Aspe

# TECHNICAL REPORT

STYM

# 35

WITH I.S.I. INMUNOLOGICAL SYSTEM INITIATOR

IMPORTED FROM EU

# INDEX

# 1 / Presentation

**STYM 35 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

Approved by ECOCERT INPUTS


## 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 35 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 35 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 35 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 35 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 35 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 Amino Acids | 35,00 |
| Total Nitrogen (N) | 6,80 |
| Density: 1,26g/cc<br>pH: 7 | |

| 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” |

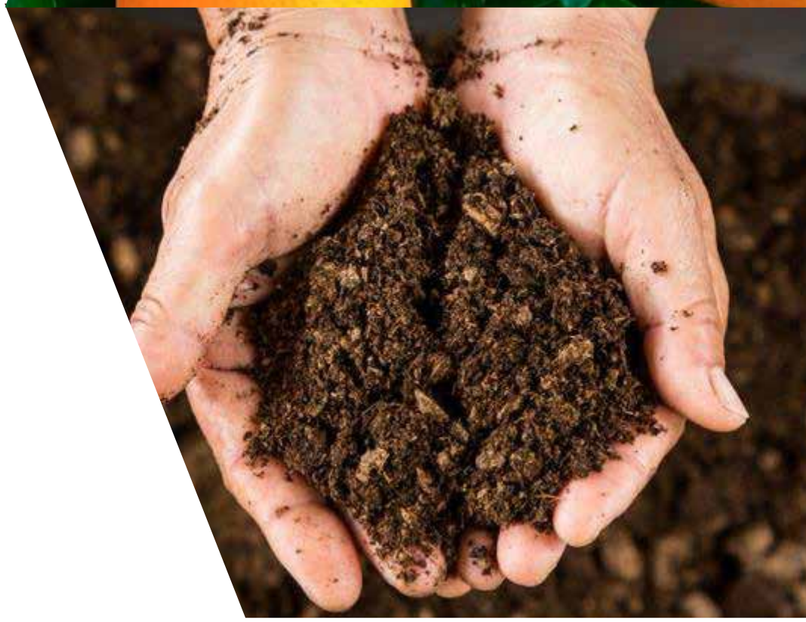
# 4 / Benefits of Stym 35 application in crops (1 of 2)

## 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 35 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 35 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 35 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

Universidad Nacional Agraria La Molina

Universitat d'Alacant
Universidad de Alicante

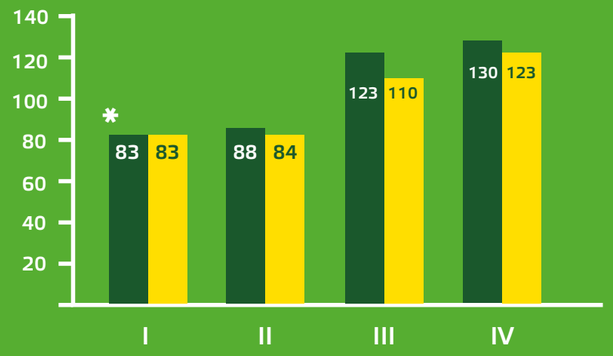



Figure 1. ppm Fe Lemon Leaf

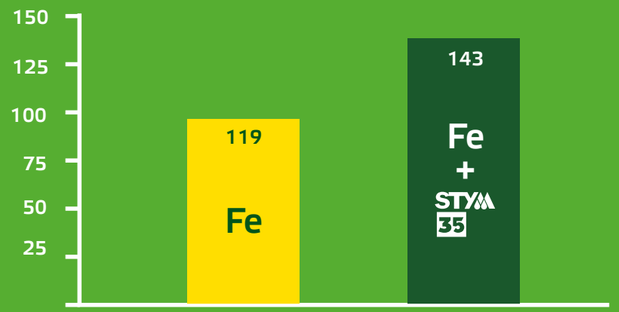



Figure 2. Average weight gr/fruit lemon

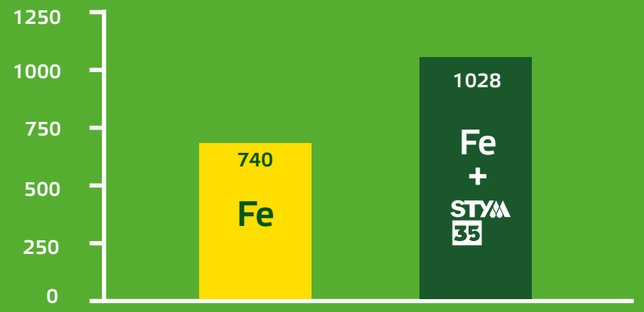
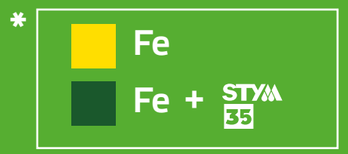


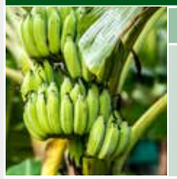

Figure 3. Vitamin C mg/100 ml. In lemon fruit.



# 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 |

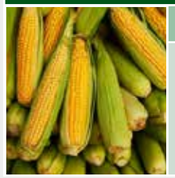
### Cereal

| 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

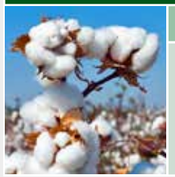
| Time of application | Dose cc/100L | Actions |
|---|---|---|
| Start of flowering | 200 | Stress resistance |
| Falling petals / fruit setting (with Gibberellines) | 250 | Improves the action of the chelates |
| Fruit sizing | 250 | Induces pre-flowering |
| With micronutrients: Fe, Zn, Mn | 300 |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

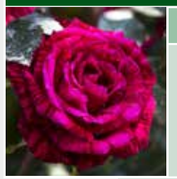
### Rice

| Time of application | Dose cc/100L | Actions |
|---|---|---|
| In combination with fungicide treatment | 250-350 | Better yield crop<br>Enhances the protective effect of fungicides.<br>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<br>Reduces effect of cold |

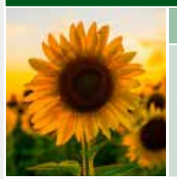
### Tubers

| Time of application | Dose cc/100L | Actions |
|---|---|---|
| App. Every 15 days | 250 | Favors rooted<br>Vegetative development<br>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

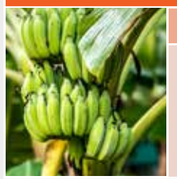
| Time of application | Dose cc/100L | Actions |
|---|---|---|
| Transplant | 200-250 | Minimize water stress |
| Inicial development | 200-300 | Improves the plant growth |
| Beginning of flowering | 200-300 | Better fruit setting |
| Beginning of fructification | 200-300 | Better fruit size and color |
| 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<br>Improves root development<br>Better harvest yield |

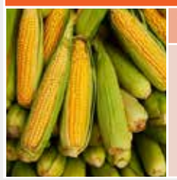
### Cereal

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

### Citrus

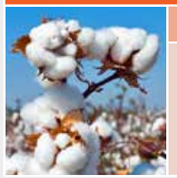
| Time of application | Dose L/Ha | Actions |
|---|---|---|
| Start of flowering | 12 | Stress resistance<br>Improves the action of the chelates.<br>Better fruit setting<br>Less fruit drop |
| Falling petals / Fruit setting (with Gibberellines) | 12 | |
| Fruit sizing | 12 | |

### 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 |

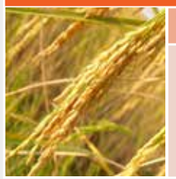
# 6 / Recommendations of use by crops

## Soil crops

### Rape

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

### Rice

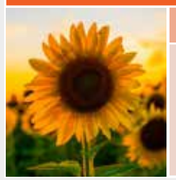


| Time of application | Dose L/Ha | Actions |
|---|---|---|
| In combination with fungicide treatment | 250-350 | Better yield crop<br>Enhances the protective effect of fungicides.<br>Reduce the lodging |

### 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<br>Improves root development<br>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.

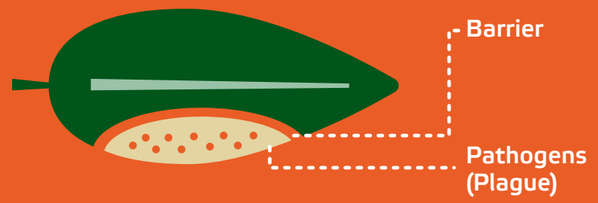
## The process

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.

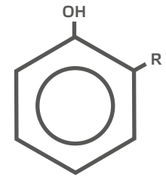
2. Necrosis (death) of the tissue surrounding the infected area

**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.

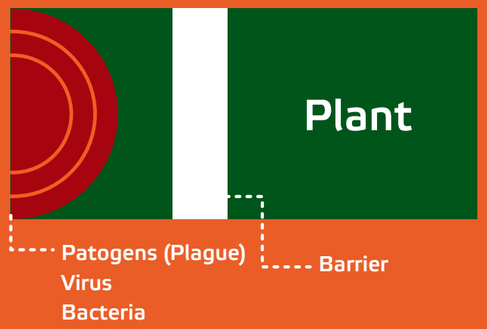
B. PROTECTS
Front to ozone and ultraviolet light.

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 35 (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 35 an additional, unique advantage in the world market, which makes it doubly recommended.

WITH I.S.I. INMUNOLOGICAL SYSTEM INITIATOR

ASPEAGRO GLOBAL S.L.
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## For more information:

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