

Micropropagation in Your Kitchen

Propagation is a joy. Most people propagate from stem cuttings. Some of us have dared to do grafting and then proceeded to try budding. Now it is possible to do tissue culture in your own kitchen. The ability to propagate your favorite plant and nourish it to maturity is really a thrill. It is like seeing your child get very intrigued with a bug. Plant tissue culture is a method to mass propagate plants in a short period and really a wonder. It just makes me gitty to see a large set of seedlings take root and to know that I did it.

Tissue culture has been around a long time, but the routine use has been restricted to professionals with expensive equipment and impressive laboratories. Now it is possible to propagate using tissue culture at home. I tissue culture in my kitchen with items such as a microwave, measuring spoons, quart jars, bleach, baking soda, vinegar, table sugar, baby food jars, and liquid fertilizer and so can you.

Ok, now hold on to your hat, I am going to talk about some things that seem complicated but are not. Micropropagation, also called *plant tissue culture, in vitro culture, meristem culture, and in the case of orchid seeds, flasking, involves the mass production of plants, from small parts (such as shoot tips, axillary buds, nodes, rhizomes, seeds) in sterile controlled environments. Are you still with me?

The advantage of this technique is that a small piece of plant can produce hundreds of new plants that can be identical to the "mother" plant. When you do stem cuttings, you are restricted to the number of plants that you can create by the amount of material available.

The major steps are as follows:

1. Establishing an explant in a sterile culture environment free of contamination from bacteria and fungi

2. Inducing a proliferation of multiple shoots using growth hormones
3. Transferring these shoots to fresh media to induce further growth
4. Rooting in vitro or in soil
5. Acclimating the plantlets to the outside environment.

Now you want to know what is an explant. An explant is the tissue that you are going to use that will develop multiple shoots. Think of a bud as an explant or part of the leaf in an African violet.

Explants are usually rinsed in dilute commercial bleach with a few drops of detergent to get rid of contaminants. The strength of the disinfecting solution and the duration of soaking of the explant in the disinfectant will vary from species to species. Other disinfectants, such as calcium hypochlorite, alcohol, PPM (a biocide), or even antibiotics, can be used in the procedure. The disinfection process can easily take place in your kitchen.

Once the explant has been disinfected, it needs to be handled aseptically. This means that you cannot contaminate it. So what do you do? You need to use forceps and knives sterilized by dipping them in alcohol, a work area free from microorganisms and air drafts, sterile water to rinse off the bleach from the explant, and sterile growth medium.

Sounds similar to Dr. Frankenstein in his lab. Not to worry, this is not difficult. This can be accomplished by using a box as a clean area and spraying it down with dilute bleach or 70% alcohol. Forceps, which can be purchased in the fishing department at your local discount store, are soaked in alcohol (I use tall shot glasses for this). The alcohol can be the inexpensive isopropanol from the discount store. Sterile water and sterile media can be prepared in a microwave or a pressure cooker. The only exotic items needed are professional media and plant hormones that are easily purchased on the internet or possibly from your local botany teacher or college professor.

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The growth medium contains the macro- and micro-nutrients (similar to a fertilizer but more complex), a carbon source (table sugar), plant hormones, a biocide to limit growth of microorganisms, and a support such as agar, cotton balls, gelatin, and others.

The plant hormone, BAP (benzylaminopurine) is used in the media to induce shoot formation (This is not DAP that is a caulk found at Home Depot). The media is as easy to make as Jell-O. Here is the recipe for simple African Violet Leaf Culture Medium:

African Violet Leaf Culture Medium:

The following is combined in a quart jar:

Distilled water (about 2 cups)

1 packet MS medium

2 tablespoons table sugar

1 ml BAP

1 ml PPM (biocide)

Distilled water

Mix until dissolved using a long handled teaspoon. Bring volume to 1 quart by adding more water. Mix again. Using pH paper, vinegar, and baking soda, adjust the pH to about 5.5 to 6.0.

There are several sights on the internet to purchase BAP. If you have trouble finding it, I would be happy to sell you some. The media is then dispensed into baby food jars (using measuring spoons) and processed in a microwave or a pressure cooker.

Cultures are maintained in a bright room out of direct sunlight or set on shelves with cool-white fluorescent lights set to 16 hours of light in a 24-hour period. As cultures grow, they can be transferred to fresh, hormone-free media (see recipe below) for further growth and multiplication or to soil (if they have developed roots). This is where the hobby greenhouse owner has an advantage * space for all the plant

babies.

Home Style Medium for Subculture:

In a quart jar filled with water, mix:

1 teaspoon hydroponic fertilizer (Peters NPK 20-20-20)

2 tablespoons sugar

a multi-vitamin pill

1 ml PPM

Mix well. The vitamin pill will not completely dissolve. It can be removed after a couple of minutes. Test pH and adjust as you did in the first batch of medium. Measure 3 tablespoons medium into each baby food jar. Add two cotton balls, or 1/2 teaspoon gelatin, or agar (as previously described). Cap with polypropylene caps, or metal baby food jar caps if using a pressure cooker. Sterilize as described earlier. A complete description of this can be found at:
<http://www.kitchenculturekit.com/sivbposter.htm>

Ok, I know it is not difficult to propagate an African Violet. You can take a leaf and stick it in the soil medium and the leaf will develop roots, but you need to crawl before you walk. Try it - you will be amazed. Rather than getting a few plants from that one leaf, you will get 10 to 100 times.

Theoretically, any plant can be mass-produced using tissue culture techniques. As plants reproduce in different cultures, the process for tissue culture is not known for all plants. Did you know that some plants require fire to break their dormancy?

Research continues on developing new protocols for other difficult plants. Some of the most popular plants that are being tissue cultured by hobbyists include orchids, banana, bamboo, roses, carnivorous plants, daylily, hosta, and blackberry.

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There are many resources on the internet to help you get started with your tissue culture project (much of which is free). A good start is Carols site: www.kitchenculturekit.com Sources for plant tissue culture media, hormones, and other supplies can be found there.

In 1998, Carol started a Home Tissue Culture Listserve that has grown to over 800 people from around the world. This list is probably the most valuable resource on the net. Unlike many professional lists, we list members are willing to share information, trade seed, cultures, etc. Membership is free and open to anyone. Information on joining can be found at the website.

Below is a shopping list of supplies that Carol gives her online students. It helps you to get organized and to save money. Feel free to contact Carol for specific information: carolstiff@kitchenculturekit.com

Carol Stiff is a former university professor and researcher. She is currently an adjunct professor at several community colleges in Texas, teaches online courses and live workshops in plant tissue culture in the home, and is President and CEO of Kitchen Culture Kits, Inc., an internet company that sells kits and supplies for home and classroom plant tissue culture.

From: David Sarasua dsarasua@pacbell.net