

ELECTRO CONDUCTIVITY AND KSC



TIMAC AGRO ADVICE KIT



WHY MANAGE THE ELECTRO-CONDUCTIVITY OF FERTIGATION SOLUTION?

Electrical conductivity (EC) measures how well a substance can transmit an electrical current. Plants are sensitive to electroconductivity for the absorption of nutrients and water. In the water solution, the EC is directly related to the number and the nature of ions dissolved in it. The water quality and the fertilizer effect on the conductivity must be carefully managed to grow crop well. KSC fertilizer products are recognized to lower the increase of EC in improving the quality and quantity yield of plants.

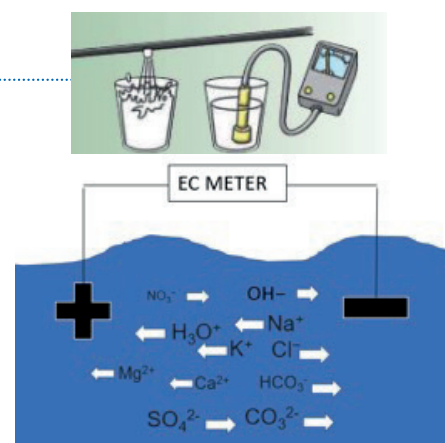
The potential yield of onions can be decreased by **50%** due to a 2 dS/m increase in EC (Source in the table below)

1 TIMAC AGRO INSIGHT

The electro conductivity in fertigation solution

The conductivity of a fertigation solution is the sum of the conductivity of the dissolved fertilizers and the water used. The conductors are the ions (cations + and anions -) dissolved in the solution. The EC of each ions depends on their molar ionic conductivity, also their potential to bind with water. The measurement of the EC is carried out by an EC meter and is generally expressed in mS/cm or dS/m.

Important to know, the total conductivity varies a lot with temperature.



$$\text{Conductivity of the fertigation solution (total)} = \text{Conductivity of fertilizer} + \text{Conductivity of water}$$

The electro conductivity for plants

- The EC for plant is important for several reasons, including the plant's ability to absorb water and nutrients from the soil or the water solution, and the plant's ability to transport these substances throughout its metabolism.

If the EC is too high for the stage of development of the plant, osmosis can reverse, and the plant will then trigger a biological protection mechanism to reject water through the roots and gradually dilute the excess mineral salts present in the substrate.

- The EC sensibility and the EC tolerance depends on crops and on their stage of development. Tolerated EC evolves with vegetative development, at the same time as the evolution of nutritional (ionic) requirements.

Table : Reduction of the yield potential of crops by the water solution electroconductivity (E_{cw}).

Yield potential reduction:	0%	10%	25%	50%
Field crops:	EC_w in dS/m			
Tomato (<i>Lycopersicon esculentum</i>)	1.7	2.3	3.4	5
Cucumber (<i>Cucumis sativus</i>)	1.7	2.2	2.9	4.2
Grapefruit (<i>Citrus paradisi</i>)	1.2	1.6	2.2	3.3
Corn (maize) (<i>Zea mays</i>)	1.1	1.7	2.5	3.9
Potato (<i>Solanum tuberosum</i>)	1.1	1.7	2.5	3.9
Pepper (<i>Capsicum annuum</i>)	1	1.5	2.2	3.4
Blackberry (<i>Rubus sp.</i>)	1	1.3	1.8	2.5
Lettuce (<i>Lactuca sativa</i>)	0.9	1.4	2.1	3.4
Radish (<i>Raphanus sativus</i>)	0.8	1.3	2.1	3.4
Onion (<i>Allium cepa</i>)	0.8	1.2	1.8	2.9
Bean (<i>Phaseolus vulgaris</i>)	0.7	1	1.5	2.4
Carrot (<i>Daucus carota</i>)	0.7	1.1	1.9	3
Strawberry (<i>Fragaria sp.</i>)	0.7	0.9	1.2	1.7

Source : Adapted from Maas and Hoffman (1977) and Maas (1984).
<https://www.fao.org/3/T0234E/T0234E03.htm#3note3>



2 TIMAC AGRO SOLUTIONS

TIMAC AGRO recommends the KSC range of fertilizers with its specificity PHYT-ACTYL which thanks to its organic compounds has a buffering effect on the fertigation solution EC and pH.



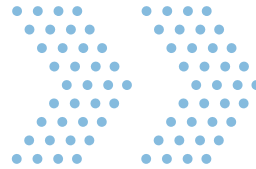
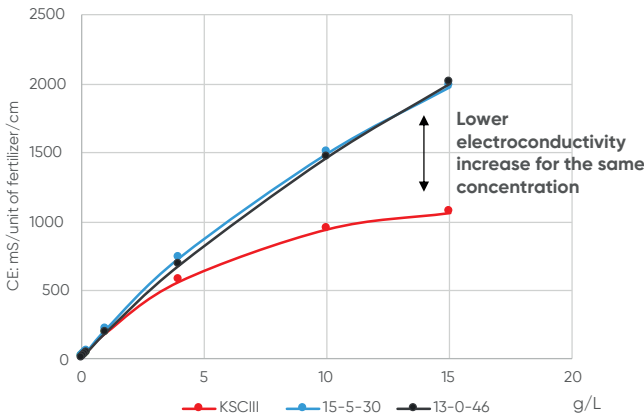
KSC PHYT-ACTYL is the unique watersoluble range with a triple action on plant, soil and specific nutrition composed of seaweeds extracts and organic compounds.

- Contains high quality raw material adapted to fertigation features (pH, EC)
- Water-soluble fertilizer with some biostimulant effects
- KSC range is composed of adapted formulas for all the crop cycle

- Improves nutrients absorption
- Increases the plant's efficient use of water
- Supports crop growth and ensures phenological stage transition in all conditions.

ZOOM ON THE TECHNOLOGY

Measurement of the electroconductivity increase of fertilizers



KSC PHYT-ACTYL offers **lowers electroconductivity** in the fertigation solution which ensures higher **nutrition efficiency** thanks to **selected raw materials**.



ZOOM ON TRIALS

KSC-PHYT ACTYL effect on the production and quality of pepper plant (cv Lamuyo) grown in greenhouses with fertigation system under saline stress. **Soil EC : 11,6 dS/m.**

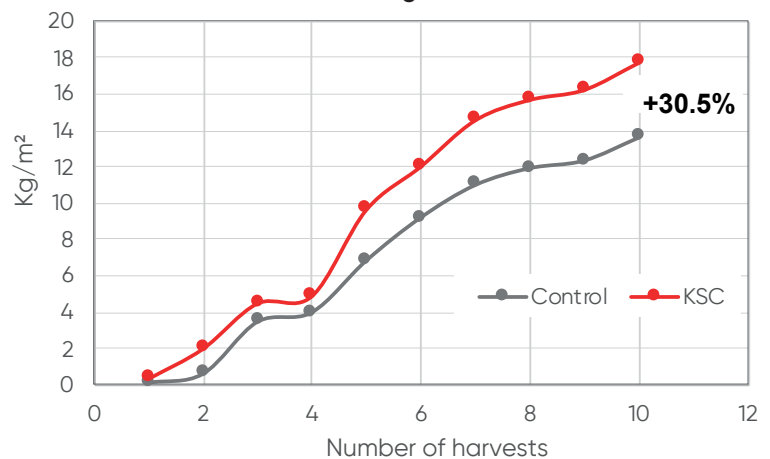
Source: Bernal, J., Urdániz, A. y García-Mina, JM^o in Actas Hortic., 19, 233-239, 1997.

Nota bene: A soil is considered saline if the EC of the saturation extract exceeds 4 dS/m at 25°C (Source Soil Science Society of America 2001).

Methods:

Two fields were conducted in greenhouse, each with a total of 1500m² (equivalent to 4215 pepper plants) divided in five subplots. One plot received a conventional commercial fertilization and the other received the **KSC-PHYT ACTYL**, both with the same fertilizer units during the entire vegetative cycle.

KSC effect on accumulated pepper production under high saline stress



Results:

→ **30,5% more pepper production with KSC compared to the control.**