



JUNE 11-15, 2016  
SAN DIEGO, CALIFORNIA USA **2016**  
**WORLD CONGRESS ON IN VITRO BIOLOGY**

## **Hands-On Plant Tissue Culture Workshop for High School and Community College Teachers**

# Resource Guide

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## **TECHNICAL & BACKGROUND RESOURCES**

### **Introduction of Plant Biotechnology (My Agricultural Information Bank)**

Good resource for history of plant tissue culture, explanations on Biotechnology, methods and protocols for plant single cell, callus, and tissue culture. Discussions on biopesticides, biofertilizers, secondary metabolites, cryopreservation, and Blue Green Algae.

<http://agriinfo.in/default.aspx?page=topiclist&superid=3&catid=63>

### **Plant Tissue Culture (Theagricos.com)**

Theagricos.com is a web based source for useful information for most of the topics related to agriculture, biotechnology and allied areas like plant breeding, genetics, seed technology and tissue culture. Simple explanations and definitions for plant tissue culture techniques, micropropagation, artificial seeds, somatic embryogenesis, and anther/pollen culture, and a good glossary of related terms.

<http://theagricos.com/tissue-culture/tissue-culture-techniques/>

### **Plant Tissue Culture Guide (Sigma)**

Sigma's Plant Tissue Culture Guide is a collection of detailed, optimized procedures/protocols for use in the plant research lab. Organized by category, the Plant Tissue Culture Technical Guide contains specific applications for subjects such as plant antibiotics, classic plant media, plant growth regulators, gelling agents and much more.

<http://www.sigmaaldrich.com/life-science/molecular-biology/plant-biotechnology/learning-center/tissue-culture-guide.html>

### **Technical Information (Phytotechnology Laboratories)**

Download catalog and turn to "Technical Information". All kinds of information from laboratory setup, stock preparation, sterilization methods, etc.

<https://phytotechlab.com/>

### **Plant Tissue Culture Media (Duchefa)**

Download Catalog. First 30+ pages has good information on how each plant media component supports plant health and growth: Macro and Micro elements, hormones, and additional additives, etc. Also, nice pictures of plant tissue culture laboratories and plants in culture.

<https://www.duchefa-biochemie.com/>

### **Plant Protocols: Plant Preservative Mixture (Caisson Labs)**

Overview and usage of Plant Cell Technology's PPM

<http://www.plantcelltechnology.com/ppm/>

<http://www.caissonlabs.com/support.php>

## **CLASSROOM RESOURCES**

### **Plant Tissue Culture (CTE Online)**

Lesson plan on Plant Tissue Culture including PowerPoint Presentation.

<https://www.cteonline.org/curriculum/lessonplan/plant-tissue-culture/XqJ8EM>

### **Plant Tissue Culture Lab (CTE Online)**

Lesson plan for Plant Tissue Culture Lab, media prep, explants and maintenance of clones, as well-as a final assessment with a written Lab Report.

<https://www.cteonline.org/curriculum/lessonplan/plant-tissue-culture/tGh6VG>

### **Classroom Activities in Plant Biotechnology. (The American Phytopathological Society)**

Molecular and Cellular Biology activities – includes modifications for different grade levels

- 1) Activity 5: Plant tissue culture in the classroom.

<http://www.apsnet.org/edcenter/K-12/TeachersGuide/PlantBiotechnology/Pages/Activities.aspx>

- 2) Plant Tissue Culture – Teacher Guide and Student Activity

<http://www.apsnet.org/edcenter/K-12/TeachersGuide/PlantBiotechnology/Documents/PlantTissueCulture.pdf>

### **Experimenting with Industry: Plant Tissue Culture (National Centre for Biotechnology)**

Teacher' guide and Students' notes for classroom projects with cauliflower, carrots and more. Great Pictures of experiments in progress and notes on what can be expected.

<https://www.stem.org.uk/elibrary/resource/28399>

### **Propagating Plants by Tissue Culture (New Mexico Horticulture Lesson Plan Library)**

Lecture notes and unit test.

[http://www.nmffa.org/uploads/4/1/0/7/41075673/a3\\_6\\_propagating\\_plants\\_by\\_tissue\\_culture.pdf](http://www.nmffa.org/uploads/4/1/0/7/41075673/a3_6_propagating_plants_by_tissue_culture.pdf)

### **Kitchen Culture Kits**

Brining plant tissue culture to the home and classroom.

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

### **Kemtec/AquaPhoenic**

Innovative, classroom-ready kits.

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

### **Caorlina Biological**

Equip students with excellence. Kit solutions for the classrooms.

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

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2016 World Congress on In Vitro Biology. June 11-15, San Diego, California USA**

**Pure Food Gardening / MicroClone**

Manufacturer of Microclone plant tissue culture kits and rack gardening trays.

<http://planttc.com>

<https://www.facebook.com/Microclone>

**Freerice.com (United Nations World Food Programme)**

Freerice has two goals: 1) Provide education to everyone for free; 2) Help end world hunger by providing rice to hungry people for free. Every correct answer to this site's endless quiz, ten grains of rice are donated to the UN World Food Program. They have a subject section on world hunger. Play and feed hungry people.

<http://freerice.com/#/world-hunger/1657709>

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**ADDITIONAL TRAINING**

**Kitchen Culture Kits INC**

Founder and President, Carol Stiff, Ph.D. M.Ed.  
Brining plant tissue culture to the home and classroom  
<http://www.kitchenculturekit.com/>

**Plant Transformation Research Center - University of California, Riverside**

Director: Martha Lucia Orozco-Cardenas, Ph.D. <http://ptrc.ucr.edu/contact.html>  
Training and Tours <http://ptrc.ucr.edu/training.html>

**Lifedu**

Founder and President, Albert P. Kausch, Ph.D.  
Open Education Resource for General Public  
BCH 191 Agricultural Biotechnology  
<http://www.lifedu.us/public/>

**REFERENCES TO LITERATURE**

**A new initiative in micropropagation: airborne bacterial volatiles modulate organogenesis and antioxidant activity in tobacco (*Nicotiana tabacum* L.) callus**

Selvaraj Gopinath, Karuppiyah Senthil Kumaran, Muthuraman Sundararaman  
Micropropagation: In Vitro Cellular & Developmental Biology - Plant  
October 2015, Volume 51, Issue 5, pp 514-523  
<http://link.springer.com/article/10.1007%2Fs11627-015-9717-6>

**Agriculture: A new breed of edits**

Claire Ainsworth. *Nature* 528, S15-S16 (03 December 2015)  
doi:10.1038/528S15a Published online 02 December 2015  
[http://www.nature.com/nature/journal/v528/n7580\\_suppl/528S15a.html](http://www.nature.com/nature/journal/v528/n7580_suppl/528S15a.html)

**“Precise Methods. Nature-Identical Results”** by Mandy Schnell KWS in dialog 12/2015

[http://www.vsesdelki.kws.ua/global/show\\_document.asp?id=aaaaaaaaaushro](http://www.vsesdelki.kws.ua/global/show_document.asp?id=aaaaaaaaaushro)

**Oligonucleotide-mediated genome editing provides precision and function to engineered nucleases and antibiotics in plants.**

Noel J Sauer, Javier Narváez-Vásquez, Jerry Mozoruk, Ryan B Miller, Zachary J Warburg, Melody J Woodward, Yohannes A Mihiret, Tracey A Lincoln, Rosa E Segami, Steven L Sanders, Keith A Walker, Peter R Beetham, Christian R Schöpke and Greg FW Gocal. First Published on February 10, 2016, doi: <http://dx.doi.org/10.1104/pp.15.01696> *Plant Physiology* February 10, 2016 pp.01696.2015  
<http://www.plantphysiol.org/content/early/2016/02/10/pp.15.01696.abstract>

## **VIDEO TYPE A: GENERAL OVERVIEW**

### **Tissue Culture & Plant Propagation Basics**

A look into the science of tissue culture of plants and how it is being utilized within agriculture. Good videos of plant cell biologists working in lab. Beef Elite (20:55)  
<https://www.youtube.com/watch?v=6y13hYGPi8Q>

### **Basic Plant Tissue Culture**

This plant biology lecture explains plant tissue culture basics and about shoot tip culture, root tip culture etc. Shomu's Biology (32:24) <https://www.youtube.com/watch?v=bi755vQVNx8>

### **Tissue Culture in Agriculture**

Find 1500+ education videos available at <https://www.youtube.com/user/IkenEdu>  
Every living beings has cells, tissues, organs and many things. Cells and tissues are the main building blocks of the body. In this video you will learn all about the tissues and tissue culture as to how they develop.

Learn about Tissue Culture - Part I (10:08)

<https://www.youtube.com/watch?v=ocHRaQ7wdLs&list=PLbA6cGm7wvdXQn1Afc6p56x4HCZLCmM0l&index=7>

Learn about Tissue Culture - Part II (9:57)

<https://www.youtube.com/watch?v=Y6h1JUwICmc&t=301s>

### **Tissue Culture and Micrpropagation**

Dr. Sandy Wilson, Associate Professor of Horticulture at the University of Florida lectures on the topics of Tissue Culture and Micropropagation. Buddy Tignor

Tissue Culture Part I (16:35)

<https://www.youtube.com/watch?v=D7Glb319mbY>

Tissue Culture Part II (27:06)

<https://www.youtube.com/watch?v=Jew0j1RGgvM>

Tissue Culture Part III (25:26)

<https://www.youtube.com/watch?v=XjGCIi0pgrc>

### **How To Clone Trees and Plants In Your Kitchen**

Here's a great tissue culture kit called kitchen culture that can help you produce clones of almost any plant or tree at home. Sustainability Theory (2:06)

<https://www.youtube.com/watch?v=9WIUMfqg6ZA>



**VIDEO TYPE B: SPECIFIC ACTIVITIES**

**Media Preparation**

How To. BioNetwork (3:30)

<https://www.youtube.com/watch?v=cneascR3OEc>

**Plant Tissue Culture Media Preparation**

PhytoTechnology Laboratories presents Media Preparation, an informative video highlighting the steps to prepare plant tissue culture and micropropagation media from powdered formulations. Phytotechnology Laboratories (5:57)

<https://www.youtube.com/watch?v=ltbdM3boWmU>

**Commercial Phalaenopsis Production (Orchid culture)**

Example of International Business in Plant Tissue Culture.

“Science Creating Happiness” – Royal Base Corporation (5:53)

<https://www.youtube.com/watch?v=Pk5pJ0-H2nw>

**Commercial Lettuce Production**

Large LED Growth Chambers and Robotic Automated Handling – “A fully controllable environment” - Deliscious, the Netherlands (2:15)

<https://www.youtube.com/watch?v=QH2t632s6I8>