

The recipes for the germination medium and standard growth medium by Conn, S.J. et al. Protocol: optimising hydroponic growth systems for nutritional and physiological analysis of *Arabidopsis thaliana* and other plants. *Plant Methods* **9**, 4 (2013). <https://doi.org/10.1186/1746-4811-9-4>.

## Germination medium

| Macronutrients                                       | Formula weight       | g to make 1 L stock | Stock Concentration (M)         | Volume of stock (mL) for 1L | Final concentration (mM) |
|------------------------------------------------------|----------------------|---------------------|---------------------------------|-----------------------------|--------------------------|
| NH <sub>4</sub> NO <sub>3</sub>                      | 80                   | 80                  | 1                               | 0                           | 0                        |
| KNO <sub>3</sub>                                     | 101.1                | 101.1               | 1                               | 0                           | 0                        |
| CaCl <sub>2</sub>                                    | 1M Solution          |                     | 1                               | 0.75                        | 0.75                     |
| KCl                                                  | 74.55                | 74.55               | 1                               | 1                           | 1                        |
| Ca(NO <sub>3</sub> ) <sub>2</sub> •4H <sub>2</sub> O | 236.1                | 94.4                | 0.4                             | 0.625                       | 0.25                     |
| MgSO <sub>4</sub> •7H <sub>2</sub> O                 | 246.5                | 98.6                | 0.4                             | 2.5                         | 1                        |
| KH <sub>2</sub> PO <sub>4</sub>                      | 136.1                | 13.61               | 0.1                             | 2                           | 0.2                      |
|                                                      |                      |                     |                                 |                             |                          |
| Micronutrients                                       | Formula weight       | g to make 1 L stock | Stock Concentration (mM)        | Volume of stock (mL) for 1L | Final concentration (uM) |
| NaFe(III)EDTA                                        | 367.1                | 18.4                | 50                              | 1                           | 50                       |
| H <sub>3</sub> BO <sub>3</sub>                       | 61.8                 | 3.09                | 50                              | 1                           | 50                       |
| MnCl <sub>2</sub> •4H <sub>2</sub> O                 | 197.9                | 0.99                | 5                               | 1                           | 5                        |
| ZnSO <sub>4</sub> •7H <sub>2</sub> O                 | 287.5                | 2.875               | 10                              | 1                           | 10                       |
| CuSO <sub>4</sub> •5H <sub>2</sub> O                 | 249.7                | 0.125               | 0.5                             | 1                           | 0.5                      |
| Na <sub>2</sub> MoO <sub>3</sub>                     | 242                  | 0.0245              | 0.1                             | 1                           | 0.1                      |
| <b>pH with NaOH to 5.6</b>                           |                      |                     |                                 |                             |                          |
| <b>0.7% Agar</b>                                     | <b>7g per 1000ml</b> |                     |                                 |                             |                          |
| Macronutrients                                       |                      |                     | Micronutrients                  |                             |                          |
| <b>Final concentration (mM)</b>                      |                      | <b>Activity</b>     | <b>Final concentration (mM)</b> |                             | <b>Activity</b>          |
| K                                                    | 1.2                  | 4.79                | Fe                              | 0.01                        | 25 pM                    |
| Ca                                                   | 1                    | 1.05                | Mn                              | 0.005                       | 23nM                     |
| Mg                                                   | 1                    | 1.03                | Zn                              | 0.01                        | 50 uM                    |
| NH <sub>4</sub>                                      | 0                    | 1.72                | Cu                              | 0.0005                      | 23 nM                    |
| Cl                                                   | 2.51                 | 3.19                | Mo                              | 0.0001                      | 31 nM                    |
| NO <sub>3</sub>                                      | 0.5                  | 7.75                |                                 |                             |                          |
| SO <sub>4</sub>                                      | 1.0105               | 0.893               |                                 |                             |                          |
| PO <sub>4</sub>                                      | 0.2                  | 1.8 pM              |                                 |                             |                          |
| Na                                                   | 0.1012               | 1.38                |                                 |                             |                          |

## Standard growth solution

| Macronutrients                                       | FW          | g to make 1 L stock | Stock concentration (M)  | Vol of stock (mL) for 1L | Final concentration (mM) |
|------------------------------------------------------|-------------|---------------------|--------------------------|--------------------------|--------------------------|
| NH <sub>4</sub> NO <sub>3</sub>                      | 80          | 80                  | 1                        | 2                        | 2                        |
| KNO <sub>3</sub>                                     | 101.1       | 101.1               | 1                        | 3                        | 3                        |
| CaCl <sub>2</sub>                                    | 1M solution |                     | 1                        | 0.1                      | 0.1                      |
| KCl                                                  | 74.55       | 74.55               | 1                        | 2                        | 2                        |
| Ca(NO <sub>3</sub> ) <sub>2</sub> •4H <sub>2</sub> O | 236.1       | 94.4                | 0.4                      | 5                        | 2                        |
| MgSO <sub>4</sub> •7H <sub>2</sub> O                 | 246.5       | 98.6                | 0.4                      | 5                        | 2                        |
| KH <sub>2</sub> PO <sub>4</sub>                      | 136.1       | 13.61               | 0.1                      | 6                        | 0.6                      |
| NaCl                                                 | 58.44       | 58.44               | 1                        | 1.5                      | 1.5                      |
| Micronutrients                                       | FW          | g to make 1 L stock | Stock concentration (mM) | Vol of stock (mL) for 1L | Final concentration (uM) |
| NaFe(III)EDTA                                        | 367.1       | 18.4                | 50                       | 1                        | 50                       |
| H <sub>3</sub> BO <sub>3</sub>                       | 61.8        | 3.09                | 50                       | 1                        | 50                       |
| MnCl <sub>2</sub> •4H <sub>2</sub> O                 | 197.9       | 0.99                | 5                        | 1                        | 5                        |
| ZnSO <sub>4</sub> •7H <sub>2</sub> O                 | 287.5       | 2.875               | 10                       | 1                        | 10                       |
| CuSO <sub>4</sub> •5H <sub>2</sub> O                 | 249.7       | 0.125               | 0.5                      | 1                        | 0.5                      |
| Na <sub>2</sub> MoO <sub>3</sub>                     | 242         | 0.0245              | 0.1                      | 1                        | 0.1                      |
| pH with NaOH to 5.6                                  |             |                     |                          |                          |                          |
| Macronutrients                                       |             |                     | Micronutrients           |                          |                          |
| Final concentration (mM)                             |             | Activity            | Final concentration (mM) |                          | Activity                 |
| K                                                    | 5.6         | 4.79                | Fe                       | 0.01                     | 25 pM                    |
| Ca                                                   | 2.1         | 1.05                | Mn                       | 0.005                    | 23nM                     |
| Mg                                                   | 2           | 1.03                | Zn                       | 0.01                     | 50 uM                    |
| NH <sub>4</sub>                                      | 2           | 1.72                | Cu                       | 0.0005                   | 23 nM                    |
| Cl                                                   | 3.71        | 3.19                | Mo                       | 0.0001                   | 31 nM                    |
| NO <sub>3</sub>                                      | 9           | 7.75                |                          |                          |                          |
| SO <sub>4</sub>                                      | 2.0105      | 0.893               |                          |                          |                          |
| PO <sub>4</sub>                                      | 0.6         | 1.8 pM              |                          |                          |                          |
| Na                                                   | 1.5502      | 1.38                |                          |                          |                          |