

Affordable Plant Tissue Culture for the Classroom

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Plant tissue culture (PTC) techniques are used for growing plants in a sterile controlled environment for the purpose of mass production, germplasm preservation, plant breeding, physiological studies, and genetic engineering. By using plant hormones and other growth regulators, small plant parts can be induced to produce hundreds of small “plantlets”, which can later be grown in a greenhouse, in the field, or as house plants. PTC can be used as an effective tool to stimulate interest in science by introducing plant biology and biotechnology into K-14 classrooms. In the process of learning PTC techniques, students learn about plant growth, morphology, nutrition, hormones, interaction of microorganisms, aseptic methods, laboratory safety, and organizational skills. Use of plant tissue culture has been limited in the past by the need for expensive equipment (laminar flow hood, analytical balance, and autoclave). However, by using biocides such as PPM (Plant Preservative Mixture from Plant Cell Technology, Inc.) or NaDCC (sodium dichloro-s-triazinetrione is a spa and swimming pool disinfectant), expensive equipment is no longer essential. PTC experiments can be conducted in the classroom or home with little problem of contamination using inexpensive household supplies (microwave oven, baby food jars, bleach, plastic storage box, etc.). In this poster, we describe classroom PTC techniques and successful experiments of affordable plant tissue culture for the classroom or home.

Supplies in Your Classroom, Home Kitchen, or Local Discount Store?



microwave oven with turntable



or pressure cooker

Household supplies (sending students on a scavenger hunt might be appropriate and economical)

- pint and quart jars
- food coloring (optional)
- forceps (6 “ or longer)
- African violet leaves
- microwave-proof plate
- plastic or cardboard box
- hydroponic fertilizer
- baby food jars
- isopropyl or ethyl alcohol
- florist’s tape
- baking soda
- goggles and gloves
- dish detergent
- bleach and vinegar
- measuring spoons
- kitchen knife (about 6” long)
- pyrex pie pan (about 8”)
- dusk mask, apron, and shoes
- table sugar
- salad plate



Inexpensive pint jars filled with 70% ethanol, bleach, and sterile water are used to disinfect plant material. Baby food jars are used as media containers to culture plant material.

Supplies Not in Your Typical Classroom, Home Kitchen, or Local Discount Store?

- Murashige and Skoog (MS) medium
- Benzlaminopurine (BAP), a plant hormone that induces shoot formation
- Naphthaleneacetic acid (NAA), a plant growth regulator that induces root formation
- Plant Preservative Mixture (PPM), a biocide that reduces contamination
- Agar, for solidifying the medium
- Polypropylene baby food jar caps (if you are using a microwave oven)
- Plastic (regular) pint jar caps (if you are using a microwave oven)
- pH papers

Where can you find these items? There are several supply companies that will sell to schools and hobbyists. You might also contact the nearest university or college and ask for small samples of things like plant hormones and plant media. Many places conducting research might assist you. Contact us (kck@turbonet.com) if you need help locating supplies or user-friendly scientists.

Safety Recommendations

You need to teach your students some basic laboratory skills and discuss lab safety including: the safe handling and disposal of alcohol and bleach solutions, disinfecting forceps and knives with alcohol (flame sterilization is not recommended), preparation of media (depending on student age, you may need to limit this activity), and the use of protective clothing such as latex gloves, goggles, latex aprons, dusk masks, and leather or tennis shoes.

Material Safety Data Sheets (MSDS) provide information on the safe handling of chemicals. These are required for any chemical used in a classroom, and are obtained from the internet, manufacturers, and chemical supply stores.