



# PENNNAMIN<sup>®</sup>

**Patented Amino Acid Sprayable Powders**

chelated MICRONUTRIENTS

microbial ACTIVATORS

organic NITROGEN

## General Information

- **PENNAMIN** products can be used on agricultural crops, turf and ornamentals of all types, as well as in greenhouse and nursery production.
- Frequent applications at lower rates are generally more effective than fewer applications at higher rates.
- **PENNAMIN** products are recommended for use on all types of soils. Dilute before use to ensure uniform coverage. Products can be applied with other liquid fertilizers or applied separately\*. Soil applications may be made by sprinkler or band application.
- **PENNAMIN** products accelerate and enhance foliar uptake of any component in the same tank mix. It is suggested that rates of tank mix components be reduced until it is determined how **PENNAMIN** products impact efficacy of specific fertility and disease, insect and weed control products.
- Please read complete product label before using any **PENNAMIN** products.
- Rates given are maintenance rates. A tissue test should be taken on a regular basis. If tests show deficient or excessive levels of any mineral consult with your local **Performance Nutrition** Dealer for corrective rates.

\* Be sure to perform a jar test before tank mixing **PENNAMIN** products.

## Introducing the **PENNAMIN** Advantage

### Amino Acid Characteristics

100% of the amino acids in **PENNAMIN** products are **free amino acids**. This means nitrogen becomes plant available very quickly and the benefits of each amino acid are expressed sooner.

**PENNAMIN**'s amino acids are in **L-Form**. Only L-Form amino acids are suitable for plant uptake and utility.

**PENNAMIN**'S mix of 17 amino acids maintains the inherent characteristics of the individual amino acids.

**PENNAMIN** products are water soluble (or easily suspendable) so they are **easy to blend and apply**.

### Chelation

**PENNAMIN** amino acids have the ability to chelate metals and **improve micronutrient absorption by plants and turf**.

**PENNAMIN** sequesters heavy metals and can help **protect crops grown in soils high in heavy metals**.

### Drought Tolerance

**PENNAMIN** products have a **high level of Proline**, an amino acid known to **contribute to water and drought stress tolerance**.

**PENNAMIN** products **improve plant and turf water stress and drought tolerance**.

Note : Research has shown that proline applications **can delay wilting** when a plant is exposed to osmotic stress.

By managing membrane permeability and ionic uptake, the amino acids in **PENNAMIN** products **help mitigate drought and salt stress affects**.

### High Salinity Tolerance

**PENNAMIN** impacts enzyme activity!

Proline can protect enzymes against denaturation by salinity, heat or dilution.

### Regulating the Stomates

Amino acids like proline and others have been shown to have an inhibiting action on stomatal opening.

Histidine and other amino acids found in **PENNAMIN** **promote the opening of the stomates**.

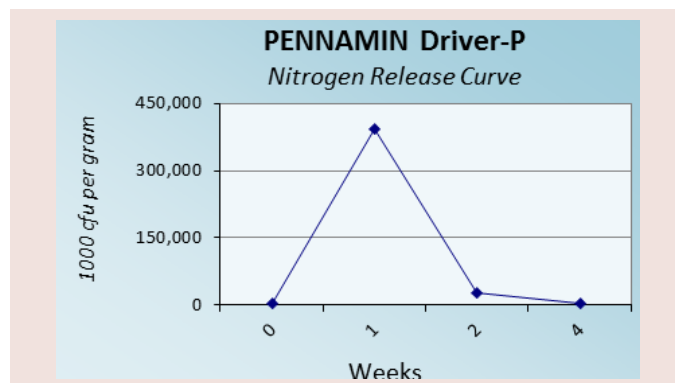
Trial results suggest **amino acids are part of the balancing mechanism of the stomates, and are essential for water retention and the exchange of gases**.

### Organic Nitrogen Source

**PENNAMIN** amino acids are the **precursors of other nitrogen-containing compounds**; as examples, **nucleic acids and chlorophyll**.

**PENNAMIN** amino acids **promote microbial life** in the soil and on the leaf surface and are "easy-to-use" nitrogen sources for micronutrients.

**PENNAMIN** has a **6:1 carbon to nitrogen (C:N) ratio**. This means nitrogen becomes plant available shortly after application and is slowly released for two (2) weeks.



The chart above illustrates the increase in the population of microorganisms which corresponds to the production and availability of organic nitrogen. Microbial populations build almost immediately and peak at about 1 week. It represents nature's own sustained-release nitrogen fertilizer.

**PENNAMIN** amino acids have a **very low average molecular weight: 130 Daltons**.

Studies have confirmed that **PENNAMIN** improves the foliar absorption of critical micronutrients through the leaf's stomates.

## PENNAMIN Product List

### SPRAYABLE

#### Microbial Activators & Foliar Uptake Enhancers

PENNAMIN DRIVER – P 12-0-0 Water-Soluble Powder

#### Typical Chemical Analysis

##### PENNAMIN Driver-P

Dry Matter	96%
Free Amino Acids	80%
Crude Ashes	6%
Sodium Chloride	<4%
Organic Nitrogen	12%

#### Physical Data

Water Solubility at 20°C	200 grams/liter
pH in 1% solution	5.5 +/- 0.3

### SPRAYABLE

#### Chelated Micronutrient Powders

PENNAMIN HIGH K	6-0-15 + 9% Ca
PENNAMIN Mg	12-0-0 + 12% Mg
PENNAMIN Perfect-K	8-0-9+5% Ca with 2% Mg, 0.1% Fe, 0.05% Cu, 0.05% Mn, 0.05% Zn and 0.02% B
PENNAMIN Si	10-0-0 + 4% Si

### SPRAYABLE

#### Chelated Micronutrient Mixes

PENNAMIN Fe + Mn	9-0-0 + 4% Fe + 3% Mn
------------------	-----------------------



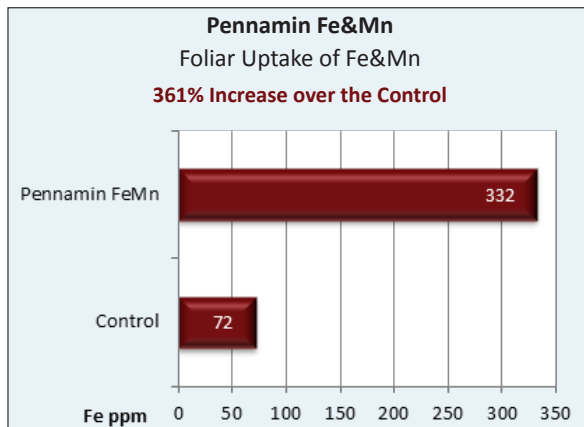
PENNAMIN DRIVER-P has the appearance of a beige dry powder and is 100% water-soluble.

#### PENNAMIN DRIVER-P Amino Acid Profile

Alanine	4.23%
Arginine	5.32%
Aspartic Acid	6.28%
Cystine	1.27%
Glutamic Acid	9.26%
Glycine	7.29%
Histidine	0.96%
Isoleucine	2.51%
Leucine	6.18%
Lysine	1.40%
Methionine	0.45%
Phenylalanine	4.39%
Proline	9.66%
Serine	11.11%
Threonine	4.08%
Tyrosine	1.09%
Valine	4.96%
<b>Total</b>	<b>80.44%</b>

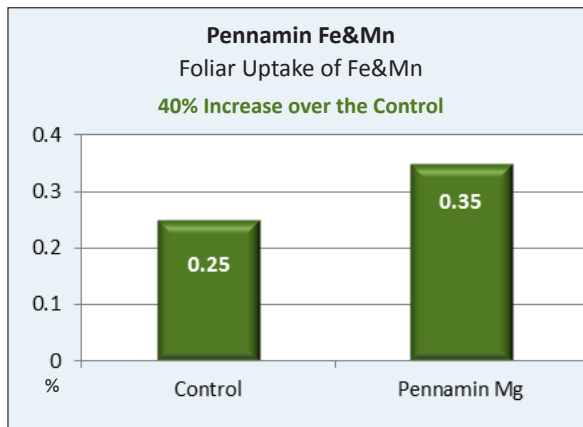
#### Case Study, Tomato:

Foliar uptake of Pennamin chelated micronutrient applications by tomato plants. These results below show the uptake of Pennamin foliar micronutrients after one application. Samples were taken 24 hours after application.



#### Case Study, Impatiens:

Foliar uptake of Pennamin chelated micronutrient applications by impatiens. These results below show the uptake of Pennamin foliar micronutrients after one application. Samples were taken 24 hours after application.





Performance Nutrition is a division of LidoChem, Inc.

Performance Nutrition and Pennamin are registered trademarks of LidoChem, Inc.  
© 2016 LidoChem, Inc.

Performance Nutrition®  
A division of LidoChem, Inc.  
20 Village Court, Hazlet NJ 07730  
Phone: (732) 888-8000  
Email: [info@pnfertilizers.com](mailto:info@pnfertilizers.com)

[www.pnfertilizers.com](http://www.pnfertilizers.com)