

## Method of applying SOL-U-FERT nutrition

One of the following methods of application may be used:

- Mix the fertilizer in a large volume of water (concentrations on p.2) which is then applied according to a specific EC, or
- Make up a concentrate mixture (stock solution) of the chemicals.

**Method (a)** is simple and comprises the application of fertilizer according to recommendation, eg. 132 g of the cucumber mixture Sol-U-Fert plus 86g Calcinit in 100 l of water (see recommendations on p.2). The EC and the pH of the final dilution in the reservoir should be checked to ensure that the EC is at the correct level for the crop. Remember that all reservoirs in which fertilizer is mixed and stored for use on plants in greenhouses, should be covered with an opaque (dark) plastic sheet to ensure that algae does not grow in the water - because it will completely block dripper lines. All fertilizer must be well mixed with the water before irrigation begins.

Reservoirs should be painted with a non-toxic, water repellent paint, eg. NUCLAD.

**Method (b)** is usually used where automatic fertilizer applicators such as a VOLMATIC or something similar, is used to inject the fertilizer into the water stream before it reaches the greenhouse (nursery).

### A concentrate mixture (Method b:) is made as follows:

It is assumed that for eg. 132g SOL-U-FERT CS plus 86g Calcinit and 2 g Microflex GA is added to 100 l of water for the cucumber mixture to ensure the correct strength without it exceeding the desired EC.

### To make a 75 x concentrate of the recommended nutritional programme proceed as follows:

#### CUCUMBERS – Example MIXTURE A:

Dissolve 75 x 132 g (9900 g) SOL-U-FERT CS in 100 l water plus 75 x 2 g (150 g) Microflex GA in the same 100 l of water.

#### MIXTURE B:

Now dissolve 75 x 86 g Calcinit (6 450g) in 100 l water.

Keep the two mixtures in separate containers.

For normal growing conditions for cucumbers in plastic bags, this liquid concentrate should be applied at:

1.3 l / 100 l of Mixture A plus  
1.3 l / 100 l of Mixture B

Dissolved in THE SAME 100 l OF WATER to the plants after having ensured that the EC and the pH of the final mixture is as recommended for cucumbers.

When a higher EC is required, increase the quantity of both Mixture A and B per 100 l until the desired EC is reached.

### THE SAME PRINCIPLES APPLY TO THE MAKING OF A CONCENTRATE FOR TOMATOES.

#### Recognition:

*These guidelines were drawn up under the guidance of the late Prof. P.C.J Maree, Professor Emeritus, University of Stellenbosch.*



Knowledge grows

# YaraTera™ SOL-U-FERT™

## Hydroponic Product Range

## Manual for growing Tomatoes and Cucumbers in greenhouses



For more information please contact your local Yara agronomist.

#### For further information contact:

Yara Africa Fertilizer (Pty) Ltd  
PO Box 59, Huguenot, 7645  
Lambrecht Street, Paarl, 7465

Tel: +27 (0)21 877 5300  
Fax: +27 (0)21 862 6604

[www.yara.co.za](http://www.yara.co.za)



# SOL-U-FERT

Hydroponic fertilizer mixtures



PRODUCT:	CROP:
SOL-U-FERT CS	Cucumbers Summer
SOL-U-FERT CW	Cucumbers Winter
SOL-U-FERT T3T	Tomatoes – three flower trusses to end of growing season



## Mixing table for preparing nutrient solution:

	Quantity per 100 l final solution			Alternative to CalFlo use:
	SOL-U-FERT gram	CalFlo ml	Microflex GA gram	YaraTera™ Calcinit™ gram
SOL-U-FERT CS	132 g	91 ml	2 g	86 g
SOL-U-FERT CW	158 g	91 ml	2 g	86 g
SOL-U-FERT T3T	164 g	77 ml	2 g	73 g

**NB:** The mixtures is ready for use as packed in the bag. CalFlo or Calcinit and Trace elements must be added to the final solution. It is **SIMPLE, LABOUR SAVING** and **ACCURATE!** One only uses **SOL-U-FERT**, CalFlo or Calcinit and Microflex GA to make up a totally balanced nutrient mixture for use in greenhouses.

Before adding the mixture to a specific quantity of water, it should be noted that there are a few important principles, which should be adhered to. These principles are briefly dealt with as follows:

### The pH of the irrigation water

When Phosphate, Calcium and Magnesium are used together in a water culture hydroponic mixture, the pH of the water, as the chemical formulations are added, is very important for the following reasons:

If the pH is between 6.5 and 7.0 and the Phosphate and the Magnesium is added to the mixture it is highly likely that a rosy coloured or sometimes black precipitate will form which is usually Calcium - or Magnesium Phosphate. To prevent this, it is important that the pH of the water in the reservoir, before

mixing, is decreased to 6.0 or 6.5 by the addition of an appropriate acid. It is safest to add the acid and mix it in well before the fertilizer is added.

NITRIC ACID – 40-60 % or PHOSPHORIC ACID (23% P) is usually used.

**The use of sulphuric acid is not recommended as it is classified as a strong acid and is dangerous to use.**



Please note that these compounds are all acids. Handle them with the appropriate care.

Although the amount of acid needed to decrease the pH can be determined by titration, it is far easier to determine the number of millilitres of acid per 100 l of water needed to lower the pH to 6.5, during the first filling with the mixture and then sticking to it. It is safest to circulate the water after the addition of the acid to ensure that the pH is the same throughout the reservoir.

Once the pH has stabilized, first slowly add the SOL-U-FERT powder. Follow this with the Calcinit and then add the trace elements. Circulate the mixture again and make sure all additives is in solution before use.

### The electrical conductivity (EC) of the final mixture

This measurement is a very important TOOL in regulating plant growth.

When a mixture is made with very fresh water, eg. 0.05 mS/cm, the EC after mixing is likely to be as follows:

**for tomatoes: 2,5 mS/cm**  
**for cucumbers: 1,6 mS/cm**

Under normal circumstances, as usually encountered in practice, this concentration is quite acceptable and will ensure good plant development. It should be remembered that the EC is probably the producer's best tool for manipulating the rate of plant growth. The manipulation of the EC is continuously necessary and should be adapted as follows during the season:

### TOMATOES - EC Management

Young plants, according to recommendations, can be grown at an EC of 2.0. The EC should be maintained as long as the plants are growing well. As soon as the growth rate declines, however, the EC should be increased from 2.0 to 2.5. The growth rate may temporarily slow again at early fruit setting at which time the EC should be maintained at 2.5 mS/cm until the plants have regained their vigour. Once the plants have attained a height of a meter or more, the EC may safely be maintained at 2.5 mS/cm.

Should the plants be growing too slow, the EC may be increased to 2.8 for a week before being returned to the normal EC of 2.5 mS/cm. In autumn when the tomatoes are beginning to ripen and small cracks appear on the shoulders of the

tomatoes, it may be necessary to increase the EC to 3.5 mS/cm for a week or more.

Mature tomato plants, ie. tomato plants carrying 8 to 9 trusses, use approximately 1.9 - 2.0 l of water per day, depending on the climate. To ensure maximal growth of the tomato plant at all times, it is necessary to watch the growth pattern of the crown of the plant. If the developing leaves in the crown of the plant curl so far downwards that the tips of the leaves almost touch the main stem, growth is too vigorous.

Should this phenomenon occur, bring the EC down to 2.0 for a week. If more vigorous growth is desired, increase the EC to 2.5 again.

The uppermost leaves should not curl more than halfway towards the main stem, otherwise the EC is too high. When the EC in the drainage water from the bag gets too high (3.5 mS/cm or higher), feed with a lower EC but never with pure water.

### CUCUMBERS - EC Management

In the case of cucumbers, plant growth can also be manipulated by changing the EC. In the Spring and Summer plantings the manipulation of the EC is not very important because the quantity of water applied is relatively high. By applying a large volume of water there is a simultaneous application of a relatively large mass of fertilizer to the planting. A mature cucumber plant, is one which has already reached the wire and which has at least 4 side shoots producing fruit, can use from 2.5 to 3.5 l of water per day, depending on the climate. In winter, without artificial heating, this figure will probably be less than half this amount.

To get plants to grow in the autumn, the EC should be increased because the plants receive much less water and therefore must be given more fertilizer per litre. This is done by increasing the EC of the mixture as follows:

From just after planting until the 2-3 leaf stage the EC in summer should be kept at 1.6 mS/cm. When the plants are at the 4-5 leaf stage they should be growing faster and therefore must receive more fertilizer. During the summer the EC may be increased to 2.0. or even 2.5 mS/cm for short periods until the plants are growing vigorously.

In winter the EC will usually not be maintained at under 2.0 mS/cm and, if more growth is required the EC may be increased to 2.5 mS/cm. It has been found that it is not desirable for the EC to be kept at above 2.5 because the leaves become hard, curl downwards and growth is not as it should be. Once the plants show better growth as a result of the higher EC, the EC may again be decreased by 0.5 mS/cm.

If the plants are still not growing optimally the following method can be used to apply more Nitrogen to the plants: - Make up a separate mixture in a container with ONLY 2g LAN28 / liter water. Do not add the hydroponic mixture to this! - it must only contain LAN! Now apply 250 ml of the LAN-mixture to each plant by hand. Immediately thereafter continue with the hydroponic mixture at the EC as applied prior to adding the LAN-mixture. Don't apply more than 250 ml of the LAN-mixture to each plant - the plants may burn! Immediately thereafter, continue once again with the normal cucumber mixture.