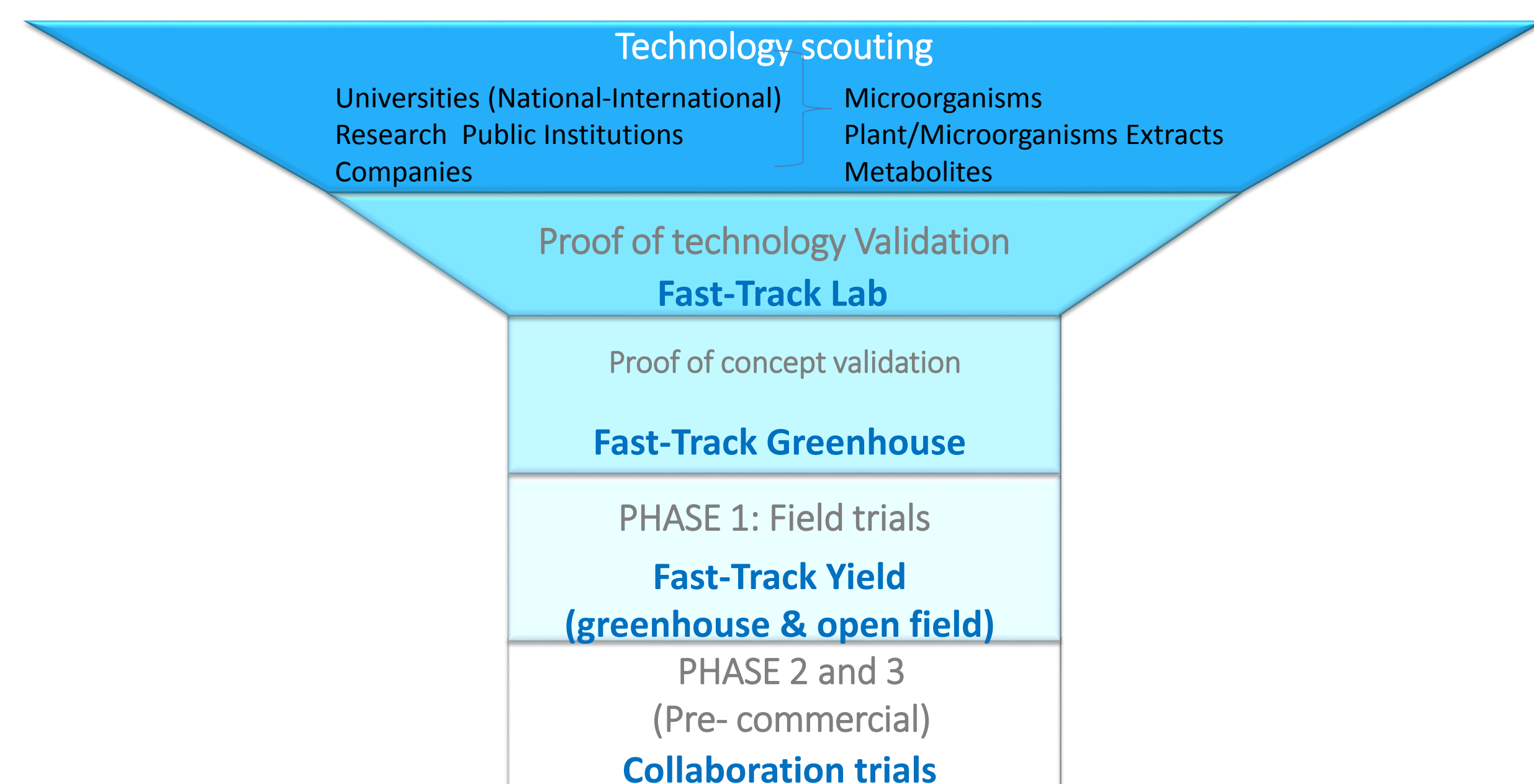


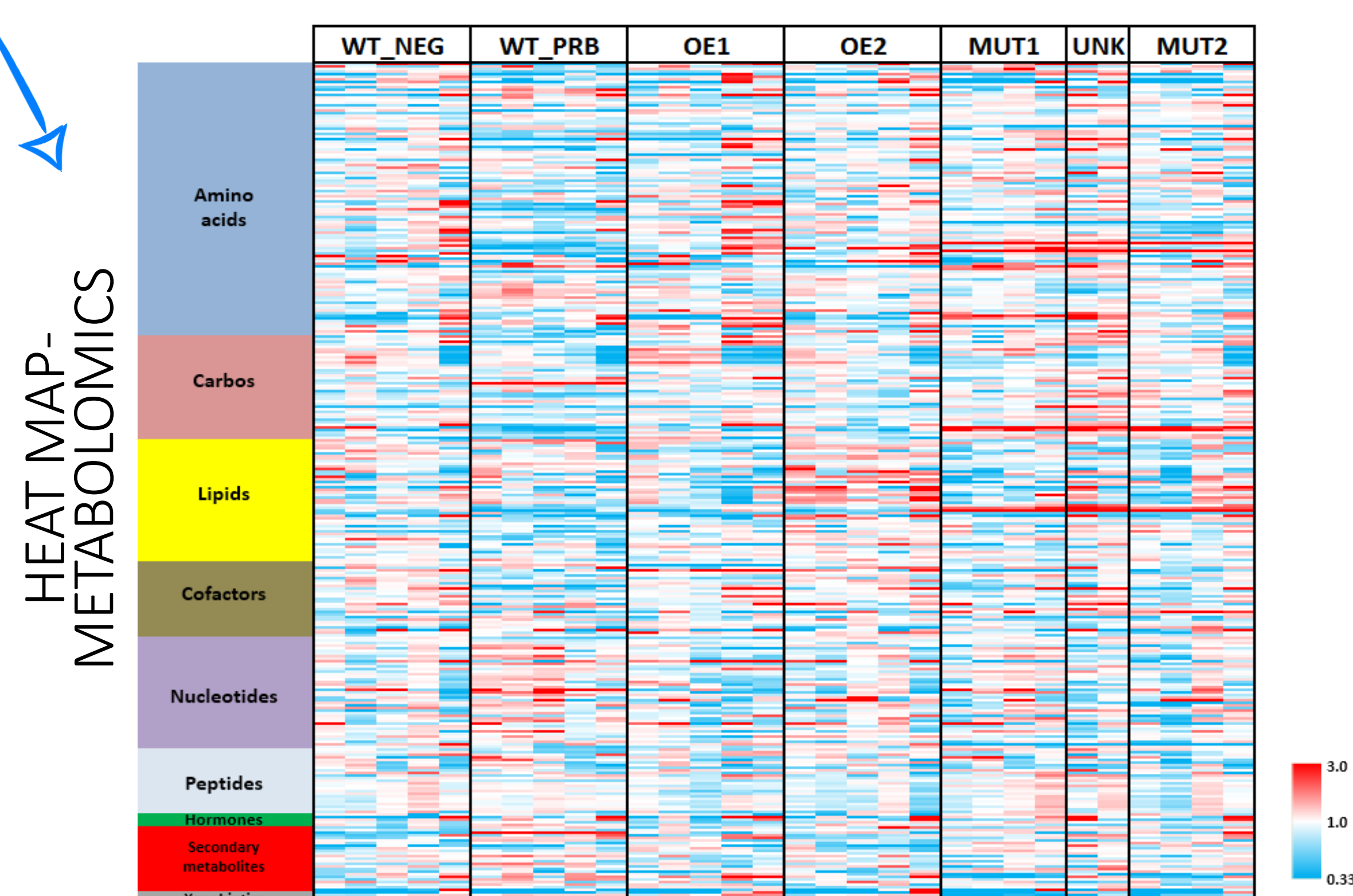
## A plant metabolite inducing salt tolerance in crops

Julio Bonet<sup>1</sup>, Rafael Catalá<sup>2</sup>, Julio Salinas<sup>2</sup> & Marisé Borja<sup>1</sup>. Plant Response Biotech.  
<sup>1</sup>Centro de Empresas. Campus Montegancedo-UPM, Pozuelo de Alarcón. 28223-Madrid. SPAIN  
<sup>2</sup>Centro de Investigaciones Biológicas. CSIC. 28040-Madrid. SPAIN

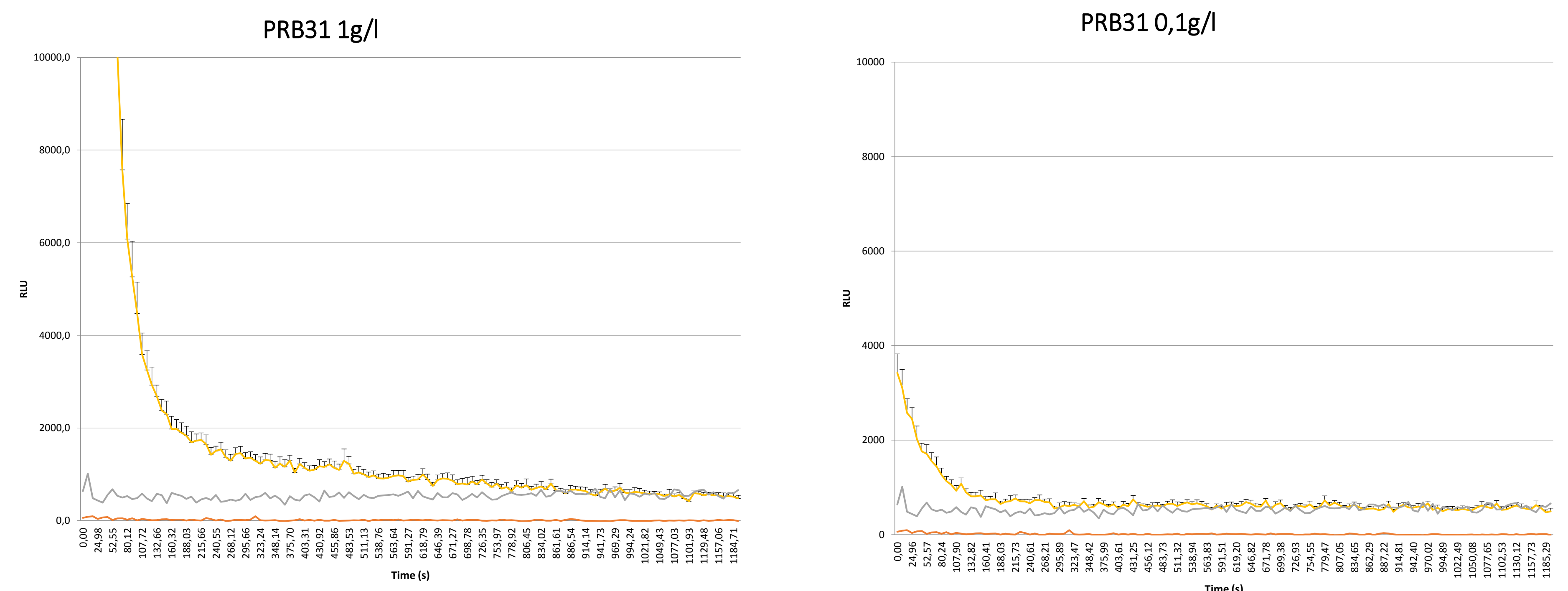
### FAST-TRACK for Rapid and Efficient Product Development



Plants treated with **PRB31** have lower amino acid, lipid and peptides turnover while there is a significant increase in the nucleotides and secondary metabolites.

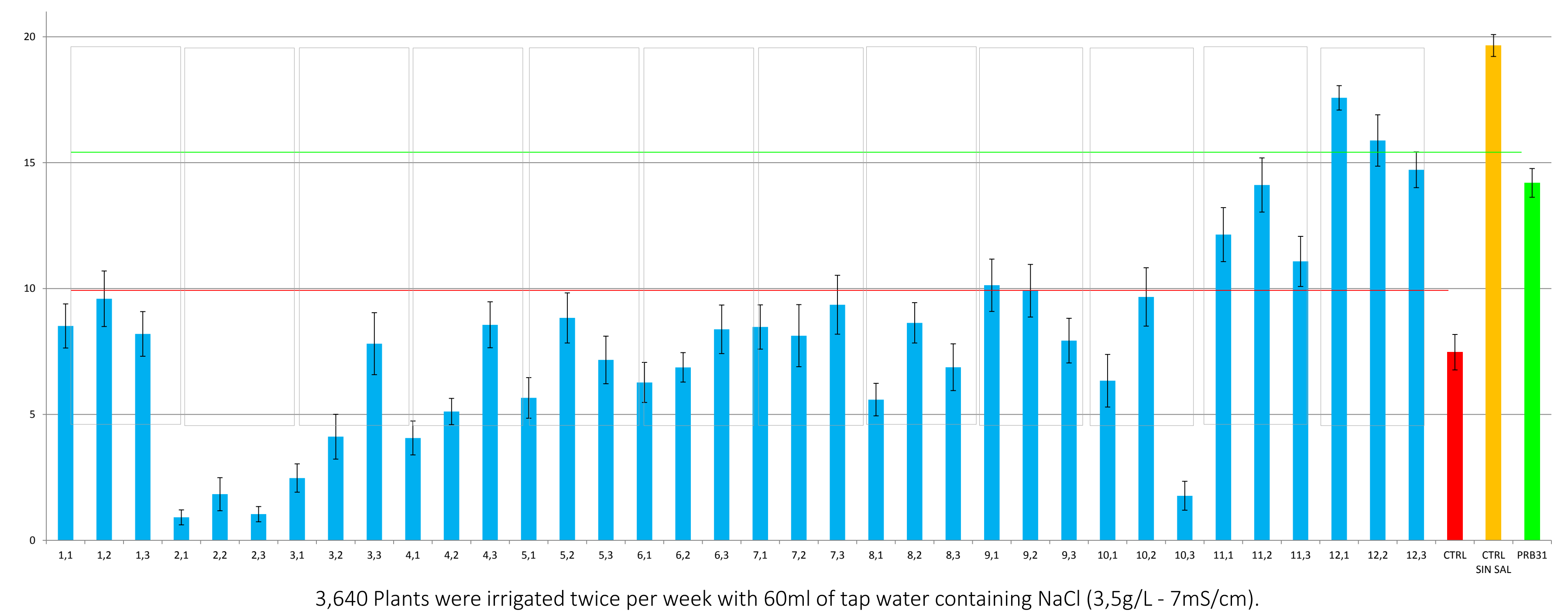


### PRB31 induces plant basal responses such as intracellular $\text{Ca}^{2+}$ release and ROS



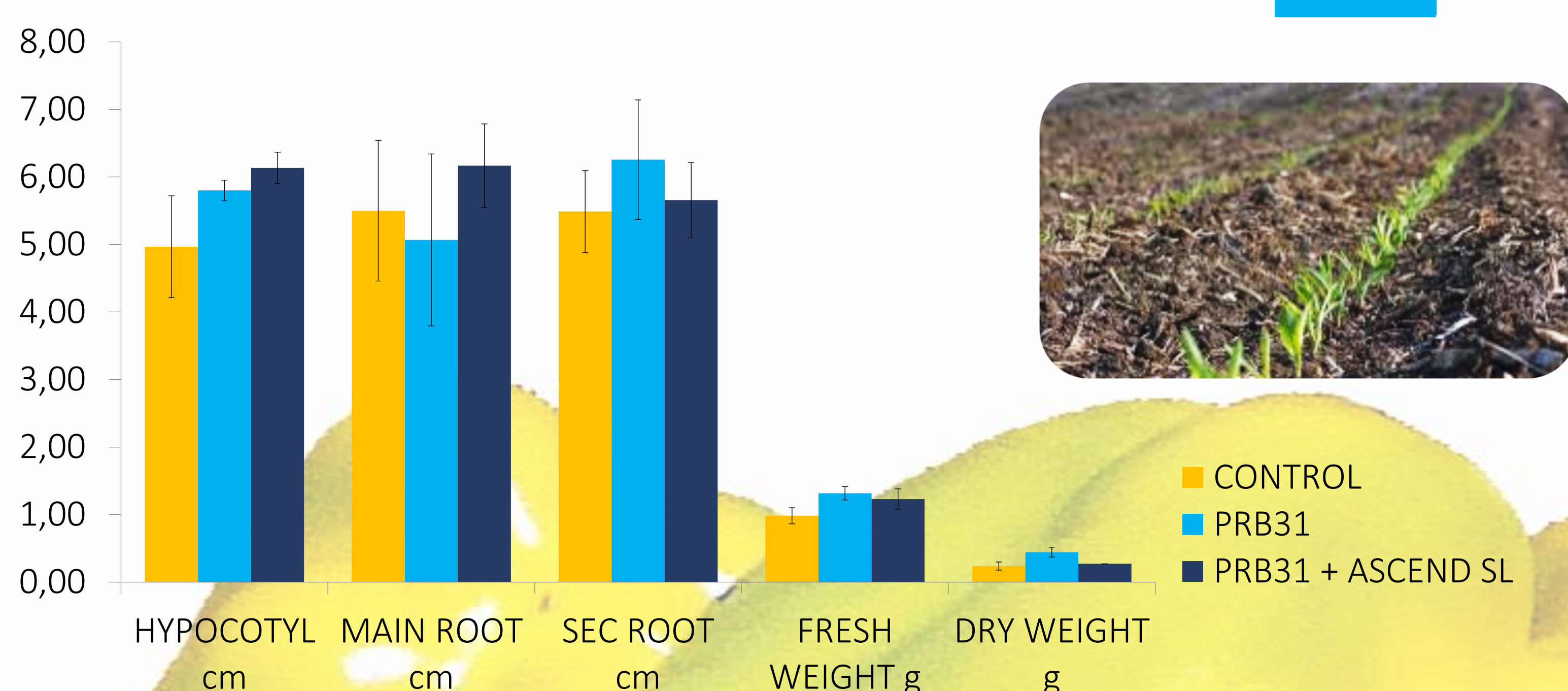
Compatibility of different combinations of **PRB31-fertilizer** products for salinity tolerance enhancement in pepper plants. Combination with DMPP a nitrification inhibitor shows the best results

### FITNESS VALUE



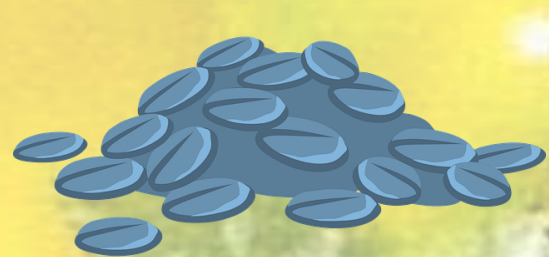
3,640 Plants were irrigated twice per week with 60ml of tap water containing NaCl (3,5g/L - 7mS/cm).

**PRB31 seed treatments** improves corn emergence, root development and dry weight under salinity conditions with and without fertilizer.



**PRB31** has a direct effect on the plants increasing their tolerance abiotic stress. It has been shown that increases productivity under salinity conditions in pepper, tomato, cucumber, melon, rice, barley, corn..... It is a natural product with **cero residues**. It can be used as:

Seed



Foliar spray



Irrigation



### Assessment Parameters

$$FV = (A + B + 2C + D) \cdot N_{\text{alive plants per pot}}$$

$$A = \frac{\frac{CCI(1) + CCI(2)}{2}}{CCI \text{ no salt}} \quad (0 - 2,96)$$

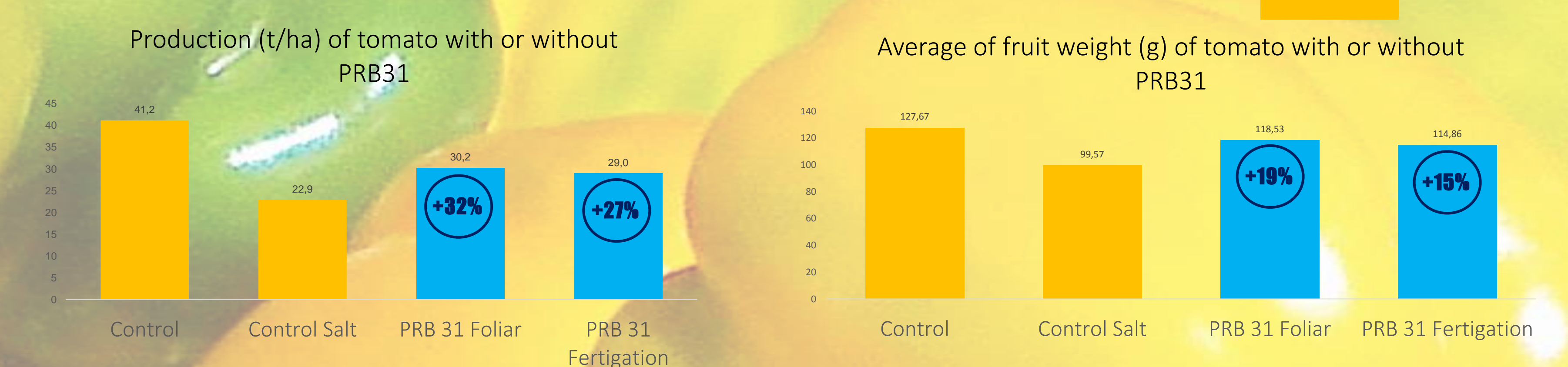
$$B = \frac{\Delta H}{\Delta H \text{ no salt}} \quad (0 - 2,78)$$

$$C = \frac{\text{Num. leaves}}{\text{Num leaves no salt}} \quad (0 - 1,44)$$

$$D = \frac{\text{Biomass}}{\text{Biomass no salt}} \quad (0 - 3,12)$$



Tomato plants treated with **PRB31** have more yield and heavier fruits under salinity conditions.





# Plant Response

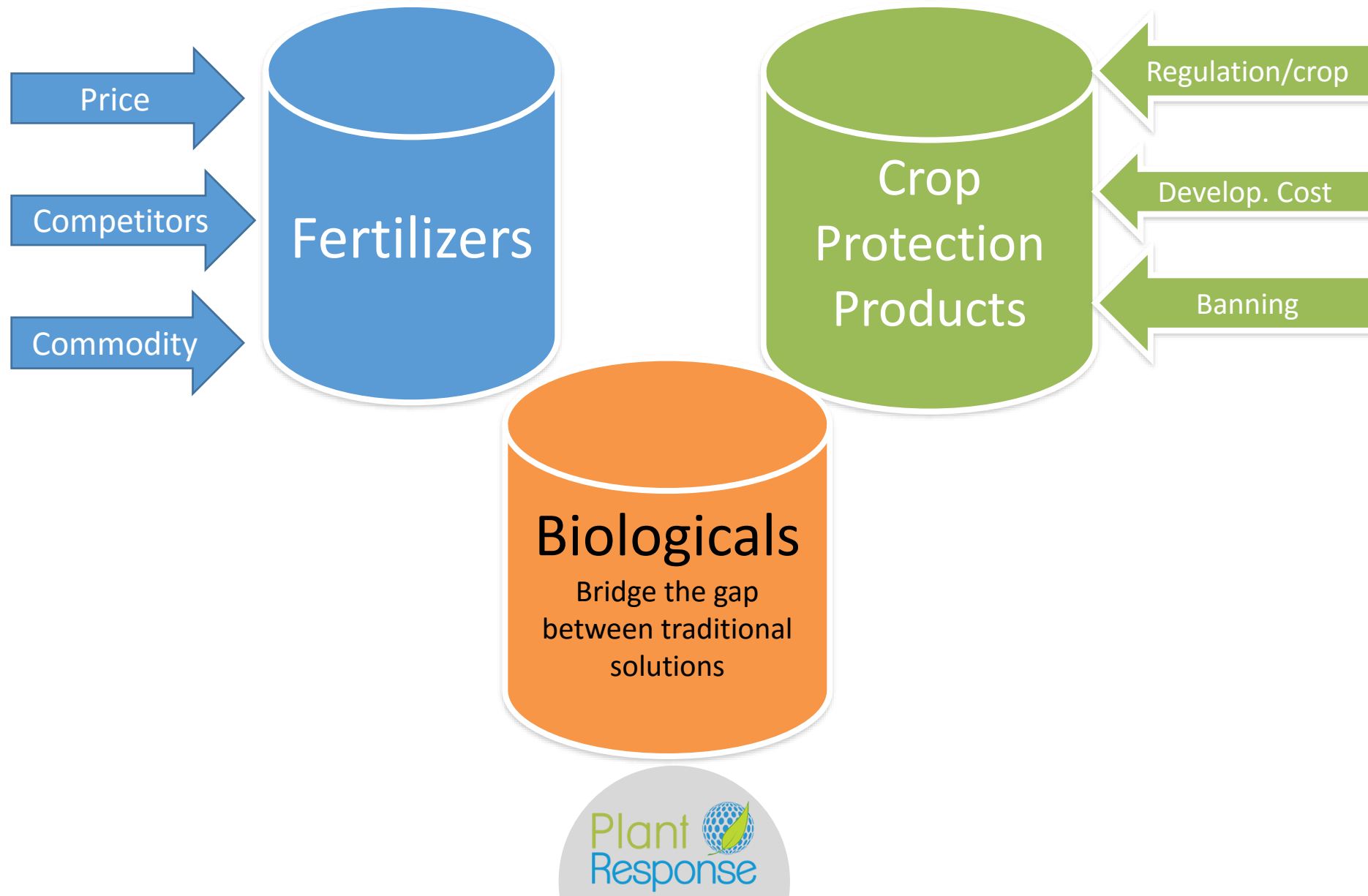
*From the lab to the grower*

*Sustainable solutions for food  
and agriculture challenges*

*Leads of  
Natural Origin  
for Novel  
Tolerance to  
Stress*

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# Agronomic tool set





## Board of Directors

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María Luisa Saiz  
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Mercedes Alonso  
Patricia Marín  
Patricia Olivares  
Paz Pérez  
Roberto Sánchez  
Rosa Pérez  
Sandra Díaz  
Yolanda Sanz



## Key investors





## about the company



Bringing research to the market: novel products and technologies



Sustainable food and agriculture solutions through plant responses

## our mission

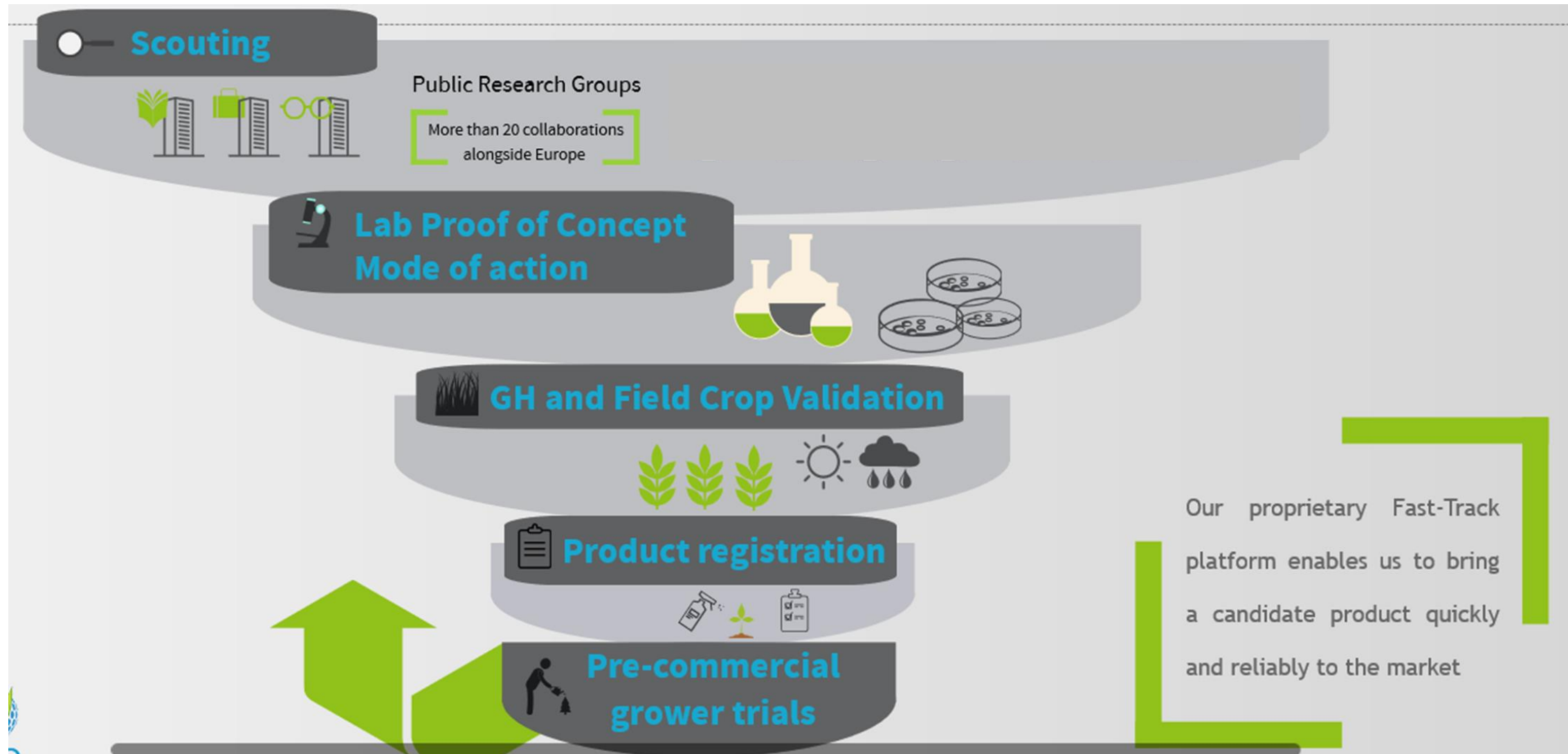


Be the leader in **novel natural products** for global agricultural challenges

**Best science backs our solution**



# Fast-track product development



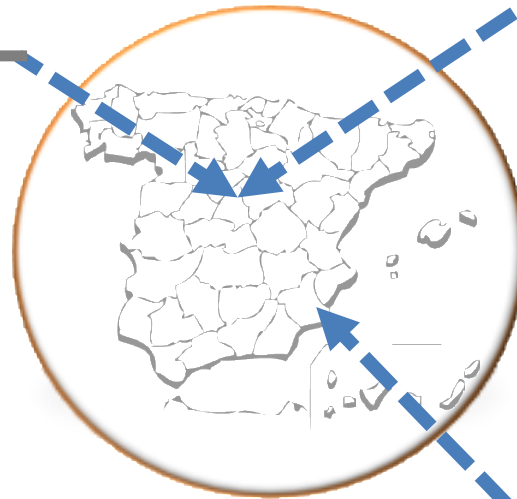
# Facilities, Capabilities

## CBGP LAB (Madrid)

30m<sup>2</sup> in use  
Agreement in using all equipment and facilities  
Flexible conditions and structure

## CBGP GREENHOUSE (Madrid)

250m<sup>2</sup> in use expandable  
Fast-track in target crops  
Early stages of growing  
Flexible conditions and structure

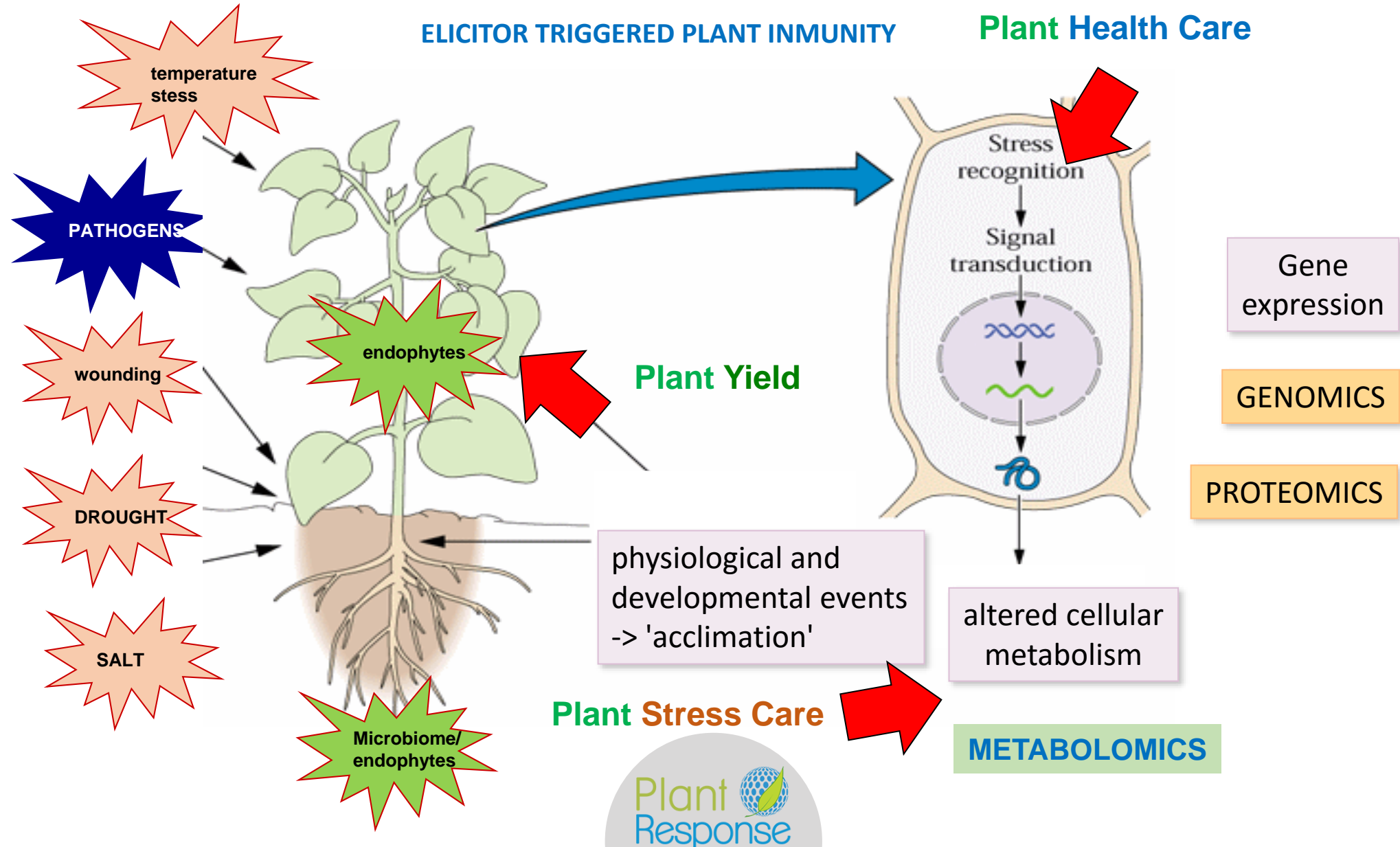


## FIELD GREENHOUSE (Murcia)

2.000m<sup>2</sup> field  
480m<sup>2</sup> greenhouse conditions  
Crop trials in real production conditions: vegetables, cereals, citrus

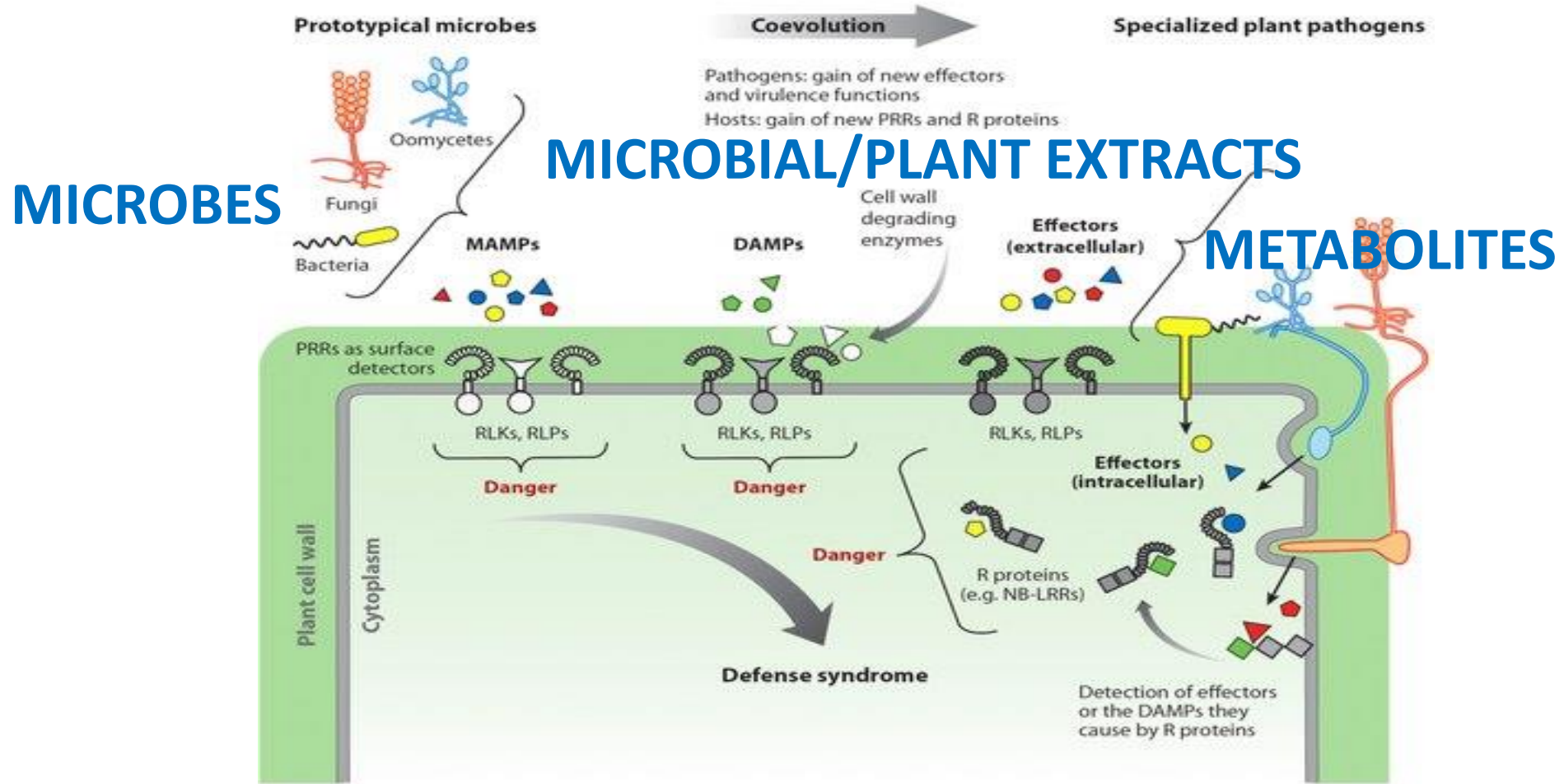


# Leads of natural origin





# Our Solution



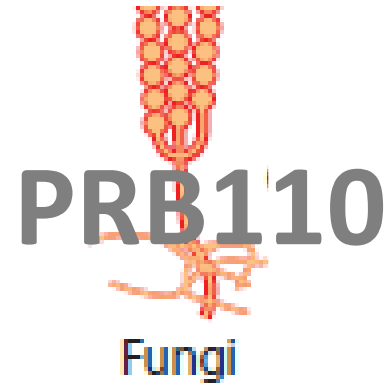
# Product status





# PRB110: Plant Yield

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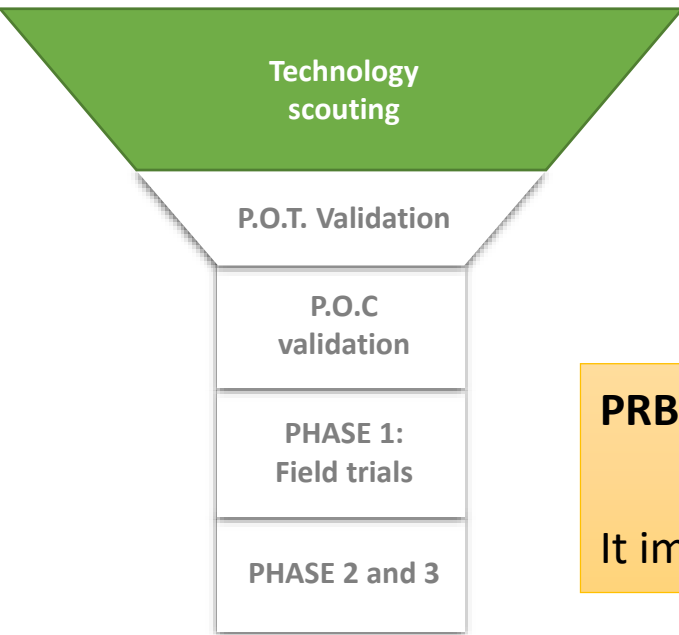


Liquid Seed treatment (dry powder under development) @1-3 cfu/ seed

[  
Novel fungal endophyte inducing phosphate  
transport, and plant growth  
]



# PRB110: TECHNOLOGY SCOUTING



## NOVEL PLANT ENDOPHYTE

**PRB110** is a novel plant endophyte isolated from *Arabidopsis thaliana* field samples.

It improves the **phosphorus transfer** to shoots, promotes plant growth, increasing fertility

### Joint PATENT

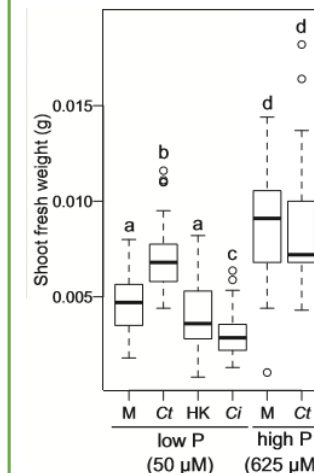
#### 5 FIELD OF THE INVENTION

The present invention has applications on the agronomic sector, particularly methods to increase flowers, seeds and / or fruits production using the microorganism *Colletotrichum tofieldiae*.

#### BACKGROUND OF THE INVENTION

10 Plants have symbiotic associations with mutualistic microorganisms in nature which give growth, survival and breeding benefits. These microorganisms can be isolated and used in crops to improve their field performance.

15 The genus *Colletotrichum* (Ascomycetes, teleomorph Glomerella) comprises 60 species and species complexes. This genus is morphologically characterized by conidia in acervuli with or without setae, with unicellular straight or curved hyaline conidia usually larger than 12 µm size and typically granular. Conidia may also be formed from the mycelium or from other conidia



Shoot fresh weight (SFW) of plants incubated with beneficial Ct or pathogenic *C. incanum* (Ci) in high or low Pi conditions. *A. thaliana* Col-0 seeds were inoculated with Ct, heat-killed Ct or Ci, or water (mock), and SFW was determined 24 days later (15 plants per experiment). The boxplot shows combined data from three independent experiments. Different letters indicate significantly different statistical groups (Tukey-HSD,  $p < 0.01$ ).

Figure taken from Hurima et al., 2016.



# PRB110:FAST TRACK FIELD TRIALS

Technology  
scouting

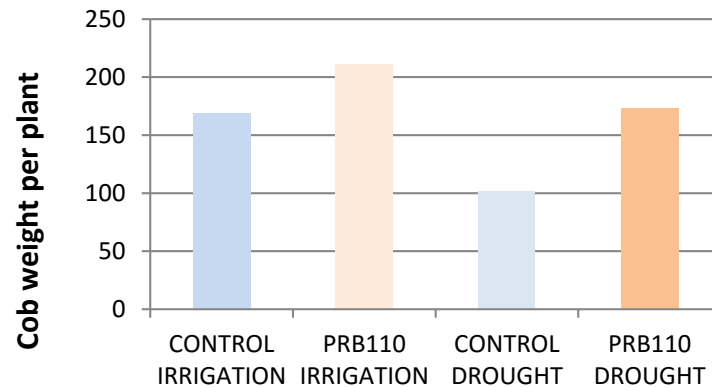
P.O.T. Validation

P.O.C  
validation

**PHASE 1:**  
Field trials

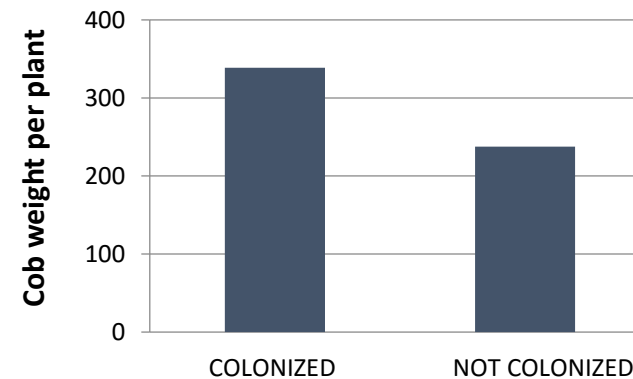
PHASE 2 and 3

## 2013-2016 TRIALS

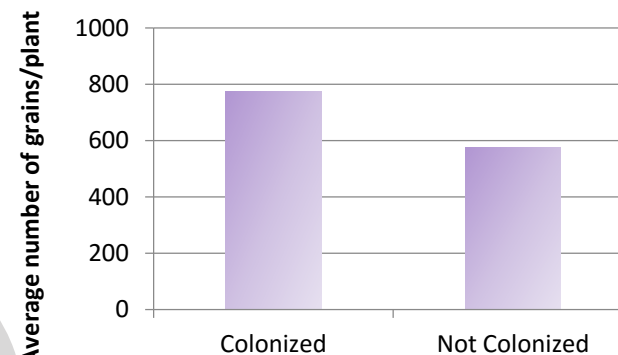


**PRB110** can be used as foliar spray or seed treatment

**Consistent yield  
increase in corn  
Drought 16-31%  
No Drought 3-16%**



**PRB110** colonized plants increase the grain weight



**PRB110** colonized plants increase number of grains

# PRB110:FAST TRACK FIELD TRIALS

Technology  
scouting

P.O.T. Validation

P.O.C  
validation

PHASE 1:  
Field trials

## 2015-16 TRIALS Yield Increase

Barley 2.5-10%

Triticale 3-12%

Wheat 2-6%

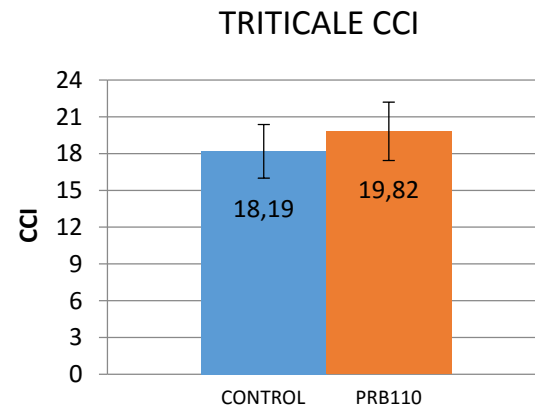
**PRB110** also increases chlorophyll content



TRITICALE APRIL



BARLEY APRIL





# The product

---



[ Novel plant metabolite that induces water stress tolerance and plant vigour ]



# Doses and Mode of Application



Liquid Foliar application



0.10% (1 ml/l) (1-3 l/ha)

Liquid Fertirrigation



0.001% (0.01 ml/l) (3-10 l/ha)

Dry powder or liquid Seed treatment



0.10% (1 g/Kg seeds)

✓ Designed for a **wide range of crops:**

**horticultural**, **row crops** and **fruit plants**, as well as for **golf courses**





# Yield increase

**neptunion** has been thoroughly **tested** in hundreds of trials during the last 4 years and demonstrated to be **effective** in a **wide range of crops**



PRB33 TRIALS	% Responsive trials	Average Positive Response (Bu/A)
BARLEY SEED	80%	17
BARLEY SEED AND FOLIAR	<b>100</b>	32
CORN SEED	59	4.8
CORN IN FURROW	62	4.1
CORN FOLIAR	83	5
CORN SEED & FOLIAR	<b>100</b>	<b>12</b>
WHEAT SEED & FOLIAR	100	26
SOYBEAN SEED	59	<b>10</b>
SOYBEAN FOLIAR	84	<b>2</b>
CANOLA SEED	100	<b>22</b>

**neptunion** can be used as **seed or foliar** spray the **best** results are **combining** both



# The product

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Liquid foliar treatment @ 0.5-20l/ha

[ 100 % natural extract derived from fungal cells, that induces plant  
innate immunity, promotes plant growth and increases quality ]



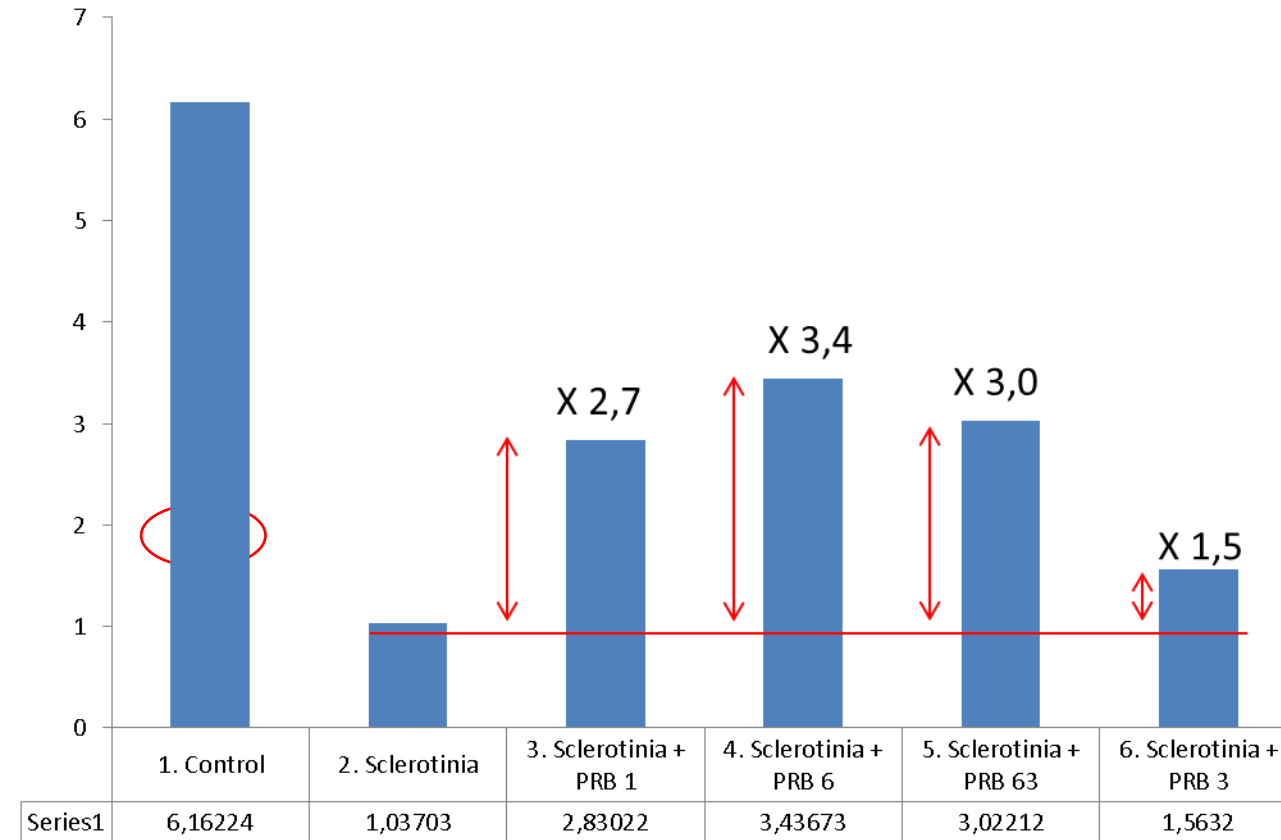


# Increasing yield

**cybelion** significantly increases **pepper and tomato production** in *Sclerotinia* sp. and *Botrytis* sp. infected plants

**cybelion** increases **crops yield and quality**. Plants are more vigorous and have significantly **less virus infections**.


Total production (kg of peppers per plant)



# Our trials platform

**cybelion** has been thoroughly **tested** with growers during the last 4 years and demonstrated to be **effective** in a **wide range of crops**



CROP	 Plant Response	% Control
Celery		2,0
Broccoli		1,6
Cauliflower		0,0
Colirhabi		4,8
Escarole		5,8
Fennel		26,9
Strawberry		21,3
Leek		1
Lettuce		5,1
Onion		10,2
Pepper		28,6
Tomato		33,6
Watermelon		50,9
Zucchini		17,5



# Plant Response



*From the lab to the grower*

*Sustainable solutions for food and agriculture challenges*

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