Germinating Aroid Seeds – Some Observations

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INTRODUCTION

The following notes are based on more than 20 years growing aroids from seed in Europe and a further four years doing the same in the everwet equatorial tropics of East Malaysia. These notes reflect personal experience gained from trial and error – mostly the latter – but with records made all the while on what failed and what, very occasionally, worked but are in no way intended to be neither comprehensive nor equivocal.

General

Whether sowing seeds in a pot on the windowsill in the temperate parts of the world or in trays in the tropics, the crucial starting point is fresh seed. Aroid seed is for the greater part recalcitrant (does not withstand storage) and stored seed (that is to say commercially bought) very soon loses viability.

Buying seed

Seed from commercial seed houses generally gives poor to non-existent germination, especially seed of species with little or no endosperm, which includes *Aglaonema*. All seed should be purchased inside the still-fleshy berry. Dried seed (in or out of the berry) will have a low to non-existent viability rate due to the problems of storing aroid seed.

Storage

Aroid seed stores poorly and dried seed will have a very low viability rate. For best results seed must be sown as fresh as possible. Seed viability falls extremely quickly once the seed is cleaned of the berry pulp and so the seed should remain in the berry until ready to sow. If seed must be removed from the berry then it is vital that it remains damp but not wet. Placing the seed in a folded, moistened kitchen paper towel (not toilet paper, which breaks down when wet) inside a plastic bag kept in a cool room is a good *temporary* storage medium.

Cleaning

The cleaning methods will vary depending on whether the seed is medium to large, or small. For medium or large seeds (e.g., *Alocasia*, *Aglaonema*, *Amorphophallus*, etc.) that are easy to handle they first need be removed and cleaned of any surrounding berry. The simplest method is to squash the berries gently onto kitchen paper towel and then separate the seeds from the pulp and any seed membrane. The seed membrane tightly adheres to the seed. Its presence is detectable by the seed feeling slippery. Gently working the seed between thumb and index finger will remove the membrane, after which the seed will often feel very slightly rough. It is vital that this cleaning is done wearing latex gloves – the fruit pulp of almost all aroids ranges from mildly to highly irritant. Gently rinse the seed in a nylon sieve and dry on kitchen paper towel for a minute or two to ease handling.

Small seeds, aside from being fiddly to handle, have the additional problem that inside each berry the numerous seeds are embedded in very viscous gel which is water insoluble and thus difficult to remove. The easiest method is to put the berries into a plastic beaker full of water,

Fig. 1. Tray suitable for seed sowing in the everwet tropics.

macerate them with the fingers and then leave the beaker and its contents in a warm, shaded place for a few days to ferment (it will smell pretty bad at the end of the time but the seed will come to no harm). After fermentation it will be found that the gel is very easily washed off by placing the entire beaker contents into a fine nylon sieve under gently running water and working the seed/gel/pulp mass with the fingers. The decomposed gel will dissolve and the larger pieces of berry, etc., may be removed by hand.

Planting containers and planting media

Plastic pots or trays are better then clay (terracotta). In very wet tropical habitats plastic mesh trays of the type used to drain kitchen dishes (crockery) are excellent (Fig. 1).

Aroid seed requires light to germinate so do not bury too deeply, if at all. Medium to large seeds require to be *just* covered with planting media and then well watered. Thereafter keep damp and moderately shaded. Small and very small seed are best surface sown and then settled in by watering but not covered.

Almost any organically rich, moisture retentive yet well-drained medium will produce good germination results. A suitable selection is:

1:1 ground sphagnum: Perlite/coarse Vermiculite, or
1:1 sieved coconut peat (coir): washed coarse (2–3 mm) river sand, or
1:1 sieved coconut peat (coir): Perlite/coarse Vermiculite, or
1:1 propriety soil-less compost: Perlite/coarse Vermiculite

From experience for tropical species 1:1 ground sphagnum: Perlite works best in the everwet tropics while the 1:1 propriety soil-less compost: Perlite mix is ideal for

Fig. 2. *Alocasia* ×Portodora at onset of fruit maturity; note the persistent lower spathe beginning to split longitudinally to reveal ripe orange-red berries.

temperate regions. If using coconut peat (coir) ensure that the source is free of salt contamination; most coconut peat originates from coastal areas of the tropics and if not properly matured often contains significant salt contamination.

Temperate genera listed below (*Arum, Arisarum, Biarum* & *Dracunculus, Eminium* and *Helicodiceros*) benefit from a small quantity of mineral soil (c. 0.25) to whichever mix is used. The seed of these genera should be covered limestone grit to the depth of the seed, rather than sowing media.

Germination

Ideal conditions for germination of tropical genera are a heated greenhouse or in warm climates a shade house. If germinating indoors then choose a brightly lit but not sunny windowsill and put the entire pot inside a polythene bag secured by an elastic band. Once germination is seen to

Fig. 3. *Alocasia chaii* with mature fruits; note that the lower spathe while still fresh has split segments that have recurved to reveal the fruit.

be underway loosen the bag but do not remove immediately. Allow the plants inside to acclimatize to the drop in humidity that the loosened bag provides. After two or three days remove the bag at night to allow a period of cooler temperatures before the first full day without a covering.

Temperate genera are best germinated in a frost-free greenhouse.

NOTES FOR SPECIFIC GENERA

Alocasia (including *Xenophya*)

Size

Alocasia seed is medium to moderately large (on average black peppercorn size) and easy to handle.

Home collection

In most species the seed is mature once the persistent lower spathe splits into recurved strips to reveal the orange-red berries (Figs. 2 & 3) although in the *A. longiloba* complex the lower spathe withers and falls before fruit maturity (Fig. 4).

Cleaning

Squash onto kitchen paper towel; remove pulp and seed membrane and rinse.

Fig. 4. *Alocasia longiloba* with the fruit displayed and the lower spathe withered and fallen.

Sowing

Cover to own depth.

Germination

2–3 weeks at a minimum of 21°C (70°F) and a maximum of 29°C (84°F). Medium shade.

Post germination

Allow the seedlings to continue growing until a second leaf has fully developed before transplanting.

Transplantation

At the start of third leaf emergence transplant into individual pots taking care not to bury the stem base as this invariably leads to either fungal or bacterial rotting. Thereafter, pot-on with minimal root disturbance.

Notes

As *Alocasia* grow and enter maturity they become very intolerant of root disturbance. It is important that after initial pricking out plants are potted on in such a way as to minimize root damage.

Species (and their hybrids) originating from limestone habitats benefit from a scant topdressing of small (½–1 cm) limestone chips. Species and hybrids concerned are: *A.* x Amazonica, *A. longiloba* 'lowii' (syn. *A. lowii*), *A. puteri*, *A. pangeran*, *A. principiculus*, *A. reginula*, *A. reginae*, *A. reversa* & *A. ridleyi*. In addition, although their habitat is not recorded the following

species also benefit from a limestone dressing: *A. clypeolata*, *A. nebula* & *A. sinuata*.

Aglaonema, *Aglaodorum* & *Nephthytis*

Size

Aglaonema, *Aglaodorum* and *Nephthytis* seed is large (hazelnut to date stone size) and easy to handle.

Home collection

For *Aglaonema* and *Nephthytis* the seed is mature once the fruits turn red (*Aglaonema*– Fig. 5) or orange (*Nephthytis*). By contrast, ripe fruits of *Aglaodorum* remain green (Fig. 6). Ripeness is indicated by the fully formed fruits falling easily from the peduncle.

Cleaning

Unlike many other aroid seed there is no endosperm; instead the seed consists of a massive green cotyledon that is easily damaged, so the squash onto kitchen paper towel and subsequent removal of pulp and seed membrane must be carefully done. While the red or orange pulp of *Aglaonema* and *Nephthytis* is very soft when ripe and readily removed, the spongy fruit tissue of *Aglaodorum* is very difficult to remove (undoubtedly because in nature these entire fruit functions as a floating dispersal unit) and these fruits are best sown whole into individual pots.

Sowing

Cover to own depth.

Germination

4–6 or more weeks at a minimum of 21°C (70°F) and a max. of 29°C (84°F). Light (*Aglaodorum*) to medium (*Aglaonema* & *Nephthytis*) shade.

Post germination

As soon as the first green shoot emerges the seedlings should be individually potted.

Transplantation

At the initial potting from germination it will be seen that there will already we an extensive root system and great care should be taken to prevent root damage. Once potted, grow on until the pot is full of roots and then pot on successively into the final container or ready for planting put, avoiding root disturbance at each potting.

Notes

Aglaonema brevispathum, *A. costatum* and *A. chermsiriwattanae* benefit from a scant topdressing of small (1/2–1 cm) limestone chips.

As an adult plant *Aglaodorum* requires a heavy mineral rich soil but germinates best in a loose medium such as 1:1 ground sphagnum: Perlite/coarse Vermiculite.

Amorphophallus

Size

Amorphophallus seed is usually medium to large (small peanut to date stone size) and easy to handle.

Home collection

Seed is mature once the fruits turn red or, rarely, blue or green. Whatever the colour of the ripe fruit at this stage the pulp will be soft and squash easily.

Cleaning

Squash onto kitchen paper towel; remove pulp and seed membrane and rinse.

Sowing

Cover to own depth.

Germination

3–5 weeks at a minimum of 21°C (70°F) and a max. of 29°C (84°F). Light to medium shade.

Post germination

Once the first leaf has expanded transplant into individual pots.

Fig. 5. Ripe fruits of *Aglaonema simplex*. Note that the epidermis is beginning to split.

Fig. 6. Fruits of *Aglaodorum griffithii* at the onset of maturity. The berries remain green to full ripeness at which point fully formed fruits detach easily from the peduncle.

Transplantation

It will be seen that there will already be an extensive root system and great care should be taken to prevent root damage. Once potted, grow on until the pot is full of roots and then pot on successively into the final container or ready for planting put, avoiding root disturbance at each potting.

Notes

These notes are based on the germination and aftercare of the Bornean species. These generally do not have a fixed nor long dormant period. I have no experience with germination and aftercare of species from monsoonal habitats.

The limestone species (e.g., *A. brachyphyllus*, *A. eburneus*, etc.) benefit from a scant topdressing of small (½–1 cm) limestone chips.

Amydrium, Anadendrum, Pedicellarum, Pothoidium & Pothos

Size

Seed is medium sized (black peppercorn to small peanut sized) and easy to handle.

Home collection

Amydrium humile, *A. medium* and *A. sinense* fruit ripen white (Fig. 7); the other genera ripen red (Fig. 8).

Cleaning

Squash onto kitchen paper towel; remove pulp and seed membrane and rinse.

Fig. 7. Ripe infructescence of *Amydrium medium*.

Sowing

Cover to own depth.

Germination

3–5 weeks at a minimum of 21°C (70°F) and a max. of 29°C (84°F). Light shade.

Post germination

As soon as the first green shoot emerges the seedlings should be potted individually.

Transplantation

It will be seen that there will already be an extensive root system and great care should be taken to prevent root damage. Once potted, grow on until the pot is full of roots and then pot on successively into the final container or ready for planting put, avoiding root disturbance at each potting.

Fig. 8. Ripe infructescences of an unidentified *Anadendrum*.

Notes

Many climbing aroids germinate as a shade-seeking leafless (minute cataphylls present) thread-like, creeper ('eocaul') capable of extending for a considerable distance along the forest floor and, although the green stem is presumably capable of photosynthesis, at least in the initial stages it appears to depend partly on food reserves in the large seeds. Field observations suggest that the function of the eocaul is to locate a climbing host on which to establish juvenile shoots. It is apparent that once this function is satisfied the eocaul soon withers. Once a suitable vertical surface is encountered, the shoot alters its mode of growth and attaches itself to the substrate by means of short clasping roots and begins to produce foliage leaves. If no such climbing surface is found the plant will continue to exist as a thread-like stem but will eventually exhaust itself and perish.

ANADENDRUM*– SEE *AMYDRIUM

ARIDARUM* – SEE *COLOCASIA

ARISARUM* – SEE *ARUM

ARUM, AMBROSINA, ARISARUM, BIARUM, DRACUNCULUS, EMINIUM & *HELICODICEROS*

Size

Seed of these European and Mediterranean genera is medium sized (black peppercorn sized) and easy to handle.

Home collection

Arum, *Dracunculus*, *Eminium* and *Helicodiceros* fruits ripen red; *Ambrosina* dull green; *Arisarum* pale green; *Biarum* white to lilac.

Cleaning

Squash onto kitchen paper towel; remove pulp and seed membrane and rinse. The berry pulp of *Arum*, *Dracunculus*, *Eminium* and *Helicodiceros* is *especially* caustic; prolonged handling of the pulp will result in skin loss. Latex gloves essential. Seeds of *Biarum* and *Eminium* have a large fatty structure on one end - a strophiole or elaiosome that functions as a dispersal agent (ants) attractant. Experience has shown that this is prone to fungal attack that can spread to the seedling and is best removed prior to sowing – in habitat this fatty body is eaten by the ants and the seed discarded.

Sowing

Cover to own depth.

Germination

3–5 weeks at a minimum of 15°C (59°F) and a max. of 22°C (c. 72°F). Bright light but not full sun.

Post germination

It is important that seedlings are not grown too shady, especially the steppe-dwelling species of *Biarum* and *Eminium*. Too-shady conditions will lead to soft, etiolated growth that aside from being susceptible to fungal pathogens will also produce a weak tuber.

Transplantation

Plants should be kept growing as long as possible during the first year and the pots should not be allowed to dry out as this encourages the plants to become dormant. When the leaves start to yellow the watering should be cut back but not stopped. When dormant, the tubers should be treated in the same way as mature plants. It is best to repot the tubers, about three to a 10 cm pot, into fresh compost at the time when the rest of the collection is repotted. The seedlings should now be treated as mature plants.

Notes

Sow in pots rather than trays since on germinating seedlings immediately begin to form a tuber and the shallow nature of seed-trays can inhibit this severely. The

pots should be filled with compost to within 3 cm of the top, the seed sown on the surface and then covered to its own depth with limestone grit.

The seed will germinate at the same time that the mature plants begin growth. If the seed is fresh it should germinate at the start of the next growth season, but if old or dry it may take up to a year longer. Seedlings of those species subjected to winter cold will spend their first growing season as underground tubers, showing no signs of aerial growth. They will not produce leaves until the start of the second growing season. It is most important that pots are not discarded for at least two years.

Biarum* – SEE *Arum

Bucephalandra* – SEE *Colocasia

***Colocasia, Furtadoa, Homalomena* & *Schismatoglottis* (including *Aridarum, Bucephalandra, Phymatarum* & *Piptospatha*)**

Size

Seed is small (average 1 mm × 1.5 mm) and tricky to handle.

Home collection

Ripe fruits of *Colocasia* are pale yellow to brown and strongly fruit-scented; before maturity they are contained in the persistent lower spathe; at fruit maturity the lower spathe splits irregularly and peels to reveal the fruits. The lower spathe of most *Schismatoglottis* and *Phymatarum* behaves in a similar manner but the ripe fruit are white to pale green (Fig. 9) and odourless. In *Homalomena* and the allied *Furtadoa* the whole spathe persists into fruit ripeness and then splits from the base into long strips that curl upwards to reveal the pale green or white, weakly perfumed fruits (Fig. 10). *Aridarum*, *Bucephalandra* and most *Piptospatha* carry the fruits in a splash-cup formed by the persistent lower spathe. At maturity fruits are green (Fig. 11)

Fig. 9. *Schismatoglottis* cf. *niahensis* at ripe fruiting.

Cleaning

The main problem with cleaning is that inside each berry there are numerous seeds embedded in very viscous gel which is difficult to remove. The easiest method is to put the berries into a plastic beaker full of water, macerate them with the fingers and then leave the beaker and its contents in a warm, shaded place for a week to ferment (it will smell pretty bad at the end of the time but the seed will come to no harm). After fermentation it will be found that the gel is very easily washed off by placing the entire beaker contents into a fine nylon sieve under gently running water and working the seed/gel/pulp mass with the fingers. The gel will dissolve and the larger pieces of berry, etc., may be removed by hand.

Sowing

The cleaned seed is most easily sown by filling the beaker of seed with fresh water,

Fig. 10. *Homalomena griffithii* at ripe fruiting.

Fig. 11. Splashcup infructescence of *Aridarum crassum*; the fruits are fully ripe.

vigorously stirring with a finger and then pouring the suspended seed and water onto the surface of the compost in a pre-prepared pot or tray; keep the beaker moving to ensure an even distribution of seed.

Germination

Germination takes 1–2 weeks at a minimum of 21°C (70°F) and a max. of 29°C (84°F). Light shade and high humidity.

Post germination

In *Colocasia* the first leaf is kidney shaped and at this stage the plants are very delicate and difficult to handle. Leave the plants as long as possible in the germination container before attempting transplanting. The other genera all produce rather more conventional lanceolate leaves but all should be left to become crowded before attempting transplantation (Fig. 12).

Transplantation

The best transplantation method is to allow the clumps of seedlings to grow until they become congested and then to transplant small clumps of seedlings into individual pots. At the fourth or fifth leaf emergence stage transplant into individual pots.

Notes

Seedlings of these genera are very susceptible to fungal attack and it is recommended than the transplanted seedlings are treated immediately with a suitable fungicide as prevention against damping off. We have found that hydroxyquinoline sulphate (available commercially as Chinosol) is an excellent fungicide and also appears to have some bactericidal properties. DO NOT USE METALLIC COPPER FUNGICIDES ON ARACEAE – THEY ARE FATAL.

Fig. 12. *Piptospatha grabowskii* seedlings are the correct stage for transplanting.

CRYPTOCORYNE

Size

Seed is small (average 2 mm × 1 mm) and but not too difficult to handle.

Home collection

Cryptocoryne is one of the few aroids with a dehiscent capsule. The fruit opens in a star-like manner to real the seeds (Fig. 13)

Cleaning

None required.

Sowing

Surface sow and water well. Standing the pots in a shallow tray of water, and ensuring that the water is changed *daily* to prevent stagnation, significantly improves germination and post germination growth.

Fig. 13. Open capsule showing seeds of *Cryptocoryne lingua*.

Fig. 14. Seedlings of *Cryptocoryne yujii* at the stage suitable for transplantation.

Germination

Germination takes 2–3 days at a minimum of 21°C (70°F) and a max. of 29°C (84°F). Light shade and high humidity.

Post germination

After germination a series of short, hooked leaves develop and the resultant seedling resembles a 3-dimensional star. After some time root growth initiates and once established, leaf growth starts. It seems likely that the curious gall-like stage of the seedling is linked to the aquatic habitat of all species and may provide an anchoring device.

Transplantation

The best transplantation method is to allow the clumps of seedlings to grow until they become congested (Fig. 14) and then to transplant small clumps of seedlings into individual pots. At the fourth or fifth leaf emergence stage transplant into individual pots.

Cyrtosperma, Lasia & *Podolasia*

Size

Seed of *Cyrtosperma* and allies is medium to large (half peanut sized) and easy to handle.

Home collection

Fruits of *Lasia* are hard and green at maturity; those of *Cyrtosperma* somewhat soft and dull purple; those of *Podolasia* soft and red.

Cleaning

Although large and easily handled, cleaning lasioid seed is a troublesome since each berry contains several seeds embed-

ded in very viscous gel which is difficult to remove. Further, because the seeds are curved and variously crested and warty the gel adheres strongly. The easiest method is to put the seeds and their gel coating into a plastic beaker of water, macerate them with the fingers and then leave the beaker and its contents in a warm, shaded place for a week to ferment (it will smell pretty bad at the end of the time but the seed will come to no harm). After fermentation it will be found that the gel is very easily washed off by placing the entire beaker contents into a fine nylon sieve under gently running water and working the seed/gel mass with the fingers. The gel will dissolve and the larger pieces of berry, etc. may be removed by hand.

Sowing

Cover to own depth.

Germination

3–5 weeks at a minimum of 21°C (70°F) and a max. of 29°C (84°F). Standing the pots in a shallow tray of water, and ensuring that the water is changed *daily* to prevent stagnation, significantly improved germination ad post germination growth.

Post germination

These genera all produce substantial root systems and need to be pricked out before the roots become too tangled in order to reduce root damage.

Transplantation

Pot individual pots as soon as a green shoot appears.

Notes

Lasia and *Cyrtosperma* are mainly helophytes and need to be grown in strong light (but not full sun). Growing them too shady results in weak, disease-prone plants. Mature plants of most species will do best in full sun in standing *but not stagnant* water.

Dracunculus – SEE *Arum*

Eminium – SEE *Arum*

Epipremnum & *Scindapsus*

Size

Medium (4–9 × 3–7 mm).

Home collection

Epipremnum and *Scindapsus* shed their seeds at maturity via the greatly enlarged stylar regions becoming transversely dehiscent, the abscission developing at the junction of the enlarged stylar region and the ovary and the stylar plate sloughing away to expose the ovary cavity with the seeds embedded in variously coloured sticky pulp. The stylar region is embedded with needle-like bodies (trichosclereids) that are *exceedingly* irritating; mature fruits must not be handled without latex gloves.

Cleaning

Removal of the seeds will leave them very sticky; rinse thoroughly in a nylon sieve and then dry on kitchen paper towel.

Sowing

Surface sow and water well but do not cover.

Germination

3–5 weeks at a minimum of 21°C (70°F) and a max. of 29°C (84°F). Good light.

Post germination

Seedlings are initially very slow growing and should not be disturbed until they are becoming crowded. Attempting to transplant too soon will result in very high mortality. Seedlings approaching transplantation size will begin to produce adult roots (roots that look considerably more robust than the plant looks capable of producing) from the aerial stems. Such plants are much more resilient.

Fig. 15. Mature infructescence of *Rhaphidophora lobbii* showing the stylar plates sloughing away.

Transplantation

Once seedlings are producing adult roots they should be transferred to individual pots.

Furtadoa – **SEE *Colocasia***

Helicodiceros – **SEE *Arum***

Homalomena – **SEE *Colocasia***

Lasia – **SEE *Cyrtosperma***

Pedicellarum – **SEE *Amydrium***

Phymatarum – **SEE *Colocasia***

Piptospatha – **SEE *Colocasia***

Podolasia – **SEE *Cyrtosperma***

Pothoidium – **SEE *Amydrium***

Pothos – **SEE *Amydrium***

Rhaphidophora

Size

Small to medium (2–3 × 1–2 mm).

Home collection

Along with *Epipremnum* and *Scindapsus* (see under *Epipremnum*) the fruits of *Rhaphidophora* at maturity shed their seeds via the greatly enlarged stylar regions becoming transversely dehiscent, the abscission developing at the junction of the enlarged stylar region and the ovary and the stylar plate sloughing (Fig. 15) to expose the ovary cavity with the many seeds embedded in variously coloured sticky pulp (Fig. 16). The stylar region is embedded with needle-like bodies (trichosclereids) that are *exceedingly* irritating; mature fruits must not be handled without latex gloves.

Fig. 16. Seeds of *Rhaphidophora lobbii* exposed.

Fig. 17. Seedlings of *Rhaphidophora lobbii* ready for transplanting.

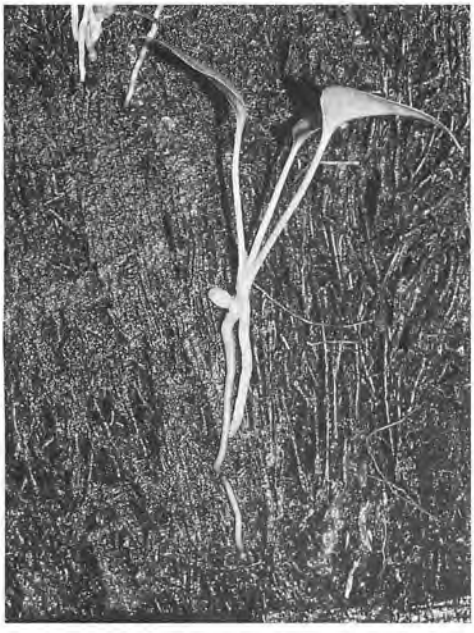

Fig. 18. *Scindapsus beccarii* seedlings on a tree fern plaque.

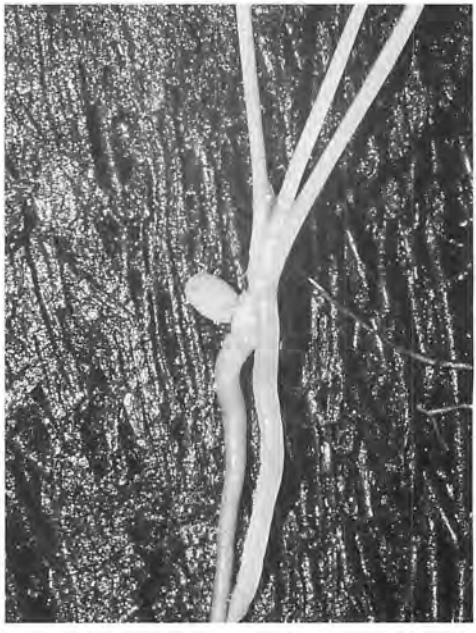

Fig. 19. *Scindapsus beccarii* closeup of the seed and initial anchoring roots.

Cleaning

Removal of the seeds will leave them very sticky; rinse thoroughly in a nylon sieve and then dry on kitchen paper towel.

Sowing

Surface sow and water well but do not cover.

Germination

1–3 weeks at a minimum of 21°C (70°F) and a max. of 29°C (84°F). Good light.

Post germination

Seedlings are initially very slow growing and should not be disturbed until they are becoming crowded (Fig. 17). Attempting to transplant too soon will result in very high mortality. Seedlings approaching transplantation size will begin to produce adult roots (roots that look considerably more robust than the plant looks capable of producing) from the aerial stems. Such plants are much more resilient.

Transplantation

Once seedlings are producing adult roots they should be transferred to individual pots.

Notes

Scindapsus beccarii, *S. crassipes* and *S. geniculatus* are epiphytes and while they grow well in pots, it is also possible to germinate them on a wood or tree fern plaque. In order to do this, do not wash the seed after removal from the fruit and simply press two or three seeds onto the chosen mount. They will adhere by means of the sticky pulp and provided that the mount is kept damp (but not wet) soon germinate and establish (Figs 18 & 19).

Scindapsus* – SEE *Epipremnum