

The Shady Side of Fern Propagation[®]

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PROPAGATION METHODS

All ferns at our nursery are propagated by either vegetative material or spore. In the case of the vegetative material we do a range of material depending on the species. Some are from pieces of rhizome; some bulbils are removed and direct stuck; and some are from bulbils along the rachis and we layer these fronds onto mix. These bulbils over time will root into the mix and can then be picked off and plugged out. Of the approximately 40–60 fern species we grow, approximately five would be vegetatively propagated. Vegetative propagation is relatively simple, but in the case of some species, we have found that better plants are obtained through spore propagation.

SPORE COLLECTION AND PROPAGATION

Over the last 12 years or so, the main focus of Fern Factor has been to develop techniques and procedures to propagate ferns by spore. This starts with the collection of the spore. There are over 10,000 spores per gram, so we are dealing with a dust-like material. Every sporangia case (that's the spots on the back of the fronds) has 64 spore in it, so you can see with a healthy fern there is no shortage of spore. Right from the start cleanliness is paramount.

Collecting. Our spore collection season generally starts in November or December (late spring to early summer), and the first genus to become ripe is the *Polystichum*. I am collecting spore right through to approximately May (late autumn). I collect the spore by collecting fronds with sori (spore cases) on them which are ripe. These ripe sori fronds are then put into paper bags and hung somewhere warm and dry. Generally over the next day or two the sporangia cases will pop open. I then try to sow this fresh spore as soon as possible.

Growing Media. The medium we have come to use is a peat, pumice, and perlite [peat, 1-4 mm pumice, medium perlite (75 : 13 : 12, by volume) plus 600 g slow release fertilizer N15–P3.5–K8.3 + trace elements and 1000 g dry trichoderma bio-inoculant per cubic metre] mix with very low fertiliser input. At one stage in the early days we got trays of prothalli burning off, caused by fertiliser guttating through the prothallus and causing the prothalli to burn. We quickly learned not to add too much fertilizer, restricting the rate to approximately 1 kg·m⁻³. After many problems with scarid fly larvae (*Lycoriella* species) in the mix, we now steam all our propagation mix. Scarid fly larvae love to eat the fine roots of the prothallus. The steaming is preformed by a boiler in combination with a fan that blows hot air through the mix at 60 °C for 30 min. The idea is to not sterilize the mix but to pasteurize it, that is, kill the baddies but leave the goodies. Our mix has fertiliser added when cooled and then it is wet down and ready to be sown with the spore.

Sowing, Germination, and Growing-On. There are many ways to do this, but the hard thing is to not over-sow the trays, remembering how fine the spore is. We add the spore to water and spray it over the trays with a hand spray bottle. After

the trays are sown they are straight away put into plastic bags, sealed, and put into the growth room or under benches in greenhouse one. Here they stay for, depending on species, 3 to 7 months. When we notice the prothalli are well developed we will then shift the trays out of the growth room, take them out of the plastic bags, and place them into a plastic tent in greenhouse one or put a plastic lid over the tray.

What makes ferns so unique is that they first develop into a prothallus, which has the sexual parts on it. As long as the right conditions are provided, with sufficient water over the prothallus to help the sperm swim from the male part to the female part on the prothallus, the prothallus will fertilize and form the true plant, that is, what we see and know as a fern. Often in the forest what you think is moss or lichen could actually be a mass of prothalli.

This stage in greenhouse one is crucial, as we are taking these very soft, vulnerable prothalli and trying to harden them up and get them to fertilize. Too wet and they will rot; too dry and they will not fertilize and will possibly die. We have a computer to monitor and operate a significant part of the cooling, humidity, and irrigation in both greenhouse one and two. This crucial stage is mainly controlled by the computer, but vigilant observation is also carried out. After fertilisation has occurred in greenhouse one, plants are then clumped out into plug trays and finally moved into greenhouse two, which is run at a lower level of humidity. From spore to a plug, depending on species, is generally a full-year process. We either sell them at this stage or grow on for our own production.