



## Comparative evaluation of foliar fertilization products in organic tomato cultivation in greenhouses.

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Foliar applications of calcium and potassium-based product fertilizers were conducted to evaluate their performance within the production and harvesting process of tomatoes (*Solanum lycopersicum*). Trial took place in greenhouses in the area of Yurécuaro, Jalisco. It should be noted that in this area, the waters available for agriculture have high sodium content, which is an important limitation of crop management, below we will describe this trial.

**Information about the products, doses, and mineral contributions:** all products applied are certified organic by OMRI. The competing brand claims being chelated with agricultural acids registered by the same company. Mil Agro, Keylamax® products are chelates and organic amino acid complexes. It is important to clarify that among the minerals used in this evaluation, calcium and potassium, only calcium can be chelated. Potassium, given its monovalent nature, can only be complexed. In the technical sheet of the competitor's product, it mentions that the potassium fertility units are chelated, this simply does not exist in chemistry, it is not possible.

Calcium source products	Dose	Mineral contribution
██████████ Calcium Organic 15% w/v (CaO)	600 cc/ha	90 g CaO/ 65 g of Ca
Keylamax® Calcium Organic 20% w/w (Ca) (powder) (Starting dose)	100 gr/ha	20 g of Ca *
Keylamax® Calcium Organic 20% w/w (Ca) (powder) (adjusted dose)	200 gr/ha	40 g of Ca *

Potassium source products	Dose	Mineral contribution
██████████ Potassium Organic 15% w/v (K <sub>2</sub> O)	600 cc/ha	90 g of K <sub>2</sub> O
Keylamax® Potassium Organic 40% w/w (K <sub>2</sub> O) (powder)	100 gr/ha	40 g of K <sub>2</sub> O **

### The Competition:

**Potassium Product:** Manufactured as a liquid fertilizer, with 15% w/v (K<sub>2</sub>O) potassium “chelated” with organic acids (although potassium cannot be chelated), with a density of 1.12 g/ml, OMRI listed for organic farming, free of nitrates, sulfates, chloride and carbonates, but described in its OMRI Certificate as potassium sulfate. It must be a potassium acetate if there are no sulfates in it.

**Calcium Product:** described by the manufacturer as liquid fertilizer, with a concentration of 15% w/v of chelated calcium with organic acids, and a density of 1.07 g/ml, listed by OMRI as organic acids, a product free of nitrates, sulfates and chlorides, described in its OMRI Certificate as calcium carbonate, but in reality it must be a calcium acetate according to their description.

### About Keylamax® products from Mil Agro Inc.

**Keylamax® Organic Potassium 40% (K<sub>2</sub>O):** high-efficiency, plant-based potassium amino acid complexes, OMRI listed for organic farming, KIWA verified for the European Community, JAS and NOP.

**Keylamax® Organic Calcium 20% (Ca):** calcium amino acid chelates, of high efficiency and vegetable origin, OMRI listed for organic agriculture, verified by KIWA for the European Community, JAS and NOP.

**Applications** started after harvest, only 3 applications were made, one per week. Taking measurements of sap in petiole and leaf, measuring ppm of nitrates, as well as potassium and calcium were determined. The applications were made as follows:



1st Application	2nd Application	3rd Application
<del>Competitor</del> Calcium Organic 600 cc/ha	<del>Competitor</del> Potassium Organic 600 cc/ha	<del>Competitor</del> Calcium Organic 600 cc/ha
Keylamax® Calcium Organic 100 g/ha	Keylamax® Potassium Organic 100 g/ha	Keylamax® Calcium Organic 200 g/ha (dosis ajustada)

**Results:** After the third week of applications, the results were as follows:

Measurement of anions and cations	Nitrates	Potassium	Calcium
Treatment of the competition	2700	5100	880
Keylamax Treatment	1600	5500	910



**Analysis of the results:**

169% more

8% more

4% more

**Nitrates:** nitrate values are a little high in the case of plants treated with competitor's products, based on the stage in which the crop is, an excess in the amount of nitrates in the plant reflects an out-of-place vegetative development in this physiological stage where production is sought. The levels of nitrates in plants treated with Keylamax® is within the appropriate range. In addition, according to the technical sheet, the competitor's product is free of nitrates, something that is unlikely based on these results.

**Potassium:** these values are quite similar, 8% higher in plants treated with Keylamax®, which in theory does not make a big difference, but if we take into consideration the amount of mineral in each application, **Keylamax® Organic Potassium has 55% less potassium and shows potassium accumulations 8% higher than the competition.**

**Calcium:** the values are quite similar, but we must consider again that **the amounts of calcium provided by Keylamax® Organic Calcium are equivalent to 46% of the competitor's product. That is less than half of the competitor's dose, and the amount of mineral in SAP is higher (4%).**

**Conclusion:**

**In both treatments it is evident that with about half of the mineral intake, the Keylamax® treatments managed to provide and assimilate more minerals, with less electrical conductivity, less probability of mineral antagonisms, and much more efficiency as a foliar nutrition treatment. Salts and EC are important to consider in these crops that work with water with high sodium content.**

**Considerations:**

- All chelates are not the same, some only facilitate the penetration of the mineral while others may only facilitate movement in the plants. Others are designed to do both.
- The labels of commercial products show a lot of information, but not necessarily the correct information. We cannot chelate certain minerals even if they are declared on the label, the field results reveal the reality.
- It does not matter the mineral concentration that a product contains on its label, the important thing is what is assimilated and will be available to the plant.
- It is always better to apply efficient products, which require lower doses and provide less salt or electrical conductivity to the medium.

**DO NOT waste your time and money, use quality products, your crop and your pocket will thank you.**