Aspe

TECHNICAL REPORT

STYM

25

WITH
I.S.I.
INMUNOLOGICAL
SYSTEM INITIATOR

IMPORTED FROM UE

INDEX

1 / Presentation

STYM 25 is made with amino acids gotten from the enzymatic hydrolysis.

That makes more effective than other products which come from a chemical process. It is recommendable for all kind of crops and at any time of the year, especially when the plants need an extra energy input:

PRE-FLOWERING
FRUIT SETTING
FRUIT SIZING
VEGETATIVE GROWTH
THERMAL, HYDRIC AND SALINE
MORE DIFFICULT UPTAKE AND EFFICIENCY

GOOD UPTAKE AND EFFICIENCY

Its formula makes the plant nutrient uptake be faster. It activates the microbial flora in the soil providing vitamins and other substances. The amino acids facilitate the uptake of micronutrients of micronutrients that are blocked in the soil.

STYM 25 is the only product in the market that incorporates I.S.I.(Inmunological System Initiator) from salicylate derivates that boost the plant resistance to diseases.

Packaging

2 / Origin

STYM 25 formulation, with amino acids extracted from the enzymatic hydrolysis, makes this bio-activator much more effective than any other amino acids which come from a chemical process or the ones that come from alkaline or acid hydrolysis. Its natural ingredients make a product harmless for health, although it has to be used following the guidelines. It can't be mixed with cupric, sulphur or oily products.

The process (Enzymatic hydrolysis) is made by protein enzymes acting over the Casein (a protein with great biological value). This process makes the protein soluble but without denaturating it. All the amino acids that are obtain by the hydrolysis are highly soluble and they take part in the growing process of the plants.

STYM 25 OBTAINED BY ENZYMATIC SYNTHESIS	AMINO ACIDS OBTAINED BY ACID OR ALKALINE HYDROLYSIS
20 essential amino acids are uptaken.	16-18 amino acids are obtained.
All the amino acids are in the L-form (natural form) and are rapidly and easily absorbed by the plants.	Not all the amino acids are in the L-amino acids, some are in D-shape, which cannot be absorbed.
No cycling of Glutamates, which is important for metabolism energy.	Cycling of Glutamates.
No destruction of Asparagine, which is involved in plant respiration.	Destruction of Asparagine.
Tryptophan in L-form, which initiates the synthesis of auxins (growth hormones).	The tryptophan is destroyed, affecting the synthesis of auxins.
Serine and theronine in L-shape.	Serine and theronine are partially destroyed.
Aspartic and glutamic acid, which are two of the most important amino acids, are availablle.	Aspartic and glutamic acids are not in an available form for plants.
Not form amides. Great biological and nutritive value.	Nitrogen amines are formed. The biological and nutritional value is severely
No presence of inorganic nitrogen (ammonium cloride).	Inorganic nitrogen is present as ammonium chloride.
Low dosages.	High dosages.

3 / Composition and physico-chemical features

Amino acids are part of plants; they are the structural unit of the protein. Proteins are organic compounds that take part in DNA synthesis, hormonal and metabolic processes related to the different phenological stages of the plant as well as in the fruit development.

STYM 25 provides the ideal quantity of amino acids the plant needs to achieve an increase in production, to improve the quality and also avoid the negative effects of heavy metal accumulation in the soil, iron-induced chlorosis, low temperatures, etc...

The present free amino acids make that STYM 25 has numerous positive effects on the plant. ASPEAGRO guarantees the composition and contents.

BIOCHEMICAL PROPERTIES	
Description	Dark liquid
Solubility (water 25º)	100% soluble
Extract dry	44-46%
pH	6-7
Density g/L	1,16
Phytotoxic substances	absent
Stability	3 years

COMPOSITION	% w/v
Free aminoacids	25,0
Total Nitrogen (N)	2,5
Organic Carbon	14,4
ISI (Disease-Resistance Activator)	3,0
pH	6,7
Density	1,16

AMINO ACID	FUNCTIONS
All amino acids	Protein synthesis
Glycine	DNA synthesis, alcaloid metabolism
Glutamic acid	Chlorophyll synthesis
Tryptophane	Auxin and phytoalexin precursor
Methionine	Ethylen and polyamine precursor
Aspartate, glutamine and glutamate	N and C storage amino acids, transport amino acids
Proline	Stress metabolism, flowering
Serine	Precursor glycine betaine, stress metabolism
Alanine	Precursor of certain antibiotics in some species
Leucine, lysine, tryptophane, histidine, phenylalanine, tyrosine and glycine	Alcaloid metabolism, plant protection against pests and stress
Phenylalanine	Salicylic acid production, stress and disease prevention
Tyrosine	Glucosinolate precursors “Phytoalexins”

4 / Benefits of Stym 25 application in crops (1 of 2)

POSITIVE EFFECTS FOR PLANTS

- Vegetal and root development
- Nutritional enhancer
  - Improve foliar uptake
- Bioactivator for processes
  - Germination, development, sprouting, flowering and fruit growing.
- Maduration
  - Fruit formation and fattening
  - More quality in fruits
  - Higher performance
- Antistress effects:
  - Biotic (Insects, fungi, etc…)
  - Abiotic (low temperatures, hydric, salt)

POSITIVE EFFECTS FOR THE SOIL

- Activator of microbial flora.
- Chelating effect, helping the uptake of micronutrients.
- Activation of sugar and polyphenol uptake.
- Improves organic matter breakdown.

4 | Benefits of Stym 25 application in crops (2 of 2)

OTHER POSITIVE EFFECTS

- **FROST RESISTANCE**

  The increased protein synthesis is reflected in energy savings that the plant uses to fight against low temperatures.

- **DROUGHT RESISTANCE**

  Some amino acids favor the water balance of the plant, increasing its resistance in times of drought.

- **INCREASES:**

YIELD

NUTRIENT UPTAKE

ROOT SYSTEM

THE SEED GERMINATION

INMUNOLOGICAL SYSTEM ACTION OF THE CROPS

- **DECREASES OF HEAVY METAL CONTAMINATION**

  These metals can combine with localised compounds localised in the root zone (amino acids), decreasing the toxicity of those elements on the plant.

- **DECREASE OF IRON CHLOROSIS EFFECT**

  The chelating action of the amino acids increase the amount of iron that the plant is able to assimilate.

5 / Stym 25 and iron nutrition (1 of 2)

Iron is the fourth most common element on the earth's crust, however a lack of this element in plants is often the main cause of nutritional problems that a crop can undergo.

The causes of iron chlorosis are complex, but it usually appears in sensitive crops in soils with a high pH level and with a high limestone content; under these circumstances, even though iron is abundant in the earth's crust, it precipitates in the ferric oxides form, isn't available for the plant.

The most commonly used iron-based fertilizers are synthetic chelates, that although are expensive, they are the most effective at keeping the iron soluble in the soil even when the environment is not the most favourable. Nevertheless, these chelates are only effective in the soil level are not once the iron is introduced inside the plant.

Amino acids also form chelates with iron and although they are not as stable as synthetic chelates, they have a radicular effect promoting the development of absorbent hair and increasing membrane permeability, demostrating a synergic effect in combination with iron. Furthermore, it keeps the activity inside the plant, allowing a greater movement into the leaves.The iron inside the plant can remain still becoming part of the reserve substances (fitoferritine), and level increase in the cells reducing the quantity of soluble iron. The accumulation of acid substances, such as amino acids, is a response that some plants have to decrease the cellular pH and maintain a higher quantity of soluble iron.

Amino acids have a radicular effect promoting the development of absorbent hair and increasing membrane permeability.

5 / Stym 25 and iron nutrition (2 of 2)

ASPEAGRO together with the University of Alicante, the National Agrarian University - La Molina (Lima- Peru) and The University Federico II (Naples - Italy) are developing the field of research: ''The study of amino acids as synergetic action compounds with iron chelates.''

This research is carried out in cropsthat are specially sensitive to iron chlorosis, such as citrus. With the application of iron chelates Fe-EDDHA along with amino acids, a higher iron concentration in the leaves is obtained, correcting the effects of the chlorosis in the plant.

Università degli Studi di Napoli Federico II

Universitat d'Alacant
Universidad de Alicante

Universidad Nacional Agraria La Molina

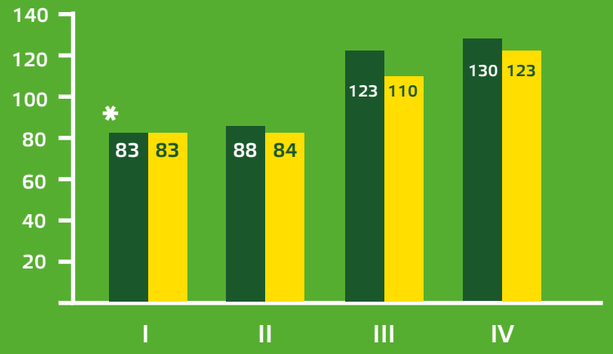


Figure 1. ppm Fe Lemon Leaf

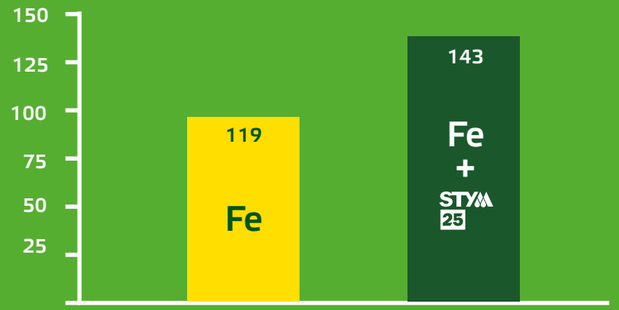


Figure 2. Average weight gr/fruit lemon

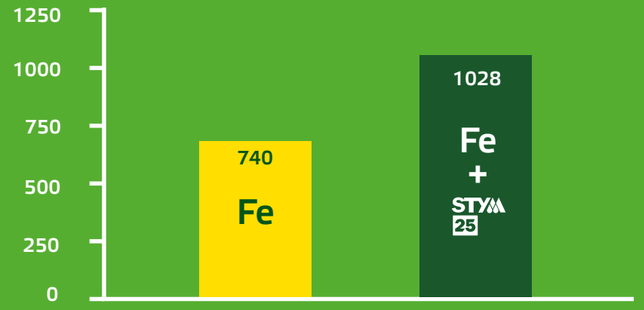
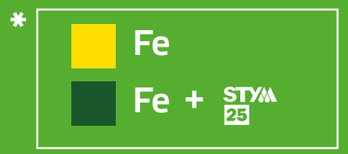


Figure 3. Vitamin C mg/100 ml. In lemon fruit.



6 / Recommendations of use by crops

Foliar crops

Banana Tree

Time of application	Dose cc/100L	Actions
Applied every 15 days	250	Reduces the effects of cold, water, salt, nutritional stress

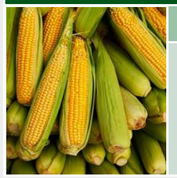
Cereal

Time of application	Dose cc/100L	Actions
From stem elongation until ear emergence	200 - 300	Vegetative development
After abiotic stress (temperature, water...) and biotic.	400	

Citrus

Time of application	Dose cc/100L	Actions
Start of flowering	200	Stress resistance
Falling petals / fruit setting (with Gibberellines)	250	Improves the action of the chelates
Fruit sizing	250	Induces pre-flowering
With micronutrients: Fe, Zn, Mn	300	Better fruit setting
After frost	400	Less fruit drop

Corn



Time of application	Dose cc/100L	Actions
An application on plants between 20-40 cm height	100 - 200	Vegetative development

Cotton

Time of application	Dose cc/100L	Actions
10 days after sprouting	300	Increase production
First flower	300	Vegetative development
20 days after	300	

Fruit Trees

Time of application	Dose cc/100L	Actions
Swollen buds	200	Prevents deformation of the fruit
Petals fall	255	Improves the action of the gibberellic acid
Fruit sizing	300	

Lawn

Time of application	Dose cc/100L	Actions
At the beginning of the vegetation and development of the crop	150 - 200	Vegetative development

Lucerne

Time of application	Dose cc/100L	Actions
At the beginning of vegetation and after each cut	150-200	Vegetative development

Nuts

Time of application	Dose cc/100L	Actions
Swollen buds	250	Resistance to stress
Petal fall	250	Improvement action of chelats
Fruit sizing	250	

6 / Recommendations of use by crops

Foliar crops

Olive

Time of application	Dose cc/100L	Actions
Beginning of spring move	250	Greatest Olive size
Flowering	250	Greatest oil yield
Pea-sized olive	250	Greatest growing in autum
Beginning autumn move	250	Better fruit setting
After frost	400	

Rice

Time of application	Dose cc/100L	Actions
In combination with fungicide treatment	250-350	Better yield crop Enhances the protective effect of fungicides. Reduce the lodging

Table Grape

Time of application	Dose cc/100L	Actions
Beginning of move	250	Resistance to stress
Beginning of bloom	250	Improvement the action of chelates
Grape	250	

Ornamental

Time of application	Dose cc/100L	Actions
Transplantation	200	Resistance to stress
Apply every 15 days	200	Improvement action of chelates

Strawberry

Time of application	Dose cc/100L	Actions
Transplantation	200	Improvement size
Beginning of bloom	200	Colouring of the fruit
app. Every 15 days	200	Vegetative development Reduces effect of cold

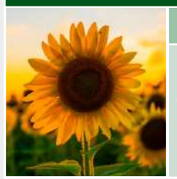
Tubers

Time of application	Dose cc/100L	Actions
App. Every 15 days	250	Favors rooted Vegetative development Reduces the stress of transplantation

Rape

Time of application	Dose cc/100L	Actions
From leaf develop ment until stem elongation	200 - 300	Yield and quality

Sunflower



Time of application	Dose cc/100L	Actions
Beginning of bloom	200	Increase in production
Grape	200	Improved sproutling and ripening

Vegetables

Time of application	Dose cc/100L	Actions
Transplant	200-250	Minimize water stress
Inicial development	200-300	Improves the plant growth
Beginning of flowering	200-300	Better fruit setting
Beginning of fructification	200-300	Better fruit size and color
Abiotic stress (salinity or high tempretures)	200-400	Reduces stress due to low temperatures
After frost	400	

*In greenhouse use lower doses

6 / Recommendations of use by crops

Soil crops

Banana Tree

Time of application	Dose L/Ha	Actions
Begining of spring (3-4 months)	6	Improves the plant growth Improves root development Better harvest yield

Cereal

Time of application	Dose L/Ha	Actions
In Spring at the start of vegetation until the end of tillering	2 - 3 Total: 15 - 20 L/Ha	Inicial development, yield and vitality

Citrus

Time of application	Dose L/Ha	Actions
Start of flowering	12	Stress resistance Improves the action of the chelates. Better fruit setting Less fruit drop
Falling petals / Fruit setting (with Gibberellines)	12	
Fruit sizing	12	

Corn

Time of application	Dose L/Ha	Actions
An application with plants between 15-20 cm height	2 - 4	Yield and quality

Cotton

Time of application	Dose L/Ha	Actions
10 days after sprouting	6	Improves the rooted
First flower	6	Speeds up production
20 days after	6	

Fruit Trees

Time of application	Dose L/Ha	Actions
Pre-blossom	5	Increases production
Fruits setting	5	Best bud
Fruit development	5	Reduces effects of stress

Nuts

Time of application	Dose L/Ha	Actions
Swollen bud	5	Higher production
Petal fall	5	Increased curd
Fruit sizing	5	Invigorates the tree

Olive

Time of application	Dose L/Ha	Actions
Beginning of move	18	Best bud
Flowering	18	More flowering
Fattening olive	18	Best fertilization

Ornamental

Time of application	Dose L/Ha	Actions
To transplant	4	Improving the rooted and germination
Apply every 15 days	4	Greater number of flowers

6 / Recommendations of use by crops

Soil crops

Rape

Time of application	Dose L/Ha	Actions
1-2 times from the 4 leaf stage	4 - 5	Yield and quality

Rice

Time of application	Dose L/Ha	Actions
In combination with fungicide treatment	250-350	Better yield crop Enhances the protective effect of fungicides. Reduce the lodging

Strawberry / Berry

Time of application	Dose L/Ha	Actions
Transplantation	4	Better rooted
Beginning of flowering	4	More flowers
Apply every 10 days	4	Improvement the action of chelates

Sunflower

Time of application	Dose L/Ha	Actions
1-2 times from the 6-7 leaves stage.	4 - 5	Yield and quality

Table and wine grape

Time of application	Dose L/Ha	Actions
Beginning of bloom	2,0	Increase in production
Grape	2,0	Improved sproutling and ripening

Table grape

Time of application	Dose L/Ha	Actions
Beginning of move	5	Increased production
Beginning of bloom	5	Improving the sprouting
Grape	5	Larger cluster

Vegetables

Time of application	Dose L/Ha	Actions
Transplant	2-3	Minimize water stress
Inicial development	3-4	Improves the plant growth
Beginning of flowering	3-4	Better fruit setting
Beginning of fructification	3-4	Better fruit size and color
Abiotic stress (salinity or high tempretures)	4-5	Reduces stress due to low temperatures

*In greenhouse use lower doses

Vid

Time of application	Dose L/Ha	Actions
Split into 5-10L/Ha applications throughout the cycle	20 - 30	Vegetative development

6 / Recommendations of use by crops

Fertirrigation

Banana Tree

Time of application	Dose ml/tree	Actions
Begining of spring (3-4 months)	2-3	Improves the plant growth Improves root development Better harvest yield

Citrus

Time of application	Dose ml/tree	Actions
Start of flowering	10	Stress resistance
Falling petals / fruit setting (with Gibberellines)	10	Improves the action of the chelates
Fruit sizing	10	Induces pre-flowering
With micronutrients: Fe, Zn, Mn	12-15	Better fruit setting
After frost	15-20	Less fruit drop

Olive

Time of application	Dose ml/tree	Actions
Beginning of spring move	20	
Flowering	20	Greatest Olive size
Pea-sized olive	20	Greatest oil yield
Beginning autum move	20	Greatest growing in autum

Table and Wine Grape

Time of application	Dose l/Ha	Actions
Beginning of bloom	6	Better Fruit setting
Beginning of flowering		Increase in final production
Pea-sized olive		

7 / I.S.I. (Inmunological System Initiator) activator disease resistance (1 of 2)

When a plant is infected by an organic pathogen (a producer of disease: virus, bacteria, fungus...) the following can occur:

A. In susceptible plants. The reproduction of the pathogen is not limited, which spreads through the plant causing considerable damage, and even the death of the plant.This lack of resistance can result in an incapacity of the plant to identify the infecting organism and implement successful self-defense mechanisms.

B. In resistant plants. This identificator does take place, and then put in action pysiological and biochemical mechanisms which limit the spreead of the pathogen to restricted zones, therefore avoiding the damage that could occur.

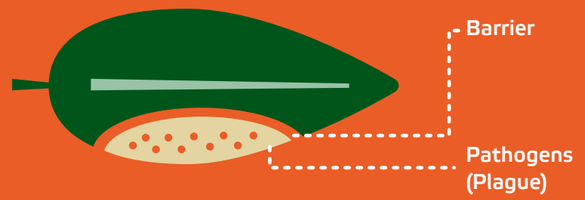
The process

This process is called: HYPERSENSITIVE RESPONSE (HR) and it is comprised of two processes:

1. Pathogen isolation to a limited zone, close to the infected area.

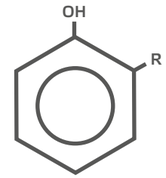
2. Necrosis (death) of the tissue surrounding the infected area

HOW TO ACTIVATE THE PLANT'S SELF-DEFENSE MECHANISM:



Current evidence, derived from multiple scientific studies (Stevenson, 1994; Bergmann, 1992; Sánchez-Andreu 2000), demonstrate that between these self-defence instigators, a group of compounds can be found, synthesised by the plants and therefore not alien to them:

The polyphenols, little molecules made up of an aromatic ring substituted for hydroxyl groups (OH), or their derivatives



The effects of these compounds on plants are diverse: In this way, they influence the germination, flowering, and growth of the fruit, closing of stomates and glycolysis. But in the last few years, it has laso been shown that a group of these phenolic compounds, the derivatives of salicylic acids (salicylates) are the instigators of the HR self-defence mechanism. That is to say when an infection is produced, if I.S.I. (Inmunological System Initiator) salicylates are present within, these initiate a series of biochemical and physiological processes in the plant, which results in the detection, isolation and elimination of the infection.

7 / I.S.I. (Inmunological System Initiator) activator disease resistance (2 of 2)

Other effects of I.S.I.

Salicylate derivatives forming part of the molecules that we have called I.S.I. have other benefits on the plant in addition to activate the resistance to diseases since it has an impact on the following:

A. STIMULATES
Growth and plant development.
Photosynthesis and perspiration.
Take and transport of nutrients.

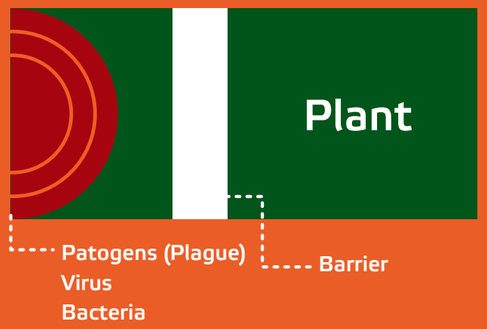
B. PROTECTS
Front to ozone and ultraviolet light.

C. REDUCES
Oxidative stress.
Saline stress.
Osmotic stress.

How the barrier acts:

Without I.S.I.

With I.S.I.



I.S.I. detects infection and active barrier

Based on these principles, ASPEAGRO, adds to its range of products STYM 25 (extract amino acids, obtained by enzymatic hydrolysis) a group of molecules registered by ASPEAGRO S.L., and called I.S.I., capable of the various functions that we have just seen.

This confers STYM 25 an additional, unique advantage in the world market, which makes it doubly recommended.

WITH I.S.I. INMUNOLOGICAL SYSTEM INITIATOR

ASPEAGRO GLOBAL S.L.U
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