

Nutrient solutions

In 1933 a recipe for a solution that provides every nutrient essential for plant growth was developed by Hoagland and Arnon. Over the years modifications have been made. Below are recipes for preparing a full nutrient solution. Deficiency effects may be investigated by omitting the nutrient to be investigated.

Stock solutions

Primary and secondary nutrients

- 1 mol dm⁻³ potassium nitrate
- 1 mol dm⁻³ calcium nitrate
- 1 mol dm⁻³ potassium dihydrogenphosphate
- 1 mol dm⁻³ magnesium sulfate
- 0.05 mol dm⁻³ calcium hydrogenphosphate
- 0.01 mol dm⁻³ calcium sulfate-2-water
- 0.5 mol dm⁻³ potassium sulfate
- 1 mol dm⁻³ magnesium sulfate
- 15 g dm⁻³ Sprint 138 iron chelate (Fe-EDDHA)

Micronutrient stock solution

- 2.86 g dm⁻³ boric acid
- 1.81 g dm⁻³ manganese chloride-4-water
- 0.22 g dm⁻³ zinc sulfate-7-water
- 0.08 g dm⁻³ copper sulfate-5-water
- 0.02 g dm⁻³ 85% molybdic acid

When diluted 1:1000 this provides the following:

- 0.5 ppm boron
- 0.5 ppm manganese
- 0.05 ppm zinc
- 0.02 ppm copper
- 0.01 ppm molybdenum

Full nutrient solution

Add the following quantities of stock solutions to 1 dm³ of water

- 5 cm³ of 1 mol dm⁻³ potassium nitrate
- 5 cm³ of 1 mol dm⁻³ calcium nitrate
- 1 cm³ of 1 mol dm⁻³ potassium dihydrogenphosphate
- 2 cm³ of 1 mol dm⁻³ magnesium sulfate
- 1 cm³ of micronutrient stock solution
- 1.5 cm³ of 15 g dm⁻³ Sprint 138 iron chelate (Fe-EDDHA) [about 3 ppm Fe in Hoagland solution]

Nutrient solution minus nitrogen

Add the following quantities of stock solutions to 1 dm³ of water

- 10 cm³ of 0.05 mol dm⁻³ calcium hydrogenphosphate
- 200 cm³ of 0.01 mol dm⁻³ calcium sulfate-2-water
- 5 cm³ of 0.5 mol dm⁻³ potassium sulfate
- 2 cm³ of 1 mol dm⁻³ magnesium sulfate
- 1 cm³ of micronutrient stock solution
- 1.5 cm³ of 15 g dm⁻³ Sprint 138 iron chelate (Fe-EDDHA)

Add some calcium nitrate to give a Hoagland's solution with some nitrogen but less than 100% nitrogen, e.g. 10% nitrogen is supplied by 0.75 cm³ of 1 mol dm⁻³ calcium nitrate.