POSTER SESSION PAPERS©

Germination of *Bletilla striata* seed on natural media

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INTRODUCTION

Terrestrial orchids have been traditionally germinated on artificial media much like the in vitro methods of tissue culture (Sawyer, 1989). However, an Eastern Region, North America I.P.P.S. exchange program with the Scandinavian Region I.P.P.S. provided a means of talking with Dr. Lillie Andersen. In conversation she touched upon the idea of germinating some terrestrial orchids, such as *Goodyera*, on a rotted wood substrate. Returning back to the U.S.A. the idea was put to the test using *Bletilla striata*.

PROCEDURE AND RESULTS

A rotted log of *Betula lenta* was found in the woodland. It was determined that it had layed upon the ground for several years and was well decayed. At that stage the wood fibers were totally broken down and almost powdery. It was easily crumbled and made into a fine substrate with screening. Samples were taken to the greenhouse for use with the fresh *Bletilla* seed.

This particular sample had about 20% moisture before sterilization. The rotted wood fines were put into an open plastic bag and microwaved for about 6 min on full power. Upon cooling the 120 g of substrate was transferred to sterile Mason jars with Saran Wrap replacing the inner metal cap. The Saran wrap was held in place by the screw band of the Mason jar.

Fresh *Bletilla* seed was extracted from a newly harvested pod and dusted lightly upon the substrate. The sealed jars were then placed upon a warm shelf with an incandescent light for 2 weeks. Since no activity was observed they were then transferred to a refrigerator and held for 30 days at about 4°C. After this period they were again placed upon the shelf with a 12-hour day length. The temperature in the immediate area was about 28°C.

The seed germinated in 5 days. At this stage it resembled a fine green film, much like that of blue-green algae on the bottom of a water puddle. Supplemental sterilized water was sprayed in every 2 weeks or so to keep things evenly moist as the Saran Wrap will allow for both air exchange and water loss.

An initial transfer was made after 30 days to plug trays filled with an artificial media and a clear plastic cover, however it became clear that this was premature and the seedlings died. It was decided to wait for another 60 days and try again. This time the seedlings were significantly bigger, much easier to see as individual plants and easier to transfer to the plug trays. Mortality was greatly reduced and survival 1 month after transference was near 100%.

The media used in the plug trays was Sierra Vegetable Plug mix, a proprietary mix that is largely finely ground peat and vermiculite with a few unspecified additives. A layer of coarser potting soil was saturated with water and the plug trays were

placed on top of this layer in a solid standard 1020 tray. This extra layer of soil added a continual supply of water vapor for the small seedling without over wetting the substrate that they were placed upon. The whole thing was then covered with clear plastic dome tops designed for the purpose. The finished plug trays were then put under warm white flourescent light fixtures with a distance of 6 inches.

After 2 months the weaker seedlings did die off, but this left a success rate of 60%. Oddly the transfer of seedlings to a 100-cell tray resulted in greater losses than in a 200-cell tray. The explanation for this is not clear. Although there is the possibility that there was less humidity in the 100 cell trays immediately around the seedlings.

After several months in this regime the seedlings have several leaves and a clearly visible protocorm.

DISCUSSION

While this experiment proved to be successful for *Bletilla* there is a large amount of work to be done to refine this approach. Harlan Hamernik of Blue Bird Nursery, Clarkson, Nebraska has cautioned that *Bletilla* is a very forgiving orchid with which to work and not all species are going to be so compliant. Rasmussen (1995) states that its is very clear that temperate terrestrial orchids do not form homogeneous groups when it comes to germination and seedling requirements. Plus it seems clear that much of orchid seedling germination is related to fungal relationships and those alliances are not clear.

Orchid seeds are amongst the smallest of the plant kingdom with ranges from 1 to 8 micrograms. While on the surface this appears to be a big problem from drying out, it is not. Actually a bigger dilemma is that the orchid seed has protective measures that exclude exterior water which is a much harder problem to overcome. This might in part explain some of the requirements for a fungal partner. Something has to be able to break down the water barrier. It should be noted however, that once seedlings are germinated the protocorms are very sensitive to desiccation.

Other problems with orchid seed have to do with light, and in general the smaller the seed the more likely light is necessary, but this is not always the case and some orchids need a preliminary dark period to germinate (Rasmussen, 1995).

It appears that while fungal relationships are helpful to orchid seed germination and seedling development they are not an absolute requirement and the seedlings are capable of acquiring nutrients on their own if the nutrients are present.

A great deal of work needs to be done to work out the production protocols for terrestrial orchids but it does seem that *Bletilla* might be a good model to develop technique.

LITERATURE CITED

Rasmussen, H.N. 1995. Terrestrial orchids: From seed to mycotrophic plant. Cambridge University Press.

Swayer, C.E. (Ed.). 1989. North American terrestrial orchids; Propagation and production. Brandywine Conservancy, Chadds Ford, Pennsylvania.