Universidade de Lisboa
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# Nutrient Solution Calculator

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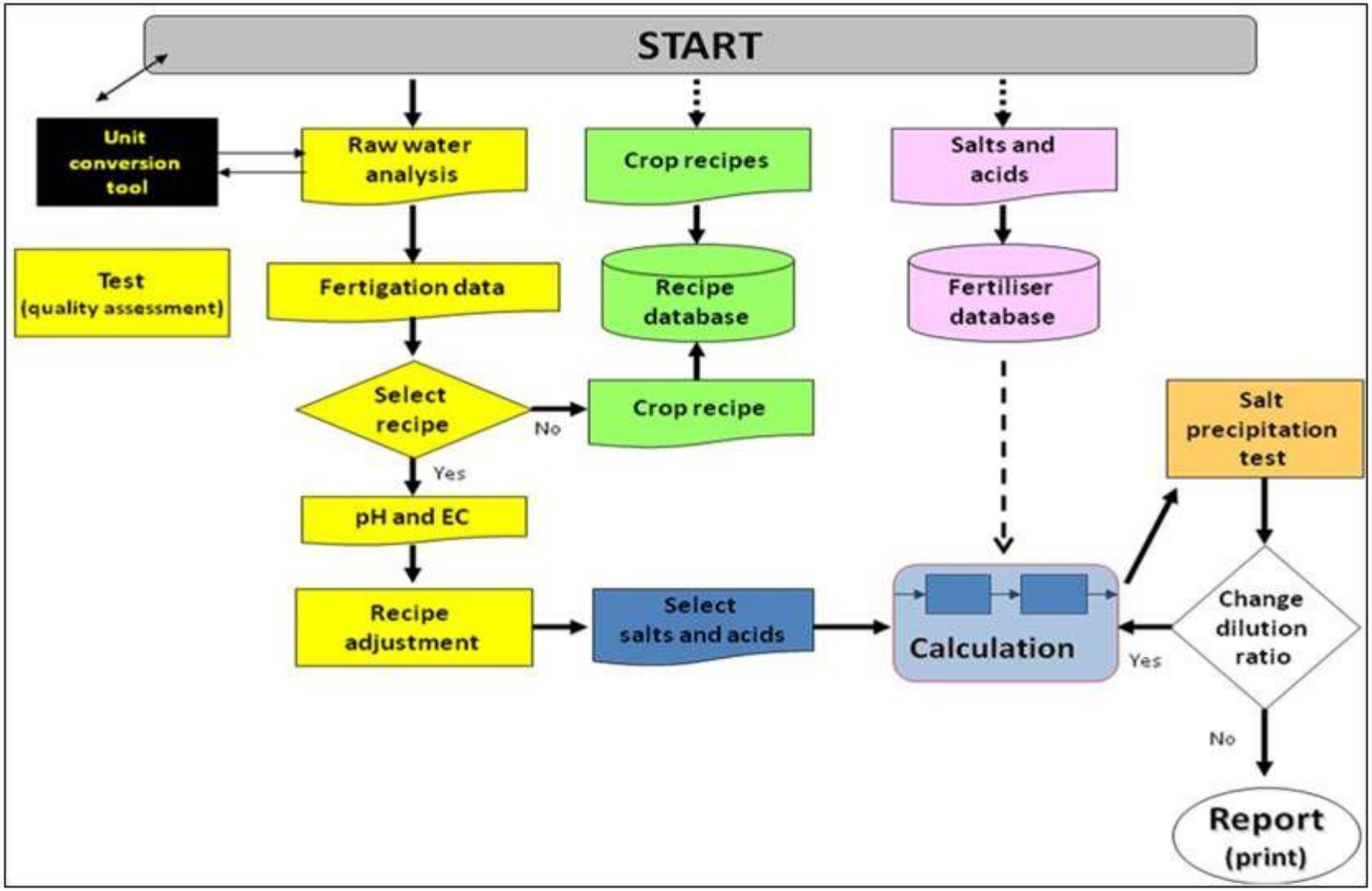
# Nutrient Solution Calculator

Nutrient Solution (NS) calculator is an EXCEL™ spreadsheet developed by Dr. Luca Incrocci (Dipartimento di Biologia delle Piante Agrarie, University of Pisa) to assist growers and consultants in the calculation of salts concentrations of nutrient stock solutions.

# Nutrient Solution Calculator



# NS CALCULATOR

Input

Unit converter ppm> mM

Recipes

Fertilizers and acids

Report

Calculation

**NS CALCULATOR Quick Start Guide (by Luca Incrocci)**

**Luca INCROCCI, University of Pisa, Italy**

# Recipes

Quick start guide | Unit converter ppm> mM | Calculation | Fertilizers and acids | Report | Input

Alphabetical order | ?

| Crop | Stage | EC (dS/m) | $N\text{-}NO_3$ | $N\text{-}NH_4$ | $P\text{-}PO_4$ | K | Ca | Mg | Na | $S\text{-}SO_4$ | Cl | Fe | B | Cu | Zn | Mn | Mo | Electro-chemical neutrality test | $C^+ - A^-$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aubergine | Single | 1.96 | 15.00 | 1.00 | 1.30 | 7.00 | 3.50 | 1.80 | 0.00 | 1.50 | 0.00 | 15.00 | 30.00 | 1.00 | 5.00 | 10.00 | 1.00 | | -0.70 |
| Bean | Single | 1.70 | 12.00 | 1.00 | 1.20 | 5.50 | 3.50 | 1.20 | 0.00 | 1.20 | 0.00 | 15.00 | 50.00 | 1.00 | 5.00 | 10.00 | 2.00 | | 0.30 |
| Carnation | Single | 1.75 | 13.00 | 1.00 | 1.30 | 6.00 | 3.50 | 1.20 | 0.00 | 1.50 | 0.00 | 25.00 | 30.00 | 1.00 | 5.00 | 10.00 | 1.00 | | -0.90 |
| Cucumber | Single | 2.00 | 15.00 | 1.00 | 1.20 | 7.00 | 4.00 | 1.50 | 0.00 | 1.60 | 0.00 | 15.00 | 30.00 | 1.00 | 5.00 | 10.00 | 1.00 | | -0.40 |
| Fruit vegetable | Single | 2.04 | 15.00 | 1.00 | 1.30 | 7.50 | 4.00 | 1.50 | 0.00 | 2.00 | 0.00 | 15.00 | 30.00 | 1.00 | 5.00 | 10.00 | 1.00 | | -0.80 |
| Gerbera | Single | 1.52 | 11.00 | 1.00 | 1.30 | 5.00 | 3.00 | 1.00 | 0.00 | 1.20 | 0.00 | 35.00 | 30.00 | 1.00 | 5.00 | 5.00 | 1.00 | | -0.70 |
| Hoagland & Arnon | Universal (1938) | 2.00 | 14.00 | 1.00 | 1.00 | 6.00 | 4.00 | 2.00 | 0.00 | 2.00 | 0.00 | 45.00 | 45.00 | 1.00 | 1.00 | 10.00 | 1.00 | | 0.00 |
| Leafy cut vegetable | Single | 3.36 | 15.00 | 3.00 | 2.50 | 11.00 | 4.50 | 3.00 | 4.35 | 6.00 | 4.00 | 40.00 | 40.00 | 1.00 | 5.00 | 10.00 | 1.00 | | -0.15 |
| Leafy vegetable | Single | 2.38 | 16.00 | 2.00 | 2.00 | 10.00 | 4.50 | 1.00 | 0.00 | 2.50 | 0.00 | 40.00 | 30.00 | 1.00 | 5.00 | 5.00 | 1.00 | | 0.00 |
| Muskmelon | Single | 2.03 | 16.00 | 1.00 | 1.30 | 7.00 | 4.00 | 1.70 | 0.00 | 1.50 | 0.00 | 10.00 | 20.00 | 1.00 | 5.00 | 10.00 | 1.00 | | -0.90 |
| Ornamental outdoor plant | Single | 1.37 | 8.50 | 0.50 | 1.00 | 4.50 | 2.50 | 1.20 | 0.00 | 1.50 | 0.00 | 20.00 | 20.00 | 1.00 | 5.00 | 10.00 | 1.00 | | -0.10 |
| Pepper | Single | 2.00 | 15.00 | 1.00 | 1.30 | 8.00 | 3.50 | 1.50 | 0.00 | 1.50 | 0.00 | 15.00 | 30.00 | 1.00 | 5.00 | 10.00 | 1.00 | | -0.30 |
| Rose | Single | 1.52 | 11.00 | 1.00 | 1.30 | 5.00 | 3.00 | 1.00 | 0.00 | 1.30 | 0.00 | 25.00 | 25.00 | 1.00 | 5.00 | 5.00 | 1.00 | | -0.90 |
| Squash | Single | 2.17 | 16.00 | 1.30 | 1.50 | 7.50 | 4.00 | 2.00 | 0.00 | 1.80 | 0.00 | 10.00 | 50.00 | 1.00 | 5.00 | 10.00 | 1.00 | | -0.30 |
| Strawberry | Single | 1.70 | 10.00 | 1.00 | 1.00 | 5.50 | 3.50 | 1.20 | 0.00 | 2.00 | 0.00 | 20.00 | 30.00 | 1.00 | 5.00 | 10.00 | 1.00 | | 0.90 |
| Tomato | Single | 2.09 | 14.00 | 1.00 | 1.00 | 8.00 | 4.00 | 1.50 | 0.00 | 2.50 | 0.00 | 15.00 | 20.00 | 1.00 | 5.00 | 10.00 | 1.00 | | 0.00 |
| zzRecipe | : inserted values | 0.00 | | | | | | | | | | | | | | | | | 0.00 |
| zzRecipe | : inserted values | 0.00 | | | | | | | | | | | | | | | | | 0.00 |
| zzRecipe | : inserted values | 0.00 | | | | | | | | | | | | | | | | | 0.00 |
| zzRecipe | : inserted values | 0.00 | | | | | | | | | | | | | | | | | 0.00 |

# Fertilizers and acids

Quick start guide | Unit converter ppm> mM | ? | Recipes | Calculation | Report | Input

**Acids for carbonate neutralization**

| | % p/p | Chemical formula | Density (Kg/L) | Euro/L | %N-$NO_3$ | %N-$NH_4$ | % $P_2O_5$ | % $K_2O$ | % CaO | % MgO | % Na | % $SO_3$ | % Cl | % Fe | % B | % Cu | % Zn | % Mn | % Mo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nitric acid | 65.0 | $HNO_3$ | 1.39 | 0.72 | 14.4 | | | | | | | | | | | | | | |
| Phosphoric acid | 85.0 | $H_3PO_4$ | 1.69 | 1.43 | | | 61.5 | | | | | | | | | | | | |
| Sulphuric acid | 96.0 | $H_2SO_4$ | 1.84 | 0.48 | | | | | | | | 78.4 | | | | | | | |
| Chloridric acid | 36.5 | HCl | 1.19 | 0.50 | | | | | | | | | 35.5 | | | | | | |

| | | Euro/Kg | %N-$NO_3$ | %N-$NH_4$ | % $P_2O_5$ | % $K_2O$ | % CaO | % MgO | % Na | % $SO_3$ | % Cl | % Fe | % B | % Cu | % Zn | % Mn | % Mo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pre-mixed fertilizers** | | | | | | | | | | | | | | | | | |
| Water Soluble Fertilizer 1 | | | | | | | | | | | | | | | | | |
| Water Soluble Fertilizer 2 | | | | | | | | | | | | | | | | | |
| Water Soluble Fertilizer 3 | | | | | | | | | | | | | | | | | |
| **Calcium fertilizers** | | | | | | | | | | | | | | | | | |
| Calcium nitrate | $5[Ca(NO_3)_2{\cdot}2H_2O]NH_4NO_3$ | 0.30 | 14.3 | 1.3 | | | 26.0 | | | | | | | | | | |
| Calcium nitrate reagent pure | $Ca(NO_3)_2{\cdot}4H_2O$ | 0.30 | 11.9 | | | | 23.8 | | | | | | | | | | |
| Calcium chloride | $CaCl_2$ | | | | | | 50.5 | | | | 63.8 | | | | | | |
| **Ammonium fertilizers** | | | | | | | | | | | | | | | | | |
| Ammonium nitrate | $NH_4NO_3$ | 0.30 | 17.2 | 17.2 | | | | | | | | | | | | | |
| Ammonium sulphate | $(NH_4)_2SO_4$ | 0.16 | | 21.2 | | | | | | 60.6 | | | | | | | |
| Mono-ammonium phosphate | $NH_4H_2PO_4$ | 0.80 | | 12.2 | 61.6 | | | | | | | | | | | | |
| **Phosphorus fertilizers** | | | | | | | | | | | | | | | | | |
| Mono-potassium phosphate | $KH_2PO_4$ | 0.96 | | | 52.2 | 34.6 | | | | | | | | | | | |
| **Magnesium fertilizers** | | | | | | | | | | | | | | | | | |
| Magnesium sulphate | $MgSO_4{\cdot}7H_2O$ | 0.30 | | | | | | 15.9 | | 31.8 | | | | | | | |
| Magnesium nitrate | $Mg(NO_3)_2{\cdot}6H_2O$ | 0.91 | 11.0 | | | | | 15.7 | | | | | | | | | |
| **Potassium fertilizers** | | | | | | | | | | | | | | | | | |
| Potassium nitrate | $KNO_3$ | 0.50 | 13.8 | | | 46.5 | | | | | | | | | | | |
| Potassium sulphate | $K_2SO_4$ | 0.42 | | | | 52.1 | | | | 44.1 | | | | | | | |
| Potassium chloride | KCl | 0.24 | | | | 61.0 | | | | | 45.9 | | | | | | |
| **Iron chelates** | | | | | | | | | | | | | | | | | |
| Iron EDTA | | | | | | | | | | | | 13.00 | | | | | |
| Iron DPTA | | 7.98 | | | | | | | | | | 6.50 | | | | | |
| Iron EDDHA | | 10.96 | | | | | | | | | | 6.00 | | | | | |

| | | Euro/Kg | %N-$NO_3$ | %N-$NH_4$ | % $P_2O_5$ | % $K_2O$ | % CaO | % MgO | % Na | % $SO_3$ | % Cl | % Fe | % B | % Cu | % Zn | % Mn | % Mo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Microelement fertilizers** | | | | | | | | | | | | | | | | | |
| Microelements MIX 1 | | | | | | | | | | | | 4.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Microelements MIX 2 | | | | | | | | | | | | | | | | | |
| Borax | $Na_2B_4O_7{\cdot}10H_2O$ | 10.23 | | | | | | | 12.1 | | | | 11.30 | | | | |
| Boric acid | $H_3BO_3$ | 19.63 | | | | | | | | | | | 17.50 | | | | |
| Copper sulphate | $CuSO_4{\cdot}5H_2O$ | 14.46 | | | | | | | | 32.1 | | | | 25.50 | | | |
| Copper chelate (EDTA) | | 17.40 | | | | | | | | | | | | 15.00 | | | |
| Zinc sulphate | $ZnSO_4{\cdot}7H_2O$ | 30.78 | | | | | | | | 27.8 | | | | | 22.70 | | |
| Zinc chelate (EDTA) | | 14.66 | | | | | | | | | | | | | 15.00 | | |
| Manganese sulphate | $MnSO_4{\cdot}H_2O$ | 50.00 | | | | | | | | 47.5 | | | | | | 32.50 | |
| Manganese chelate | | 30.00 | | | | | | | | | | | | | | 15.00 | |
| Ammonium heptamolybdate | $(NH_4)_6Mo_7O_{24}{\cdot}4H_2O$ | 37.00 | | 14.0 | | | | | | | | | | | | | 54.40 |
| Sodium molybdate | $Na_2MoO_4{\cdot}2H_2O$ | 37.26 | | | | | | | 19.0 | | | | | | | | 39.70 |
| **Sodium salts** | | | | | | | | | | | | | | | | | |
| Sodium choride | NaCl | 0.50 | | | | | | | 39.3 | | 60.7 | | | | | | |

# Input

Adjust window to your monitor

Quick start guide | Unit converter ppm> mM

Recipes | Fertilizers and acids

Report | Calculation

## 1) Insert ion composition of irrigation water (mM for macronutrients and uM for micronutrients)

?

| EC (dS/m) | $HCO_3^-$ | $N\text{-}NO_3$ | $N\text{-}NH_4$ | $P\text{-}PO_4$ | K | Ca | Mg | Na | $S\text{-}SO_4$ | Cl | Fe | B | Cu | Zn | Mn | Mo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | millimoles/L | | | | | | | | | | micromoles/L | | | | | |
| 0.00 | | | | | | | | | | | | | | | | |

Electro-chemical neutrality test ?

OK

Water quality evaluation ?

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK |

## 2) Fertigation device parameters ?

| | | | |
|---|---|---|---|
| Dilution ratio of stock nutrient solutions | 200 | X | OK |
| Volume of stock nutrient solution tanks (L) | 100 | | |

## Input

Adjust window to your monitor

Quick start guide | Recipes | Report

Unit converter ppm> mM | Fertilizers and acids | Calculation

Volume of stock nutrient solution tanks (L): 100

**3)Select recipe** ?

Tomato: Stage: Single

| EC (dS/m) | $N\text{-}NO_3$ | $N\text{-}NH_4$ | $P\text{-}PO_4$ | K | Ca | Mg | Na | $S\text{-}SO_4$ | Cl | Fe | B | Cu | Zn | Mn | Mo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | millimoles/L | | | | | | | | | | micromoles/L | | | | |
| 2.09 | 14.00 | 1.00 | 1.00 | 8.00 | 4.00 | 1.50 | 0.00 | 2.50 | 0.00 | 15.0 | 20.0 | 1.0 | 5.0 | 10.0 | 1.0 |
| *ppm* | *196.1* | *14.0* | *31.0* | *312.8* | *160.3* | *36.5* | *0.0* | *80.0* | *0.0* | *0.84* | *0.22* | *0.06* | *0.33* | *0.55* | *0.10* |
| Test | | | | | | | | | | | | | | | |

pH: 5.7

Calculated EC (dS/m): 2.09 ?

Target EC (dS/m) ? Restore calculated EC

2.09 OK

**4) Actual nutrient solution**

| EC (dS/m) | $N\text{-}NO_3$ | $N\text{-}NH_4$ | $P\text{-}PO_4$ | K | Ca | Mg | Na | $S\text{-}SO_4$ | Cl | Fe | B | Cu | Zn | Mn | Mo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2.09 | 14.00 | 1.00 | 1.00 | 8.00 | 4.00 | 1.50 | 0.00 | 2.50 | 0.00 | 15.00 | 20.00 | 1.00 | 5.00 | 10.00 | 1.00 |
| | ppm | | | | | | | | | ppm | | | | | |
| ? | 196.1 | 14.0 | 31.0 | 312.8 | 160.3 | 36.5 | 0.0 | 80.2 | 0.0 | 0.84 | 0.22 | 0.06 | 0.33 | 0.55 | 0.10 |

**Molar ratios**

| N:K | $N\text{-}NH_4$:$N\text{-}NO_3$ | K: | Ca: | Mg |
|---|---|---|---|---|
| 1.88 | 0.07 | 0.59 | 0.30 | 0.11 |

**K:Ca:Mg ratio (expressed in milliequivalents)**

| K: | Ca: | Mg |
|---|---|---|
| 0.42 | 0.42 | 0.16 |

# EXERCÍCIO

Programação de um sistema de fertirrega para obtenção de uma solução nutritiva (SN) adequada para gerbera, em sistema de cultura sem solo, utilizando o **NS Calculator**.

Cultura: Gerbera

pH final da solução nutritiva: 5,6

Solução concentrada: 200x

Volume dos depósitos de solução concentrada: 500 L

Composição da água de rega:

| pH | CE (mS/cm) | $HCO_3^-$ (meq/L) | $NO_3^-$ (mg $NO_3$/L) | N-$NH_4^+$ (mg N/L) | P (mg P/L) | K (meq/L) | Ca (meq/L) | Mg (meq/L) | Na (meq/L) | S (mg/L) | Cl (mg/L | B mg/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6,5 | 0,59 | 3,0 | 40,3 | 7,0 | 1,6 | 0,15 | 1,0 | 0,16 | 2 | 0 | 35 | 0,5 |

## Composição da água de rega

| pH | CE (mS/cm) | $HCO_3^-$ (meq/L) | $NO_3^-$ (mg $NO_3$/L) | N-$NH_4^+$ (mg N/L) | P (mg P/L) | K (meq/L) | Ca (meq/L) | Mg (meq/L) | Na (meq/L) | S (mg/L) | Cl (mg/L | B mg/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6,5 | 0,59 | 3,0 | 40,3 | 7,0 | 1,6 | 0,15 | 1,0 | 0,16 | 2 | 0 | 35 | 0,5 |

↓ **Converter**

## Composição da água de rega (mg/L)

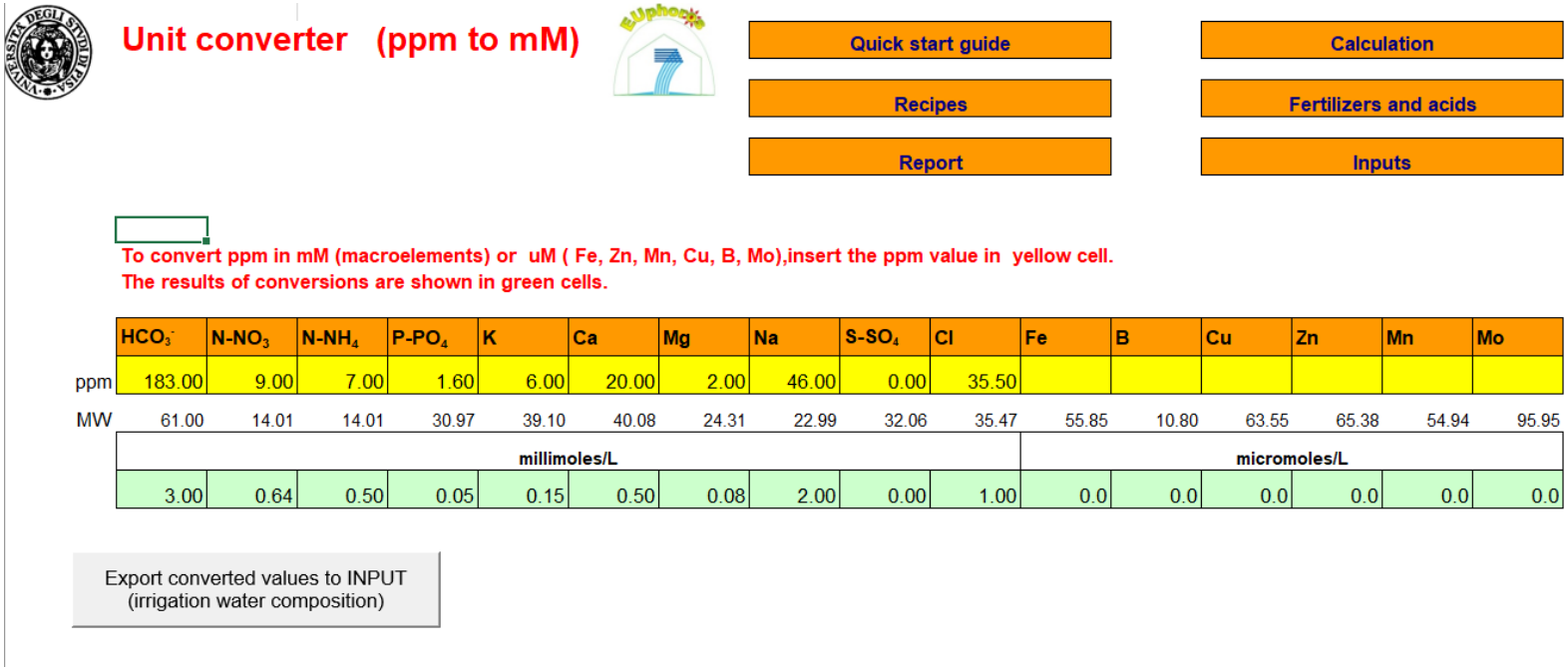
| pH | CE (mS/cm) | $HCO_3^-$ (mg/L) | $NO_3^-$ (mg N-$NO_3$/L) | N-$NH_4^+$ (mg N/L) | P (mg P/L) | K (mg/L) | Ca (mg/L) | Mg (mg/L) | Na (mg/L) | S (mg/L) | Cl mg/L | B mg/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6,5 | 0,59 | 183 | 9 | 7,0 | 1,6 | 6 | 20 | 2 | 46 | 0 | 35 | 0,5 |

↓ **Converter**

## Composição da água de rega (mM/L) – usar a funcionalidade do NS calculator

# Composição da água de rega (mM/L)

Usar a funcionalidade “Unit converter” do NS calculator



**Unit converter (ppm to mM)**

Quick start guide | Calculation | Recipes | Fertilizers and acids | Report | Inputs

To convert ppm in mM (macroelements) or uM ( Fe, Zn, Mn, Cu, B, Mo),insert the ppm value in yellow cell.
The results of conversions are shown in green cells.

| | $HCO_3^-$ | $N\text{-}NO_3$ | $N\text{-}NH_4$ | $P\text{-}PO_4$ | K | Ca | Mg | Na | $S\text{-}SO_4$ | Cl | Fe | B | Cu | Zn | Mn | Mo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ppm | 183.00 | 9.00 | 7.00 | 1.60 | 6.00 | 20.00 | 2.00 | 46.00 | 0.00 | 35.50 | | | | | | |
| MW | 61.00 | 14.01 | 14.01 | 30.97 | 39.10 | 40.08 | 24.31 | 22.99 | 32.06 | 35.47 | 55.85 | 10.80 | 63.55 | 65.38 | 54.94 | 95.95 |
| | millimoles/L | | | | | | | | | | micromoles/L | | | | | |
| | 3.00 | 0.64 | 0.50 | 0.05 | 0.15 | 0.50 | 0.08 | 2.00 | 0.00 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

Export converted values to INPUT (irrigation water composition)

Exportar os valores da composição da água de rega para os “Inputs”

# Input

Adjust window to your monitor

Quick start guide | Unit converter ppm> mM

Recipes | Fertilizers and acids

Report | Calculation

**1) Insert ion composition of irrigation water (mM for macronutrients and uM for micronutrients)**

?

| EC (dS/m) | $HCO_3^-$ | $N\text{-}NO_3$ | $N\text{-}NH_4$ | $P\text{-}PO_4$ | K | Ca | Mg | Na | $S\text{-}SO_4$ | Cl | Fe | B | Cu | Zn | Mn | Mo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | millimoles/L | | | | | | | | | | micromoles/L | | | | | |
| 0.55 | 3.00 | 0.64 | 0.50 | 0.05 | 0.15 | 0.50 | 0.08 | 2.00 | 0.00 | 1.00 | 0.0 | 46.3 | 0.0 | 0.0 | 0.0 | 0.0 |

**Electro-chemical neutrality test** ?

OK

**Water quality evaluation** ?

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK |

**2) Fertigation device parameters** ?

| | | | |
|---|---|---|---|
| Dilution ratio of stock nutrient solutions | 200 | X | OK |
| Volume of stock nutrient solution tanks (L) | 500 | | |

# Input

Adjust window to your monitor

Quick start guide | Recipes | Report

Unit converter ppm> mM | Fertilizers and acids | Calculation

**3)Select recipe** ?

Gerbera: Stage: Single

| EC (dS/m) | $N\text{-}NO_3$ | $N\text{-}NH_4$ | $P\text{-}PO_4$ | K | Ca | Mg | Na | $S\text{-}SO_4$ | Cl | Fe | B | Cu | Zn | Mn | Mo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | millimoles/L | | | | | | | | | | micromoles/L | | | | |
| 1.52 | 11.00 | 1.00 | 1.30 | 5.00 | 3.00 | 1.00 | 0.00 | 1.20 | 0.00 | 35.0 | 30.0 | 1.0 | 5.0 | 5.0 | 1.0 |
| *ppm* | *154.1* | *14.0* | *40.3* | *195.5* | *120.2* | *24.3* | *0.0* | *38.4* | *0.0* | *1.95* | *0.32* | *0.06* | *0.33* | *0.27* | *0.10* |
| Test | | | | | | | | | | | | | | | |

| pH | Calculated EC (dS/m) ? | Target EC (dS/m) ? | Restore calculated EC |
|---|---|---|---|
| 5.6 | 1.71 | 1.71 OK | |

**4) Actual nutrient solution**

| EC (dS/m) | $N\text{-}NO_3$ | $N\text{-}NH_4$ | $P\text{-}PO_4$ | K | Ca | Mg | Na | $S\text{-}SO_4$ | Cl | Fe | B | Cu | Zn | Mn | Mo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.71 | 11.00 | 1.00 | 1.30 | 5.00 | 3.00 | 1.00 | 2.00 | 1.20 | 1.00 | 35.00 | 46.30 | 1.00 | 5.00 | 5.00 | 1.00 |
| | ppm | | | | | | | | | ppm | | | | | |
| ? | 154.1 | 14.0 | 40.3 | 195.5 | 120.2 | 24.3 | 46.0 | 38.5 | 35.5 | 1.95 | 0.50 | 0.06 | 0.33 | 0.27 | 0.10 |

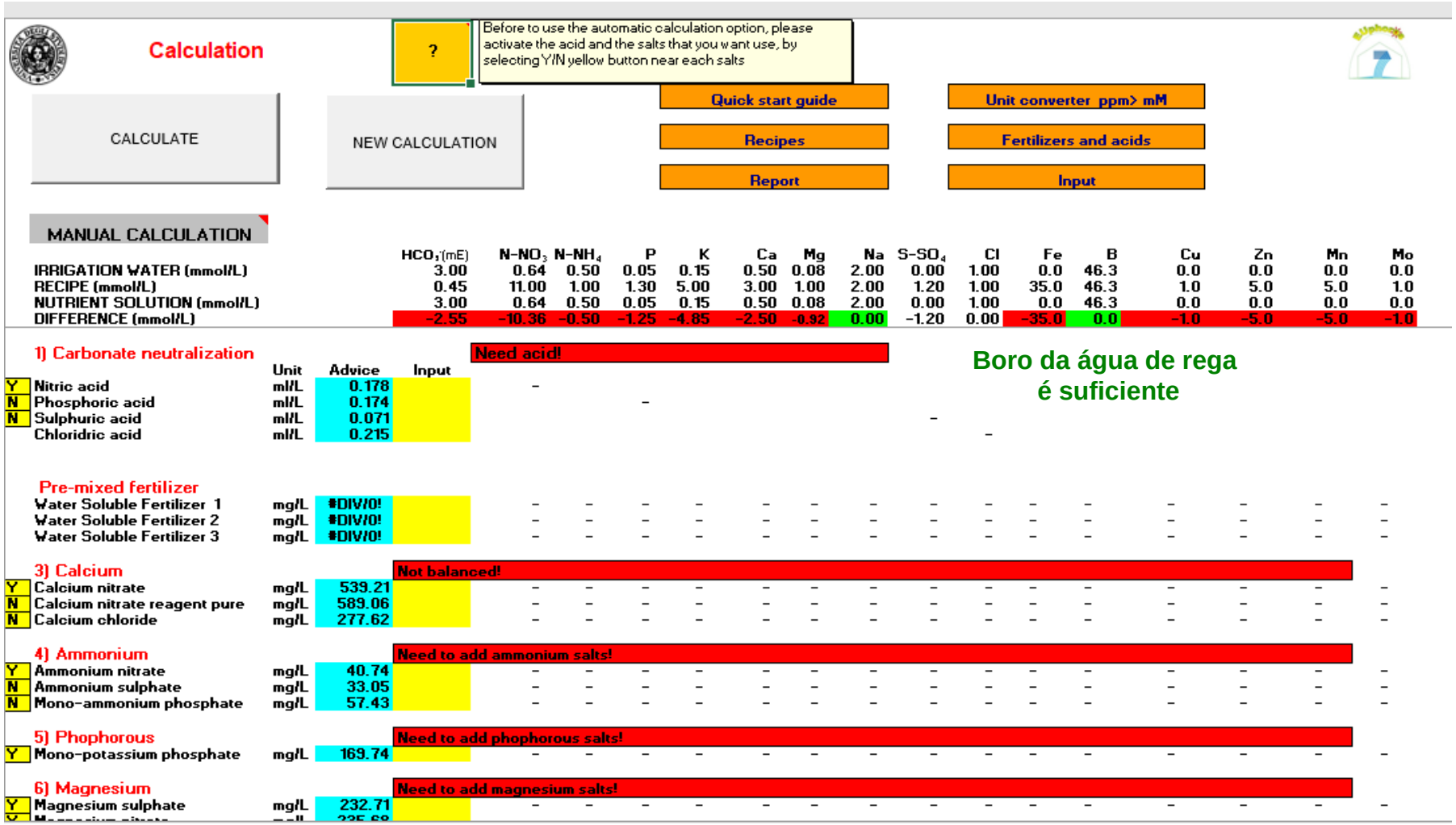
**Molar ratios**

| N:K | $N\text{-}NH_4$:$N\text{-}NO_3$ | K: | Ca: | Mg |
|---|---|---|---|---|
| 2.40 | 0.09 | 0.56 | 0.33 | 0.11 |

**K:Ca:Mg ratio (expressed in milliequivalents)**

| K: | Ca: | Mg |
|---|---|---|
| 0.38 | 0.46 | 0.15 |

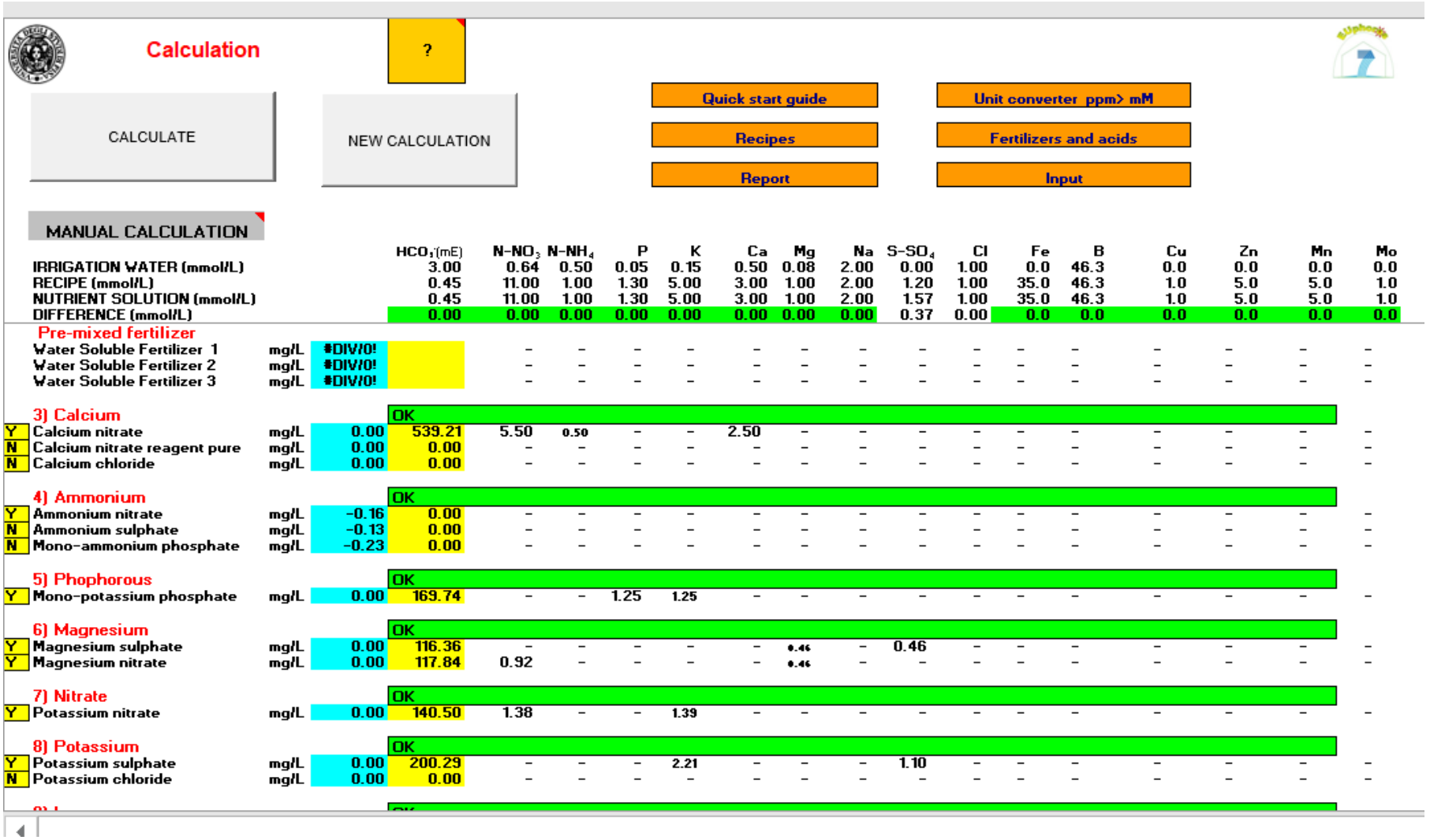
# No separador "Calculation" clicar em "NEW CALCULATION"




Boro da água de rega é suficiente

Y ou N – selecionar os ácidos e adubos que temos disponíveis

## No separador "Calculation" clicar em "CALCULATE"



Calculation

?

CALCULATE

NEW CALCULATION

Quick start guide

Unit converter ppm> mM

Recipes

Fertilizers and acids

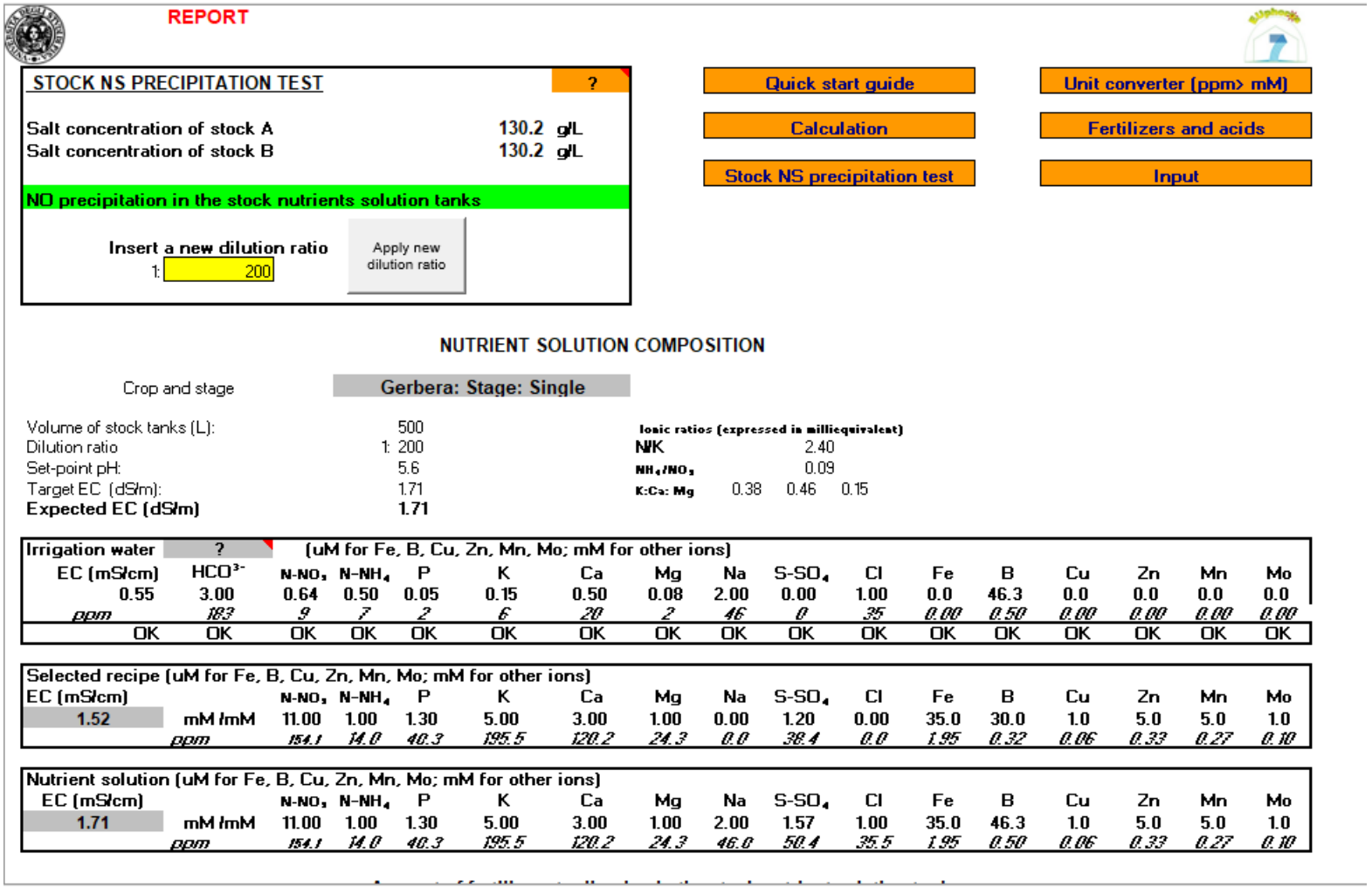
Report

Input

MANUAL CALCULATION

| | | | $HCO_3$ (mE) | $N\text{-}NO_3$ | $N\text{-}NH_4$ | P | K | Ca | Mg | Na | $S\text{-}SO_4$ | Cl | Fe | B | Cu | Zn | Mn | Mo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IRRIGATION WATER (mmol/L) | | | 3.00 | 0.64 | 0.50 | 0.05 | 0.15 | 0.50 | 0.08 | 2.00 | 0.00 | 1.00 | 0.0 | 46.3 | 0.0 | 0.0 | 0.0 | 0.0 |
| RECIPE (mmol/L) | | | 0.45 | 11.00 | 1.00 | 1.30 | 5.00 | 3.00 | 1.00 | 2.00 | 1.20 | 1.00 | 35.0 | 46.3 | 1.0 | 5.0 | 5.0 | 1.0 |
| NUTRIENT SOLUTION (mmol/L) | | | 0.45 | 11.00 | 1.00 | 1.30 | 5.00 | 3.00 | 1.00 | 2.00 | 1.57 | 1.00 | 35.0 | 46.3 | 1.0 | 5.0 | 5.0 | 1.0 |
| DIFFERENCE (mmol/L) | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.37 | 0.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Pre-mixed fertilizer | | | | | | | | | | | | | | | | | | |
| Water Soluble Fertilizer 1 | mg/L | #DIV/0! | | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Water Soluble Fertilizer 2 | mg/L | #DIV/0! | | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Water Soluble Fertilizer 3 | mg/L | #DIV/0! | | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 3) Calcium | | | OK | | | | | | | | | | | | | | | |
| Y Calcium nitrate | mg/L | 0.00 | 539.21 | 5.50 | 0.50 | - | - | 2.50 | - | - | - | - | - | - | - | - | - | - |
| N Calcium nitrate reagent pure | mg/L | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| N Calcium chloride | mg/L | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 4) Ammonium | | | OK | | | | | | | | | | | | | | | |
| Y Ammonium nitrate | mg/L | -0.16 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| N Ammonium sulphate | mg/L | -0.13 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| N Mono-ammonium phosphate | mg/L | -0.23 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 5) Phophorous | | | OK | | | | | | | | | | | | | | | |
| Y Mono-potassium phosphate | mg/L | 0.00 | 169.74 | - | - | 1.25 | 1.25 | - | - | - | - | - | - | - | - | - | - | - |
| 6) Magnesium | | | OK | | | | | | | | | | | | | | | |
| Y Magnesium sulphate | mg/L | 0.00 | 116.36 | - | - | - | - | - | 0.46 | - | 0.46 | - | - | - | - | - | - | - |
| Y Magnesium nitrate | mg/L | 0.00 | 117.84 | 0.92 | - | - | - | - | 0.46 | - | - | - | - | - | - | - | - | - |
| 7) Nitrate | | | OK | | | | | | | | | | | | | | | |
| Y Potassium nitrate | mg/L | 0.00 | 140.50 | 1.38 | - | - | 1.39 | - | - | - | - | - | - | - | - | - | - | - |
| 8) Potassium | | | OK | | | | | | | | | | | | | | | |
| Y Potassium sulphate | mg/L | 0.00 | 200.29 | - | - | - | 2.21 | - | - | - | 1.10 | - | - | - | - | - | - | - |
| N Potassium chloride | mg/L | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Report



REPORT

STOCK NS PRECIPITATION TEST ?

Salt concentration of stock A 130.2 g/L
Salt concentration of stock B 130.2 g/L

NO precipitation in the stock nutrients solution tanks

Insert a new dilution ratio
1: 200
Apply new dilution ratio

Quick start guide | Unit converter (ppm> mM)
Calculation | Fertilizers and acids
Stock NS precipitation test | Input

NUTRIENT SOLUTION COMPOSITION

Crop and stage: Gerbera: Stage: Single

| | | | |
|---|---|---|---|
| Volume of stock tanks (L): | 500 | Ionic ratios (expressed in milliequivalent) | |
| Dilution ratio | 1: 200 | N/K | 2.40 |
| Set-point pH: | 5.6 | $NH_4/NO_3$ | 0.09 |
| Target EC (dS/m): | 1.71 | K:Ca: Mg | 0.38 0.46 0.15 |
| **Expected EC (dS/m)** | **1.71** | | |

Irrigation water ? (uM for Fe, B, Cu, Zn, Mn, Mo; mM for other ions)

| EC (mS/cm) | $HCO^{3-}$ | $N\text{-}NO_3$ | $N\text{-}NH_4$ | P | K | Ca | Mg | Na | $S\text{-}SO_4$ | Cl | Fe | B | Cu | Zn | Mn | Mo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.55 | 3.00 | 0.64 | 0.50 | 0.05 | 0.15 | 0.50 | 0.08 | 2.00 | 0.00 | 1.00 | 0.0 | 46.3 | 0.0 | 0.0 | 0.0 | 0.0 |
| *ppm* | *183* | *9* | *7* | *2* | *6* | *20* | *2* | *46* | *0* | *35* | *0.00* | *0.50* | *0.00* | *0.00* | *0.00* | *0.00* |
| OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK |

Selected recipe (uM for Fe, B, Cu, Zn, Mn, Mo; mM for other ions)

| EC (mS/cm) | | $N\text{-}NO_3$ | $N\text{-}NH_4$ | P | K | Ca | Mg | Na | $S\text{-}SO_4$ | Cl | Fe | B | Cu | Zn | Mn | Mo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.52 | mM /mM | 11.00 | 1.00 | 1.30 | 5.00 | 3.00 | 1.00 | 0.00 | 1.20 | 0.00 | 35.0 | 30.0 | 1.0 | 5.0 | 5.0 | 1.0 |
| | *ppm* | *154.1* | *14.0* | *40.3* | *195.5* | *120.2* | *24.3* | *0.0* | *38.4* | *0.0* | *1.95* | *0.32* | *0.06* | *0.33* | *0.27* | *0.10* |

Nutrient solution (uM for Fe, B, Cu, Zn, Mn, Mo; mM for other ions)

| EC (mS/cm) | | $N\text{-}NO_3$ | $N\text{-}NH_4$ | P | K | Ca | Mg | Na | $S\text{-}SO_4$ | Cl | Fe | B | Cu | Zn | Mn | Mo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.71 | mM /mM | 11.00 | 1.00 | 1.30 | 5.00 | 3.00 | 1.00 | 2.00 | 1.57 | 1.00 | 35.0 | 46.3 | 1.0 | 5.0 | 5.0 | 1.0 |
| | *ppm* | *154.1* | *14.0* | *40.3* | *195.5* | *120.2* | *24.3* | *46.0* | *50.4* | *35.5* | *1.95* | *0.50* | *0.06* | *0.33* | *0.27* | *0.10* |

# Report

Amount of fertilizers to dissolve in the stock nutrient solution tanks.

| Stock A: | | |
|---|---|---|
| Calcium nitrate | 53.92 | Kg |
| Potassium nitrate | 9.66 | Kg |
| Iron EDTA | 1503.65 | g |

| | | |
|---|---|---|
| Nitric acid | 17.76 | L |

| Stock B: | | |
|---|---|---|
| Magnesium sulphate | 11.64 | Kg |
| Magnesium nitrate | 11.78 | Kg |
| Mono-potassium phosphate | 16.97 | Kg |
| Potassium nitrate | 4.39 | Kg |
| Potassium sulphate | 20.03 | Kg |
| Copper sulphate | 24.92 | g |
| Zinc sulphate | 144.01 | g |
| Manganese sulphate | 84.52 | g |
| Ammonium heptamolybdate | 17.64 | g |

| | | | | |
|---|---|---|---|---|
| Total cost of stock nutrient solutions | 84.64 Euro | corresponding to Euroh | 0.85 | 0.85 |

## Vídeo explicativo

https://www.youtube.com/watch?v=DG8s0nNkH1k