

# Plant Tissue Culture Media and Related Products

From PhytoTechnology Laboratories®



## Tissue Culture Media: It's What We Do Best.

At the heart of *PhytoTechnology Laboratories*® is our media for plant tissue culture. Our company started because we wanted to provide high-quality media at affordable prices. Every product we carry today, every service we offer, came from the desire to make tissue culture media for plant science research. Today, *PhytoTechnology Laboratories* offers more than 150 different formulations of tissue culture media available for an array of different species, crops, and applications. We have made hundreds of custom formulations for our customers world-wide. We carry over 1000 products for the plant sciences and every new product was added while maintaining our commitment to quality and competitive pricing.

## Our Promise of Quality

*PhytoTechnology Laboratories*® knows that the basis of any good research is consistent repeatable results. To that end we go to great lengths to ensure that the media you get from *PhytoTechnology Laboratories* will meet the quality that your research deserves. Tissue Culture Media is manufactured in compliance with cGMP guidelines and ISO standards of quality. Biochemical components used in manufacturing meet either USP or ACS specifications, where applicable to the component. Proprietary inventory management and manufacturing protocols ensure minimal lot-to-lot variation. All tissue culture media pass biological testing on commercially significant and product appropriate plant cell lines. Media must also pass physio-chemical testing prior to release. Discover more about the *PhytoTech*™ Quality by visiting our website at

[www.phytotechlab.com](http://www.phytotechlab.com)

# Murashige & Skoog Media Family

PhytoTechnology Laboratories offers more than 50 variations to the original Murashige & Skoog formulations including deficient media, crop specific media, and stock solutions of media and vitamins.

## Deficient Media

M502 - MS Macronutrient Salt Base  
M654 - MS Macronutrient Stock Solution  
M554 - MS Micronutrient Salt Base  
M529 - MS Micronutrient Stock Solution (10x)  
M407 - MS Basal Salts without N, P, & K  
M561 - MS Basal Mixture with 1/2  $\text{NH}_4\text{NO}_3$  &  $\text{KNO}_3$   
M571 - MS Basal Salt Mixture without  $\text{NH}_4\text{NO}_3$   
M531 - MS Basal Salt Mixture without Nitrogen  
M290 - MS Modified Basal Salt Mixture with 1/2  $\text{NH}_4\text{NO}_3$ ,  $\text{KNO}_3$ , &  $\text{CaCl}_2$   
M153 - MS Basal Salt Mixture with 1/2 Macro- & Micronutrients

## Basal Salt Mixtures

M524 - MS Basal Salt Mixture  
M576 - MS Basal Salt Concentrate Solution (20x)  
M5541 - MS Basal Salt Mixture, Van Der Salm Modification  
M504 - MS Basal Salts, Finer & Nagasawa Modification  
M153 - MS Basal Salt Mixture with 1/2 Macro- & Micronutrients

## Media with Vitamins

L689 - Linsmaier & Skoog (LS) Medium  
M5800 - MS Medium with FeNaEDTA  
M541 - MS Modified Medium with Casein & Adenine; without  $\text{KH}_2\text{PO}_4$   
M535 - MS Modified Medium with Adenine  
M536 - MS Modified Medium with Adenine  
M5642 - MS Medium, Van Der Salm Modification  
M519 - MS Medium with Vitamins  
M404 - MS Medium with Gamborg's Vitamins  
M5531 - MS Medium with 1.0 g/L MES  
L477 - Linsmaier & Skoog Medium with 1.0 g/L MES

## Media with Vitamins & Carbohydrates

M5615 - MS Medium Solution (1x) with 15.0 g/L Sucrose & Glucose  
M5501 - MS Medium with Vitamins & Sucrose  
M5530 - MS Medium Solution (1x) with Vitamins & Sucrose  
M5707 - MS Medium with 10.0 g/L Sucrose & 20.0 g/L Glucose  
L473 - LS Medium with 30.0 g/L Sucrose & 1.0 mg/L MES

## Media with Agar

L467 - LS Medium with 30.0 g/L Sucrose & 7.0 g/L Agar  
L452 - LS Medium with 30.0 g/L Sucrose, 7.0 g/L Agar, & 1.0 g/L MES

## Liquid Media & Stock Solutions

M5615 - MS Medium Solution (1x) with Vitamins & 15.0 g/L Sucrose & Glucose  
M5530 - MS Medium Solution (1x) with Vitamins & Sucrose  
M654 - MS Macronutrient Stock Solution (10x)  
M529 - MS Micronutrient Stock Solution (10x)  
M576 - MS Basal Salt Concentrate Solution (20x)

## Media with Vitamins & PGRs

M516 - MS BC Potato Medium  
M401 - MS Modified Medium with BA & NAA  
M550 - MS Modified Medium with Kinetin & 2,4-D  
M701 - MS Modified Medium with 2iP, IAA, & Adenine  
M702 - MS Modified Medium with 2iP, IAA, & Adenine  
M555 - MS Modified Multiplication Medium with Kinetin  
M517 - MS African Violet/Gloxinia Multiplication Medium  
M518 - MS African Violet/Gloxinia Pretransplant Medium  
M508 - MS Fern Multiplication Medium with Kinetin & NAA  
M509 - MS Gerbera Multiplication Medium with Kinetin & IAA  
M510 - MS Gerbera Pretransplant Medium with IAA  
M511 - MS Kalanchoe Multiplication Medium with 2iP  
M512 - MS Kalanchoe Pretransplant Medium with IAA  
M527 - MS Multiplication Medium with Kinetin & IAA  
M491 - MS Multiplication Medium with 2iP & IAA  
M507 - Murashige Cattleya Orchid Medium with IAA, IBA, & NAA

## Crop Specific MS Modifications

M516 - MS BC Potato Medium  
M517 - MS African Violet/Gloxinia Multiplication Medium  
M518 - MS African Violet/Gloxinia Pretransplant Medium  
M508 - MS Fern Multiplication Medium with Kinetin & NAA  
M509 - MS Gerbera Multiplication Medium with Kinetin & IAA  
M510 - MS Gerbera Pretransplant Medium with IAA  
M511 - MS Kalanchoe Multiplication Medium with 2iP  
M512 - MS Kalanchoe Pretransplant Medium with IAA  
B144 - Banana AGS Medium  
M462 - Musa (Banana) Multiplication Medium  
M507 - Murashige Cattleya Orchid Medium with IAA, IBA, & NAA  
H435 - Hosta Initiation/Multiplication Medium  
H436 - Hosta Multiplication Medium  
H437 - Hosta Pretransplant Medium  
H3959 - Hosta Initiation/Multiplication Medium II

## Vitamin Mixes & Solution

M533 - MS Vitamin Powder (1000x)  
M553 - MS Vitamin Solution (1000x)  
M547 - MS Modified Vitamin Solution (1000x)  
M557 - MS Modified Vitamin Solution (1000x)  
C149 - Chu N6 Vitamin Solution (1000x)  
E330 - Eriksson Vitamin Solution (1000x)  
G249 - Gamborg Vitamin Powder (1000x)  
G219 - Gamborg Vitamin Solution (1000x)  
K421 - Kao & Michayluk Vitamin Solution (100x)  
M587 - Morel & Martin Vitamin Solution (100x)  
M592 - Morel & Wetmore Vitamin Solution (100x)  
N608 - Nitsch & Nitsch Vitamin Powder (1000x)  
N603 - Nitsch & Nitsch Vitamin Solution (1000x)  
S826 - Schenk & Hilderbrandt Vitamin Powder (100x)  
S743 - Staba Vitamin Solution (100x)



Indicates the common or recommended usage of the product.



Indicates the form of the media (powder or stock solution).



Indicates the storage temperature of the product. RT indicates room temperature.

# PhytoTech Media

## Understanding Our Media Terminology

**Deficient Salts & Media:** A basal salt mixture that lacks one or more essential elements. Macronutrient and micronutrient stock solutions are considered deficient media.

**Basal Salt Mixtures:** Contain only the inorganic elements of tissue culture media. Inorganic elements are divided into macronutrients and micronutrients. Typically, at least vitamins, carbohydrates, and a gelling agent will need to be added before inoculating the medium with plant tissue.

**Media:** Basal salt mixtures (inorganic elements) plus the addition of either vitamins, gelling agents, or carbohydrates. Typically, other organic components will need to be added before inoculating the medium with plant tissue. Media can also referred to as Basal Media.

**Complete Media:** A medium that contains the basal salts, vitamins, carbohydrates, and plant growth regulators.

**Media with Gelling Agents:** Generally considered to be comprised of media (inorganic elements plus vitamins) but also include a gelling agent and carbohydrate.

Amino acids or other nitrogen sources and undefined organic supplements are typically considered optional or are dependent on the stage of plant growth. Despite this, *PhytoTechnology Laboratories*® offers a variety of media formulations that include these optional components.

### M524 Murashige & Skoog Basal Salt Mixture

Contains the macro- and micronutrients as described by Murashige & Skoog (1962). Originally developed for use with tobacco callus cultures.



4.33 g/L

Powder

2 to 8 °C

Available Package Sizes: 1L 5L 10L 50L 100L 500L

### M519 Murashige & Skoog Basal Medium with Vitamins

Contains the macro- and micronutrients, and vitamins as described by Murashige & Skoog (1962).



4.43 g/L

Powder

2 to 8 °C

Available Package Sizes: 1L 5L 10L 50L 100L 500L

### M404 Murashige & Skoog Modified Basal Medium with Gamborg Vitamins

Contains the macro & micronutrients described by Murashige & Skoog, & vitamins described by Gamborg, et al (1966).



4.44 g/L

Powder

2 to 8 °C

Available Package Sizes: 1L 10L 50L 100L

### M499 Murashige & Skoog Modified Basal Salt Mixture

Contains the macro- and micronutrients as described by Murashige and Skoog (1962) except for the replacement of Ferrous Sulfate and Na<sub>2</sub>-EDTA with FeNa-EDTA.



4.30 g/L

Powder

2 to 8 °C

Available Package Sizes: 1L 10L 50L 100L

# MS Media Variants

## Media, Equipment and Supplements for Orchid Tissue Culture

PhytoTechnology Laboratories provides more than 50 modification of the original Murashige & Skoog Media. Some of our best selling MS media formulations are listed in this section. If you have a MS modification that you can't find from us, remember that we can custom manufacture it for you. For our complete listing of Murashige & Skoog media, please visit [www.phytotechlab.com](http://www.phytotechlab.com).

### B144 Banana AGS Basal Medium

Contains the macro- and micronutrients, vitamins, and plant growth regulators required to culture bananas.



4.71 g/L

Powder

2 to 8 °C

Available Package Sizes: 1L 10L 50L

### L689 Linsmaier & Skoog Basal Medium

Contains the macro- and micronutrients, & vitamins as described by Linsmaier & Skoog (1964). This medium is the standard Murashige & Skoog (MS) basal salts supplemented with Linsmaier and Skoog vitamins. This is a subsequent optimization of the medium developed by Murashige and Skoog. Linsmaier's research on the optimization of vitamins first described by Murashige as essential.



5.22 g/L

Powder

2 to 8 °C

Available Package Sizes: 1L 10L 50L 100L

### L467 Linsmaier & Skoog Modified Basal Medium with Sucrose & Agar

Contains the macro- and micronutrients, & vitamins as described by Linsmaier & Skoog (1964). This medium is the standard Murashige & Skoog (MS) basal salts supplemented with Linsmaier and Skoog vitamins. This is a subsequent optimization of the medium developed by Murashige and Skoog. Linsmaier's research on the optimization of vitamins first described by Murashige as essential.



41.43 g/L

Powder

2 to 8 °C

Available Package Sizes: 1L 10L 50L

### M508 Murashige Fern Multiplication Medium

Contains the macro- and micronutrients as described by Murashige and Skoog (1962) and the vitamins described by Linsmaier and Skoog (1965). Also contains (mg/L): 255 Sodium Phosphate monobasic, 2.0 Kinetin, 0.1 NAA, and FeNa-EDTA in place of Ferrous Sulfate and Na<sub>2</sub>-EDTA.



4.66 g/L

Powder

2 to 8 °C

Available Package Sizes: 1L 10L 50L

### M654 Murashige & Skoog Macronutrient Stock Solution (10x)

Contains the macronutrients as described by Murashige & Skoog (1962).



100 mL/L

Liquid

2 to 8 °C

Available Package Sizes: 500mL 1L

### M529 Murashige & Skoog Micronutrient Stock Solution (10x)

Contains the micronutrients as described by Murashige & Skoog (1962).



100 mL/L

Liquid

2 to 8 °C

Available Package Sizes: 500mL 1L

## M561 Murashige & Skoog Modified Basal Salt Mixture

Contains the macro- and micronutrients as described by Murashige and Skoog (1962) with the following exceptions: ½x Ammonium Nitrate (product number A300) and ½x Potassium Nitrate (product number P100).



2.56 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L

## M5800 Murashige & Skoog Basal Medium with FeNa-EDTA

Contains the macro- & micronutrients and vitamins as described by Murashige and Skoog (1962) with the exception of FeNa-EDTA added as the iron source.



4.41 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L 100L

## M5501 Murashige & Skoog Basal Medium with Vitamins & Sucrose

Contains the macro- and micronutrients, and vitamins as described by Murashige & Skoog (1962). Modified to include 30 g/L sucrose.



34.43 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L 100L

## M5530 Murashige & Skoog Medium with Vitamins and 30 g/L Sucrose (1x)

Sterile filtered liquid solution containing the Macro- and Micronutrients and Vitamins as described by Murashige & Skoog (1962), then modified to contain 15 g/L sucrose and 15 g/L glucose.



1x



Liquid



2 to 8 °C

Available Package Sizes: 500mL 1L

## M535 Murashige & Skoog Modified Basal Medium

Contains the macro- and micronutrients as described by Murashige and Skoog (1962) and the vitamins described by Linsmaier and Skoog (1965). Also contains 80 mg/L Adenine Hemisulfate (product number A545). Comparable to Linsmaier & Skoog Basal Medium (L689) with an added 80 mg/L Adenine Hemisulfate.



4.51 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L 100L

## M571 Murashige & Skoog Modified Basal Salt Mixture

Contains the macro- and micronutrients as described by Murashige and Skoog (1962) with the following exception: no Ammonium Nitrate (product number A300).



2.68 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L

## M462 Musa (Banana) Multiplication Medium

Contains the macro- and micronutrients as described by Murashige and Skoog (1962). IITA formulation as described by Vuylsteke (1989) (International Institute for Tropical Agriculture).



36.36 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L

# Classic Media

## Classic Media

Beyond the Murashige & Skoog media, *Phyto*Technology Laboratories offers a range of classic tissue culture media.

### C167 Chu's N6 Basal Medium with Vitamins

Contains the macro- and micronutrients, and vitamins as described by Chu (1975). Chu (N6) Medium was developed to promote the initiation, growth, and differentiation of callus from rice pollen cultures. Ammonium Nitrate has been replaced by Ammonium Sulfate. The molar concentration of  $\text{NH}_4$  is 7.0 mM compared to 20.6mM for MS.



3.99 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L 100L

### G768 Gamborg Basal Salt Mixture (B-5 Salts)

Contains the macro- and micronutrients as described by Gamborg, et al. (1968). This medium was developed for the initiation and growth of soybean cell suspensions. This medium contains no Ammonium Nitrate; it does contain Ammonium Sulfate and increased levels of Potassium Nitrate. Concentrations of  $\text{NH}_4^+$  over 2 mM inhibited cell growth.



3.10 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L 100L

### G398 Gamborg B-5 Basal Medium

Contains the macro- and micronutrients, and vitamins as described by Gamborg, et al. (1968). This medium was developed for the initiation and growth of soybean cell suspensions. This medium contains no Ammonium Nitrate; it does contain Ammonium Sulfate and increased levels of Potassium Nitrate. Concentrations of  $\text{NH}_4^+$  over 2 mM inhibited cell growth.



3.21 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L 100L

### H353 Hoagland Modified Basal Salt Mixture

Contains the macro- and micronutrients as described by Hoagland and Arnon (1950). With Ferrous Sulfate (product number F263).



1.63 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L 100L

### S816 Schenk & Hildebrandt Basal Salt Mixture

Contains the macro- and micronutrients as described by Schenk and Hildebrandt (1972).



3.20 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L 100L

### W898 White Basal Salt Mixture

Contains the macro- and micronutrients as described by White (1963).



0.93 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L

# Woody Plants

## Media for Woody Plant Species

PhytoTechnology Laboratories provides a range of media for use with woody plant species. The unique nutrient requirements for woody plants continues to present challenges for researchers in finding the right media for their cultivars. Some of the most popular tissue culture media, that are applicable to a wide variety of woody plants are listed below. For our complete listing of woody plant media, please visit [www.phytotechlab.com](http://www.phytotechlab.com).

### A267 Anderson Basal Salt Mixture

Contains the macro- and micronutrients as described by Anderson (1978, 1980). Anderson achieved a two-fold increase in multiplication of red raspberries using this formulation compared to MS. The optimal concentrations of growth regulators for shoot multiplication of red and black raspberries was 0.1 - 2.5  $\mu\text{M}$  IBA (product number I560) and 4.5 - 9.0  $\mu\text{M}$  6-BA (product number B800).



1.89 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L

### C287 Chee & Pool C2D Vitis Medium

Contains the macro- and micronutrients as described by Chee & Pool (1987). This medium was developed to improve grape shoot multiplication. This formulation has reduced levels of Chloride, Iodide, and manganese compared to MS. Calcium Chloride was replaced by Calcium Nitrate, thus improving the quality of grape shoots.



4.49 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L

### D146 DCR Basal Salt Mixture

Contains macro- and micronutrients as described by Gupta & Durzan (1985). This medium was developed to promote shoot proliferation. This formulation has approximately  $\frac{1}{4}$  the concentration of  $\text{NH}_4\text{NO}_3$  and  $\text{KNO}_3$  compared to MS. Additional  $\text{Ca}^{+2}$  and  $\text{NO}_3^-$  ions are supplied by  $\text{Ca}(\text{NO}_3)_2$ .



1.64 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L

### D190 DKW Basal Salt Mixture

Contains macro- and micronutrients as described by Driver & Kuniyuki (1984) and McGranahan, et al. (1987). Without vitamins. This medium was developed for the multiplication of shoots from nodal explants. The medium was supplemented with 4.5  $\mu\text{M}$  BA (product number B800) and 5 nM IBA (product number I560).



5.22 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L

### L154 Lloyd & McCown Woody Plant Basal Mixture

Contains the Woody plant medium macro- and micronutrients as described by Lloyd & McCown (1981). This medium was originally developed for the culture of shoot tips of Mt. Laurel, and has become a standard for the culture of many woody plants. Potassium Nitrate (product number P100) has been replaced with Potassium Sulfate (product number P854) in the media.



2.30 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L 100L

### L449 Lloyd & McCown Woody Plant Basal Medium with Vitamins

Contains the Woody plant medium macro- and micronutrients and vitamins as described by Lloyd & McCown (1981). This medium was originally developed for the culture of shoot tips of Mt. Laurel, and has become a standard for the culture of many woody plants. Potassium Nitrate (product number P100) has been replaced with Potassium Sulfate (product number P854) in the media.



2.41 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L 100L

# You Create

## Focus on your Research

*PhytoTechnology Laboratories*® knows that your time is valuable. Making media in the lab from scratch is time consuming and complicated. Making large batches on a frequent basis becomes even more time consuming and costly. Even with careful precision, lot-to-lot variances can crop up during media production. These kinds of variances can be problematic to achieving consistency in research or production.

Let us help improve the efficiency of your labwork so that you can focus on the science. Simplify your day-to-day laboratory protocols by allowing us to provide ready-to-use media, prepared media culture vessels or custom packaged buffers, liquid media or other custom packaged products. See the difference that *PhytoTech*™ Quality can make. Wouldn't you like to make your research or production more efficient, more cost effective, and more reliable?

## Custom Media Manufacturing

Have a proprietary media formulation or looking for a non-proprietary formulation we don't carry? *PhytoTechnology Laboratories*® can make it for you. *PhytoTechnology Laboratories* can custom manufacture proprietary and non-proprietary dry powder media and buffers for customers according to cGMP and ISO standards of quality, in our environmentally controlled manufacturing facility in Overland Park, KS. We can manufacture lots of up to 50,000 liters of dry powder media. We can also manufacture sterile liquid media in batches up to 1000 liters.

- ❖ Batches from 100 Liters to 50,000+ Liters;
- ❖ Packaged in bottles, foil bags, or polycarbonate pails at the volume that best meets your daily needs;
- ❖ Competitive pricing makes using custom media more cost effective compared to purchasing individual components and making media or stock solutions from scratch in the lab;
- ❖ Reduces labor and overhead costs associated with media preparation; and
- ❖ Reduces technician error by eliminating lot-to-lot variances.



# We



# ate It

## Liquid Media Production

Need a stock solution for plant cell media? *PhytoTechnology Laboratories*® can custom manufacture liquid solutions for your needs. *PhytoTechnology Laboratories*® has dedicated production areas for the manufacturing of sterile liquid products.

- ❖ Batches from 10 to 1,000 Liters;
- ❖ Individual packaging as small as 1 mL up to 20 L packaging;
- ❖ Sterility is tested to US Pharmacopeia (USP) <71> protocols;
- ❖ Ready-to-use liquids reduce labor costs and overhead associated with media and stock solution preparation; and
- ❖ Reduces technician errors associated with media preparation.

## Confidentiality Guaranteed

*PhytoTechnology Laboratories*® knows that you've spent years, maybe even decades, researching and perfecting your media formulations. To protect your research, *PhytoTechnology Laboratories*® will sign mutual non-disclosure agreements and welcomes outside audits of our manufacturing process. Not only will you get media of the highest quality, you'll get peace of mind.

## *PhytoTechnology Laboratories*® Custom Capabilities

Custom Service	Production Capabilities	Packaging Capabilities	Typical Lead Time for your first batch
Dry Powder Plant Tissue Culture Media	100 Liters up to 50,000+ liters batches	1L to 10,000L packages	1-2 weeks after approval
Dry Powder Microbiology Media	1 kg up to 120 kg batches	100 g to 25 kg packages	1-2 weeks after approval
Liquid Media	10 liter up to 1,000 liter batches	100 mL to 20 liter packages	1-2 weeks after approval
Liquid Stock Solutions	10 liter up to 1,000 liter batches	1 mL to 20 liter packages	1-2 weeks after approval
Custom Packaged Biochemicals	n/a	10 mg to 25 kg packages	1 week depending on product availability

# Make It



# Orchids

## Media, Equipment and Supplements for Orchid Tissue Culture

PhytoTechnology Laboratories provides a range of products for orchid tissue culture. Beyond some of our most popular media, listed below, we also carry reagents like Activated Charcoal (product number C325) and Coconut Water (product number C195) as well as a range of glass culture vessels ideal for orchid cultures. For a complete listing of all of our products for Orchids, visit [www.phytotechlab.com](http://www.phytotechlab.com).

### B141 BM-1 Terrestrial Orchid Medium with Agar

Contains the macro- and micronutrients, vitamins, and supplements required to culture orchids. Contains agar. Seed germination may be enhanced by the addition of 50 mL/L Coconut Water (product number C195).



26.22 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L

### F522 Fast Orchid Medium

Contains the macro- and micronutrients, vitamins, sucrose fructose, agar, and supplements required to culture terrestrial orchids.



27.84 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L

### K425 Knudson C Modified Plus Orchid Medium

Proprietary Formulation. Contains Charcoal, Sucrose, Banana Powder and gelling agent. The unadjusted pH of this medium typically ranges from 4.1 - 5.6. The pH should be checked and adjusted as desired during preparation.



79.11 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L

### M534 Malmgren Modified Terrestrial Orchid Medium

Contains the macro- and micronutrients and organic constituents as described by Malmgren (1996). Without sucrose and agar.



21.84 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L

### M507 Murashige Modified Cattleya Orchid Multiplication Medium

Contains the macro- and micronutrients as described by Murashige and Skoog (1962) and modified vitamins. Contains 20 g/L Sucrose. Also contains: 150 mg/L Citric Acid, 0.3 mg/L IAA, 1.75 mg/L IBA, 1.75 mg/L NAA, and Ferric Sodium EDTA in place of Ferrous Sulfate and Disodium EDTA.



24.57 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L

### O156 Orchid Maint/Replate Medium with Banana & Charcoal, without Agar

This medium is a modification of our Orchid Maintenance/Replate Medium (P748). It lacks a gelling agent to permit its use in a liquid culture system. This medium contains banana powder to promote growth and rooting. The pH of this medium should be adjusted after adding the gelling agent and prior to sterilization.



57.31 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L

## P668 Orchid Maintenance Medium with Charcoal, without Agar

This medium was originally developed for the culture of Phalaenopsis stem props. It is now widely used as a seed sowing and replate medium for many epiphytic orchid species.



27.31 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L 100L

## O139 Orchid Maintenance/Replate Medium without Charcoal & Agar

This medium is a modification of our original orchid replate medium except without charcoal (and agar). This medium permits the culture of orchids in a liquid system or for orchid species that do not require charcoal to neutralize phenolics produced by the plants.



25.31 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L

## P748 Orchid Maintenance/Replate Medium with Banana, Charcoal, & Agar

This medium is a modification of our original orchid replate medium. It is a complete replate medium containing banana powder to promote growth & rooting, and a gelling agent (agar) for physical support. This medium should be pH adjusted prior to sterilization.



64.31 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L

## P793 Orchid Multiplication Medium without Charcoal & Agar

This medium is a modification of our Orchid Multiplication Medium by the deletion of charcoal and agar. It was originally developed for the multiplication of plantlets from Phalaenopsis flower stem nodal segments. This medium, when used in combination with Orchid Maintenance/ Replate Medium (product numbers P668 or P748), provides a complete plant propagation cycle.



65.79 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L

## P723 Orchid Seed Sowing Medium

This medium is a modification of our original orchid replate medium which has shown to be too high in salt concentration as a seed propagation medium. This medium is modified by reducing the major inorganic salts by 1/2x. The reduction of salt helps promote the germination of seed of many epiphytic & terrestrial species. Germination may be enhanced by adding 50 mL of coconut water per liter of medium.



32.74 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L

## P656 PhytoTech™ Phalaenopsis Replate Medium

PhytoTech™ Phalaenopsis Replate Medium is a proprietary formulation. It's a complete orchid replate medium and is ready for use after pH adjustment. Contains sucrose, banana powder, potato powder, charcoal, a gelling agent.



61.31 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L

## T839 Terrestrial (Cypripedium) Orchid Medium

Contains a modification of the macro- and micronutrients, glucose, and agar as described by Steele (1996). Contains 400 mg/L Calcium Nitrate and 400 mg/L Casein. Without Ammonium Nitrate.



27.44 g/L



Powder



2 to 8 °C

Available Package Sizes: 1L 10L 50L

# Growth Regulators

## Plant Growth Regulators

PhytoTechnology Laboratories offers a line of the most popularly used plant growth regulators. Our wide range of Auxins, Cytokinins, Gibberellins, and other plant growth regulators are all tissue culture tested for activity and many are available as sterile filtered liquid solutions so you don't have to make your own stock solutions. Find our full listing of all of our plant growth regulators online at [www.phytotechlab.com](http://www.phytotechlab.com).

### A102 (+/-) Abscisic Acid (ABA)

ABA; mixture of (2Z,4E)-5-[(1S)-Hydroxy-2,6,6-trimethyl-4-oxo-2-cyclohexen-1-yl]-3-methyl-2,4-pentadienoic acid and its enantiomer (2Z,4E)-5-[(1R)-Hydroxy-2,6,6-trimethyl-4-oxo-2-cyclohexen-1-yl]-3-methyl-2,4-pentadienoic acid.



14375-45-2

EtOH/DMSO

-20°C

Available Package Sizes: 100mg 500mg 1g 5g

### G500 Gibberellic Acid

GA3; Gibberellin A3.

Also available as Sterile Filtered solutions in concentrations of 1 mg/mL (product number G198) and 13 mg/mL (product number G362).



77-06-5

KOH/EtOH

2 to 8 °C

Available Package Sizes: 100mg 500mg 1g 5g

### D295 2,4-Dichlorophenoxyacetic (2,4-D) Acid Solution (1 mg/mL)

Sterile Filtered solution. 2,4-Dichlorophenoxyacetic acid being an auxin can support embryogenesis and callus formation at low concentrations, and have herbicidal activity at high concentrations, 2,4-D

Also available as a Sterile Filtered Solution in a concentration of 10 mg/mL (product number D309).



94-75-7

Water

2 to 8 °C

Available Package Sizes: 100mL 500mL 1L

### N600 $\alpha$ -Naphthaleneacetic Acid (NAA)

$\alpha$ -Naphthaleneacetic acid is a naphthalene-based auxin.

Also available as a Potassium Salt, K-NAA (product number N610) or as a Sterile Filtered solution in a concentration of 1 mg/mL (product number N605).



86-87-3

KOH

RT

Available Package Sizes: 25g 100g 500g

### D159 Dicamba

Dicamba is an auxin-like herbicide that can act as a selection agent for plant cells expressing the DMO gene, 3,6-Dichloro-o-anisic Acid.

Also available as a Sterile Filtered Solution in a concentration of 1 mg/mL (product number D165).



1918-00-9

KOH

2 to 8 °C

Available Package Sizes: 100mg 500mg 1g 5g

### I885 Indole-3-Acetic Acid (IAA)

IAA; Heteroauxin. Indole-3-acetic acid is an indole-based auxin.

Also available as a Sterile Filtered Solution in a concentration of 1 mg/mL (product number I364).



87-51-4

KOH

-20°C

Available Package Sizes: 5g 25g 100g

## I538 Indole-3-Butyric Acid (IBA)

IBA; 4-[3-Indolyl]Butyric Acid. Indole-3-butyric acid is an indole-based auxin.

Also available as a Potassium Salt, K-IBA (product number I560) or as a Sterile Filtered solution in a concentration of 1 mg/mL (product number I460).



133-32-4



KOH



2 to 8 °C

Available Package Sizes: 5g 25g 100g 1Kg

## B800 6-Benzylaminopurine (BA)

BA; N6-Benzyladenine. 6-Benzylaminopurine is the most widely used adenine-based cytokinin.

Also available as a Sterile Filtered solution in a concentration of 1 mg/mL (product number B130).



1214-39-7



KOH



RT

Available Package Sizes: 1g 5g 25g 100g 500g 1Kg

## D525 6-( $\gamma,\gamma$ -Dimethylallylamino)purine (2iP)

2iP; N6-[2-Isopentyl]Adenine. 6-( $\gamma,\gamma$ -Dimethylallylamino)Purine is an adenine-based cytokinin which is generally considered to be the second most potent of all the cytokinins behind Zeatin (product numbers Z125 and Z860).



2365-40-4



KOH



-20°C

Available Package Sizes: 100mg 500mg 1g 5g 10 25g

## K750 Kinetin

6-Furfurylamino-purine. Kinetin was the first cytokinin discovered. It is also adenine-based.

Also available as a Sterile Filtered solution in a concentration of 1 mg/mL (product number K483).



525-79-1



KOH



-20°C

Available Package Sizes: 1g 5g 25g

## T888 Thidiazuron (TDZ); >98% Purity

TDZ, 1-Phenyl-3-(1,2,3-thiadiazol-5-yl)urea. Thidiazuron was originally used as a defoliant but this phenyl-urea also has cytokinin activity.

Also available as a Sterile Filtered solution at a concentration of 1 mg/mL (product number T8118) and as DMSO solution (T7999).



51707-55-2



DMSO



-20°C

Available Package Sizes: 100mg 500mg 1g

## Z125 *trans*-Zeatin

(2E)-2-methyl-4-(1H-purin-6-ylamino)-2-buten-1-ol, 6-(4-Hydroxy-3-methylbut-2-enylamino)purine. *trans*-Zeatin is an adenine based cytokinin and is generally considered to be the most potent of all cytokinins.

Also available as *trans*-Zeatin Riboside (product number Z899) or as a Sterile Filtered solutions in concentrations of 1 mg/mL of Zeatin (product number Z860) and 1 mg/mL of Zeatin Riboside (product number Z875).



1637-39-4



KOH



2 to 8 °C

Available Package Sizes: 10mg 50mg 100mg 250mg 500mg 1g

## T841 *meta*-Topolin

*meta*-Topolin is an adenine-based cytokinin that generally causes less root inhibition than 6-Benzylaminopurine (product number B800 and B130).

Also as a Sterile Filtered solution in a concentration of 1 mg/mL (product number T7885).



75737-38-1



KOH



-20°C

Available Package Sizes: 100mg 500mg 1g



Indicates the Chemical Abstracts Service (CAS) Number of the product.



Indicates the solubility or miscibility of the product.



Indicates the storage temperature of the product. RT indicates room temperature.

# Gelling Agents

## G434

### Gellan Gum, CultureGel™

CultureGel™ Type I; Biotech Grade  
 Transparency (Clarity): ≥ 80%.  
 Gelling Strength: >800 g/cm<sup>2</sup>  
 CAS Number: 71010-52-1



2.0 - 4.0 g/L

Water

RT

Available Package Sizes: 2g 100g 500g 1Kg 5Kg

## G3251

### Gelzan®

Gelzan® is produced by fermentation and an agar substitute also known as Gellan Gum.  
 Gelling Strength: 100-700 g/cm<sup>2</sup>  
 CAS Number: 71010-52-1



2.0 - 4.0 g/L

Water

RT

Available Package Sizes: 2g 100g 500g 1Kg 5Kg

## A111

### Agar, Micropropagation Grade

Agar, Plant TC Micropropagation Grade from *Gracilaria sp.* This is a higher gel-strength tissue-culture grade agar over A296.  
 Gelling Strength: >900 g/cm<sup>2</sup>  
 CAS Number: 71010-52-1



9.0 g/L

Water

RT

Available Package Sizes: 9g 100g 500g 1Kg 5Kg 10Kg 25Kg

## A296

### Agar, Micropropagation Grade

Agar Plant TC, Micropropagation Grade from *Gelidium sp.*  
 Gelling Strength: >700 g/cm<sup>2</sup>  
 CAS Number: 71010-52-1



9.0 g/L

Water

RT

Available Package Sizes: 9g 100g 500g 1Kg 5Kg 10Kg 25Kg

## A175

### Agar, High Purity

Agar Plant TC, Purified Grade from *Gelidium sp.*  
 Gelling Strength: >700 g/cm<sup>2</sup>  
 CAS Number: 9002-18-0



8.0 g/L

Water

RT

Available Package Sizes: 8g 100g 250g 500g 1Kg 2.5Kg 5Kg

## A133

### Agargellan™

Agargellan™  
 CAS Number: 9002-18-0/71010-52-1



5.0 g/L

Water

RT

Available Package Sizes: 5g 100g 500g 1Kg 5Kg



Indicates the common or recommended usage of the product.



Indicates the solubility or miscibility of the product.



Indicates the storage temperature of the product. RT indicates room temperature.

# Must-See Products!



## P6820 PTC3™

PTC3™ (Plant Tissue Culture Contamination Control) is a broad spectrum biostat/fungistat that can be added to plant tissue culture media to reduce microbial and fungal contamination and can be autoclaved.



0.2 to 2.0 mL/L



Water



2 to 8 °C

Available Package Sizes:

25mL

100mL

500mL

## M5630 Media Optimization Kit (MS)

Our media optimization kit (MS-based) allows the user to optimize the nutrient formulation using 5 different components which make up the macronutrients, mesonutrients, micronutrients, and iron.



See Manual



Water



2 to 8 °C

Available Package Sizes:

1 Kit (Individual liquid components can be purchased separately)



## Vitamin Mixes for Plant Tissue Culture

PhytoTechnology Laboratories offers vitamin mixes of some of the more popular formulations used in plant tissue culture. All solutions listed below are sterile filtered through 0.2 µm filter, and confirmed sterile according to USP <71> protocols. If we carry the original formulation of media that includes these vitamins it is listed as the Parent Media on this table (though more than one media may use vitamins described below). If we don't have what you're looking for, remember that we carry all of the commonly used vitamins, you can find those product listings at [www.phytotechlab.com](http://www.phytotechlab.com).

Product Number	Product Name	Usage at (1x)	Stock Solution Usage	Sterile?	Publish Date	Parent Media	Storage	Package Size
M533	Murashige & Skoog Vitamin Powder (1000x)	0.1031 g/L	10.31 g/100mL	n/a	1962	M519	2 to 8 °C	100mL 250mL
M553	Murashige & Skoog Vitamin Solution (1000x)	1 mL/L	n/a	yes	1962	M519	2 to 8 °C	100mL
M547	Murashige & Skoog Modified Vitamin Solution (1000x)	1 mL/L	n/a	yes	1962	n/a	2 to 8 °C	100mL 250mL
M557	Murashige & Skoog Modified Vitamin Solution (1000x)	1 mL/L	n/a	yes	1962	n/a	2 to 8 °C	100mL
C149	Chu N6 Vitamin Solution (1000x)	1 mL/L	n/a	yes	1975	C167	2 to 8 °C	100mL
E330	Eriksson Vitamin Solution (1000x)	1 mL/L	n/a	yes	1965	n/a	2 to 8 °C	100mL
G249	Gamborg Vitamin Powder (1000x)	.112 g/L	11.20 g/100 mL	n/a	1968	G398	2 to 8 °C	100mL
G219	Gamborg Vitamin Solution (1000x)	1 mL/L	n/a	yes	1968	G398	2 to 8 °C	100mL 500mL
K421	Kao & Michayluk Vitamin Solution (100x)	10 mL/L	n/a	yes	1975	K427	-20°C	100mL 500mL 1L
M587	Morel & Martin Vitamin Solution (100x)	10 mL/L	n/a	yes	1955	n/a	2 to 8 °C	100mL
M592	Morel & Wetmore Vitamin Solution (100x)	10 mL/L	n/a	yes	1955	n/a	2 to 8 °C	100mL
N608	Nitsch & Nitsch Vitamin Powder	0.1086 g/L	10.86 g/100 mL	n/a	1969	N616	2 to 8 °C	100mL 250mL
N603	Nitsch & Nitsch Vitamin Solution	1 mL/L	n/a	yes	1969	N616	2 to 8 °C	100mL
S826	Schenk & Hilderbrandt Vitamin Powder (100x)	1.11 g/L	10.11 g/100mL	n/a	1972	S808	2 to 8 °C	100mL 1L
S743	Staba Vitamin Solution (100x)	10 mL/L	n/a	yes	1979	n/a	-20°C	100mL 500mL



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**SCIENCE CAN BE CHALLENGING.**

PRODUCTS FROM *PHYTOTECNOLOGY* LABORATORIES CAN HELP YOU PRODUCE

**RELIABLE RESEARCH**

**“QUALITY”**

**“INNOVATION”**

**“SERVICE”**

More than just words, this is the backbone of our company culture. They are a part of our everyday decision making process from customer service to manufacturing to product development, as we strive to provide you with high-quality products that help you conduct *Reliable Research*. From innovative proprietary media, culture vessels, and chemicals, to custom media formulation and services, we provide the products and services you need, so that together, we can continue

*“Helping Build a Better Tomorrow Through Plant Science”™*