NUTRI-PHITE PGA

PRODUCT GUIDE

NUTRI-PHITE PGA

VERDESIAN

THE NUTRIENT USE EFFICIENCY PEOPLE®

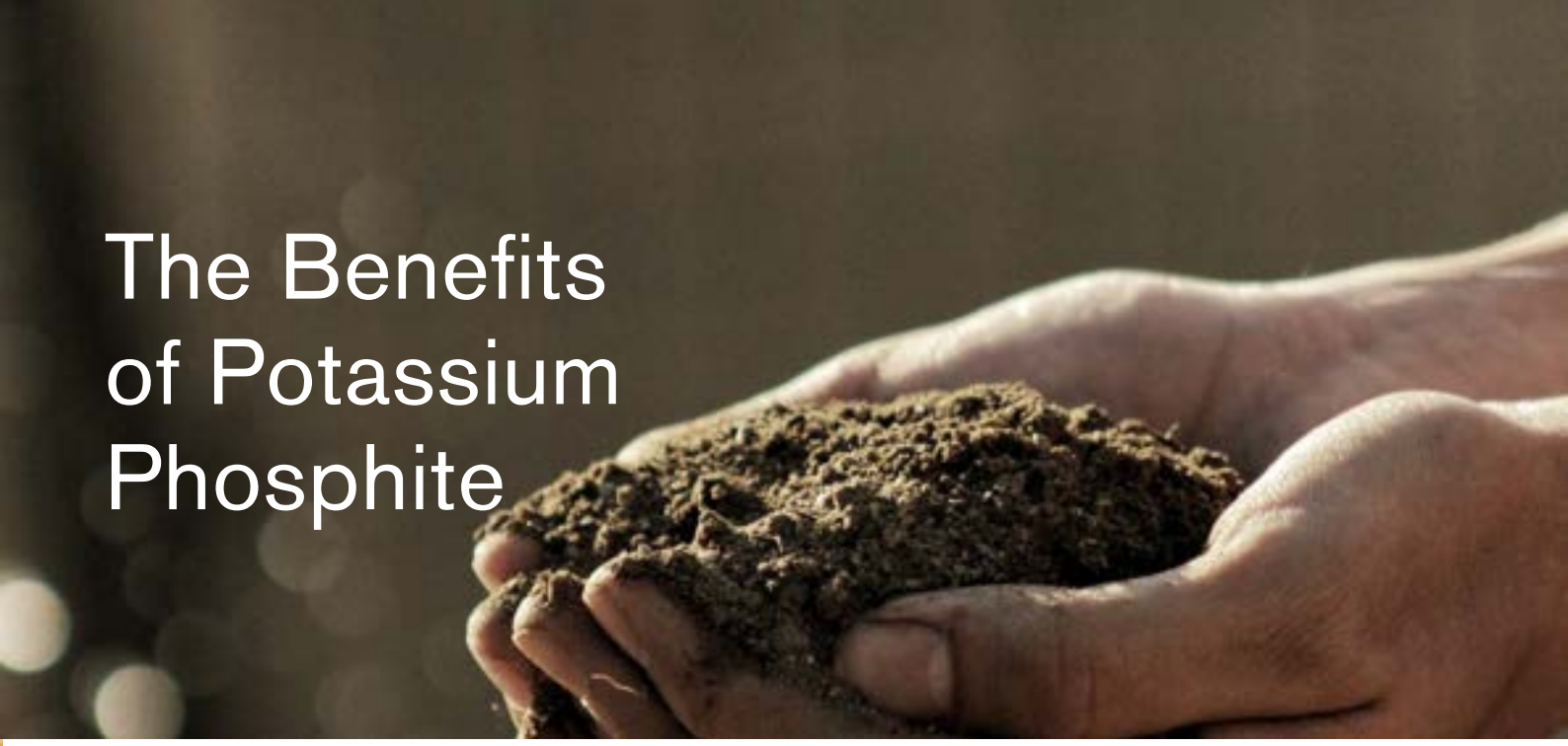
VERDESIAN LIFE SCIENCES EUROPE LTD.

Introduction

Nutri-Phite PGA contains two robust biostimulants which are proven to stimulate crops to grow faster and stronger for a higher quality plant. Nutri-Phite PGA optimises and accelerates carbon dioxide fixation in the plant which in turn increases the rate of nitrogen uptake from the roots. Foliar applied at 0.5-2lt per hectare to all agricultural and horticultural crops Nutri-Phite PGA boosts metabolism, increases root and shoot growth and helps to maximise yield potential.

Major Components:

Active stabilised Potassium Phosphite , 29.3%
PGA biostimulant , 4% D&L isomers
Nutrient complex N (3) and K(7) , 0.5% Zn , 0.5% Mn



The Benefits of Potassium Phosphite

Overview

The mode of action of phosphite is root-specific, and not related to any role as pesticide or fertilizer. Recent studies in wheat, oilseed rape, sugar beet and ryegrass showed that phosphite improved root biomass up to 30% and acted as a specific biostimulant of root growth. Roots provide the means of capturing nutrients and water required to generate a productive photosynthetic crop canopy. Root anatomical properties such as root length, density, depth, root front velocity and angle improve resilience under resource poor conditions by enhancing the uptake of water and mineral elements. These root traits also correlate with improvement in both nitrogen (N) and shoot carbon assimilation. It has been proven that phosphite treatment increases the activity of Nitrate Reductase, which is a key enzyme in N assimilation. Therefore phosphite treatment improves plant tolerance of abiotic stresses through improved N and C assimilation which is in turn associated with improved root growth.

Effect on Root growth

Trials* tested the effect of phosphite on young seedlings in four commercial winter wheat varieties Diego, Leeds, , Siskin and Skyfall. Within 6 days post application these commercial winter wheat varieties showed a significant increase in the seminal root length. The seminal root count in Diego was significantly increased by 18% while its lateral root counts significantly increased by 38% and Leeds by 58%. These results indicate the clear biostimulant impact of phosphite treatment on early root growth that leads to improved seedling establishment. Trial Results in wheat - conducted by the University of Nottingham*

Effect on Photosynthesis and Water

Improved root traits due to phosphite application also have benefits for water and leaf gas exchange explaining the increase in photosynthetic capacity and transpiration rate leading to improved leaf water use efficiency.

The improved leaf water efficiency also provides extra leaf cooling helping to reduce the impact of high leaf temperatures. Chlorophyll degradation occurs in plants under high temperature stress and it is shown that phosphite treatment inhibits high temperature chlorophyll degradation reducing the abiotic stress on the plant.

Effect on Assimilation of inorganic N

Tests* were conducted to assess the effect of the key enzyme nitrate reductase activity in field grown wheat plants. Plants were treated with phosphite in autumn, spring or both in autumn and spring. The tests detected a significant increase of 51% in nitrate reductase activity in dual phosphite application of autumn and spring. Accordingly, an increased nitrate reductase activity leads to increased assimilation of inorganic N to build up the plant's root, stalk/stem, leaf, and grain/seed.

*This work was supported by the awards from the Biotechnology and Biological Sciences Research Council and by funds from six Industrial Partners including Verdesian Life Sciences Europe Ltd.

The Benefits of Pidolic acid (PGA)

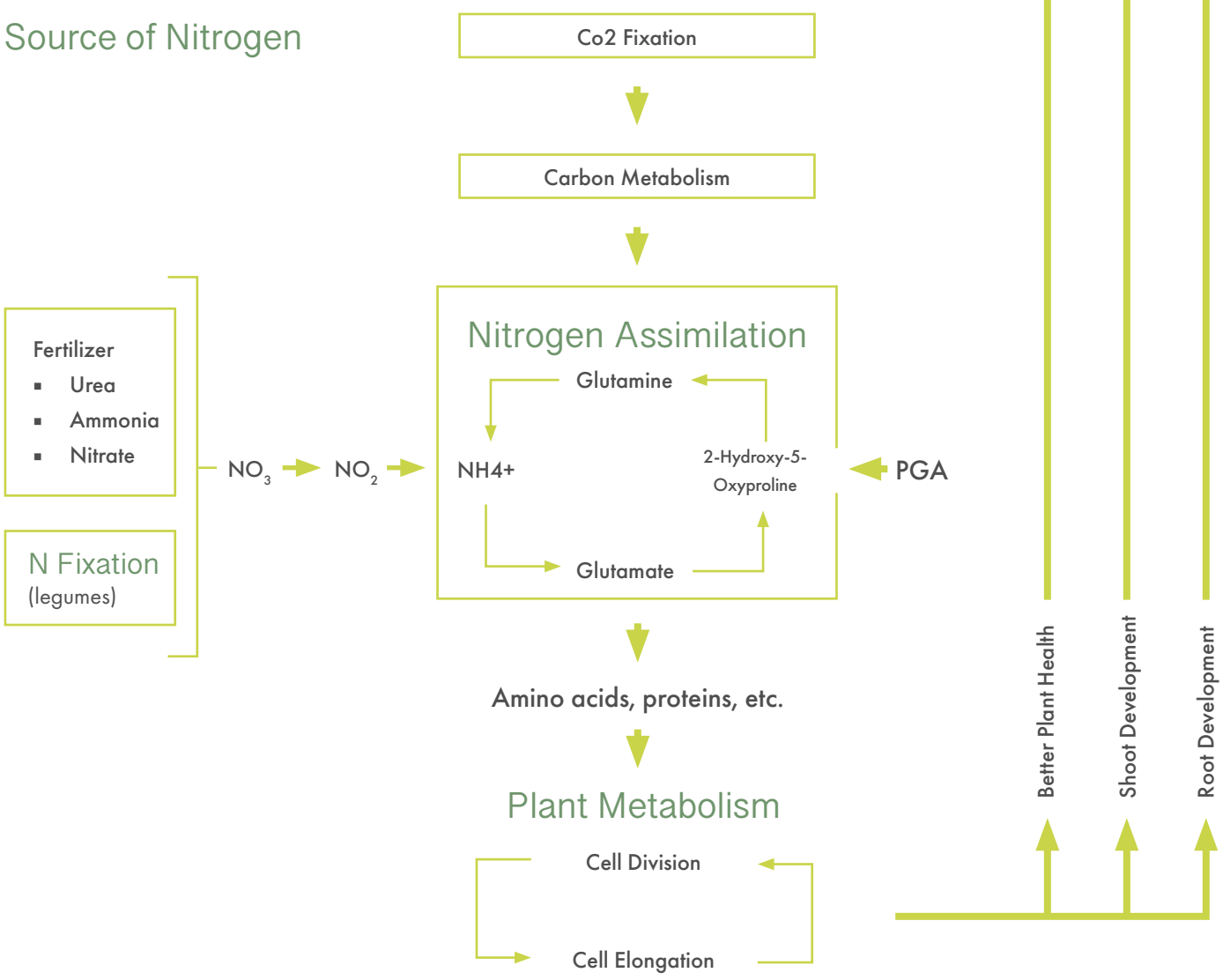
Overview

Pidolic Acid (PGA) is a proline found in humans and plants. The PGA acts as an internal regulator in a plant's Glutamate pathway which optimises nitrogen use efficiency from the carbon fixation within the plant, which also leads to improving the plant's nitrate uptake.

Mode of Action of PGA

The D & L PGA isomers found in Nutri-Phite PGA which at increased concentrations help to speed up the nutrient assimilation processes inside the plant. The PGA content helps to optimise nitrogen use efficiency and carbon fixation, therefore also improving applied nitrogen uptake from the soil. PGA works alongside the key enzymes Glutamate and Glutamine which play a central role in the complex matrix of plant nitrogen metabolism which leads to increased plant vigour, growth and productivity. PGA is currently the only 'Crop Nitrogen Assimilator' that manages nitrogen uptake and utilisation inside the plant. Verdesian currently holds the patent for use of D & L PGA as a plant biostimulant. The diagram below illustrates the interaction of PGA within the Nitrogen Assimilation Cycle.

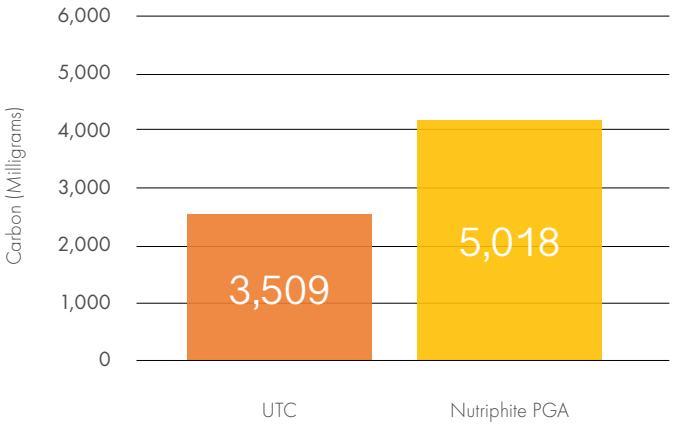
Product Trials and Results



Benefits of PGA in Carbon Sequestration

Carbon is sequestered into the soil by plants through their own process of photosynthesis and can be stored as soil organic carbon (SOC). In trials conducted by Verdesian the application of Nutriphite PGA increased the carbon sequestration by 30% versus untreated plants.

+30% Carbon Sequestration

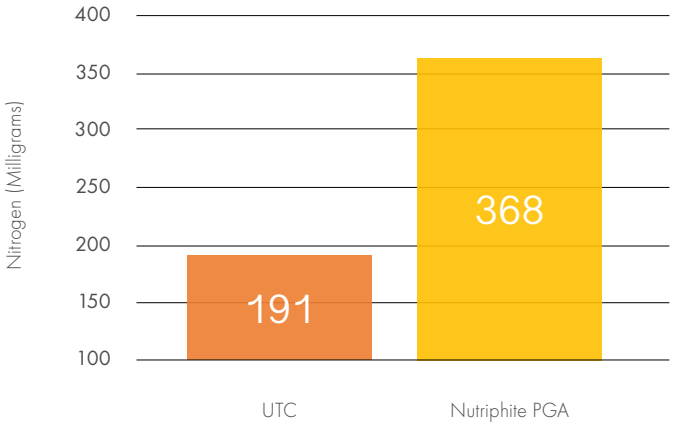


Benefits of PGA in Nitrogen Utilisation

Crop plants have been developed over the last 10,000 years and for most of this time they were not heavily fertilized. However, in the last 60 years the nitrogen fertilization of crop plants worldwide has increased more than 20-fold. Unfortunately, the use of this fertilizer is generally inefficient with only about 50% being taken up by the crop. Therefore improvements in nitrogen use efficiency and utilisation are important for farm economics but also reducing the impact on the environment through the release of green house gases ammonia and nitrous oxide plus the added effect of leached nitrates polluting water courses.

In trials conducted by Verdesian the application of Nutriphite PGA increased the nitrogen utilisation by 48% versus untreated plants.

+48% Nitrogen Utilisation

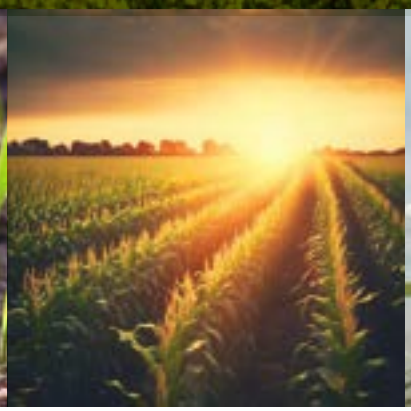


Analysis 21 days post application
Source: Verdesian Laboratories , Kansas 2014

Benefits

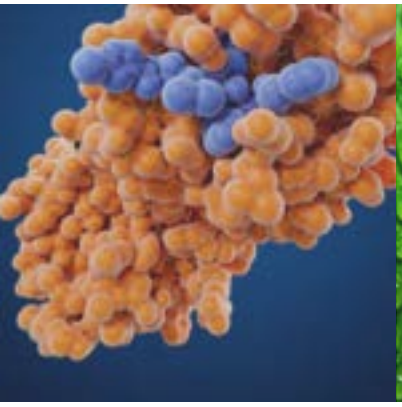
Improved root length and mass

Maximum nutrient use efficiency when applied at early growth stages



Improved photosynthesis activity

Improved crop response under water, heat and nutrient stress conditions



Increased activity of enzyme nitrate reductase improving the assimilation of inorganic N

Increased leaf water use efficiency

Up to 48% increased nitrogen utilisation within the plant

Up to 30% increased carbon sequestration

The Conclusion

for Nutri-Phite PGA

Trial results clearly demonstrate that Nutri-Phite PGA promotes root and shoot growth and improves nutrition use efficiency (root biomass per unit nutrient supply). Improved carbon sequestration and nitrogen utilisation especially under conditions of nutrient and water limitation providing enhanced abiotic stress tolerance. All these benefits combine to result in a stronger more resilient plant enabling the crop to push towards its yield potential.

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