

By spring the now empty pots still remained in their respective places until I at some time or another eventually got round to clearing them up. I first noticed the *P. crystallina* pot which displayed some thing interesting on the surface of the compost. On closer inspection a few small green almost spherical bodies were observed, not being too sure what these were I held onto the pot. Over time these 'bodies' developed further until they finally open out to reveal Pinguicula looking leaves, several plants were formed in this way. The green 'bodies' were certainly not seedlings, they were far too large and gave the impression of being a bud presumably developed from the top of the surviving root. I noticed the *P. alpina* somewhat later than the *P. crystallina ssp hirtiflora*. In the pot where the hibernacula used to be were several small plantlets. By the time I noticed them they were already well developed so I cannot be certain that they also started as the small green buds I had noticed with the *P. crystallina*. The plants were far too large and well developed to be seedling plants and their proximity to the old root stock of the previous years hibernacula lead me to conclude that these too had regenerated from the roots.

The third observation of this phenomena was made during the winter of '96/'97 with the North American species *P. primuliflora*. One particular specimen amongst several planted in the same pot became infected with a pathogen transmitted from old leaves that had accumulated under the rosette. Despite removing all dead growth in the pot and cutting away all infected material, the disease continued to reappear on the plant. Eventually fearing the disease would soon spread to the remaining plants in the pot, I took the drastic action of cutting out the entire rosette (or what remained of it) in the pot. This left behind the stumps of several fleshy roots. This did finally eradicate the disease from the pot and the roots remained healthy after the severed tips had dried off. With time small green buds developed from the sides of these roots a little below the severed tips which eventually became small plants. This time there was no doubt at all these plants definitely had grown back from the roots.

So from these observations it is possible to regenerate some Pinguicula from the root stock, though is perhaps only feasible with those species which do form a substantial root system. This is per-

haps too drastic and risky to exploit as a method of propagation though may warrant some further investigation to determine the potential. Perhaps the most important aspect of these observations is that under some circumstances it is worth while retaining the pots of 'lost' plants for at least a few months should anything decide to come back from the roots.

### Temperate Pinguicula seed germination.

Loyd Wix

E-mail: Loyd.Wix@Unilver.com

For several years now I have been keen on the cultivation of temperate (particularly European) Pinguicula. In that time I have had my fair share of attempts to grow these plants from seed. Over the years I have used the time honored method as described by Slack (ref. 1.) and this has become part of my mid winter routine of planting the Pinguicula seed and then exposing the seeds to the frosts of late December and January.

This method has produced spectacular results on occasions though is some what haphazard with quite variable results over the years in terms of germination rates even from my own seed. In this time one particular species has eluded me and not through a lack of determination. I have repeatedly sown *P. alpina* seed every year since 1990 and have never obtained germination. At the beginning I was somewhat suspicious of the quality of the seed available from commercial supplies though since having tried seed collected by fellow IPSGers and other enthusiasts living close to the locations where the plants live. One factor which may not have helped is that *P. alpina* often lives under somewhat alkaline conditions in central Europe - I have often used an acidic peat/sand mixture in the past. Non-the-less this species had almost convinced me that it was impossible to grow from seed. Never one to give up easily and having succeeded with other 'impossible' to germinate plants such as *Byblis gigantea* and some of the Northern Australian *Utricularia* - I needed to adopt a different approach and be presented with the opportunity to break me out of my mid winter routine. The opportunity presented its self when a friend from the Czech

Republic sent me seed of an unusual coloured *P. vulgaris* (violet centered flower/white outer) together with some other *P. vulgaris* seed and 3 different locations/forms of *P. alpina*. With no frosts to stratify the seeds I needed an alternative approach. In the past I have resorted to putting pots containing the seed into the deep freezer - all this did was to force the plasticiser out of the plastic to make the pots brittle and the surface sticky - plus none of the seeds germinated anyway. I then remembered an article by Miloslav Studnicka (ref.2.) about the long term storage of temperate *Pinguicula* seed based upon his observations on *P. bohemica*. Studnicka found that seed submerged in water for a few days would germinate without a period of stratification. This observation was explained by the dispersion of abscissic acid (ABA) from the seed by suspension in water. With the removal of this dormancy promoting chemical, treated seed could be stored in water for several years and still maintain viability though the seeds needed to be kept in darkness to prevent germination. O.K. Studnicka was interested in long term storage of otherwise short lived *Pinguicula* seed, though his observations also showed me how to avoid a stratification period and also to achieve germination at the same time without even sowing the seeds on compost!

I filled a number of 150ml lidded containers with cooled boiled water and sprinkled seed on the surface. The containers were then placed exposed to light but not in an environment where the contents were liable to over heat. Using this 'bean sprout' method I aimed to remove the dormancy promoting ABA from the seeds but wanted to include light to promote germination. After 3 weeks germination was notice in most of the containers including all 3 *P. alpina* containers. Using mature aged compost filled pots, the seedlings were planted using a small plastic pipette to suck up each seedling in turn from the water container and transferring it together with a small quantity of water to the compost filled pot. Cocktail sticks were also useful implements to separate the seedlings from one another.

I held onto the pots and ungerminated seed for several months. Over this time further seedlings appeared so even under these conditions staggered germination occurred. One interesting observation is that

a high proportion of these later germinating seedlings appeared to lack chlorophyll so following germination the seedlings were a pale straw colour which failed to develop further and eventually died. Nether the less some green seedlings were still occasionally appearing even during the Winter months.

Due to these successes with this method I will break my mid Winter routine as I will only plant a proportion of my stored temperate *Pinguicula* seed according to Slacks method. Given the current mild weather in the UK it seems I will be lucky to get any frosts anyway. The remainder will be sown upon water in the spring which should hopefully allow me to better manage the seedlings than having trays hanging around with the usual uncertainties of ever achieving germination. After all if I only obtain 1 seedling from a batch of seed, a 150ml water pot is more ergonomic than a 12 inch seed tray. So as simple as that - after several years I had achieved *P. alpina* germination! What I found most interesting is that 2 lots of seed were harvested in 1995 making the seed 2 years old by the time it was planted - prior to this experience (listening to conventional wisdom on the short viability period of these seeds) I would have considered the germination of such seed to be a forlorn hope. In conclusion this method offers a simple but effective method for the propagation of temperate *Pinguicula*. It may also be worth while attempting this method on other difficult to germinate seed where the presence of germination inhibiting substances such as ABA may be the reason for poor or low germination using conventional methods.

#### References.

1. Adrian Slack. Insect eating plants and how to grow them. Alpha-books 1986
2. Miloslav Studnicka. Solution to the Problem of Short Vitality in Seeds of European Butterworts. CPN Vol 22, No's 1 & 2 March and June 1993.