

**ASGAP PALM & CYCAD STUDY GROUP**

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**Weather & plant behaviour :** A cooler than usual summer for 2000, except for a few very hot days around Jan. 20th., was followed by a cool autumn & fairly mild winter (8 frosts), & a normal spring. The rainfall for Brisbane for the year 2000 has however been the lowest on record, with almost no useful rain since February. However, pretty much the reverse has been true in northern NSW. I delivered a load of plants to a doctor at Alstonville in late May, & he had had rain on all but two days of the year up to then. Quite a few reports of adult cycads dying suddenly in Northern NSW & wet areas of Qld have come in to me & to PACSOA (Palm & Cycad Societies of Australasia). Probably the wet weather has been conducive to fungal rots, although weevils (native or exotic) have also been suggested.

My biggest (& sole surviving) *Cycas calcicola* started to flush on 3-2-00, & was deciduous again by mid June (80% white by 1-6-00), & still is as I write this on 8-6-01. No wonder it is not growing fast, with such a short growing season. It is still in a large pot, so that I can move it to a dry spot in my big shed over winter each year; hardly necessary last winter.

My big *C. armstrongii* had its leaves 60% white by early June, & by late August all were white; about 40% were then white on my big *C. 'kennedyana'*. My big *C. armstrongii* & biggest *C. maconochiei* started to flush on 2-11-00, much as usual, & the big *C. kennedyana* started to flush on 30-11-00, after pulling some nutrients out of its previous leaves, which although mostly green were starting to look rather tatty. The other cycads performed much as usual, with *C. angulata* & *C. megacarpa* at all stages of growth, & some *C. cairnsiana* flushing in October & others still inactive.

**Cycad antiquity :** While tidying up my office the other day ( see the Filing Elf cartoon) I came across an article from 1990 Science 249:1152-1154 by R. L. Leary on a probable cycad ancestor from the Early Pennsylvanian of western Illinois, about 320 million years ago, & some 35 million years earlier than previous candidates for an ancestral cycad. This specimen was of *Lesleya*, previously known only as sterile foliage, & had 2 rows of ovule-bearing receptacles on either side of the petiole. Leary proposes *Lesleya* as an ancestor of *Taeniopteris* & *Phasmatocycas*, the oldest (Early Permian) previous cycad ancestors. Paleobotanists routinely assign scientific names separately to say foliage, fruit & bark, until better specimens allow them to 'unify' some of the names. The 3 ancient genera listed above all had entire leaves, & it is now thought that compound leaves came later in this lineage. *Lesleya* seems to have grown in a well-drained area. So cycad fussiness about good drainage may go a long way back.

**The good oil from overseas :** I have included (with permission) two articles reprinted in the S-E Qld. newsletter of PACSOA, by U.S. nurseryman Tom Burns. I prefer my furnace ash based potting medium to those he describes, but we agree on the causes of disasters.

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A happy New Year to all of you, & may it rain on those in need of it.

## Growth Medium <sup>2.</sup>

By Tom Broome

The choice of material that comprises your growing media will probably be the most important decision you can make in growing a superior cycad. Proper fertilizer is important, but a poor growing medium can render even the best fertilizers virtually useless.

Organic materials that are commonly used to make up potting soil in Florida are: Florida peat, Canadian peat, pine bark, and saw dust. To increase drainage, people use very coarse sand, chicken grit, pumice, Perlite, Airlite, Zonolite, and other similar products.

One thing that many people fail to realize is that most everything involved with growing plants breaks down to chemistry and physics. When choosing a component for your soil, not only do you look at what the material is now, but what it will become later. Florida peat will very quickly turn into muck. Growing cycads in muck is probably the worst thing you can do. PH is also very important. Pine bark as it breaks down will turn your soil very acidic. The chemistry between your soil and fertilizer breaks down with very high or very low pH.

Pine bark, if not aged for a sufficient amount of time, can leach out as much as 50% of the nitrogen in your fertilizer. It also seems to be a magnet for ants, cockroaches, and termites.

Florida peat is made of organic materials that have broken down over many, many years. All the trees, bushes, and other small plants in a certain area die, then break down and settle in a depressed area. After thousands of years, this becomes a peat bog. Any nursery person can tell you that most plants are susceptible to their own particular insects and pathogens. Peat derived from several species of plants may also be susceptible to just as many pathogens as the plants themselves. Canadian peat is primarily broken down sphagnum moss. Not only does Canadian peat not break down as fast as Florida peat, but it also does not seem to be as susceptible to disease.

I originally used a standard nursery mix of 50% Florida peat and 50% aged pine bark. Then I would add coarse sand to that mix. Depending on the cycad species I was potting up at that time, I would add sand so that it made up 20% to 50% of the total mix. Central American *Zamia* would get 20% sand, whereas *Encephalartos horridus* or *E. arenarius* would need 50% sand. After that, I would add about 10% to 20% Perlite. Even though that all worked very well, I was having problems from time to time with fungus, especially with seedlings. Also, not having a uniform mix caused problems with watering. Some of the plants were getting dry too fast, and some were staying too moist.

One day I went to Kurt Decker's nursery and looked at his soil mix. It was made up of 40% Canadian peat, 30% coarse sand, 20% saw dust, and 10% Perlite. After seeing seedlings that we had purchased at the same time, and realizing that his were larger than mine, I thought I would try his mix. After using this mix for three years, I have seen great results. The plants root faster, I have not had as many problems with pathogens, and it is a uniform mix I can use for everything. Also, because it is Canadian peat based, it breaks down slower, and I don't have to re-pot as often.

My problem was that my original soil mix cost about \$14.00 per yard, whereas the new mix is about \$32.00 per yard. The former owner of 1-4 Plantland, Don Maynard, used to tell me, "The most expensive thing you can buy is cheap soil." To illustrate this point, he explained that he had purchased two loads of "bad soil". After about a year, he threw away \$75,000.00 worth of azaleas. For those of you who say you can't afford \$32.00 per yard, let's look at this monetarily. The difference between the two soils in cost is \$18.00 per yard. Most people can fill 250, one gallon pots per yard. If you are growing rare species of *Zamia*, even if you lose only one plant out of 250 because of cheap soil, which is the better choice? I would also venture to say you would lose a lot more than just one plant, on the average. Losing ten plants could pay for a ten yard load of good soil.

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 Through the years, I have always had problems with the "parazamia" type of Macrozamia. For the last four years, I have been growing Macrozamia in pure coarse sand, with a small amount of regular soil in the bottom of the pot. If you just use sand, it will pour out the bottom of the pot when it gets dry. Since I have been doing this, I have not lost even one Macrozamia. It is important, however, that you use a complete fertilizer like Nutricote, because sand obviously has no nutrients.

Along with fertilizer, the type of soil is the most important variable for growing a healthy cycad. The only other variable is water, but that is a subject for another article. When the chemistry between your fertilizer and the soil is working well, you can then use advanced nursery techniques to manipulate your cycads to grow faster, and to produce more seeds, as well as reduce your plant mortality rate.

(In the first newsletter of the year we printed Tom's article on fertilisers, that was the first in a three part series on the most important components to growing cycads. This article on Growth Medium is the second of the series, whilst some of the components mentioned sound foreign there is usually an equivalent available here. The most important information in this article is the principal behind optimum growth and the variables that control this process, the third article that will be presented later in the year is on Water. Brett Northey, President SQG).

**PALMS, CYCADS AND THE INTERNET (Part 4)** – Article by Daryl O'Connor

In previous installments of this article, we reviewed the various Palm and Cycad Society web sites as well as some of the Botanical Garden, commercial nursery and private web sites. This issue I'm going to highlight 2 interesting web sites from different corners of the globe. The first, while not strictly palm oriented, features many tropical treasures as well as 130 species of palms growing in their grounds. The second site is a very well presented site from a South African Palm Enthusiast. First, some background on how I 'found' these sites and some of the other sites featured in previous articles:

**Searching For Gold**

The Internet is a vast store of information. With the introduction of the World Wide Web (www) the information available was presented in a much easier format, and navigating through all of this information was as simple as clicking on your screen. However, it soon became apparent that there was just too much information available, and 'web-surfers' were being engulfed in pages and pages of information that was totally unrelated to their queries. People spent hours pointing and clicking until they (hopefully) found what they were looking for.

The solution to all of this was the Search Engine. Search Engines are, in effect, databases of web pages and their contents. Various automated processes scour the World Wide Web daily, gathering information about web pages and saving the results of their searches in the search engine 'database'. This is a bonus for all of us using the web because all we need to do to locate any information is ask the search engine.

You simply visit the search engine site, type in your question, and the search engine displays a list of all related web pages that it is aware of. For example, a query of 'palms + photos' might return 300 references to web pages with palm photos on them. You can then quickly look at some of these links until you find something of interest. This is a simple example, and most search engines have much more intelligence engineered in, with the ability to sort the references by relevance, for example the number of times the word 'palm' or 'cycad' appears in each page. Some categorise their results, some offer more advanced methods of searching. It is really down to personal choice, as well as what is most effective in locating the 'right' pages you are looking for. There are many Search Engines available, the more popular ones being:

Altavista [www.altavista.com](http://www.altavista.com)  
 Lycos [www.lycos.com](http://www.lycos.com)  
 Excite [www.excite.com](http://www.excite.com)

Google [www.google.com](http://www.google.com)  
 Ask Jeeves [www.askjeeves.com](http://www.askjeeves.com)  
 Metacrawler [www.metacrawler.com](http://www.metacrawler.com)

Plant of the Month continued

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Water, The Third Variable - Tom Broome

The quality of your water source is just as important as the soil and the fertilizer used in growing your cycads. If you grow cycads in containers, you can change the brand of fertilizer, or change the soil mix, but many times you are stuck with the available water supply. In fact, when choosing a location for a nursery, after, "Is this land prone to flooding," your second question should be, "What is the quality of the available water source?" I have seen two nursery owners buy the same seedlings, use the same soil and fertilizer, but get totally different results. These two nurseries were only two miles apart, but the water supply was different.

Water can contain elements such as iron, sulfur, calcium, magnesium, sodium, and chlorine, as well as carbonates and bicarbonates. If concentrations of any of these chemicals are too high, there can be trouble. Compensating for these chemicals can be expensive and time consuming. If your water contains sulfur, the pH can get on the acidic side. If so, add some dolomite. If you have alkaline water, which is very common in south Florida, add some sulfur to the soil. Iron doesn't really hurt your plants that much, but the build-up will stain the leaves badly. There are various chemicals that can be used in an injector system to dissolve iron build-up. If drip irrigation can be used, at least then the leaves won't be stained. If your water contains high concentrations of calcium, magnesium, sodium, or chlorine, things can get a little more complicated. These elements are salts that can cause many different problems. Build up of salts can bum roots and kill your plants. Before discussing remedies, a few things need to be explained.

Dissolved nutrients in the soil, fertilizers, and certain chemicals, such as sodium, in the water are all types of soluble salts. Water is attracted from areas of low salt concentration, to areas of high concentration. The concentration of salts in the root system of plants causes water to move from the soil into roots. When salt levels become so high in the soil, water can be drawn out of the roots. Salts can be absorbed by roots as well as by leaves. If these salts accumulate to toxic levels, roots and leaves can be burned. High levels of sodium can cause other nutrients such as calcium and magnesium to be leached out, causing nutrient deficiencies in plants. If your water contains high salt levels, drip irrigation can at least keep the salts off the leaves. Newly emerging leaves on cycads are particularly vulnerable to burning.

Water, The Third Variable continued 5

As you water your plants, nutrients and salts are being leached out. As you fertilize, salts are being added. The secret to all this is the balance between the adding and leaching of salts. Soils with coarse materials in them, such as pine bark, can cause water to flow through too quickly. Soils with fine textured materials hold water longer, helping the leaching process. This is one reason why I suggested the soil mix in a previous issue. If salt levels are high in your water, another way to compensate is by using a time-release fertilizer. That is why using Nutricote can be beneficial. Many people like to keep cycads on the dry side when it comes to watering. When salt levels are high in the soil, the reduced water levels intensify the effects of salts on roots. Watering for shorter periods of time, but on a regular basis, will help with this. If salts are not being leached out properly from normal watering, once-in-a-while watering for two or three times longer than normal may be necessary.

While we are on the subject of water, I have noticed that one of the most common ways that people kill cycads is by rotting the stems or roots. Several years ago, I was talking to Larry Bussell about our native *Zamia* (*Z. integrifolia*), and he told me what would be the single most important clue in growing cycads: "Zamia likes to be uniformly moist, not dry, not wet." I have noticed at more xeric habitats that the apex of the plant was one foot below the surface. The soil was almost pure sand. The wetness of the rain never really reached the stem, but the capillary action of the sand drew down a uniform moistness. At the same time, at that level the sun never dried the soil completely. I have also observed *Zamias* growing in marginally wet areas. The bottom of the tuber would rot, harden off, then pull the apex below ground level. As the plant grew above the surface, the process would repeat. Even though you can't generalise about all cycads, if you keep your growing medium "uniformly moist," I think most cycads would benefit.

Here in Florida, growers of *Zamia integrifolia* have noticed that plants grown in full sun have a tendency to have curled leaflets. In the shade these same plants will have flattened out, attractive leaflets. When the newly emerging leaflets are soft, they will curl to reduce the amount of surface facing the sun, thus reducing the loss of water in the leaflets. I have experimented with severed plants and found that extra watering while new leaves are still soft will flatten out the leaflets. Once the leaflets harden off, they will stay flattened. This procedure will make your plants a lot more attractive.

Sometimes I will have plants that push new leaves, but these leaves will abort before reaching full size. In particular, I had a group of *Cycas micholitzii* in my hot greenhouse that would abort leaves on a regular basis. Last summer, I noticed they were all pushing new leaves again. One of them was pushing two leaves, and the first leaf to emerge was already half shrivelled. I brought the plant into the shade and started watering it twice a day. The bad leaf started growing and hardened up beautifully, except for the few leaflets that were already damaged. After repeating this procedure on the rest of the plants, all leaves came up and hardened off normally. Since then, I have had six species of cycads try to do the same thing, and I have saved all the leaf flushes after repeating this procedure. I have noticed that plants growing in a well-drained potting mix have a tendency to abort leaves more often. Sometimes, the aborting of leaves can be a sign of a reduced root system due to fungus, or a high water table, if the plant is grown in the ground.

This is the last article of a series of three. Once you have mastered the balance of soil, fertilizer, and water, everything else in culture becomes easier. There are many ways to speed up growth and to produce more seeds. Some of these techniques may not work for you unless this balance can be maintained. Keep in mind that certain soil components and fertilizer brands may not be available in all parts of the country. Also, climate can alter individual results, but the basics of these three articles should help all growers. If you are not all that concerned with fast growth, you will at least lose fewer plants. In many cases, some of these cycads are hard to find. At least by reducing the mortality rate of your cycads, these plants can become more common.