ABSTRACT: 420

INTERACTION BETWEEN STIMULATE® AND DIFFERENT LEVELS OF POTASSIUM AND PHOSPHORUS ON SOYBEAN YIELD

BRANCALIÃO S R[1], BÁRBARO I M[2], CATO S C[3], LEONEL C L [3], TICELLI M[2] & MIGUEL F B[2]

[1]Doctor on Agricultural Science – Biological Institute of Campinas; [2]Apta Alta Mogiana Regional, Colina, [3]Stoller do Brasil Ltda, Campinas, Brazil
E-mail: brancaliao@iac.sp.gov.br

Fertilizer management for soybean in clay soils always demands close attention to mechanisms inherent to the type of soil, farming practices, sowing time and interaction with other products. In the literature there are few studies with representative results combining the use of mineral fertilizer and bioregulators. Thus, this work aimed to evaluate the interaction between a plant regulator and different doses of phosphorus and potassium in soybean yield. The bioregulator used was Stimulate®, containing 0.009% of kinetin, 0.005% of gibberellic acid, and 0.005% of indolbutyric acid. The trial was carried out under field conditions. The treatments were: 1) 200 kg/ha of 0-20-20 fertilizer; 2) Stimulate® at 500 ml/100 of seed + 200 kg/ha of 0-20-20 fertilizer; 3) Stimulate® at 250 ml/ha on foliar application at V5 + 200 kg/ha of 0-20-20 fertilizer; 4) 300 kg/ha of 0-20-20 fertilizer; 5) Stimulate® at 500 ml/100 of seed + 300 kg/ha of 0-20-20 fertilizer; 6) Stimulate® at 250 ml/ha on foliar application at V5 + 300 kg/ha of 0-20-20 fertilizer; 7) 400 kg/ha of fertilizer; 8) Stimulate® at 500 ml/100 of seed + 400 kg/ha of 0-20-20 fertilizer; 9) Stimulate® at 250 ml/ha on foliar application at V5 + 400 kg/ha of 0-20-20 fertilizer. Experimental plots were an area of 25m^2, with 4 replications in a randomized block design. We evaluated the following parameters in soybean: percentage of emergence, plant height at maturity, 100-grain mass, number of pods/plant and yield. Data was analyzed using the Scott Knott test at 5% probability. In relation to percentage of emergence, the highest increase was obtained in treatment 5, reaching 97.5%. For the number of pods and 100 grain mass, the best results were obtained with treatments 2, 5 and 8, showing significant differences in relation to other treatments. Treatment 5 gave the highest average yield (2,894kg/ha), but no significant differences were obtained in relation to treatments 2, 6, 8 and 9.

INTERACTION BETWEEN STIMULATE AND DIFERENT LEVELS OF POTASSIUM AND PHOSPHORUS ON THE SOYBEAN YIELD.

BRANCALIÃO, S.R.; BÁRBARO, I.M.; CATO, S. C.; LEONEL, C. L.; TICELLI, M.; MIGUEL,F.B.

- Challenges of Modern Agriculture
- Soybean Overview in Brazil
- Plant Hormones
- Research Result







CHALLENGES OF MODERN AGRICULTURE



2010

70% increase
on **food production**



2050



Weather instability
demanding technologies to minimize stress

Limited agricultural land
demanding a significant increase on yield

Limited resources (water)
calling for more efficient plants

CHALLENGES OF MODERN AGRICULTURE



How c… produce more with less?

- Enhancing Plant's Efficiency
- Minimizing Biotic and Abiotic Stress
- Maximizing Yield Potential

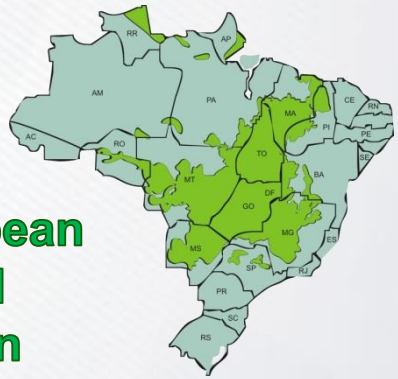
Only 30 to 50% of yield potential is effectively harvested

Stoller®

Soybean Overview



Year	Area ('000 ha)	Production ('000 t)	Yield kg/ha
12/13	27,348	82,679	3,023

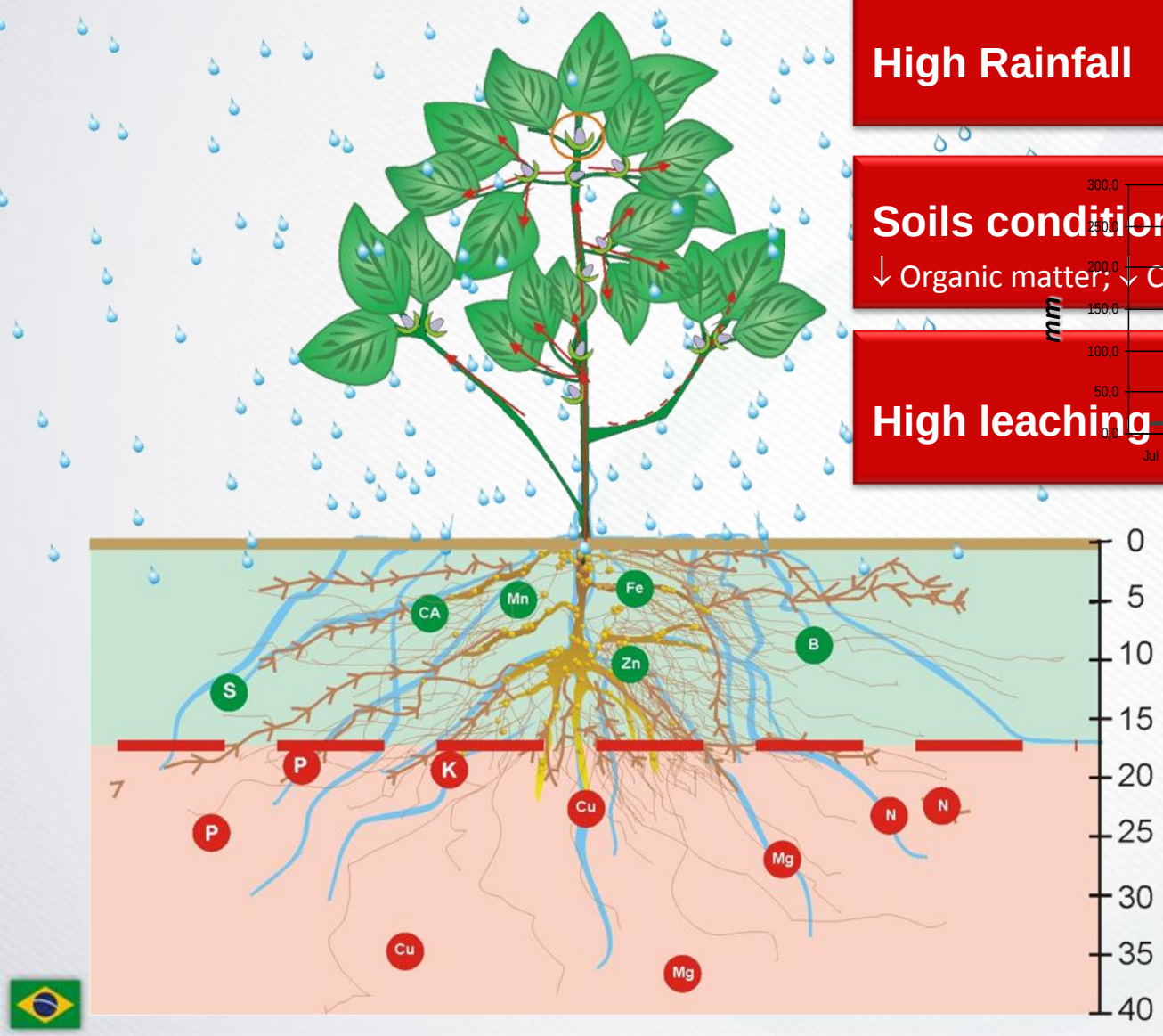




More than 60% of Soybean Production in Brazil comes from Brazilian Cerrado

Source: CONAB (November, 2012) - *Estimated data

Brazilian Cerrado Characteristics

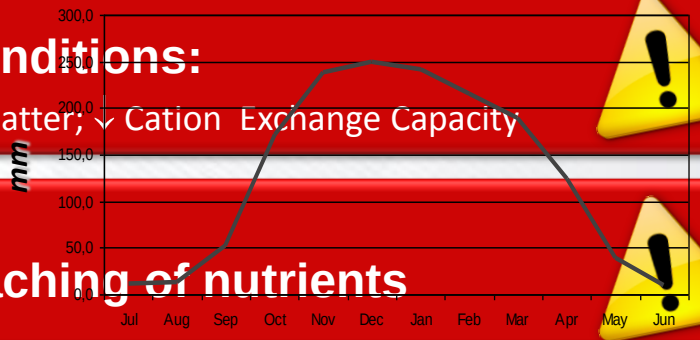


High Rainfall

Soils conditions:

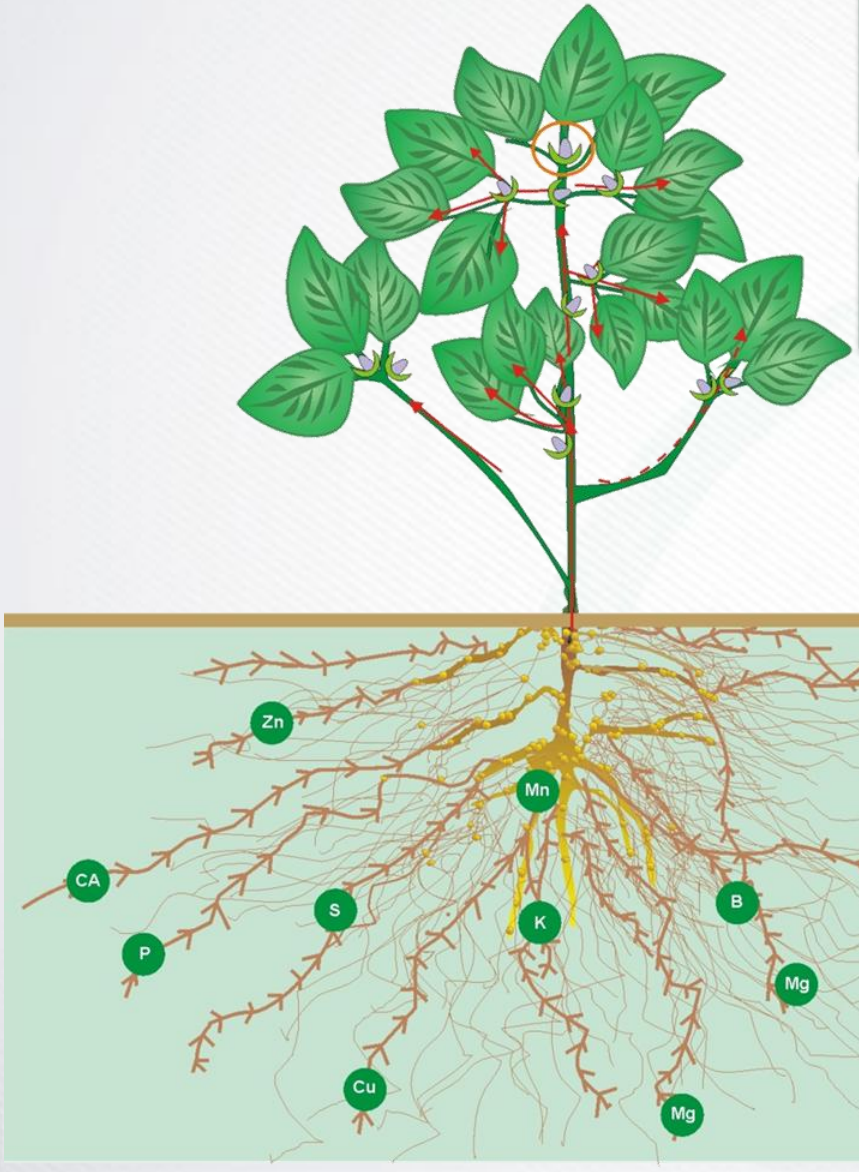
↓ Organic matter; ↓ Cation Exchange Capacity

High leaching of nutrients



Stoller®

Enhancing Plant's Efficiency



- Maximize the use of water and nutrients
- Providing a better plant (root) development

Stoller®

Plant Hormones have a positive effect on plant development

Plant Hormones

Organic compounds produced by the plants which at very low dosages (10^{-4}M)

are able to

Promote, Inhibit or Modify

Physiological and Morphological Process in Plants

Bioregulators

Organic compounds, which applied exogenously at very low dosages, provide similar effects of plant hormones

Plant Hormones have a positive effect on plant development

Bioregulators

Plant Promoters

Citokinin; Auxin and Gibberellin

Plant Inhibitors

Growth Retardants

“ Plant development results from the combined effects of plant hormones (TAIZ; ZEIGER, 2004).”

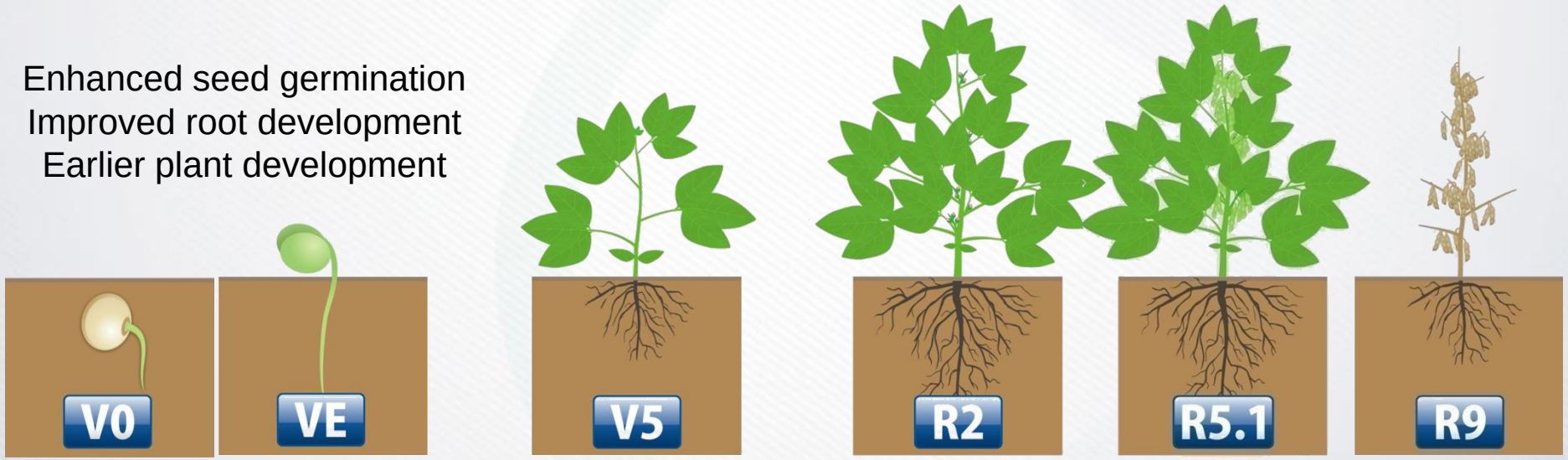
Effect of Citokinin + Auxin + Gibberellin

↑Plant Promoters
↓Negative Effects of Stress

Enhanced fruit set
Grains/pod
Grain mass

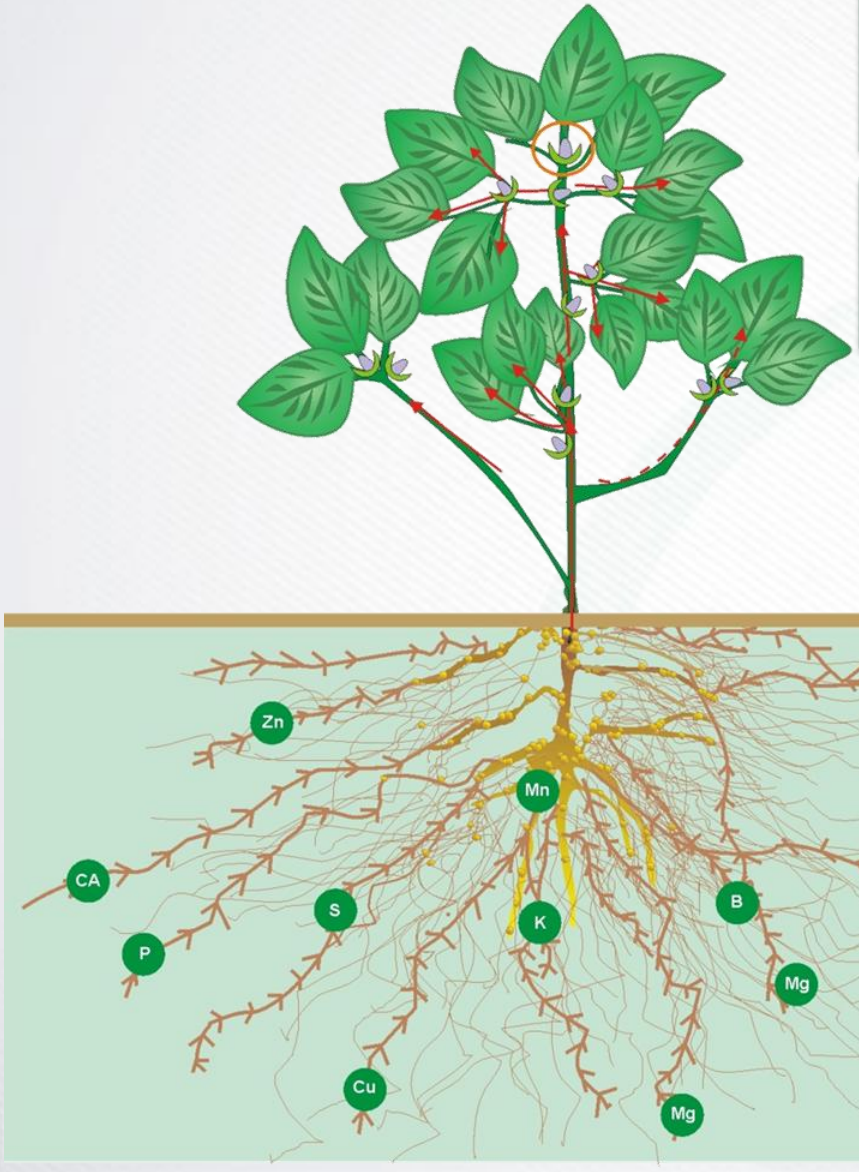
Improved root growth
Enhanced new shoot development
Greater number of fruit points

Enhanced seed germination
Improved root development
Earlier plant development



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- Providing a better plant (root) development

Stoller®

Effect of Citokinin + Auxin + Gibberellin on root development

Cytokinins + Auxins + Gibberellins

Cell Division and Differentiation

Lateral roots development

Root elongation



More Roots

↑Efficiency of using available resources

↑Capacity of overcoming stressful conditions

Stoller®

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Institution: Agronomic Institute of Campinas
Local: Campinas/SP



Goal

To evaluate the capacity of bioregulators to improve the plant's efficiency to absorb nutrients.

Material and Methods

- **Soybean Cultivar:** IAC-23 (determinate)
- **Field trial** (Seedling Emergence and Yield Components)
- **Experimental Design:** Randomized Blocks
- **4 Replications**
- **Plot: 25m^2**

Material and Methods

Fertilizer Rates	STIMULATE®	Form of STIMULATE
--- Kg/ha ---		
200	---	----
200	5 ml/Kg	Seed Treatment
300	---	---
300	5 ml/Kg	Seed Treatment
400	---	---
400	5 ml/Kg	Seed Treatment

Fertilizer Formula: 00-20-20 **(300kg/ha – recommended dosage)**

STIMULATE®: Citokinin (90mg/L) + Auxin (50mg/L) + Gibberellin (50mg/L) (STOLLER BRAZIL) Bioregulator Registered for Soybean Crop in Brazil

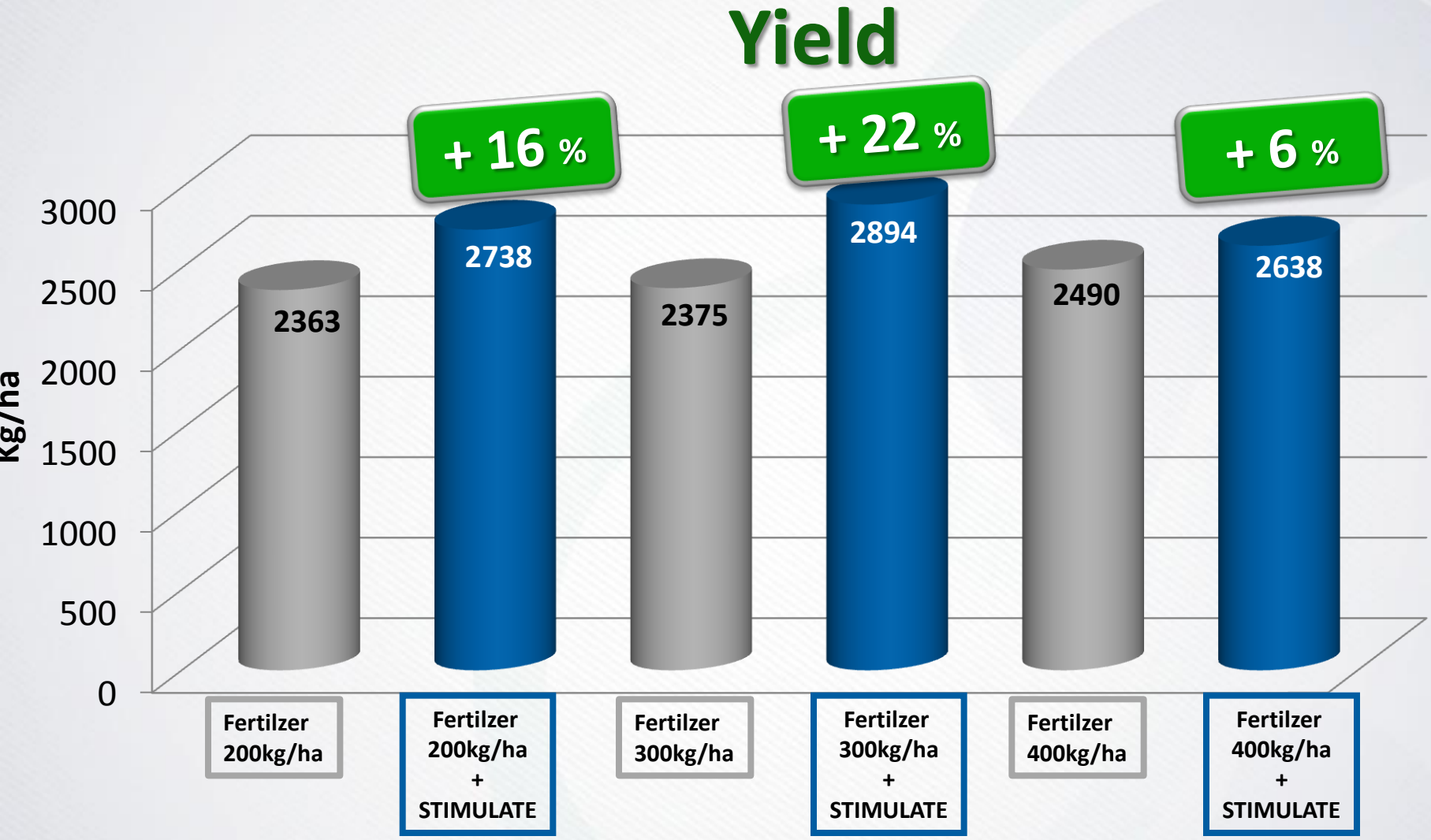
Results

Fertilizer Rates	STIMULATE®	Seedling Emergence	Pods/Plant	100 Grain Mass
--- Kg/ha ---	----	--- % ---	-----	--- g ---
200	---	92.0 c	34.2 b	14.2 b
200	ST (5 ml/Kg)	94.5 b	55.0 a	16.1 a
300	---	95.0 b	43.0 b	14.2 b
300	ST (5 ml/Kg)	97.5 a	54.0 a	16.5 a
400	---	94.2 b	48.2 b	14.1 b
400	ST (5 ml/Kg)	94.0 b	55.5 a	17.5 a

Fertilizer Formula: 00-20-20

STIMULATE®: Citokinin (90mg/L) + Auxin (50mg/L) + Gibberellin (50mg/L) (STOLLER BRAZIL) Bioregulator Registered for Soybean Crop in Brazil

Results


Yield
+ 16 %
+ 22 %
+ 6 %
3000
2500
2000
1500
1000
500
0
Kg/ha
2363
2738
2375
2894
2490
2638
Fertilzer 200kg/ha
Fertilzer 200kg/ha + STIMULATE
Fertilzer 300kg/ha
Fertilzer 300kg/ha + STIMULATE
Fertilzer 400kg/ha
Fertilzer 400kg/ha + STIMULATE

Conclusions

Stimulate® on soybean (5 ml/kg of seeds) increased the plant's efficiency to absorb fertilizer nutrients, resulting in a significant increment on the yield components:

- ✓ Seedling emergence (+2,6%)
- ✓ Pods/plant (+25%)
- ✓ Grain mass (+16%)
- ✓ Yield (+22%)