHURS liquid fertilizers on a variety of crops: corn, soybeans, cotton, cereal crops, tobacco, peanuts, fruits and vegetables, just to name a few. Most crops have a critical need for phosphorus and potassium from germination through reproductive stages where maximum yield potential is determined. NACHURS liquid fertilizers ensure that the crop has adequate available nutrients when the plant needs it the most.

Give your crops a strong and uniform emergence with NACHURS in-furrow starter. When used as a foliar fertilizer the nutrients are absorbed quickly throughout the plant for a healthier crop. NACHURS products offer flexible application options to fit most crops and production practices. NACHURS liquid fertilizers can also be tank-mixed with most crop protection products to save growers time and money. Below is a summary of the features and benefits that NACHURS products offers their growers:

Top quality raw materials

Nachurs fertilizers are manufactured with the highest quality raw materials to provide ease of application, available nutrients, and crop safety.

Low salt index & high solubility

Nachurs fertilizers have a lower salt index and higher solubility.

Chloride-free & low impurities

Nachurs fertilizers are chloride-free and contain minimal heavy metals and impurities.

Non-corrosive

Nachurs fertilizers will not corrode your application equipment and storage tanks. Our products are environmentally friendly!

Low application rates & storage

Nachurs fertilizer products store well and have lower application rates, requiring less storage capacity.

Sales, agronomic, & technical support

Nachurs fertilizers have the most comprehensive sales, agronomic, and technical sales support in the industry.

Equipment rebate

To use nachurs liquid fertilizers, your planter/drill may need modifications for in-furrow or precision placement. Ask your nachurs authorized dealer about the equipment rebate program, which offers rebates based on gallons purchased.



NACHURS liquid fertilizers are complementary to the 4Rs of Nutrient Stewardship as it encourages using the right fertilizer source, at the right rate, at the right time, and in the right place.



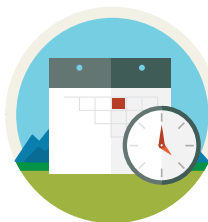
RIGHT SOURCE

Matches fertilizer type to crop needs.



RIGHT RATE

Matches amount of fertilizer to crop needs.



RIGHT TIME

Makes nutrients available when crops need them.



RIGHT PLACE

Keeps nutrients where crops can use them.

Balanced Plant Nutrition Overview

Making the most efficient use of your dollars spent on crop nutrition is a constant goal of all growers today. As crop nutrition prices increase, each grower tries to maintain the balance between obtaining higher crop yields and staying within an overall crop inputs budget to obtain the highest possible profit level from each field.

We recognize this continual challenge that growers face each year as they prepare their crop plans for another growing season. Trying to bring about the economic balance with the natural and ever changing environmental conditions can be very frustrating. Our goal is to reduce the risk from variable weather conditions by managing the nutritional requirements for the crop in a balanced, timely manner to maximize net profits. This approach ensures the crop has the proper nutrition at each of its growth stages yet allows growers to be flexible in applying nutrients as the growing conditions vary during the season. The plant must have the proper balanced nutrition to be able to succeed under a variety of adverse conditions. While our products are part of a complete fertilizer package, they are not meant to replace your base fertility program.

PLANTING

Once the seed has germinated, nutrition for the young seedling is provided by the starter nutrition program. One of the limiting factors affecting nutrient uptake of starter nutrition early in the season is soil temperature. Many growers today cannot seed all of their acres at the most opportune time so steps need to be taken to overcome this unavoidable problem. Healthy seedlings that are vigorous help to reduce the stresses brought on by harsh environmental conditions and seedling diseases. Phosphate and potassium are key nutrients for the establishment of a healthy crop. Once the root mass has been established, the plant is able to take advantage of the nutrients from the base fertility program.

Starter fertilizers require time to dissolve or to break down the polyphosphates into the plant available orthophosphate form. NACHURS in-furrow starters are already in a liquid soluble form with 60-100% of the phosphorus in the orthophosphate form. The majority of potassium in the soil is not available to be taken up by the plant; it is commonly recognized that approximately 1% of the soil resident potassium is readily available in the soil solution making it available for exchange within the soil complex and plant uptake. NACHURS liquid fertilizers are very efficient in supplying nutrients for plant uptake even under cold, dry soil conditions. The low use rate of NACHURS fertilizers helps to reduce the overall time and handling of supplying crucial nutrients and helps increase planting efficiency. Growers can also easily apply any additional NACHURS micronutrients to balance the crop's nutritional requirements.

VEGETATIVE & REPRODUCTIVE STAGES

Foliar applied plant nutrition supplies the crop with further nutrition determined by environmental conditions and by soil and plant tissue tests, maximizing yield potential and nutrient efficiency. Depending on the plant's requirements, NACHURS foliar nutrition products can be applied economically with many crop protection products at various stages. This dual application increases a grower's time efficiency and reduces application costs. NACHURS has developed several foliar nutrition products which can be mixed with additional NACHURS micronutrients to provide the proper nutrition solution.

NACHURS foliar nutrition programs give the grower the flexibility to reduce the base fertilizer program and then manage the remaining nutrient budget in a manner which ensures the efficient use of each nutrient by the plant. In doing so, the grower is proactively reducing their risk with environmental conditions and increasing profit potential.



▲ Highly available liquid fertilizer seed-placed and available in cold soils



▲ Herbicide timing



▲ Fungicide timing

Nutrient Functions and Interactions

All plants, whether it be corn, soybeans, wheat, cotton, cranberries, or canola, require nutrients for proper growth and development. About 90–95% of plant dry matter is composed of carbon, hydrogen, and/or oxygen. The remaining 5–10% is obtained from the soil and/or from fertilizer supplied by the grower. We may understand the importance of primary nutrients (nitrogen, phosphorus, potassium) in achieving production goals that are set each year, however, we often forget the importance of secondary nutrients (calcium, magnesium, sulfur) and micronutrients (boron, copper, iron, manganese, molybdenum, zinc) in the overall process of plant growth and development. Although these nutrients are required in much smaller quantities, they are essential for completion of many physiological cycles and processes within the plant. In many cases, plants cannot fully utilize primary nutrients without adequate supplies of secondary and/or micronutrients supplied at the appropriate time. Below is a listing of functions these nutrients provide within the plant.

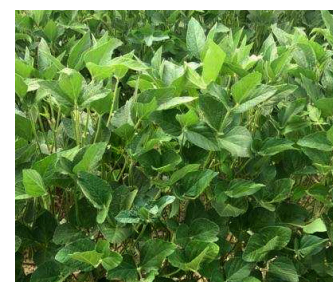
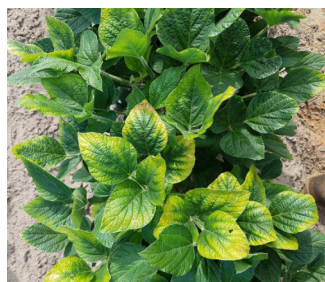
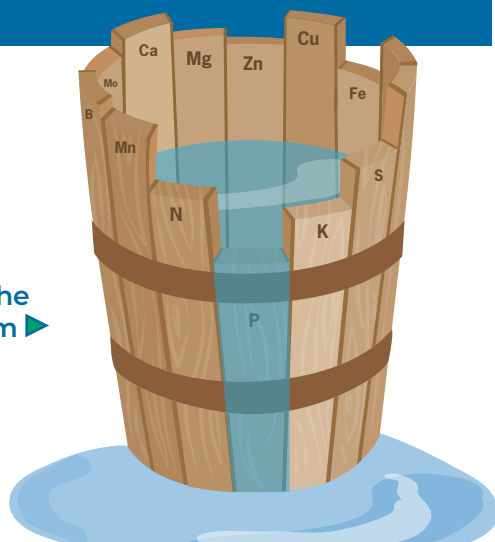
Nutrient	Function in the plant
Nitrogen (N)	<ul style="list-style-type: none"> Converts to amino acids, the building blocks for proteins Produces necessary enzymes and structural parts of the plant Becomes part of the stored proteins in the grain Works with chlorophyll to utilize the sunlight as an energy source Needed for rapid growth and full development
Phosphorus (P)	<ul style="list-style-type: none"> Needs to be available during early development for max yield potential Needed for strong root development Encourages early plant growth for longer growing seasons Provides required energy for nutrient transport Plays a vital role in photosynthesis Essential in providing the genetics for all plant growth and development
Potassium (K)	<ul style="list-style-type: none"> Plays a vital role in photosynthesis Regulates water use with stomatal activity Keeps transportation systems functioning normally Required for protein synthesis and starch synthesis Enhances quality by improving disease resistance and stress management
Sulfur (S)	<ul style="list-style-type: none"> Mirrors phosphorus requirements in plants Primary constituent of many amino acids Aids in activation of enzymes and vitamins Needed for chlorophyll formation Used in nitrogen stabilization Nodulation in legume crops

Nutrient	Function in the plant
Calcium (Ca)	<ul style="list-style-type: none"> Necessary for the proper functioning of growing points Forms compounds which strengthen cell walls Aids in cell division and elongation Neutralizes organic acids Regulates protein synthesis and slows the aging process
Magnesium (Mg)	<ul style="list-style-type: none"> Only mineral component of the chlorophyll molecule Aids in formation of sugars and starches Plays important part in phosphorus translocation Aids in proper functioning of plant enzymes
Boron (B)	<ul style="list-style-type: none"> Required for cell division Plays important part in calcium translocation Protein synthesis and hormone formation Carbohydrate metabolism Pollen viability Flower formation and fruit set
Copper (Cu)	<ul style="list-style-type: none"> Required for chlorophyll production Aids in photosynthesis and enzyme formation Involved in oxidation-reduction reactions Regulates water movement in cells Needed for seed production
Iron (Fe)	<ul style="list-style-type: none"> Necessary for the formation of chlorophyll Involved in oxidation process that releases energy from starches Protein formation Aids conversion of nitrate to ammonia in cells Plant respiration
Manganese (Mn)	<ul style="list-style-type: none"> Essential for chlorophyll production and photosynthesis Aids in carbohydrate metabolism Oxidation-reduction reactions Enzyme activation Combines with iron, copper, and zinc in hormone balance
Molybdenum (Mo)	<ul style="list-style-type: none"> Co-factor in nitrate reductase enzyme Essential for rhizobia in nitrogen fixation process Aids in nitrate utilization Involved in phosphate and iron metabolism
Zinc (Zn)	<ul style="list-style-type: none"> Necessary in chlorophyll formation Involved in enzyme activation and production Required in hormone (auxin) and nucleic acid synthesis Aids in uptake and water use efficiency



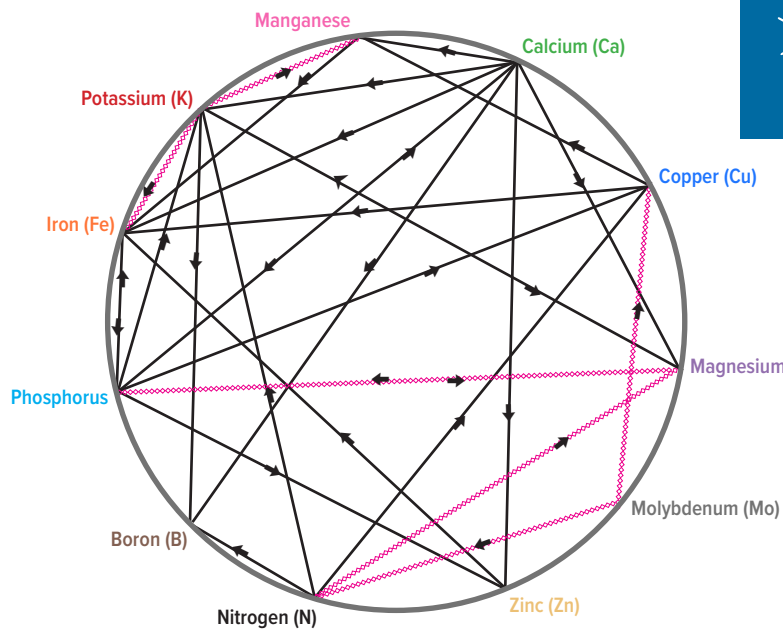
Most growers are well aware of Liebig's Law of the Minimum which states that any deficiency in a nutrient, no matter how small, will hold back the yield potential. As growers have evolved their crop nutrition programs to provide the maximum nutrients to achieve optimum yields, it is often a micronutrient deficiency that is restricting the plant from reaching its genetic potential.

**Liebig's
Law of the
Minimum** ▶



A crop with a potassium deficiency greatly improves after a dose of NACHURS K-fuel®, powered by Bio-K®.

Mulder's Chart ▼



Growers must take into account the interactions of nutrients with each other. Any over supply of one nutrient can cause another nutrient to become the limiting factor. Balance of nutrient supply is critical.

ANTAGONISM →

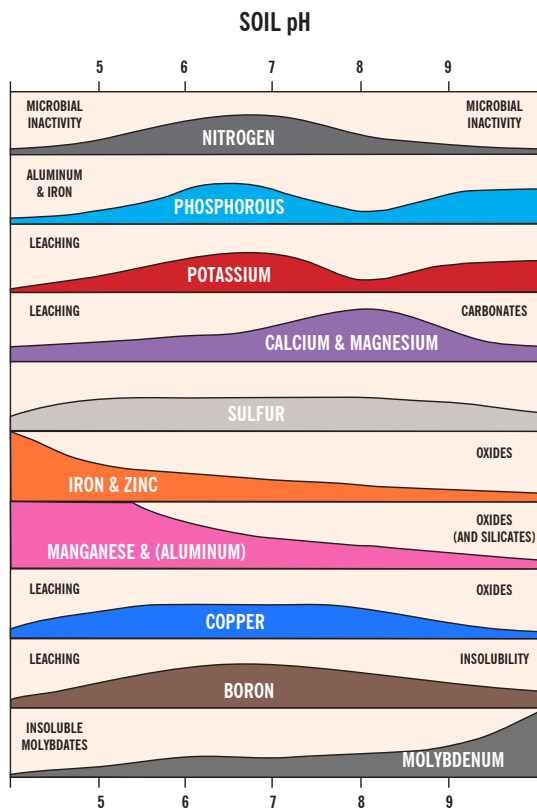
A decrease in availability to the plant of a nutrient by the action of another nutrient.

STIMULATION →

An increase in the need for a nutrient by the plant because of the increase in the level of another nutrient.

(see direction of arrows)

Soil pH ▼



SOURCE: A&L LABS

Overall Plant Growth

Nitrogen • Phosphorus
Potassium • Calcium
Magnesium • Boron
Iron • Zinc
Molybdenum • Sulfur

Respiration (Energy)

Phosphorus • Iron
Potassium • Copper

Reproduction

Phosphorus • Magnesium
Zinc • Boron

Stress Management

Potassium • Zinc
Copper • Calcium • Iron

Stalk Integrity

Phosphorus • Potassium
Calcium

Ear Fill

Potassium • Magnesium
Copper • Boron

Photosynthesis

Nitrogen • Magnesium
Sulfur • Phosphorus
Iron • Zinc • Copper
Manganese

Seedling Development

Potassium • Zinc
Copper • Calcium • Iron

Root Mass

Phosphorus • Zinc
Boron

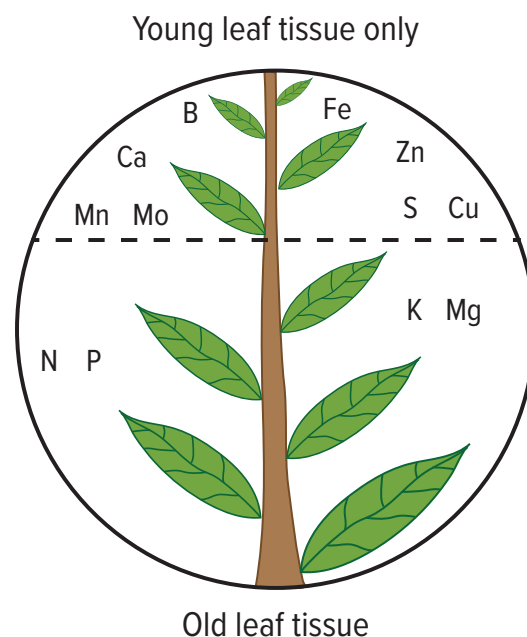
Nutrient Deficiency Symptoms

All twenty one nutrients required by the plant, including macronutrients, micronutrients, and secondary nutrients, must be in balance in order for the plant to maintain its utmost health to defend against unfavorable environmental conditions. A proper soil and tissue sampling program is key tool in managing plant nutrition.

MACRONUTRIENTS	SECONDARY NUTRIENTS	MICRONUTRIENTS	
Nitrogen	Calcium	Boron	Manganese
Phosphorus	Magnesium	Zinc	Copper
Potassium	Sulfur	Molybdenum	Iron

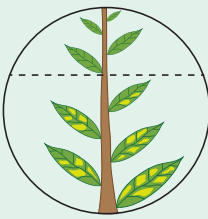
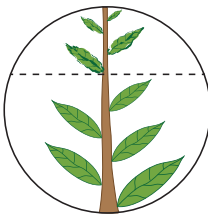
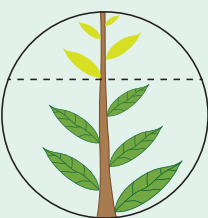
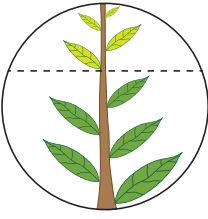
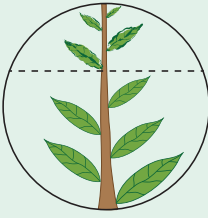
Micronutrient deficiencies are likely when one of the following conditions apply:

- Removal of large amounts by high yielding crops
- Leaching from sandy soils
- Naturally high pH soils
- Over-limed soils resulting in a high pH
- Land leveling
- Additions of high rates of phosphorus
- Soil compaction
- Cool, wet growing conditions
- Tie-up by the soil
- Use of sensitive crop varieties



Nutrient	Position on plant	Chlorosis?	Leaf margin necrosis?	Color and leaf shape	Diagram	NACHURS® Product
Nitrogen (N)	All leaves	Yes	No	Yellowing of leaves and leaf veins	 Nitrogen (N) Deficiency	NACHURS SRN® NACHURS N-Rage Max® NACHURS Finish Line® NACHURS imPulse® NACHURS First Down® NACHURS Green-Flag® NACHURS NockOut®
Phosphorus (P)	Older leaves	No	No	Purplish patches	 Phosphorus (P) Deficiency	NACHURS imPulse® NACHURS First Down® NACHURS Triple Option® NACHURS Aqua-Tech® 7-20-4* NACHURS Balance® NACHURS Green-Flag® NACHURS Rhyzo-Link® PE * For overhead irrigation
Potassium (K)	Older leaves	Yes	Yes	Yellow patches	 Potassium (K) Deficiency	NACHURS K-fuel® NACHURS K-flex® NACHURS K-fuse NACHURS Triple Option® NACHURS Finish Line® NACHURS First Down® NACHURS Aqua-Tech® 2-0-20 NACHURS Balance®

SOURCE: INTERNATIONAL PLANT NUTRITION INSTITUTE (IPNI)

Nutrient	Position on plant	Chlorosis?	Leaf margin necrosis?	Color and leaf shape	Diagram	NACHURS® Product
Magnesium (Mg)	Older leaves	Yes	No	Yellow patches	 Magnesium (Mg) Deficiency	NACHURS® 2.5% Mg EDTA
Calcium (Ca)	Young leaves	Yes	No	Deformed leaves	 Calcium (Ca) Deficiency	NACHURS® 3% Ca EDTA
Sulfur (S)	Young leaves	Yes	No	Yellow leaves	 Sulfur (S) Deficiency	NACHURS K-flex® NACHURS K-flex® MAX NACHURS K-fuse NACHURS Aqua-Tech® 2-0-20 NACHURS Triple Option®
Manganese (Mn) Iron (Fe)	Young leaves	Yes	No	Interveinal chlorosis	 Manganese (Mn) and Iron (Fe) Deficiency	NACHURS® 6% Mn EDTA NACHURS® 4.5% Fe EDTA NACHURS Finish Line® NACHURS Sideswipe®
Boron (B) Copper (Cu) Molybdenum (Mo) Zinc (Zn)	Young leaves	--	--	Deformed leaves	 Boron (B), Copper (Cu), Molybdenum (Mo), and Zinc (Zn) Deficiency	NACHURS® 10% B NACHURS® 7.5% Cu EDTA NACHURS® 9% Zn EDTA NACHURS Finish Line® NACHURS Balance® NACHURS Sideswipe® NACHURS Face Off® NACHURS NockOut®

rhyzo-LINK®

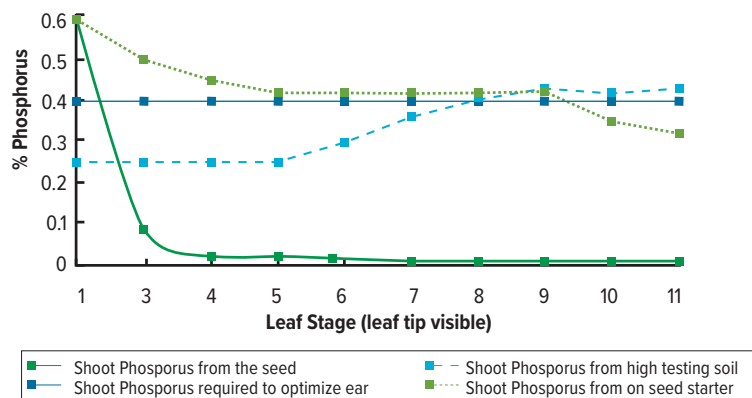
The microbiology in Rhyzo-Link products react synergistically within the rhizosphere and the plant to promote beneficial responses that improve soil productivity and plant health along with crop performance.



“Soil health has been defined as the capacity of soil to function as a living system. Healthy soils maintain a diverse community of soil organisms that help to control plant disease, insect and weed pests, form beneficial symbiotic associations with plant roots, recycle essential plant nutrients, improve soil structure with positive effects for soil water and nutrient holding capacity, and ultimately improve crop production. A healthy soil also contributes to mitigating climate change by maintaining or increasing its carbon content.”

- Food and Agriculture Organization of the United Nations

Phosphorus Concentration in the Corn Shoot



Source: University of Guelph, Miller et al - 1989-95

Starter Nutrition

Starter nutrition is a key component of any balanced nutrition program. Starters provide the emerging seedlings with essential nutrients which are accessible near the young roots just as the sugars and starches are being depleted from the germinated seed. By encouraging vigorous seedling development through the use of a seed-placed starter, opportunity for greater yield and plant health can be positively impacted. Robust seedling development can better resist insect and disease pressure as well as thrive more effectively with any competing weeds.

In starter nutrition, phosphorous (liquid or dry) is a key nutrient since it is practically immobile in the soil and is known to promote vigorous root growth. A small amount of nitrogen in the starter provides the nutrition needed early on for rapid growth and full development without causing seedling injury. The addition of potassium in the starter enhances crop quality and improves disease resistance. If soil tests call for micronutrients, then it is most efficient to place them close to the seed with the starter nutrition for maximum benefit.

Starter nutrition can be described as the catalyst to achieve the full genetic yield potential of the plant. To increase the probability of the emerging seedlings roots and making contact with this catalyst, one can control its placement with properly equipped planters. By placing the starter nutrition as close to the seed as possible the efficiency in nutrient uptake by the plant is maximized.

Nitrogen

Most plants absorb a majority of their nitrogen in the nitrate (NO₃⁻) form and to a lesser extent the ammonium (NH₄⁺) form. Plant growth seems to improve when a combination of ammonium and nitrate nitrogen is taken up by the plant. Once inside the plant, the nitrate transforms to NH₄-N through energy provided by photosynthesis.

Inside the plant, nitrogen converts to amino acids, the building blocks for proteins. These amino acids are then used in forming protoplasm, which is used in cell division. These amino acids are also utilized in producing necessary enzymes and structural parts of the plant and can become part of the stored proteins in the grain.

Nitrogen serves as the source for the dark green color in the leaves of various crops. This is a result of a high concentration of chlorophyll. Nitrogen combined with high concentrations of chlorophyll utilizes the sunlight as an energy source to carry out essential plant functions including nutrient uptake.

Chlorophyll is associated with the production of simple sugars from carbon, hydrogen, and oxygen. These sugars along with their conversion products play a role in stimulating plant growth and development along with higher protein content in the grain.

Nitrogen Requirements							
Corn		Soybeans		Wheat		Alfalfa	
bu/A Yield	N lbs/A Required	bu/A Yield	N lbs/A Required	bu/A Yield	N lbs/A Required	tons/A Yield	N lbs/A Required
150	199	40	220	50	105	5	300
175	233	55	303	75	158	7.5	450
200	266	70	385	100	210	10	600

Synergistic effect of nitrogen and potassium on the uptake of phosphorous:

Treatment	% P Absorbed
P alone	12.1
N+P	20.3
P+K	13.1
N+P+K	22.3

—Dr. John Strauss
Director of Agronomy Services, Tulsa, Oklahoma

Phosphorus

Plants take in phosphate in the orthophosphate form of H₂PO₄ and HPO₄²⁻. Traditional liquid phosphate fertilizers are 70% polyphosphate which must convert into the orthophosphate form in the soil solution. Although some polyphosphates will decompose without enzyme interaction, the primary conversion factor is enzymes produced by microorganisms and plant roots.

Conversion of Polyphosphate to Orthophosphate

Soil pH	Days After Application	% Remaining In Polyphosphate Form
4	100	50
7.2	30	50

Source: Sutton and Larson, Soil Science 97

Orthophosphate

Each molecule contains a single atom of phosphorus. In simple terms, this looks like the individual links in a chain not being connected. In this form a plant can readily absorb the phosphorus.

Polyphosphate

Poly means “many” and refers to multiple linkages of phosphorus in each molecule. In simple terms, this would look like a chain with the links connected. Here the polyphosphate form must go through a chemical reaction converting it into the orthophosphate form to be readily available for the plant to absorb the phosphorus. There are a variety of factors that can affect the conversion of the polyphosphate to the orthophosphate form. These include soil temperature (cooler temperatures can lengthen the conversion time), soil pH, clay content of the soil, application method, along with several other factors.

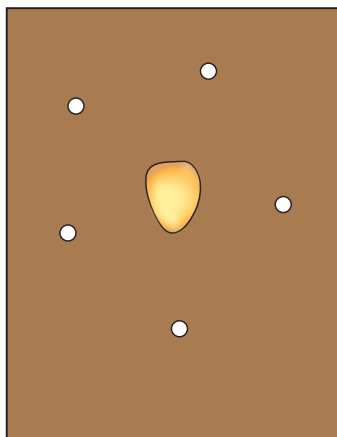
Since all plants must drink their food, dry forms of phosphate fertilizer which are already in the orthophosphate form must convert into a solution in the soil before the plant can uptake the nutrient. The conversion rates of both of these processes are dependent on soil moisture and temperature conditions.

“The final grain yield is influenced by the tissue phosphorus concentration prior to the 6-leaf stage, regardless of the P supply at later stages.”

—University of Guelph, Miller ET AL. 1988

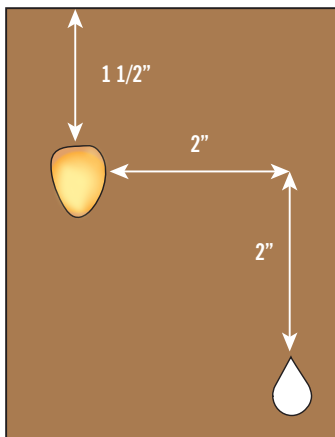
PRECISION PLACEMENT

BROADCAST



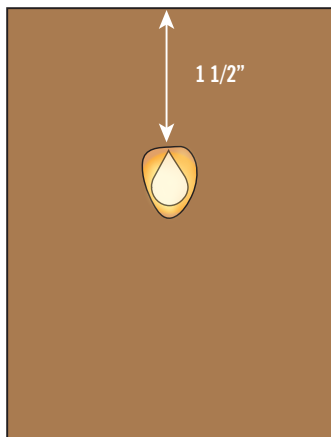
Leaves plant potentially short of P at a critical growth stage. Crop roots likely will not come in contact with the fertilizer during early growth as P only moves 1/10" in the soil.

BANDED 2"x 2"



Leaves plant potentially short of P at a critical growth stage. Roots may or may not come in contact with fertilizer during critical growth period. Crop roots will come into contact with approximately only 2% of the soil.

IN-FURROW



Fulfills needs of the young plant in regard to P requirements. Phosphorus placed for maximum plant efficiency. Roots are in immediate contact with the fertilizer.

◀ NACHURS liquid starters can be placed directly on the seed safely, while other starters such as 10-34-0 should be banded because of their high salt index.

Numerous studies have shown that a lack of phosphate early in plant growth will negatively affect the yield and maximum yield cannot be achieved even if phosphate availability or additional supply is available to the plant at later growth stages.

Work by the University of Guelph has show that the phosphate supply from seed placed starter fertilizers will provide the required amount of phosphate to the plant at this critical stage in plant development. The plant is unable to source enough phosphate from the soil at this stage even in soils which test high for available phosphate. NACHURS liquid fertilizers are 80-100% orthophosphate and are specifically manufactured to be placed directly on the seed.

Potassium

The plants absorb the ionic form of potassium (K⁺) from the soil. Plant roots will only come in contact with approximately 2% of the soil area. This is very critical in potassium management. Once the plant is growing, the potassium ion will only move a limited distance through the soil solution by diffusion during the growing season.

Potassium is one of the greatest investments in protecting a crop. It has the ability to strengthen stalks and stems, protecting the plant from lodging. It has the ability to make plant cells thicker to endure stressful conditions. In alfalfa and other forage crops, it is essential in providing optimum nutrition for winter hardiness. In soybeans potassium has proven to increase seed and grain quality by reducing the number of infected and shriveled seeds.

Potassium has this impact because it is involved in over sixty enzyme systems that regulate plant growth reactions. One of these major roles is in regulating water use efficiency in the plant. The opening and closing of the stomates in the leaves is directly related to the concentration of potassium in the cells that surround the stomates. If the plant has a shortage of potassium, the stomates will only open partially and be slower in closing.

Potassium is also vital in photosynthesis. If a plant is deficient in potassium, photosynthesis will decline, in turn, the plants respiration rate increases causing the plant's carbohydrate supply to decrease. Carbohydrates provide energy for plant growth when they are broken down, which potassium plays a key role in.

Potassium Requirements							
Corn		Soybeans		Wheat		Alfalfa	
bu/A Yield	K ₂ O Required	bu/A Yield	K ₂ O Required	bu/A Yield	K ₂ O Required	tons/A Yield	K ₂ O Required
150	199	40	97	50	90	5	250
175	233	55	134	75	135	7.5	375
200	266	70	170	100	180	10	500

"A higher starter rate won't compensate for fertilizer being farther from seed. The closer the starter is to the seed, the better the response is."

—Ken Ferrie, Farm Journal Agronomist

Not all potassium is created equal. Bio-K is the preferred source of potassium for plant uptake due to the acetate carrier molecule: more efficient and readily absorbed by the plant. Just because a soil test may say there is plenty of potassium for optimum production, that does not mean it is all available during the growing season.

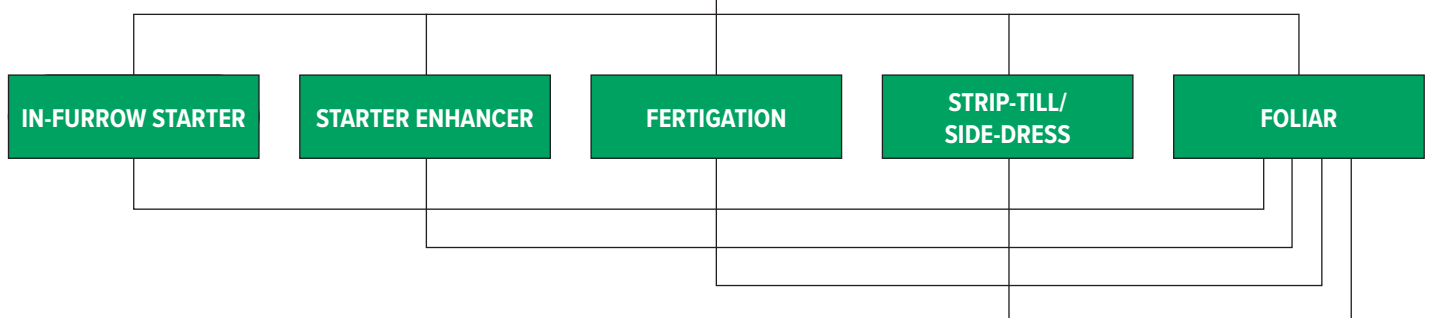


NACHURS® Bio-K®: Elevate your K®

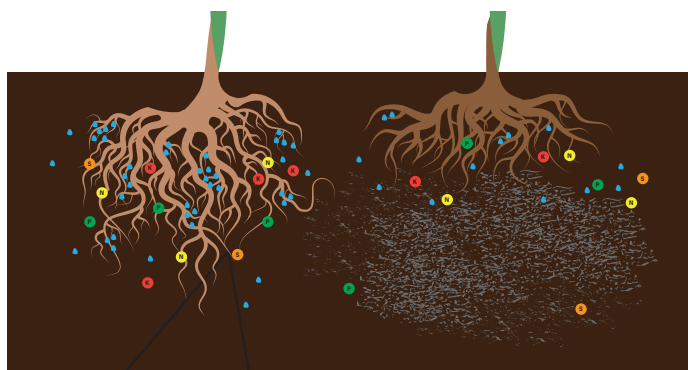
NACHURS offers a potassium-based fertilizer technology: NACHURS Bio-K. This technology is a combination of an inorganic salt reacted with an organic acid to form a potassium acetate fertilizer. What makes Bio-K unique is in the origination of its organic-based carrier (anion), the acetate molecule. Acetate is a natural plant metabolite that has many important functions within the plant as well as in the symbiotic relationship between plant roots and soil microbes/mycorrhizal fungi. Acetate is also a very important part of signaling compounds (flavonoids, lipochitooligosaccharides, etc.) which promote plant-soil microbe relationships and increased plant productivity. Since the carrier portion of Bio-K is a natural plant metabolite, it is more rapidly and readily taken up by plants, which in turn leads to increased potassium use efficiency and higher productivity.

**NACHURS® Bio-K® benefits both plant and soil health.
It has two modes of action:**

1. A source of potassium
2. A stimulant for beneficial soil microbes/mycorrhizal fungi

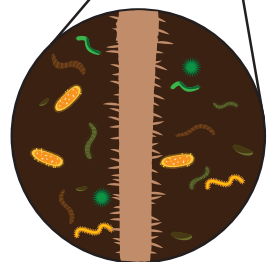


The Science



Healthy Soil

Improved root growth leads to greater soil porosity and higher nutrient/water use efficiency.

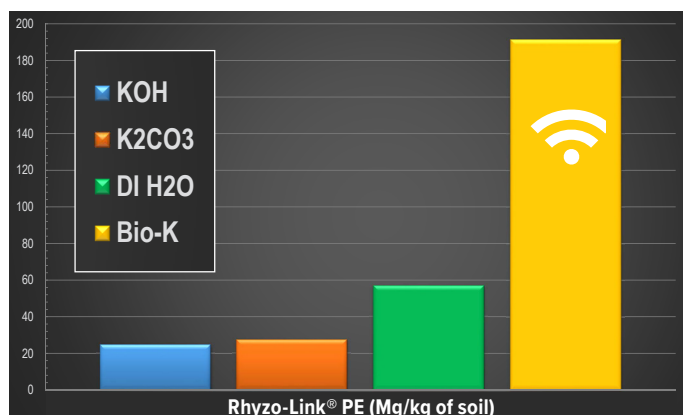


It's not so much about the use of potassium (as we all agree it is an important farming practice), but rather the use of an efficient, available, and soluble potassium source to drive nutrient stewardship, sustainability, and yield.

"Soil health has been defined as the capacity of soil to function as a living system. Healthy soils maintain a diverse community of soil organisms that help to control plant disease, insect and weed pests, form beneficial symbiotic associations with plant roots, recycle essential plant nutrients, improve soil structure with positive effects for soil water and nutrient holding capacity, and ultimately improve crop production. A healthy soil also contributes to mitigating climate change by maintaining or increasing its carbon content."

- Food and Agriculture Organization of the United Nations

Texas A&M AgriLife Extension – Lubbock, TX Soil microbial biomass carbon (SMBC) study*

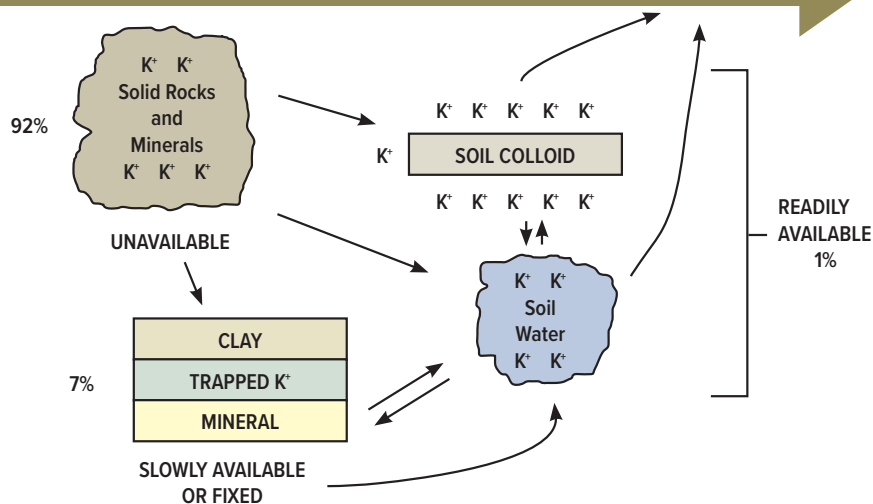


*Application rate: 4 gal a.i./acre (93.5% K-salt + 6.5% PGPR) = 1.5 ul a.i./90 g soil

Potassium status effects plant uptake and availability

Source: extension.umn.edu

The majority of potassium in the soil is not available to be taken up by the plant. Only 1% is readily available in soil solution and is available for cation exchange with soil colloids, therefore available to the growing crop.



Acetate fuels microbial growth, which leads to greater biomass carbon production and improved soil health. Soil health and microbial populations promote increased root growth. More roots leads to greater nutrient and water retention, increased plant growth, less soil erosion, and improved soil porosity.

Size (molecular weight) of potassium sources (g/mol)

NACHURS Bio-K®	98.1
Potassium Nitrate	101.1
Potassium Sulfite	119.2
Potassium Carbonate	138.2
Potassium Thiosulfate	190.4

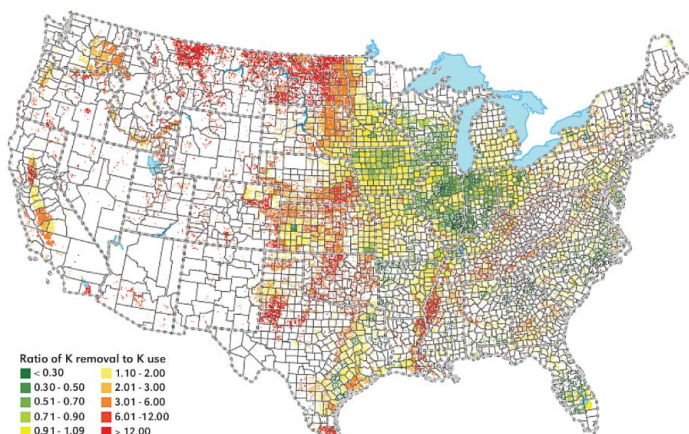
Generally speaking, products with lower molecular weight will gain entry to the plant via cell membranes at a faster rate than those of larger molecular weight origin. Other factors such as polarity, chelation, etc. will also have an effect.

Solubility of potassium sources (g/100 ml)

NACHURS® Bio-K®	286.6
NACHURS Double OK®	112.6
Potassium Sulfite	107.0
NACHURS K-Thio®	96.1
Potassium Chloride (KCl)	34.3
Potassium Nitrate	31.6
Potassium Sulfate	11.1

Journal of Plant Nutrition, 9(2), 143-157 (1986)

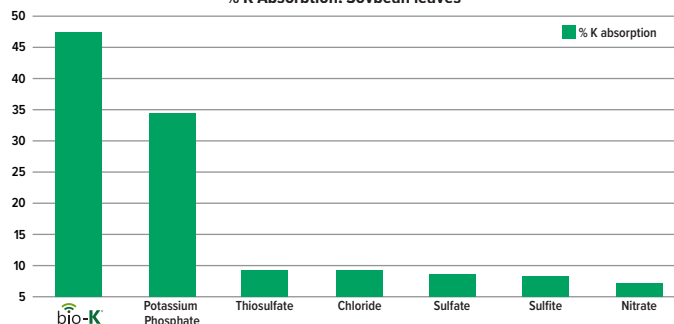
Map of potassium removal to potassium use ratios for the US in 2012



IPNI NuGIS (<http://nugis.ipni.net>)

Foliar absorption of potassium after 48 hours from organic and inorganic K carriers

% K Absorption. Soybean leaves



Journal of Plant Nutrition, 9(2), 143-157 (1986)

Point of Deliquescence *del-i-ques-cence*

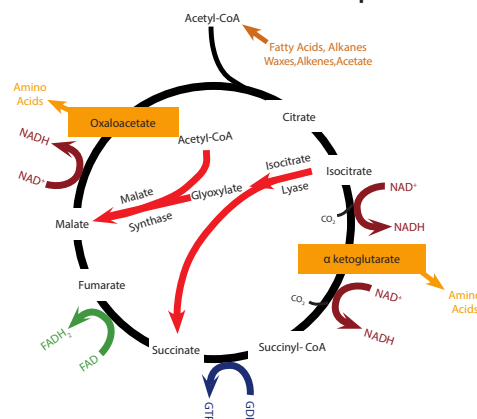
Adjective: deliquescent **Chemistry (of a solid):**
 Becoming liquid or having a tendency to become liquid. Tending to absorb moisture from the air and dissolve in it.

Point of deliquescence of potassium sources (% RH)

NACHURS® Bio-K®	23.3
NACHURS Double OK®	44.0
Dipotassium Phosphate	50.0
NACHURS K-Thio®	64.5
Muriate of Potash (KCl)	85.0
Potassium Sulfite	88.5
Potassium Nitrate	93.2
MKP	97.0
Potassium Sulfate	97.2

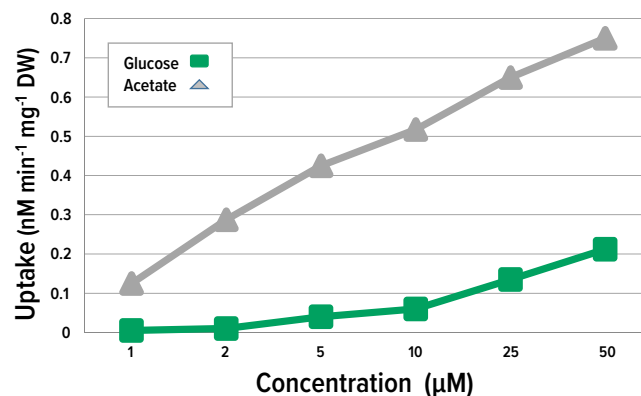
Tommy Roach, NACHURS 2022

Acetate as a food source for plants



Many bacteria and plants are able to subsist on acetate or other compounds that yield acetyl-CoA. Biochemistry, 5th Edition, 2002, Section 17.4

Uptake of acetate vs. glucose over time



Adapted from: Bucking et al. (2008) Root exudates stimulate the uptake and metabolism of organic carbon in germinating spores of *Glomus intraradices*.

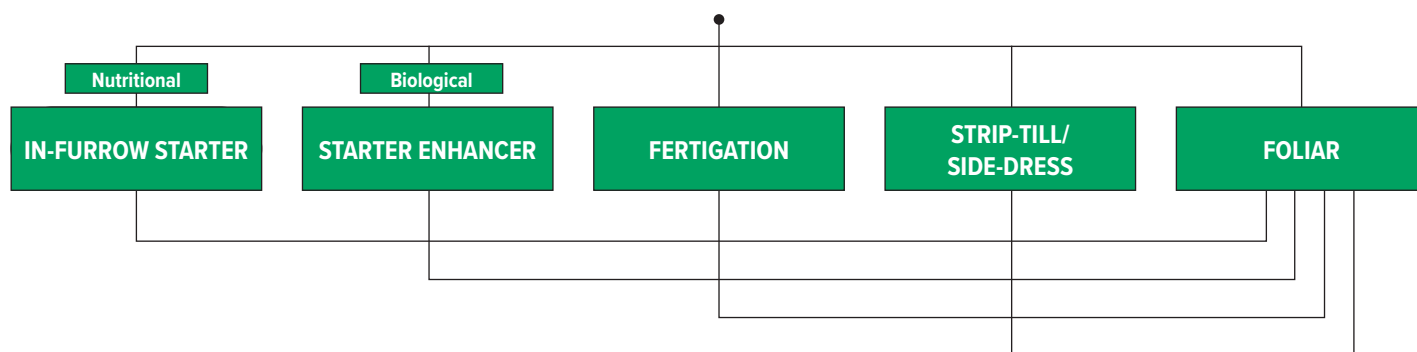


NACHURS® Rhyzo-Link®: Rise to your potential®

NACHURS Rhyzo-Link is a Proprietary Plant Growth Promoting Rhizobacteria (PGPR) technology, delivering the highest concentration of multi-strain, pure culture rhizobacteria. This technology ultimately leads to increased soil and plant health benefits resulting in maximum and sustainable yield potential.

**NACHURS® Rhyzo-Link® benefits both plant and soil health.
It has 2 modes of action:**

1. Nutritional
2. Biological



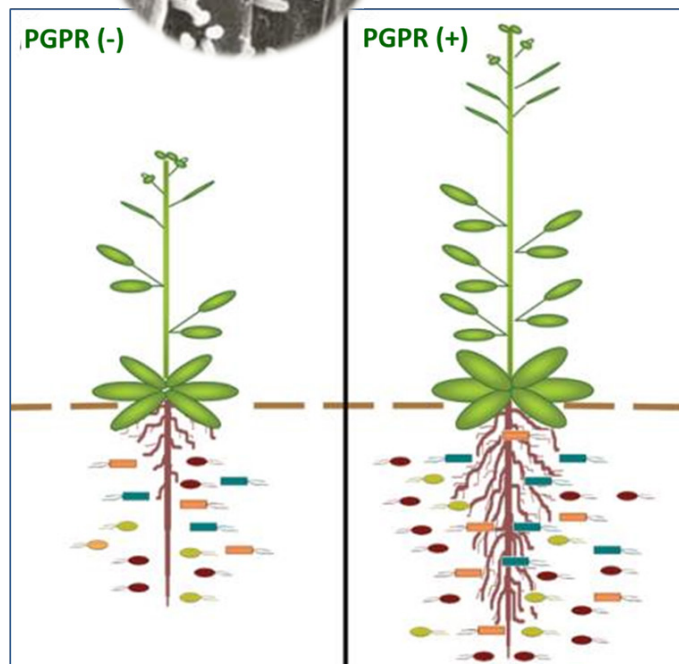
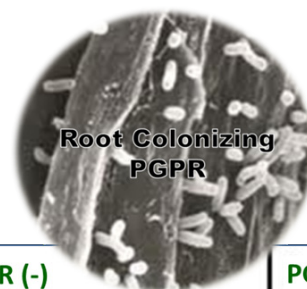
Rhyzo-Link solutions are the next generation in plant fertility, combining a high quality NPK fertilizer with a pure culture, poly-microbial component (PGPR) for use in a wide range of environmental conditions and cropping systems. This “Bio-Charged” fertility solution is designed to provide greater nutrient utilization and efficiency via increased plant biomass, as well as better adaptability to biotic and abiotic factors which occur through numerous physical, chemical, and environmental interactions. Rhyzo-Link solutions provide a buffering or moderating “link” between soil health/chemistry and plant productivity through efficient balance, placement, and recovery of soil/plant nutrients.

Rhyzo-Link contains Plant Growth Promoting Rhizobacteria (PGPR) which is unique to the marketplace. It is a pure culture, multi-strain, poly-microbial solution formulated to enhance fertilizer solutions. It has the natural ability to improve nutrient utilization which helps the plant to better tolerate biotic and abiotic interactions. This is done through the production and ultimate release of secondary metabolites (i.e. enzymes, lipopeptides, biosurfactants, etc.) into the rhizosphere which then impact plant processes such as nutrient availability, root hair proliferation, and systemic mechanisms. Once applied to the rhizosphere and/or phyllosphere and absorbed by the plant, it helps to promote a healthy plant with a more pronounced root system, and ultimately helps to improve crop yield and productivity. Rhyzo-Link when incorporated into fertilizer solutions, truly becomes an easy to use “Bio-Charged” fertility package.

With the plant signaling mechanism (triggered by environmental conditions) via the release of root exudates, to the ultimate production of beneficial plant metabolites by PGPR, soil and plant processes are “linked” together to result in increased growth and yield by the following actions:

- improved plant vigor and stand establishment
- improved handling of biotic and abiotic interactions
- improved nutrient uptake and efficiency
- improved soil health and water use efficiency
- improved adaptive and coping mechanisms
- improved flowering and fruit quality

This all leads to increased plant yield and productivity.



The products of photosynthesis are transported throughout the plant, in part, 20-30% are released through the roots as exudates. Those exudates are then utilized as a food source by the soil microbiology producing metabolites, fueling various activities and responses.

Bacillus tequilensis	Bacillus velezensis	Enzyme assay	Function	Benefit to Plant
Yes	Yes	Alkaline phosphatase	Organic phosphorus conversion	Primary
Yes	Yes	Esterase	Diminish toxic effects of heavy metals and salts	Secondary
Yes	Yes	Esterase lipase	Plant growth promotion	Secondary
No	Yes	Trypsin	Peptide hydrolysis	Primary
No	Yes	a-chymotrysin	Peptide hydrolysis	Primary
Yes	Yes	Acid phosphatase	Inorganic phosphorus conversion	Primary
Yes	Yes	Naphthol As-Bi-phosphohydrolase	Release of nutrients bound in manure	Primary
Yes	No	a-galactosidase	Breakdown of oligosaccharides and polysaccharides	Primary
Yes	Yes	a-glucosidase	Conversion of carbohydrates to sugar	Secondary
Yes	Yes	B-glucosidase	Stress Tolerances	Secondary
Yes	Yes	Amylase	Degradation of organic matter	Primary
Yes	Yes	Protease	Stress tolerance	Secondary
Yes	Yes	Cellulase	Degradation of cellulose and carbon	Primary



Stewardship, sustainability, and efficiency are essential to help feed the world. We must change how we grow a bushel of corn, a bale of cotton, a bag of potatoes, and a ton for forage...

“One of the touted benefits of foliar fertilization is the increased uptake of nutrients from the soil.”

—George Kuepper, NCAT Agriculture Specialist, Foliar Fertilization, 2003

Rate Of Foliar Absorption	
Nutrient	TIME FOR 50% Absorption
Nitrogen (As Urea)	1/2 - 2 hours
Phosphorus	5 - 10 days
Potassium	10 - 24 hours
Calcium	10 - 94 hours
Magnesium	10 - 24 hours
Sulfur	5 - 10 days

Source: Michigan State University

Pounds of soil applied nutrients replaced by one pound of foliar applied nutrient		
Nutrient	Foliar	Soil
N	1	4
P	1	20
K	1	6
S	1	5 - 7
B	1	30
Cu	1	12
Mn	1	30
Mg	1	75
Zn	1	12

Foliar Nutrition

The application of foliar nutrition has been in use for many years in high value specialized crops. As growers are looking to maximize net returns and nutrient efficiencies, the application of foliar nutrition is making its way into many of the progressive growers' crop nutrition programs. Growers are experiencing the positive effect this strategy has on increasing crop yields, nutrient efficiencies and reducing the impact that environmental factors impose on their nutrient programs.

The effectiveness of foliar applied nutrition was first reported by the Michigan State University in the early 1950s. The U.S. Atomic Energy Department provided the University with a grant and radioisotopes of all nutrients for them to study the rates of absorption and movement within the plant. These early studies concluded that foliar applied nutrients were 8-10 times more effective in supplying the required nutrients than soil applied nutrients.

Other work has established the equivalency of foliar applied nutrients to soil applied nutrition. This type of work confirms what growers are seeing in their fields when foliar nutrition is used with a base fertility program.

The advantages of using foliar applied nutrition with a base fertility program are:

- Correct nutrient deficiencies as determined from soil or tissue tests
- Strengthen damaged crops
- Speeds up growth
- Stimulate root uptake
- Provide nutrient efficiency

Foliar nutrition results are highest when the plant is showing high growth activity, going from the vegetative to reproductive stage and when deficiencies are present or when the crop has been damaged. To achieve the best results, the foliar product should contain nitrogen to act as an electrolyte to carry the other nutrients and phosphorous to move the nutrients within the plant.

The foliar nutrients enter the plant through the leaf stomata and hydrophilic pores in the leaf cuticle. The nutrients are only absorbed while in solution on the leaf surface. For this reason, applications are best made in mornings and evenings when heavy dew is on the leaf surface, when there is high humidity, and temperatures are below 68°F.

The initial benefit of a foliar application is an increase in chlorophyll synthesis which can often result in leaves turning a darker green. The increase in photosynthetic activity will stimulate extra root growth; in turn the root hairs excrete excess sugar which stimulates microbial colonies. These bacterial colonies provide auxins and other root stimulating compounds. With the increase in cellular activity gas exchange increases the uptake of water. As the roots take up more water they also bring in more of the nutrients from the soil solution. The foliar application stimulates the entire "pumping system" in the plant to increase the uptake of the base applied nutrition.

Crops benefit in two manners by the foliar application of nutrients:

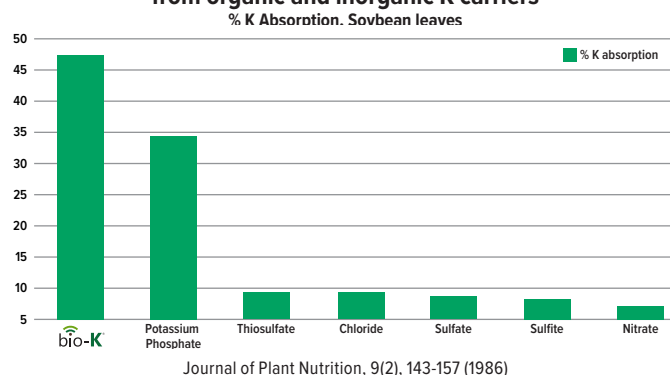
1. By the rapid influx into the plant of the foliar applied nutrients
2. By the increased uptake of the base applied nutrients

This planned approach, utilizing staged foliar applications, delivers the highest efficiency of nutrients and the greatest ability to minimize negative influences of stress factors which in turn creates the highest return on the investment of the grower's crop nutrition program.

N-P-K

Foliar feeding maintains a nutrient balance within the plant, which may not occur strictly with soil uptake. Absorption of essential nutrients through the plant's roots may at times be limited by root distribution, soil temperature, soil moisture, or soil nutrient imbalances or other factors. Primary nutrients that are foliar fed are mobile and will be transported throughout the plant. Potassium is readily absorbed and highly mobile. Phosphorus is absorbed at a slower rate, but is also mobile and transported at a rapid rate.

**Foliar absorption of potassium after 48 hours
from organic and inorganic K carriers**



Slow release N (SRN)

Slow release nitrogen products allow plants to absorb nitrogen on the leaf surface several weeks after foliar spraying. Nitrogen is a critical component throughout the growth and development of plants, and when used in conjunction with N-P-K fertilizers, can help maximize yields. Slow release nitrogen products can also be incorporated with most crop protection chemical programs for timely applications.

Micronutrients

NACHURS micronutrients are versatile and can be easily mixed with most crop protection chemicals for timely applications.



aqua-TECH®

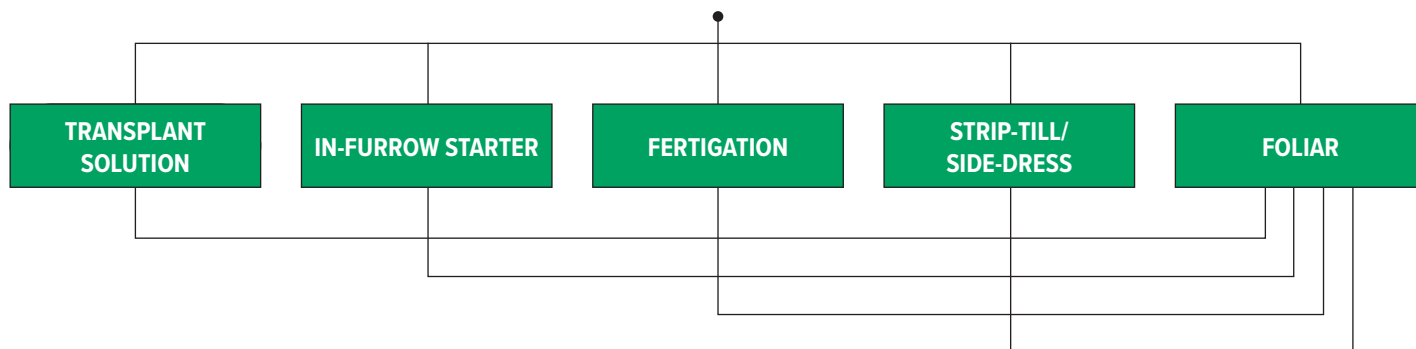
POWERED BY
bio-K®

NACHURS® Aqua-tech®: Fertigate with confidence®

NACHURS® Aqua-Tech® is a unique polyamine technology that allows for greater plant productivity through fertigation systems, delivering highly available low-salt nutrients safely and precisely. Offering much flexibility, Aqua-Tech® products can be used in-furrow and foliar on a variety of crops. Aqua-Tech® contains NACHURS® Bio-K® technology which ultimately leads to better plant establishment, more vigorous growth, and higher yields.

NACHURS® Aqua-Tech® benefits both plant and soil health. It has three modes of action:

1. Polyamine Technology: eliminates the binding of phosphorus with minerals found in hard water.
2. NACHURS® Bio-K® Technology: provides potassium while stimulating soil health by buffering the nutrient delivery zone and stimulating microbial growth.
3. Orthophosphate Technology: 100% of the contained phosphate is present in the orthophosphate form which is immediately available for plant absorption.



NACHURS® Aqua-Tech® 7-20-4 contains both unique potassium and phosphorus chemistry.

Aqua-Tech chemistry is a patented process and refers to a polyamine molecule with proprietary additives and compatibility agents which helps protect phosphorus against adverse interaction with metals (calcium, iron, aluminum, etc.) and bicarbonates which may be contained in irrigation water sources. Products selected for this line have unsurpassed nutrient solubility and plant availability.

Patented polyamine technology occupies the cations to prevent them from binding to plant available phosphate.

- Reduces the occurrence of precipitates which plug emitters.
- Increases plant nutrient uptake by avoiding phosphorus binding with Ca^{++} , or Mg^{++} which causes it to become insoluble and unavailable.

Aqua-Tech is the most soluble fertigation fertilizer available, ensuring nutrients will be available to the plants and not precipitate from solution.

- Protects contained phosphorus against adverse interaction with metals and bicarbonates.
- Phosphorus supplied is in the orthophosphate form.
- Has a greater concentration of nutrients than many other options.
- The pH of Aqua-Tech 7-20-4 is 5.8 making it safe to handle and especially suited for plant uptake.
- Contains proprietary additives and compatibility agents.
- Contains **NACHURS Bio-K** which has a lower molecular weight, lower salt content, and greater solubility.

The source of each nutrient selected to be included in Aqua-Tech is what makes this technology so unique.



NACHURS® Aqua-Tech® is unsurpassed in preventing hard water tie-up which leads to scale formation and nutrient unavailability. Aqua-Tech® delivers highly available low-salt nutrients safely and precisely in conjunction with a unique polyamine technology that works to eliminate phosphorus tie-up in most cases.

The Science:

Properly-managed applications of plant nutrients through all sources of fertigation significantly enhance fertilizer efficiency. Fertigation through drip irrigation is gaining recognition as a best management practice and is one of the primary reasons many growers install drip irrigation.

Understanding the function and timing of key nutrients is an important aspect of utilizing SDI to maximize nutrient delivery. Nutrient concentration in row crops is often greater when the plant is small but nutrient uptake increases as the plant grows, with maximum uptake of many nutrients occurring during the reproductive phase (Figures 1 and 2).

Nutrient Uptake of Cotton

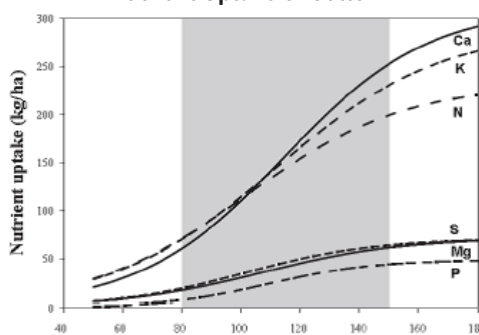


Figure 1. The pattern of nutrient uptake during the growth of an irrigated cotton crop that yielded 2250 kg (4960 lbs.) lint/ha in Narrabri, Australia. From: Nutrient upRochester, Ian J., et al. "Nutritional Requirements Of Cotton During Flowering And Fruiting." Flowering And Fruiting in Cotton. 35.

Potassium Uptake of Cotton

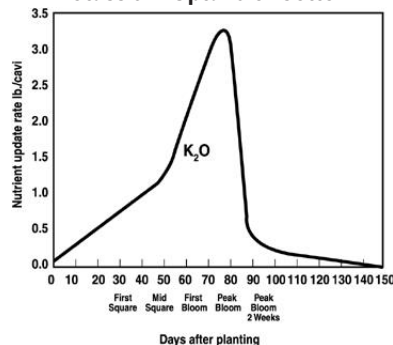


Figure 3. From: Mullins, G. L. and C.H. Burmester. 1990. Dry matter, nitrogen, phosphorus, and potassium accumulation by four cotton varieties. Agron. J. 82:729-736.

Corn Nutrient Uptake and Dry Matter Accumulation

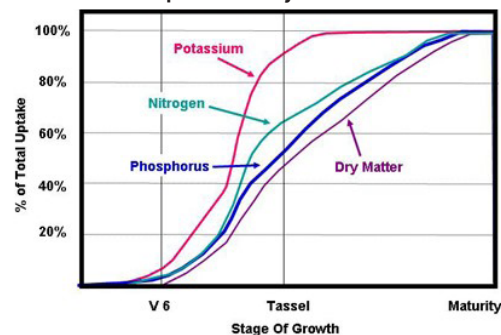
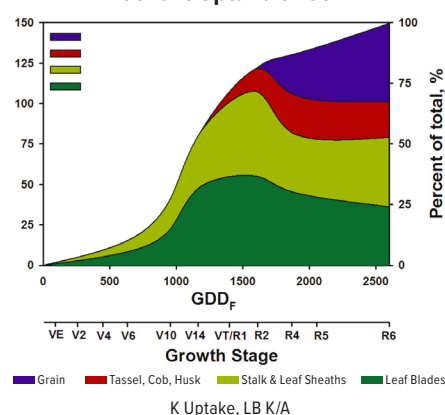
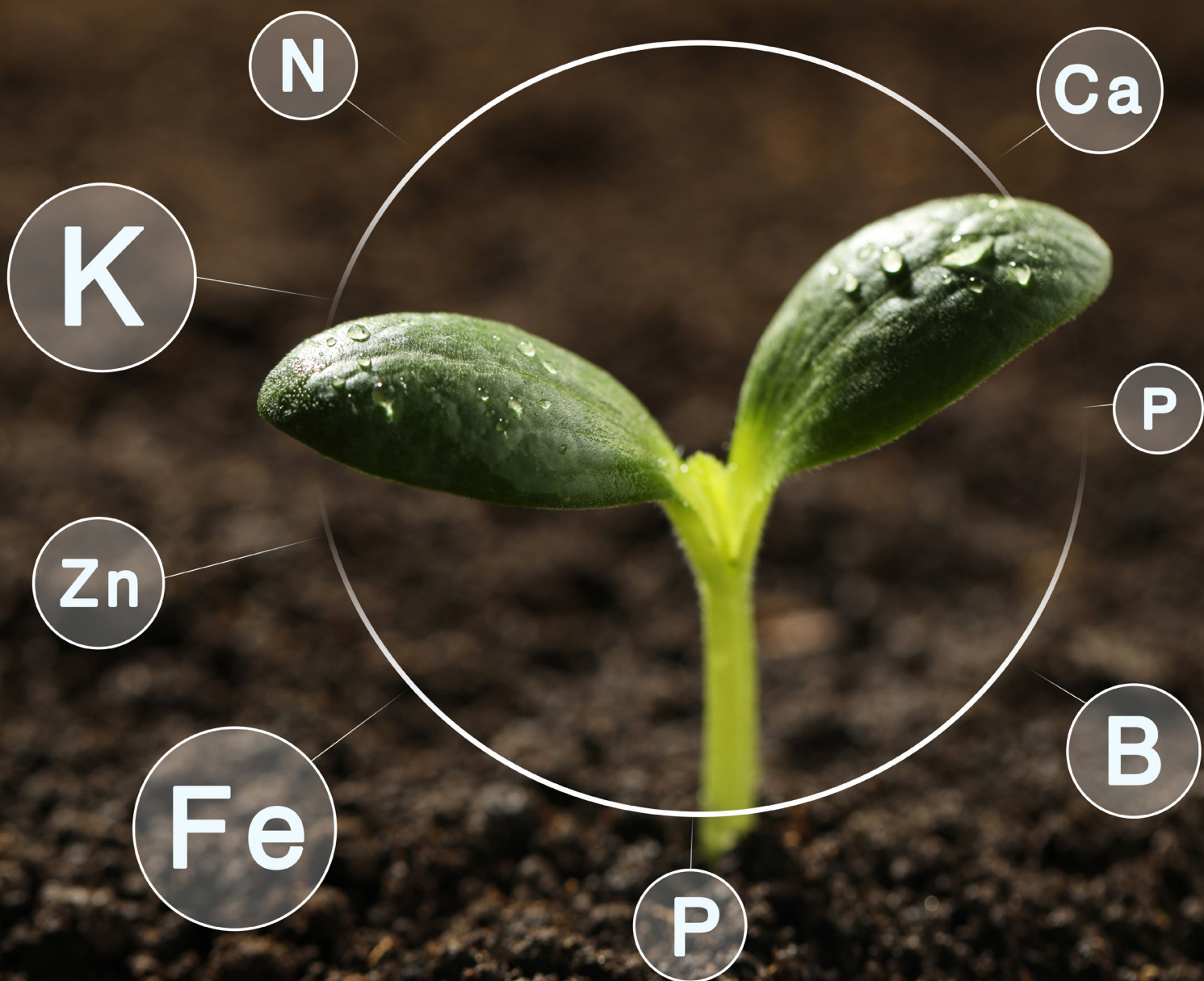


Figure 2. Corn Nutrient Uptake and Dry Matter Accumulation. From: Fluid Fertilizer Foundation <http://www.fluidfertilizer.com/misc/photos/Nutrient%20Uptake%20Corn.html>

Nutrient Uptake of Corn





Always refer to a soil or tissue report to determine the nutrients needed to correct micronutrient deficiencies.

Secondary Nutrients and Micronutrients

Even though micronutrients are required in very small quantities, they are essential for healthy plant growth and profitable crop production. Most of the secondary nutrients and micronutrients can be provided to plants in a chelated form with the exception of sulfur, boron, and molybdenum. EDTA chelated micronutrients provide an economical source for correcting nutrient deficiencies and improving plant health. Preventing micronutrient deficiencies in a crop is far better than correcting them after symptoms appear.

What is a chelate?

A chelate is a complex organic molecule that surrounds the nutrient ion. Chelates are used as carriers for micronutrients, to keep them in solution and protect them from reactions that cause the micronutrient to become insoluble and unavailable to the plant. Chelation allows nutrients to remain available to the plant even if environmental conditions are less than optimal. There are many forms of chelates that can be used, ranging from EDTA, citric acid, amino acids, and organic acids.

The EDTA difference

Unlike other micronutrient sources such as -complexes, partial chelates, and natural organic complexes, EDTA chelated micronutrients are 100% available to the crop. Other micro sources contain too little complexing agent and undergo major chemical changes, delivering significantly less micronutrient in a form available for plant uptake. While these sources of micros may offer cost savings at first, they can actually create deficiencies for lack of nutrient availability.

EDTA fully chelated micronutrients are specifically formulated to prevent nutrient tie up. With the EDTA chelating process, a ring-like structure is placed around the micronutrient, protecting it from being tied up with the soil or other nutrients, thus ultimate nutrient availability to the plant is assured, and deficiencies can be corrected.

NACHURS 100% EDTA Chelates

Other manufacturers do not offer EDTA chelates or use a percentage of EDTA and some other chelating agent. NACHURS micronutrients are fully chelated and can be applied to soil at planting time or foliar spray applied directly to the plant. The stability of NACHURS chelated micronutrients makes them compatible with most pesticides and won't settle out or react with other components in NACHURS liquid fertilizers. NACHURS 100% EDTA chelated micronutrients include: calcium, copper, iron, magnesium, manganese, and zinc.

"A nutritionally-balanced crop is much better able to withstand stresses put upon it by adverse growing conditions (cold or hot, dark or bright, wet or dry, etc., weather)."

— Noel Garcia, CCA, Technical Director, Texas Plant & Soil Lab

Micronutrient Responses

Crop	Mn	B	Cu	Zn	Mo	Fe
Corn	M	L	M	H	L	M
Soybeans	H	L	M	M	M	M
Wheat	H	L	H	L	L	L
Canola	M	H	H	M	L	
Alfalfa	M	H	H	L	M	M
Oats	H	L	H	L	L	M
Grass	M	L	L	L	L	H
Barley	M	L	M	M	L	H
Dry Beans	H	L	L	H	M	H
Potatoes	H	L	L	M	L	
Rye	L	L	L	L	L	
Peas	H	L	L	L	M	

Legend: H... High M... Medium L... Low

Type of Micronutrient	Chemical	Stability	The Facts
Chelated	EDTA DTPA EDDHA	Strong	Stable at high pH Stable with phosphates Crop safe
Sequestered	Phenolics Lignosulphonates	Moderate	Only for foliar application
Complexed	Amino Acids Citrates Glucosheptonates	Weak	Cheap but poor storability
Inorganic	Sulfates Nitrates Carbonates	None	Only for foliar application High rates required Risk of phytotoxicity

NACHURS Technologies

start finish2®

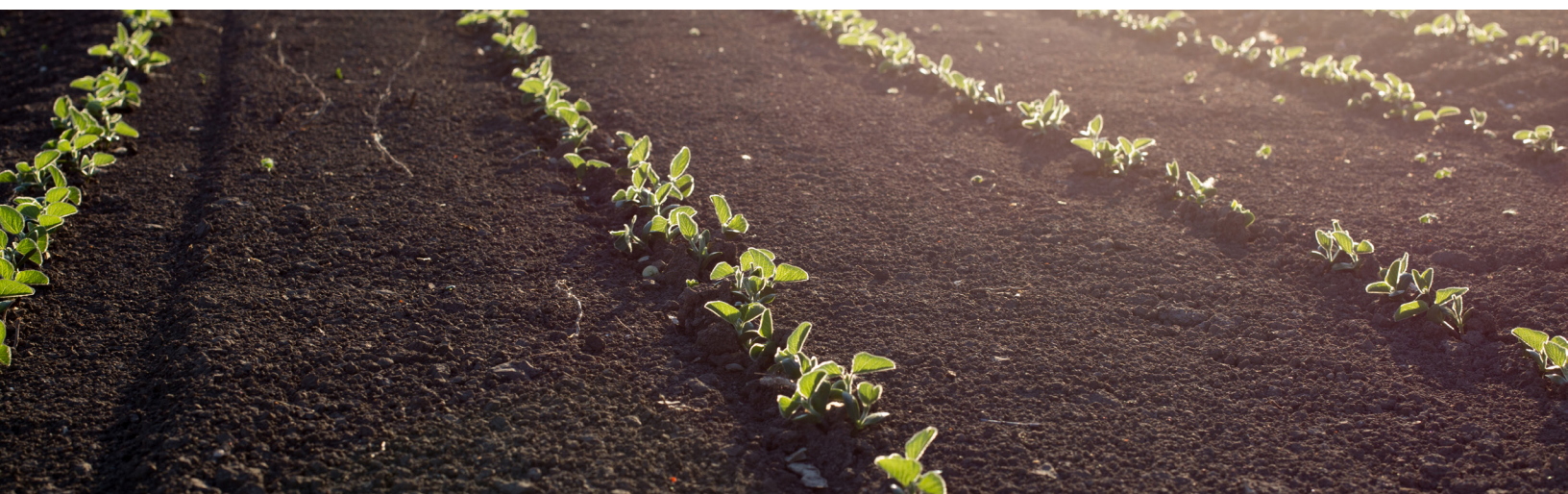
The NACHURS® Bio-K® System

for Maximizing Crop Yields



bio-K®

Overview	NACHURS Bio-K is a premium source of potassium fertilizer combined with a natural plant metabolite; the most effective and efficient source of potassium. Using Bio-K technology results in quicker germination, improved root development, and an elevated abiotic stress tolerance; leading to better plant establishment, more vigorous growth, and higher yields.
The Technology	<p>What makes Bio-K unique is in the origination of its organic-based carrier (anion), the acetate molecule. Acetate is a natural plant metabolite that has many important functions within the plant as well as in the symbiotic relationship between plant roots and soil microbes/mycorrhizal fungi.</p> <p>Since the carrier portion of Bio-K is a natural plant metabolite, it is more rapidly and readily taken up by plants, which in turn leads to increased potassium use efficiency and higher productivity.</p>
The Science	<p>The majority of potassium in the soil is not available to be taken up by the plant. Only 1% is readily available in soil solution and is available for cation exchange with soil colloids, therefore available to the growing crop.</p> <p>Acetate fuels microbial growth, which leads to greater biomass carbon production and improved soil health. Soil health and microbial populations promote increased root growth. More roots leads to greater nutrient and water retention, increased plant growth, less soil erosion, and improved soil porosity.</p>



NACHURS Technologies



Overview	NACHURS® Rhyzo-Link® is a Proprietary Plant Growth Promoting Rhizobacteria (PGPR) technology, delivering the highest concentration of multi-strain, pure culture rhizobacteria. This technology ultimately leads to increased soil and plant health benefits resulting in maximum and sustainable yield potential.	NACHURS® Aqua-Tech® is a unique polyamine technology that allows for greater plant productivity through fertigation systems, delivering highly available low-salt nutrients safely and precisely. Offering much flexibility, Aqua-Tech products can be used in-furrow and foliar on a variety of crops. Aqua-Tech contains NACHURS Bio-K technology which ultimately leads to better plant establishment, more vigorous growth, and higher yields.
The Technology	Rhyzo-Link solutions are the next generation in plant fertility, combining a high quality NPK fertilizer with a pure culture, poly-microbial component (PGPR) for use in a wide range of environmental conditions and cropping systems. This “Bio-Charged” fertility solution is designed to provide greater nutrient utilization and efficiency via increased plant biomass, as well as better adaptability to biotic and abiotic factors which occur through numerous physical, chemical, and environmental interactions. Rhyzo-Link solutions provide a buffering or moderating “link” between soil health/ chemistry and plant productivity through efficient balance, placement, and recovery of soil/plant nutrients.	Aqua-Tech phosphorus chemistry refers to a polyamine molecule with proprietary additives and compatibility agents which helps protect phosphorus against adverse interaction with metals (calcium, iron, aluminum, etc.) and bicarbonates which may be contained in irrigation water sources. Products selected for this line have unsurpassed nutrient solubility and plant availability. Polyamine technology occupies the cations to prevent them from binding to plant available phosphate. Aqua-Tech also contains NACHURS Bio-K which has a lower molecular weight, lower salt content, and greater solubility.
The Science	<p>Rhyzo-Link is designed to build a healthy soil rhizosphere which can support increased plant growth and productivity. The rhizosphere is the narrow region of soil that is directly influenced by root secretions and associated soil microorganisms.</p> <p>The rhizosphere contains many bacteria that feed on sloughed-off plant cells, and the proteins and sugars released by roots (root exudates). Protozoa and nematodes that graze on bacteria are also more abundant in the rhizosphere. Much of the nutrient cycling needed by plants occurs immediately adjacent to roots.</p>	<p>Properly-managed applications of plant nutrients through all sources of fertigation significantly enhance fertilizer efficiency. Fertigation through drip irrigation is gaining recognition as a best management practice and is one of the primary reasons many growers install drip irrigation.</p> <p>Understanding the function and timing of key nutrients is an important aspect of utilizing SDI to maximize nutrient delivery. Nutrient concentration in row crops is often greater when the plant is small but nutrient uptake increases as the plant grows, with maximum uptake of many nutrients occurring during the reproductive phase.</p>



This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



The newest products from
Nachurs Alpine Solutions
to enhance yields of
North American Farmers.

Why choose Advanced Adjuvants?

With Advanced Adjuvants you can expect that same dedication to quality, integrity and innovation you experience with NACHURS.

- Commitment to service, quality, and value
- Proven line of high-performance products

Our Line of Adjuvants

- Kovar Fortitude SR™ – A proprietary adjuvant for soil residual herbicides
- Kovar Force VR™ – A multifunctional adjuvant with an industry leading volatility reducing agent
- Kovar Exalt HSO™ – A High Surfactant Oil Concentrate
- Kovar Condition CS™ – A Non-AMS water conditioner (AMADS)
- Kovar Ampio DR™ – A proprietary adjuvant for drift reduction
- Kovar Flair NS™ – A proven nonionic surfactant

For more information, contact:
Matt Cimino, Sales Manager

ph: 512-450-8090
mcimino@nachurs.com
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Premium Liquid Fertilizers Since 1946

In-furrow Starters • Sidedress
Additives • Foliar Nutrition
Fertigation • Micronutrients

start finish²



NACHURS[®]



Always the innovator, never the imitator.[®]

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