PROPAGATION FROM SPORE OF SELECTED TASMANIAN FERNS AND THEIR POTENTIAL FOR CULTIVATION

MICHAEL GARRETT

Bicheno Nursery
P.O. Box 43
Bicheno, Tasmania 7215

A handful of fern species and cultivars is at present well entrenched in the trade as indoor ferns in Australia. Fewer however, are so widely known or used for culture out-of-doors. It seems only logical to look at Tasmania's own "bush ferns" as possible candidates to help fill this niche. They already suit the climatic conditions but particular attention should be paid to their other requirements. Unless otherwise stated, the ferns listed in this paper require some protection from exposure to harsh sun and wind, and require good drainage with an ample moisture supply. However, all ferns listed are selected because of their relative tolerance to the above conditions.

The majority of Tasmanian native ferns can be successfully raised from spore when it is available. By following the correct technique, thousands of fern plants can be ready for potting on within 8 to 12 months.

MATERIALS AND METHODS

Strict adherence to hygiene is most important during the collection of the spores, the preparation of the sowing medium, and the actual sowing. It is preferable that all spore be collected from plants in the wild, rather than from stock plants held within the nursery. There may be too much competition from other faster growing ferns (such as some *Pteris* and *Adiantum)* within the nursery, and it is hard to prevent contamination of stock plants with foreign spore. Even in the wild, some contamination with unwanted spore may occur—mainly from "weedy" species, such as *Histiopteris incisa* and *Hypolepis* spp.

Spore can be raised on almost any sort of medium—so long as it can be kept moist and is an easy medium for pricking out young plants (i.e., fine and separable but not clumpy). Ideally, a slightly acid medium of pH 5.5 to 6.5 is best.

Whatever the medium (usually sieved peat moss) it must be sterilized before sowing. Everything else involved in the sowing technique should also be sterilized—the water used to moisten the medium, all containers, glass, hands, and even any labels used. Without this detail to hygiene, the extremely slow growing prothallli

stand little chance against very invasive fungi, mosses, and sometimes liverworts.

Spore should be sown in an area free of draughts and mature ferns capable of shedding spore, as air-borne spore can contaminate the spore trays. After sowing, the container should be sealed as soon as possible—usually with clean glass. If the medium is sufficiently moistened before sowing, it may only need additional watering once or twice before the glass is removed in about 4 to 6 months.

Spores germinate soon after sowing, but the small green prothalli are not visible to the naked eye for 2 to 3 weeks. If the spore has been sown evenly and thinly, these will all have room to develop at the same rate to maturity. Depending on the species, sexually mature prothalli may take from 12 weeks to 9 months from sowing to develop. Some ferns (e.g. *Cheilanthes sieberi)* are apogamous—the prothalli do not need to be fertilized and sporophytes (actual fern stage) arise directly from each prothallus. However, most ferns require fertilization at the gametophyte (prothallus) stage. Misting or flooding the spore trays with water once the prothalli are mature will aid in fertilization.

From the initial sowing of spore and throughout the entire development of the prothalli, good light is essential. The use of bottom heat is not of paramount importance, but it will hasten the growth of some species and make them less susceptible to fungal attacks. In the case of some other ferns, it makes them more susceptible.

Hardening-off begins when there is a good showing of fronds. The glass covering can be tilted sideways to let some air movement in, then totally removed after about 1 week. After a further 2 to 6 weeks the young ferns should be large enough and hardy enough to be pricked out.

Even with the strictest hygiene, problems do occur. *Botrytis* is common, more particularly in the latter stages of prothallus growth, and one infection is capable of wiping out thousands of plants in the space of a couple of days. Spot spraying these outbreaks as they occur with an appropriate fungicide is usually successful, first making sure that the fungicide is not phytotoxic to the prothallus.

Water moulds, and mosses may become established in propagation trays—these are slower growing and may simply be dug out of the tray as they occur.

Slugs and snails will not usually attack prothalli, but have a feast on the fronds of some fern species. One slug can cause havoc if it gets into a spore tray. Bait scattered around the perimeter of the trays, rather than in them, should prevent entry.

The larvae of sciarid fly (fungus gnats) can be one of the most frustrating problems the spore grower can encounter. The flies

favour all the conditions provided for the germination and growth of the prothalli and, with a life cycle of 2 weeks during the summer months, can be present in plague proportions. The larvae feed on the 1 or 2 roots each of the prothalli possess, and the end result is whole "forests" of young ferns being "clear felled." To date, I know of no cure for this problem, except to have the prothalli developing as strongly and vigourously as possible.

SUGGESTED FERNS FOR CULTIVATION

Adiantum aethiopicum (maidenhair fern). This fern has already been released in Australia as a house plant. It is an easier subject to grow out-of-doors in soil where its almost insatiable thirst is more easily satisfied. It has a slow spreading habit with semi-erect fronds forming a tight clumpy plant. This species of maidenhair can withstand quite a deal of exposure to sun and wind.

Asplenium flabellifolium (necklace fern). Comparatively easy to raise from spore, necklace fern is a small quick growing plant suitable for rock gardens and an excellent candidate for hanging baskets. In nature, it is always found growing amongst rocks which helps prevent its root system from drying out. "Baby" plants are produced on the tips of older fronds.

Asplenium obtusatum (sea fern, shore spleenwort). This rates as one of the hardiest of all ferns—growing just above the high tide mark around the Tasmanian coastline. Here it receives the full brunt of strong, salt-laden winds. To withstand this normally desiccating effect, it has developed very thick plastic-like fronds. Under cultivation, fronds are dark green and naturally shiny and can reach 75cm in length.

Blechnum cartilagineum (gristle fern). This is a large, robust, slow-spreading fern that withstands quite a deal of exposure to the elements. New fronds are often tinged red and can reach close to a metre in height. This is perhaps one of the best larger ground ferns for cultivation.

Blechnum nudum (fishbone water fern). Young plants form a remarkably neat tussock of fronds—similar to that of a bird's nest fern. Fronds are always a fresh, light-green colour and can grow to 75cm in height. This is one of those amazing ferns that grow equally well in boggy, badly-drained sites, or in drier, sandy soils.

Blechnum wattsii (hard-water fern). A very common fern of southeast Australia, and one that deserves to be in cultivation. Its new fronds add a blaze of colour to the otherwise predominantly green world of ferns. These arise as various shades of bronze and red, and careful selection of stock plants for spore, should ensure a good colour range. *B. wattsii* has a slow, spreading habit, and its mature fronds are dark green and may reach a metre in height.

Cheilanthes austrotenuifolia (rock fern). This is a small, quick growing fern with fresh, green parsley-like fronds. In its natural habitat it grows in full sun or light shade in dry rocky ground. For this reason it adapts easily to cultivation and looks best planted amongst large slabs of rock that also give some protection against drying out. Being apogamous, a closely allied species *(C. sieberi)* is much easier to raise from spore, but is not quite so attractive as *C. austrotenuifolia.*

Culcita dubia (rainbow fern). Similar to the common bracken fern in its large scale spreading habit, this is an ideal fern for landscaping. Its fronds are fine and lacey, and in full sun take on an eye-catching yellowish-green appearance. Rainbow fern will grow well in sun or shade and will withstand periods of dryness, but has to have excellent drainage.

Cyathea australis (rough tree fern). Along with a few other species of tree ferns, this fern is already used in landscaping in southern Australia. Of all the approximately 800 species of *Cyathea,* it is one of the slowest growing, but is an excellent cool climate species for southern Australia. In contrast with the other cool climate favourite *(Dicksonia antarctica),* its trunk cannot be sawn off and transplanted, but it withstands more exposure to sun and wind, and it has a more attractive crown of fronds.

Dicksonia antarctica (man fern, soft tree fern). This fern is perhaps the most widely planted outdoor fern in southern Australia. However, all plants are harvested as 15 to 50 year old trunks from the wild. This resource will not last forever, and it may be time now to introduce young spore-grown plants to the public and nursery industry. This is the main reason for the inclusion of this plant here; besides, man fern makes a most attractive tub plant when young.

Pellaea falcata (sickle fern). Because of its very narrow glossy, dark green fronds, this fern is distinctive from other ferns listed. Its fronds stand upright from a short creeping rhizome, and a mature plant may cover a square metre in area. Sickle fern can withstand dry periods and makes a good contrast plant with other small shrubs or rockery plants.

Phymatosorus diversifolius (kangaroo fern). In nature, this fern occurs as an epiphyte on trees and rocks, but in cultivation adapts well to reasonably drained sites in the ground. As is implied by the specific name, fronds are variable in shape, from simple to multi-lobed. Its rhizome is thick and long creeping, making it a useful groundcover as well as hanging basket plant.

Polystichum proliferum (mother shield fern). A very common fern in Tasmania, this plant occurs from the salt spray zone on the coast all the way to sub-alpine areas. It proves just as hardy under

cultivation. It is a neatly-shaped, robust fern that is large enough to be planted amongst shrubs.

Pteris tremula (tender brake). This fern is already known and used within the nursery trade in Australia as an indoor plant. It is fast growing and easy to raise from spore but, as a pot plant, is often lanky and just grows too quickly for its own good. It is an easy fern to grow in the garden where it can withstand a good deal of exposure, but it does not do well in complete shade.

Todea barbara (king fern). Often classed as a tree fern, this is a large robust fern with a short, very thick trunk. It is slow growing but well worth the wait with its large glossy light green fronds. It needs ample moisture and does best in situations where it receives good light. King fern comes from a very ancient family of ferns; its spores are green and quickly lose their viability.

REFERENCES

Brownsey, P.J , D.R Given, and J D Lovis, 1985 A revised classification of New Zealand pteridophytes with a synonymic checklist of species. *New Zealand Jour. Bot.* 23. 431-489

Garrett, M. *A Field Guide to the Ferns and Fern Allies of Tasmania* (In preparation).

Quirk, H., T C Chambers, and M. Regan, 1983. The fern genus *Cheilanthes* in Australia. *Australian Jour Bot* 31:501-553