



## Wissenschaftlicher Bericht/Scientific Report

**Produkt/Product:**

penergetic b  
penergetic p

**Verantwortlich/Responsible:**

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**Datum/Date:**

2018

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### Scientific report on soybean in Brazil

Tests carried out in the summer harvest 2017/2018 between the months of January and April, 2018.

#### Effect of fertilization and bioactivation of the productive system

- Seeding in no-tillage system
- Soybean cultivation used: NS 6767 RR
- Phytosanitary management using chemical molecules
- Artificial irrigation: not used

#### Fertilization

Two dosages according to the treatments. Dosage recommended by the manuals of fertilization for the crop (85 kg) and dosage adjusted according to search results (50 kg). Potassium fertilization was not adjusted.

## Season of application

Table of treatments evaluated in the test

Treatment	penergetic b	penergetic p	Fertilization (kg/ha)	
			P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
Full fertilizer	-	-	85	70
Adjusted fertilizer	-	-	50	70
Full fertilizer + penergetic	Pre-planting (250g)	V3 (250g)*	85	70
Adjusted fertilizer + penergetic	Pre-planting (250g)	V3 (250g)	50	70

\* single application in V3

## Results

All the results obtained in the test demonstrated that the amount of phosphate fertilization present in the soil influences both the root development and the microbial activity, resulting in different results as the crop productivity.

Phosphate fertilization, even if it is essential for the development of the crops, in certain dosages can negatively interfere in the microbial activity in the soil and in the symbioses between active microorganisms and the root system of the crops, especially the soybean. This effect is widely known and discussed by worldwide research.

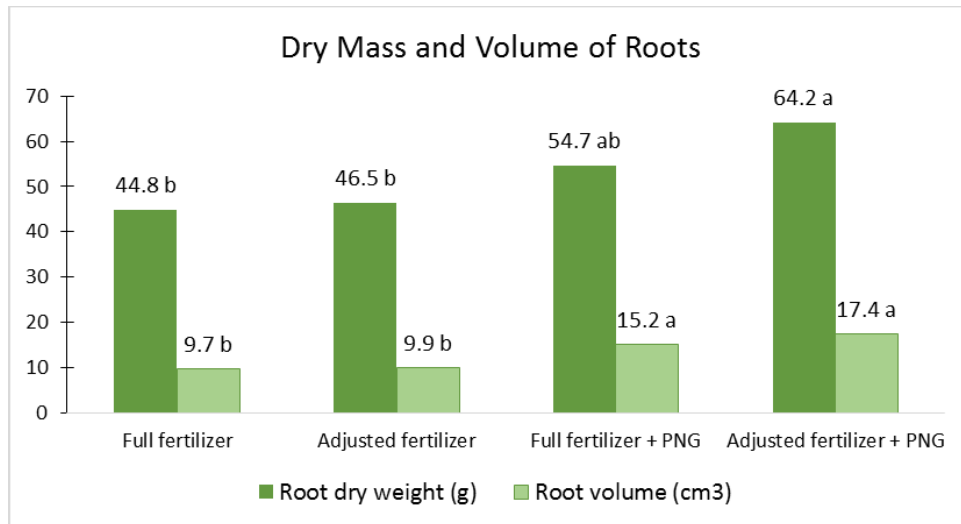
The results showed that the simple adjustment in phosphate fertilization (reduction at adequate levels for the plant), provided an increase in root development. This result (beneficial effect of adjustment on fertilization) was increased when the productive system was bioactivated (Penergetic treatments).



## Figures

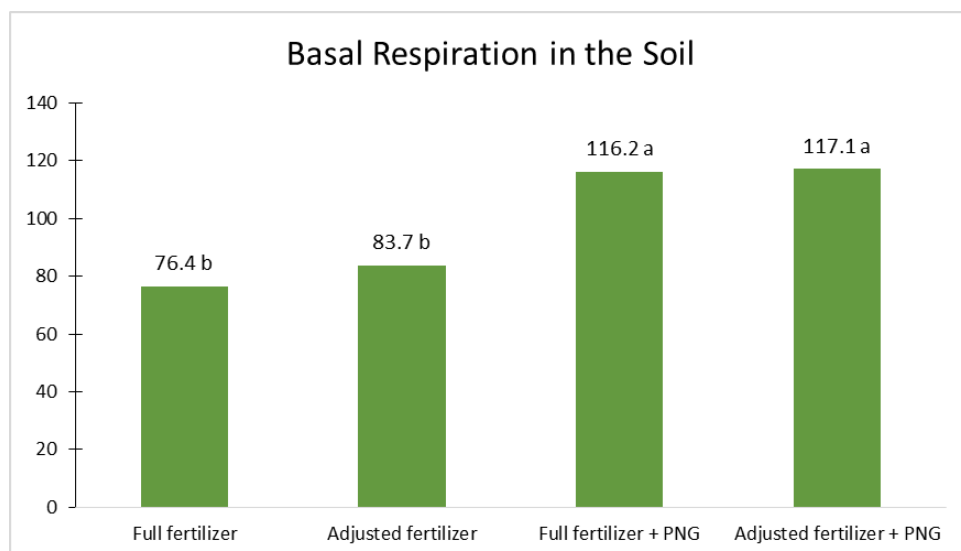
**Figure 1:** Dry mass (grams) and volume (cubic centimeters) of soybean roots grown in different treatments.

\*Means followed by the same letter do not differ by the Tukey test at 5% probability.



**Figure 2:** Basal respiration in the soil (mg C-CO<sub>2</sub> / kg dry soil / day) in different treatments.

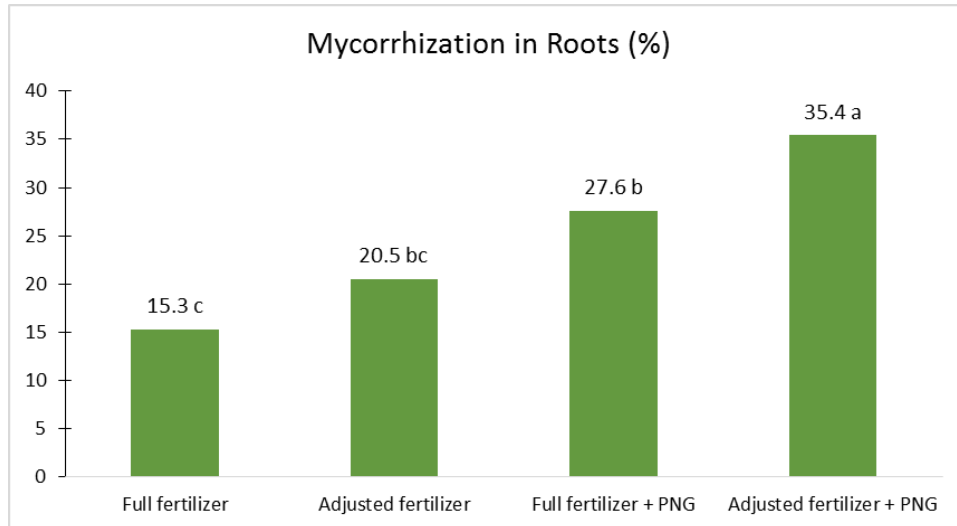
\*Means followed by the same letter do not differ by the Tukey test at 5% probability.



The effect of adjusting the fertilization directly influenced the microbial activity, as shown in figure 2. The basal respiration was superior in the treatment and there was a reduction of the fertilization. When in a bioactivated system (presence of Penergetic), this effect was much higher. Basal respiration was significantly higher in treatments receiving penergetic b + p. Basal respiration is an indirect indicative of the biological activity of the soil. The higher the carbon value in the form of carbon dioxide emitted by the soil, the greater the biological activity in this environment.

**Figure 3:** Percentage of mycorrhization in soybean roots in different treatments.

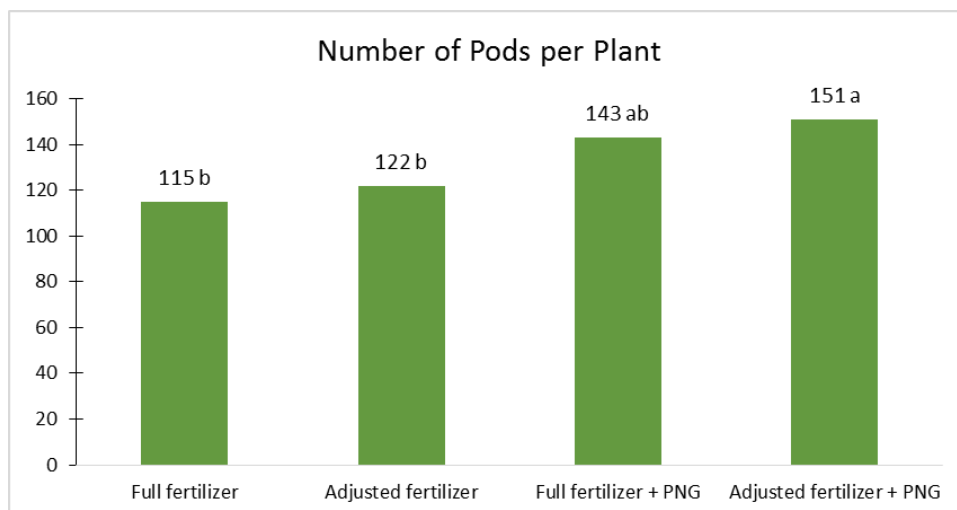
\*Means followed by the same letter do not differ by the Tukey test at 5% probability.



The effect of increased biological activity can be easily observed in mycorrhization results, also shown in the comparison pictures at the end of this report. The percentage of mycorrhization shows the total percentage of roots that were effectively forming a symbiotic association with mycorrhizal fungi in the soil.

**Figure 4:** Number of pods per soybean plant in different treatments.

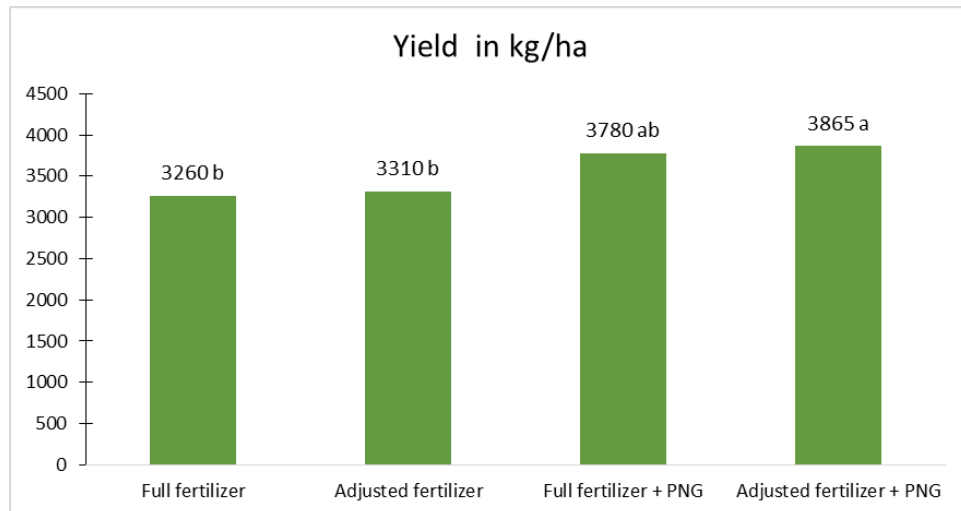
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The result of the bioactivation of the soil is the greater development of the plants and greater productivity. It was observed that in the treatments with Penergetic the initial reproductive development (pods) and the final yield were significantly superior.

**Figure 5:** soybean yield (kg/ha) in different treatments.

\*Means followed by the same letter do not differ by the Tukey test at 5% probability.



### Preliminary conclusions

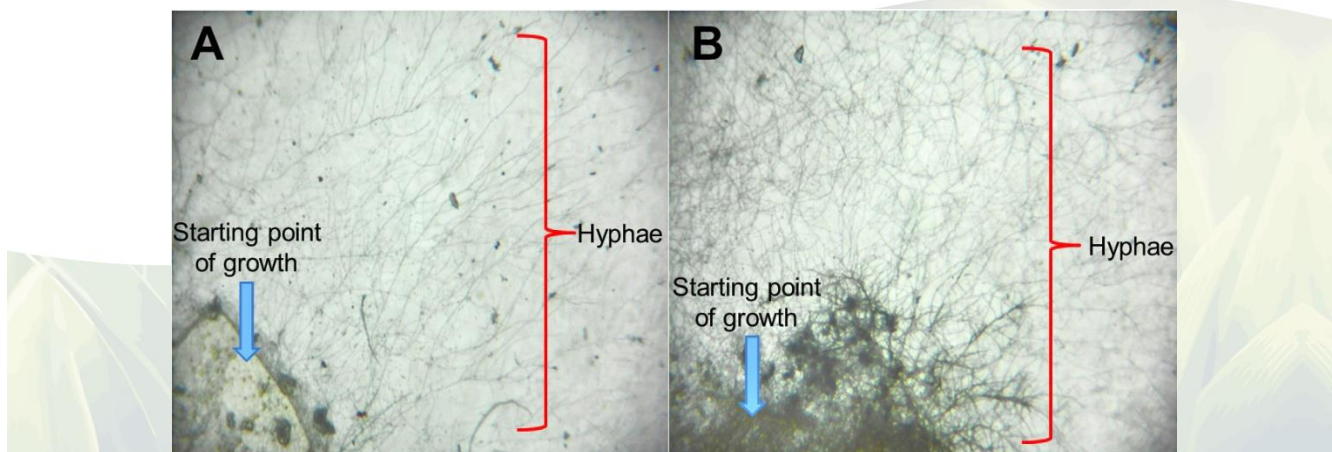
- The use of phosphate fertilization influences the development of soybean plants, showing relationship between effect and dosage
- The bioactivation of the productive system results in significant increases in soybean yield
- All the evaluated parameters showed that the bioactivation of the system resulted in gains (biological, vegetal and productive development) and demonstrated the biological activation effect of Penergetic

**All following pictures are of different works (with different dates) but with the same treatments, so the results presented refer to the effect of Penergetic on soybean culture and microbial growth.**

### Development of hyphae in laboratory tests (petri dish)

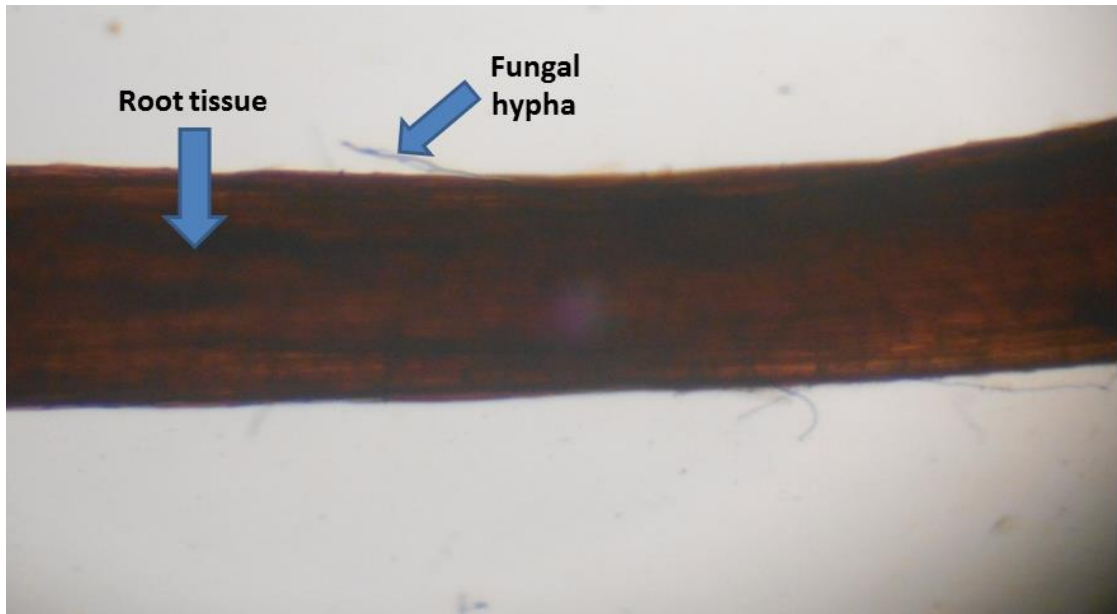
A: Density of microbial growth without penergetic p in the culture medium.

B: Density of microbial growth with penergetic p in the culture medium.



## Mycorrhizal colonization in soybean roots

Without Penergetic



With Penergetic

