ENCEPHALARTOS

JOURNAL OF THE CYCAD SOCIETY OF SOUTH AFRICA

TYDSKRIF VAN DIE BROODBOOM VERENIGING VAN SUID-AFRIKA

NO. 56 DECEMBER / DESEMBER 1998 ISSN 1012-9987

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COVER / VOORBLAD : Artificial hybrid between *Encephalartos umbeluziensis* (♀) and *E. lehmannii* (♂); with female cone

This is an interesting hybrid that looks like *Encephalartos cerinus*, but has the characteristic *E. lehmannii* collar (reddish brown) surrounding the base of each leaf. The cone is grass-green coloured with the facets of the female cone scales ornamented with brown hair.

Photo: Isabella Claassen

CONTENTS / INHOUD

CONTENTS / INHOUD (continued / vervolg)

With best wishes for
a joyful Christmas
and peace throughout
the New Year

'n Wens van vreugde
en vrede aan u met
Kersfees en deur die
Nuwe Jaar

FROM THE PRESIDENT

The discussion of the Rabson matter is being interrupted to convey important information about the financial matters of the Society to the members. From the very outset, I can assure you that the finances of the Society are in capable, conservative hands. Every effort is being made to effect savings and improvements. Therefore, our financial situation is very sound.

Numerous requests for a switch to a more modern, electronically-driven method for the payment of membership fees have been received. In view of the proven unreliability of the South African postal service and the troublesome "cheque-in-the-letter-in-the-post" method, these requests have been handled with the necessary earnest and sympathy. Our treasurer, Prof. Guillaume Theron, has investigated the matter thoroughly and encountered one particular stumbling block: if we were to switch over to a debit order system, we would have to submit the debit order electronically to the banks. Unfortunately, we have neither the facilities nor the finances to handle such a function. Therefore, the members will unfortunately have to make the most of the existing payment system.

Unfortunately, the members should also take note of another snippet of financial news. Owing to increased postal rates and printing costs, we are compelled to increase membership fees and the price of the back copies of our journal. Membership fees for 1999: R65.00 for local members, and for foreign members R250.00, US$44.00 and A$65.00 (airmail delivery of the journal) or R135.00, US$22.00 and A$35.00 (surface mail delivery). In future, local members will have to pay R15.00 and non-members R20.00 for a back copy of "*Encephalartos*". Foreign members will have to pay R48.00, US$10.00 and A$13.00 (airmail delivery) or R24.00, US$5.00 and A$6.00 (surface mail delivery), and non-members R54.00, US$11.00 and A$15.00 (airmail delivery) or R27.00, US$6.00 and A$8.00 (surface mail delivery) for a back copy. Our treasurer is also trying to curb increasing costs. Therefore, the Society has closed its current account and opened a savings account.

Although our treasurer is experiencingproblems with the implementation of a debit order system, he is by no means reserved about the other benefits of electronics. A fax machine will soon be purchased for the secretary-treasurer as well as the editor of our journal. Prof. Theron recently obtained an E-mail address and for the members' convenience it appears under "Secretary-treasurer" in the front of this issue of the journal.

Frederick de Jager

VAN DIE PRESIDENT

Die bespreking van die Rabson saak word onderbreek om belangrike inligting oor die finansiële sake van die Vereniging aan lede deur te gee. Ek wil u sommer met die intrapslag gerusstel dat die finansies van die Vereniging in bekwame, konserwatiewe hande is. Daar word deurlopend pogings aangewend om te bespaar en te verbeter. Daarom is ons geldsake kerngesond.

Meerdere versoeke vir die omskakeling na 'n meer moderne en elektronies gedrewe metode vir die betaling van ledegeld is ontvang. In die lig van die bewese onbetroubaarheid van die Suid-Afrikaanse posdiens en die beslommernis van die "tjek-in-die-brief-in-die pos-metode" is genoemde versoeke met die nodige erns en simpatie behandel. Ons tesourier, prof. Guillaume Theron, het die aangeleentheid deeglik ondersoek en veral een struikelblok teëgekom: Indien tot 'n debietorderstelsel oorgeskakel sou word, sou ons die debietorder elektronies aan banke moes deurgee. Maar ons beskik ongelukkig nie oor die fasiliteite en die finansies om sulke opdragte te hanteer nie. Lede sal dus ongelukkig maar vir lief moet neem met die bestaande betaalstelsel.

Lede moet ongelukkig ook kennis neem van 'n ander brokkie finansiële nuus. Weens verhoogde postariewe en drukkoste is ons verplig om ledegeld en die prys van vorige uitgawes van ons tydskrif effens te verhoog. Ledegeld vir 1999 sal R65.00 wees, en voortaan sal lede R15.00 en nie-lede R20.00 vir 'n vorige uitgawe van "*Encephalartos*" moet opdok. Ons tesourier probeer self ook om stygende kostes teë te werk. Daarom is die Vereniging se lopende rekening gesluit en 'n spaarrekening geskep.

Hoewel ons tesourier probleme met die inwerkingstelling van 'n debietorderstelsel ondervind is hy hoegenaamd nie sku vir ander voordele van die elektronika nie. Eersdaags word 'n faksmasjien vir sowel ons sekretaris-tesourier as vir die redaktrise van ons tydskrif aangekoop. Prof. Theron het onlangs 'n E-pos adres verkry en vir die gerief van lede verskyn dit reeds onder "Sekretaris-tesourier" voorin hierdie uitgawe van die tydskrif.

Frederick de Jager

FOCUS ON ... FOKUS OP ...

In each edition of ENCEPHALARTOS, we focus on one cycad species, in the form of an in-depth article in layman's language. In this edition the spotlight falls on:

In elke uitgawe van ENCEPHALARTOS fokus ons op een broodboomsoort, in die vorm van 'n in-diepte-artikel in leketaal. In hierdie uitgawe val die kollig op:

MACROZAMIA LUCIDA L.A.S. Johnson

Roy Osborne
Cycad Connections, P.O. Box 244, Burpengary, Queensland 4505, Australia

DISTRIBUTION OF *MACROZAMIA LUCIDA*

Figure 1 Map: Distribution of *Macrozamia lucida*. The main population is from Brisbane and slightly to the north, with very small groups near the New South Wales border.

INTRODUCTION

Although by present counts, there are 38 or 39 different species in the genus *Macrozamia* (Hill & Osborne, *in preparation*), only one - *Macrozamia moorei* - has thus far been featured in this magazine's "Focus on ... " series (Osborne 1997). On a more personal note, as I glance up right now from this desk in my home study, the early morning light shows a long line of thickly-wooded hills about 5 km away. It is in these hills where *Macrozamia lucida* finds its home. [Slightly further in the distance I can make out another line of hills where *Lepidozamia peroffskyana* and *Macrozamia miquelii* are quite prolific - do any other members of our Society have the privilege of seeing three different wild cycad stands from their home?]

Figure 2 *Macrozamia lucida* on the lower slopes of Mount Ngungun, one of the Glasshouse Mountains, and site of collection of the species by Dr Lawrie Johnson in 1951.

Relatively unknown outside its native territory in south-east Queensland, *M. lucida* - the biggest of the Section *Parazamia* cycads - is an attractive, undemanding and

highly rewarding plant for containers, garden plantings and for landscape work. It deserves much greater attention than it presently receives. I hope this article will stimulate a greater interest in this species.

Figure 3 ***Macrozamia lucida*****. Leaf detail showing the characteristic prominent callous bases at the point of insertion of each leaflet along the rachis. Plant at Mount Mee, Queensland.**

DISCOVERY

The first collections of *Macrozamia lucida* were incorrectly referred to as *M. spiralis*; this name was also used in the early literature. The situation was resolved only in 1951 when the late Dr Lawrie Johnson collected a specimen from the southern side of Mount Ngungun (one of the Glasshouse Mountains in south-east Queensland) and filed this in the New South Wales National Herbarium (accession number NSW 40668). Johnson used this as the type specimen in his official description of *M. lucida* which was published in the *Proceedings of the Linnean Society of New South Wales* in 1959. The specific epithet *lucida* derives from Latin *lucidus* for "shining/gleaming/glossy" and refers to the particularly glossy foliage which is characteristic for this species.

DISTRIBUTION AND ECOLOGY

The distribution of *Macrozamia lucida* starts around Brisbane in south east Queensland. Near the city, it occurs in low hills in the Brookfield, Kenmore, The Gap, Enoggera and Mount Coot-tha areas. A little more distant, it is found northwards, scattered throughout the entire D'Aquilar range, the Glasshouse Mountains and into wooded sites still further north to Maleny (Figure 1).

Figure 4 ***Macrozamia lucida*****, male cones at the time of pollenshedding. Photo: Will Kraa.**

The southern distribution for this species has been a matter of some conjecture, discussed in a previous article in this magazine (Forster & Jones 1995). Confusion was partially resolved when *Macrozamia johnsonii* was described (Jones & Hill 1992) as some folk (including Johnson) had previously mistaken juveniles of the latter species for examples of *M. lucida*, giving rise to claims that *M. lucida* occurred in New South Wales. Curiously, recent sightings by a number of cycad enthusiasts have lead to the validation of a few isolated groups of *M. lucida* far to the south; one area being near the New South Wales border and the other at Pottsville Nature

Figure 5 *Macrozamia lucida*, **female cone at the stage just prior to pollination. Photo: Will Kraa.**

Reserve, still further to the south. The phenomenon of one or two specimens greatly disjunct from the centre of distribution for cycad species is well-known to students of *Encephalartos*, e.g. the remarkable distribution pattern for *E. laevifolius* (Goode 1989). It may be that in past times these cycads had a much wider distribution and the present day stands are relictual fragments from those earlier populations.

Generally, *Macrozamia lucida* is found in the vegetational type described as wet sclerophyll forest, sometimes near streams in the lower-lying areas and sometimes on higher slopes. It is usually in shady situations, generally understorey to various *Eucalyptus* tree species. These wooded areas are prone to occasional fires but there is no documented evidence that growth and reproduction of *M. lucida* is dependent on a fire cycle. The climate is typically subtropical; day/night summer temperatures are about 28/21°C while the winters are cooler at 20/8°C. The annual rainfall is about 1000 mm, mainly during the summer periods, and is accompanied by high relative humidities.

The thrip insect *Cycadothrips chadwickii* is found in male cones of *Macrozamia lucida* plants and may be a pollination agent (Forster *et al.* 1994).

DESCRIPTION

[Morphological dimensions quoted in the description of this species are taken largely from Jones (1993).]

1. STEM

Like many of the Section *Parazamia* species, *Macrozamia lucida* has a large underground caudex, measuring 25–40 cm in diameter in mature specimens by about 40 cm in length. This may become exposed in disturbed areas to give the impression of plants having small trunks. The trunk is occasionally branched dichotomously so that older plants sometimes give a "clumping" effect.

2. LEAVES AND LEAFLETS

Stems of mature specimens of *Macrozamia lucida* carry 20–40 leaves (considerably more than other species in the Section *Parazamia*). The leaves (Figure 2) are typically 80–100 cm in length, but both leaf length and leaf number are greatly influenced by light, nutrient and moisture availability. The petiole is about 25% of the leaf length, swollen and slightly woolly at the base, 3–7 cm wide and rounded in cross-section or only slightly convex on the upper side. The absence of reduced leaflets or spines on the petiole distinguishes this taxon from *M. miquelii* and other Section *Macrozamia* species. The rachis is more-or-less straight, a feature which separates *M. lucida* from many of the other Section *Parazamia* species which have spirally twisted rachises. Leaf flushes alternate with cataphyll production, the cataphylls degenerating to brownish, persistent and sharply pointed structures about 3 cm long.

Each leaf bears about 50–100 leaflets more-or-less oppositely along the rachis, fairly widely spaced towards the base and more crowded and forward projecting towards the tip. Leaflets are in a flattish plane or inserted at an angle such as to give a slightly keeled appearance to the leaf. There is a characteristic prominent white callous swelling at the point of insertion of each leaflet (Figure 3). The leaflets are flat, deep green in colour, highly glossy and 15–35 cm long by 0.7–1.1 cm wide. Stomata are borne on the lower leaflet surfaces only.

3. REPRODUCTIVE STRUCTURES

Male cones are borne in succession so that all stages are often present together on the same plant. They measure typically 12–18 cm by 3.5–5.0 cm, are cylindrical in shape (Figure 4), straight at first but becoming curved at the time of pollen shedding and recumbent thereafter. A vivid light green at emergence, they turn yellowish at the time of pollen release and then dry to a brown colour. Generally only one or two cones (rarely up to 8) are produced at any one time and these are supported

Figure 6 *Macrozamia lucida*, **female cones just prior to the seed-shedding stage. Photo: Will Kraa.**

by peduncles 2 cm in width which extend up to 30 cm in length as the cone matures. The male cone axis holds numerous wedge-shaped microsporophylls which measure 2.5–4.0 cm by 1.2–2.0 cm and extend into a sharp upwards-projecting apical spine up to 3 cm long.

Female plants bear 1–2 ovoid to barrel-shaped green-coloured cones (Figures 5, 6), 12–20 cm long by 6–10 cm wide, on a peduncle 3 cm wide and extending to 20–30 cm long as the cone develops. Female sporophylls are typically 3–5 cm by 2–4 cm in dimension, obovate in profile and, like their male counterparts, terminate in a sharp, upwards-pointing spine up to about 3 cm long.

Fertile seeds typically measure about 2.0–2.5 cm by 1.5–2.0 cm, are ovoid to oblong in shape and have a dark orange sarcotesta at maturity (Figures 7, 8). The ripe seeds are said to be highly attractive to bandicoots, rats, possums (Jones 1993) which feed on the fleshy outer layer and thus act as dispersal agents for the seed kernels.

Figure 7 *Macrozamia lucida*, **female cone scale with seeds. Photo: Will Kraa.**

AFFINITIES

Although it is regarded as a taxonomically distinct species within its own group (the *Macrozamia lucida* group in Section *Parazamia*), this species shares some affinities with *M. miquelii* and other members of that

Figure 8 *Macrozamia lucida*, **seeds from the current year with seedlings from the previous year immediately below the mother plant, Mount Mee.**

Figure 9 *Macrozamia lucida*, **with other cycads in cultivation in a nursery environment in Queensland.**

group - which includes *M. cardiacensis, M. douglasii, M. longispina* and *M. mountperriensis*. In some respects, *M. lucida* is the "odd one out" in the otherwise fairly clear-cut division of the genus into Section *Macrozamia* and Section *Parazamia*.

Hybrids of *M. lucida* and *M. miquelii* are known to occur in the Brisbane Forest Park where these two species occur in close proximity (Jones 1993).

Figure 10 Noelene Ray, of Deception Bay Palms and Landscape Supplies, with specimens of *Macrozamia lucida* **at a recent cycad promotion at that nursery.**

CULTIVATION AND CONSERVATION

A somewhat untidy plant in the wild, *Macrozamia lucida* responds well in cultivation, giving more vigorous growth, more foliage and greater reproductive potential than its wild-grown counterparts. It is very successfully grown in containers or in garden plantings. It is not demanding with respect to soil type, water frequency, nutrition or temparature but responds well to modest attention. It will tolerate full sun, but performs better in semi-shady situations.

This species is gaining interest from Queensland landscapers who are beginning to appreciate its potential in commercial and residential development projects. It is not yet generally available at

nurseries apart from those of the specialist cycad growers (Figures 9, 10). It is easily grown from seed but, like many of the *Macrozamia* species, is rather slow in its growth pattern over the first few years.

All cycads in Queensland are protected by the State's Nature Conservation Regulations. Fortunately, *Macrozamia lucida* is considered "common" in terms of current assessments (Forster 1996) and occurs in considerable abundance in National Parks and State Forests, where it is afforded additional legislative protection, as well as on private leasehold or freehold land. My own inspections of local stands of this species have shown high levels of recruitment, often with small "forests" of seedlings germinating near their parent plants but also with better dispersal giving rise to plants in less crowded sites.

ACKNOWLEDGEMENTS

Paul Forster of the Queensland Herbarium was good enough to review the first draft of this article. Will Kraa kindly supplied many of the photographs; others were taken by the author. Kerry Rathie, Robert Ritchie and Stan Walkley passed on useful information about *Macrozamia lucida*.

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SHORT COMMUNICATIONS / KORT MEDEDELINGS

GROWING CYCADS IN FLORIDA
2. SOIL

Tom Broome

9128 Golden Gate Boulevard, Polk City, Florida 33868, U.S.A.

Received 3 April 1998

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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 almost 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 become 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 I–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 can 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 225 one gallon pots per yard. If you are growing rare species of *Zamia*, even if you lose only one plant out of 225 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.

Through the years, I have always had problems with the "parazamia" type of *Macrozamia*. For the last two 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.

REQUEST FOR SPECIMENS OF *ANTLIARHINUS* SPECIES (CYCAD WEEVILS)

Max Barclay
4th floor labs, Department of Entomology, the Natural History Museum, London SW7 5BD, United Kingdom

Received 21 September 1998

WANTED: Fresh specimens of cycad weevils, *Antliarhinus* spp., for molecular systematic work.

Discovering the systematic position of *Antliarhinus* would enable us to infer whether it was primitively associated with these ancient plants, or a more recent colonist. This would be very relevant to the study of the history of insect-plant interactions.

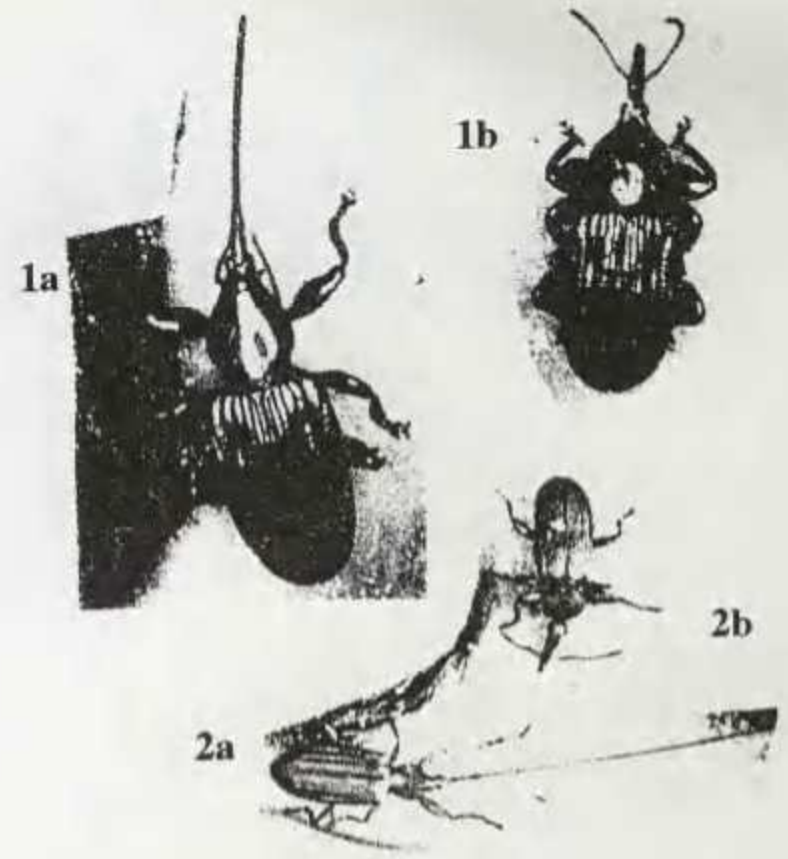
DNA analysis provides another line of evidence, to support morphological theories.

Antliarhinus is exclusively associated with cycads. Adults live for several years, lying dormant under bark or leaf brackets when the cycad is not producing strobili. The long rostrum of the female is used to drill holes in the sporophylls of female cones, usually into the ovules, in which the eggs are laid.

Antliarhinus adults or larvae should be sent **alive, or recently preserved in strong ethanol (ethyl alcohol, brandy, or cane spirit) (pinned museum specimens are sadly of no use).**

I am happy to identify specimens. Postage will be refunded. (E-mail M.Barclay@nhm.ac.uk)

[The author uses 96% ethanol to preserve the weevils. Please send specimens directly to the author. - **Editor.**]



1. *Antliarhinus peglerae*, 2. *Antliarhinus zamiae* (a = female, b = male).

INSECTS ON *MACROZAMIA* (ZAMIACEAE)

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Received 27 August 1998

A recent article in "*Encephalartos*" by Chadwick (1998) presents a considerable amount of data concerning insects that he has found either on or near plants of *Macrozamia communis*. There are a number of points in this article that we feel deserve comment as Chadwick has apparently deliberately misrepresented some of our observations that were previously published (Forster *et al.* 1994).

Chadwick (1998) commences his discussion with the statement "Forster *et al.* (1994: 218) claimed to have published the first observations on insects (about 12 species) associated with *Macrozamia* spp. However, publications by Westwood (1886), Baird (1939), Ornduff (1990), Mound (1991) and Chadwick (1993) did not entirely overlook insects on this genus of cycad". As we cited nearly all of these papers (including Chadwick [1993]), it is difficult to see how Chadwick (1998) has arrived at this curious conclusion. What we did say on p. 218 of our paper was "These are the first published observations on the insect life associated with *Cycas cairnsiana, C. megacarpa, C. ophiolitica,* and *C. platyphylla* and all of the *Macrozamia* species" (*M. crassifolia, M. fawcettii, M. douglasii, M. johnsonii, M. longispina, M. lomandroides, M. lucida, M. machinii, M. miquelii, M. mountperriensis* and *M. parcifolia)*. It is worth noting that in most of these earlier papers, the cycad species concerned are additional to those that we covered and from different geographical areas. We assume that the paper by Ornduff (1990) (omitted from Chadwick's 1998 reference list) refers to the work on *M. communis* in central New South Wales; however, the reference to Mulder (1984) remains obscure and we would like to read it if it exists. [Dr Chadwick recently informed me that the Mulder reference is: MULDER, R.H. 1984. *Xyroscelis crocata* an uncommon buprestid. *Circ. ent. Sect. RZS* No. 34: 4, and that the omitted Ornduff reference is: ORNDUFF, R. 1990. Geographic variation in reproductive behaviour and size structure of the Australian cycad *Macrozamia communis* (Zamiaceae). *Amer. J. Bot.* 77(1): 92–99. - **Editor.**] Baird (1939), Connel & Ladd (1993) and Ornduff (1991b) has studied *M. riedlei* in Western Australia, Ornduff (1989) studied *Lepidozamia peroffskyana* in

north-eastern New South Wales and Ornduff (1991a) studied *Cycas media* near Cairns in north-east Queensland. The fact remains that we were the first to publish observations on insects associated with reproductive structures of a number of cycad species from Queensland and New South Wales. It is also worth noting that our 1994 paper was published in the well reputed journal "*Biotropica*" which is peer refereed.

In 1994 we documented a small number of insects found in cones. In most cases these taxa were obviously interacting with the cycads in terms of spending parts of their life cycle in the plant or by feeding on plant parts. We have yet to conclusively prove what is the actual relationship between these insects and the cycads involved and it is hoped that future workers can repeat obeservations to the standard of e.g. Donaldson (1997), Norstog & Fawcett (1989) or Norstog *et al.* (1992). While it is pleasing that Chadwick (1998) has presented quite voluminous data on insects around *M. communis*, we wonder whether how many of these observations are of value in furthering our understanding of cycad biology. Apart from those species that eat parts of cycads, complete part of their life cycle in cycads, or that may be associated with transfer of pollen, what relevance do any of the others have? As a comparison it would be possible to draw up a list of insects associated with a white sheet back illuminated by a light (a common method used by collectors of insects), but this does not mean that there is any relationship between the sheet and the insects concerned. Because of the way that Chadwick (1998) has presented his data it is difficult to determine just how many insect taxa are directly associated with *M. communis*; however, a casual and generous interpretation of his listing would indicate that less than 60 species are involved. We would like proof that spiders, mites, scorpions, molluscs and geckos really have anything at all to do with *M. communis* apart from utilising its physical mass. As Chadwick commented in his last paragraph, his listing should be regarded as preliminary.

Now that the great era of describing new taxa of cycads is drawing to a close, researchers need to address the long-term conservation of the different species. It is now generally acknowledged that insects play a critical role in cycad biology, particularly in pollination (Norstog & Nicholls 1997). Determining both this role and the invertebrate diversity involved remain exciting fields of study for cycad students.

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NUUS OOR DIE TRANSVAALSE STREEKTAK VAN DIE VERENIGING

Hanneke Grobbelaar
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Ontvang 1 Oktober 1998

PROGRAM VIR 1999

SATERDAG 6 FEBRUARIE 1999: Ons besoek die tuin van **dr Martin Bruwer** in Montana Park, Pretoria. Vegader asseblief om 14h00 by "Cycad Kwekery" in Besembessieweg, Montana Park. Bring asseblief u eie versnaperinge.

SATERDAG 6 MAART 1999: Ons vergader om 14h00 by die hoofgebou van die Nasionale Botaniese Instituut. **Dr Heidi Anderson** van die Nasionale Botaniese Instituut, Pretoria, sal ons toespreek oor: "**Cycads as living fossils**"

Na die praatjie sal belangstellendes die herbarium waarin die fossiele geberg word kan besoek.

VERSLAE OOR ONLANGSE VERGADERINGS

Op Saterdag 1 Augustus 1998 het dr John Donaldson van Kirstenbosch ons vergas met 'n baie interessante geïllustreerde praatjie. Die samevatting van die praatjie wat dr Donaldson voorsien het verskyn hieronder:

LIFE IN THE SLOW LANE: THE BIOLOGY OF CYCAD POPULATIONS

John Donaldson
Kirstenbosch Botanical Garden, Private Bag X7,
7735 Claremont

What to do in a variable environment? An examination of cycad life histories (Summary of a talk given to members of the Cycad Society in Pretoria)

Cycads are a fascinating group of plants, not only because of their ancient history and taxonomic distinctiveness, but also because of their interesting biologies. Most enthusiasts and taxonomists are aware of the many morphological and behavioural (e.g. cone number, coning frequency) differences between cycad taxa, but what do these differences mean for cycad populations. In particular, what are the consequences of cycad growth form and reproductive behaviour for cycad population structure? I have concentrated here on just two aspects of cycad biology, the fate of seeds, and variability in growth form and reproductive behaviour.

The fate of seeds

Many collectors have expressed the opinion that cycad seeds appear to be of little importance in cycad populations because most seeds die before germinating. As a result, collectors feel that they should be allowed to collect seed from the wild so that these seeds do not go to waste. The fate of seeds is also of interest to population biologists because, the argument goes, long-lived plants can persist for long periods as adults without the need for recruitment of new plants from seeds. If a cycad lives for several hundred years, then only two seeds need to survive in that period to replace the male and the female plants that gave rise to the seeds. The critical question is, how many seeds are required to maintain a healthy population and what happens when you change seed numbers.

Over the past eight years, we have been doing research on seeds in populations of *Encephalartos cycadifolius* and *E. villosus*. We asked two questions: 1) Do populations need seeds to survive for a period of *ca*. 250 years and, 2) Does the number of seeds in the population matter? To answer the first question we don't need to look at seeds, but at adult plants. If established plants in the population are continually dying, then the population will decrease unless new plants are being recruited from seeds. Eight years ago we started marking individual plants and monitoring their fate during annual visits to these populations. What we found was that populations of *E. cycadifolius* experienced hardly any mortality. Individual stems did die off but most plants had multiple suckers so that the death of a single stem did not affect the whole plant. What this means over our arbitrary time frame of 250 years, is that almost no plants are expected to die during this period. As a result, seeds are not very important for the survival of the population. We need to bear in mind that this conclusion only applies to the conditions that prevailed during the eight years we have been monitoring the plants. Catastrophic einvironmental events could change our conclusions completely.

In contrast, we recorded many deaths in *E. villosus* populations. In one population, the plants were growing in loose humic soil and were often uprooted. The estimated time for half the original population to die out ranged from 41 years to 125 years. What this means is that the population needs to be constantly recruiting from seedlings or it will die out. In other words, seeds are an important component of *E. villosus* population dynamics.

When we manipulated seed numbers in *E. cycadifolius* populations, we found that seeds are quickly dispersed to safe sites, usually caches under bushes or in the lee of large rocks. Seeds that are not dispersed (the vast majority) soon desiccate and die. The fate of dispersed seeds is density dependent - if additional seeds are added, more seedlings survive. This means that harvesting of dispersed seeds would have a negative impact on recruitment but that non-dispersed seeds can be harvested.

The situation with *E. villosus* was quite different. The seeds were not dispersed far from the parent plant. Monkeys and birds ate the fleshy sarcotesta and discarded the seeds in the vicinity of the parent plant. When we manipulated these seed numbers, we found that more seedlings were recruited from patches where we had added more seeds. In other words, each seed counts. With the high mortality of *E. villosus* adults, seeds are obviously important for the survival of these populations.

The conclusion seems quite obvious - *E. cycadifolius* populations comprise mostly long-lived adults, seeds have low survival and recruitment is dependent on the limited chance that seeds will reach a safe germination site. In contrast, *E. villosus* adults suffer high mortality, seeds have a high chance of survival and the populations persist due to constant recruitment of new individuals. What is clear from these examples is that the importance of seeds is tied to the overall life history of the plant.

Generalizations about seeds being of little importance do not hold.

Variability in life histories

With the two extreme examples of *E. cycadifolius* and *E. villosus*, the question is whether life history characters such as growth form and coning behaviour are fixed characters. If they are, then we can make predictions about population structure and responses to various environmental events. Many cycad growers will have noticed changes in growth form in garden plants. For example, *E. villosus* occurs as a single-stemmed plant in nature but often produces multiple suckers in gardens. In nature, growth form sometimes changes along environmental gradients. *E. ferox* forms large clumps in exposed sunny sites but tends to have single stems in shaded sites. Similarly, *E. altensteinii* cones frequently in open grasslands but almost never in enclosed woodlands. A study of growth form and population structure in the *Macrozamia riedlii* complex from West Australia showed that plants in arid areas tended to have large arboreal stems compared with the small subterranean stems for plants from wetter regions. There was also some indication that mast seeding (synchronised coning with no reproduction between mast years) occurs in dry areas but that reproduction occurs more regularly in moist areas. As a result of changes in life history phenomena, population structure varied between sites with a preponderance of old mature plants in populations from arid areas and a predominance of juveniles and young mature plants in populations from wetter regions. The implication is that some life history traits can vary within a cycad species and that this will have a significant influence on how cycad populations respond to changing environmental conditions.

A few years ago I suggested that species of *Encephalartos* could be divided into four response types. Over the past five years, I have looked at variation in life history parameters and population structure for each of these response types. What I have found is that extreme types represented by species such as *E. cycadifolius* and *E. villosus* show relatively little variation. As a result, the structure of different populations tends to be quite similar and it is therefore possible to predict what will happen to these populations under different conditions (e.g. climate, seed harvesting). However, there is a lot of variation in the two intermediate response types typified by species such as *E. altensteinii, E. longifolius,* and *E. middelburgensis* and it is much more difficult to predict how these populations will respond to changes in their environment.

Despite difficulties with some response types, the studies so far on the relationship between cycad life histories and population dynamics have helped us to better understand the dynamics of cycad populations and the factors that drive them.

Op Saterdag 5 September 1998 het **mnr Martin Schwellnus** (Figuur 1) van Port Elizabeth 'n besonder boeiende praatjie met talle kleurskyfies aan ons lede aangebied. 'n Samevatting van die praatjie wat baie belangstelling gaande gemaak het word hieronder, tesame met 'n kort opsomming in Engels, gegee.

Figuur 1 Martin Schwellnus by *Encephalartos horridus* plante in die tuin van Nat en Hanneke Grobbelaar. (Figure 1 Martin Schwellnus standing between two *Encephalartos horridus* specimens in the garden of Nat and Hanneke Grobbelaar.)

EEN EN ANDER OOR OOS-KAAPSE BROODBOME

Martin Schwellnus
Posbus 7045, Newton Park, 6055 Port Elizabeth

Die verspreiding van Oos-Kaapse broodboomspesies toon oorvleueling of aangrensing tussen twee of meer

spesies in minstens een gebied vir elke spesie. Die uitsondering is *Encephalartos cycadifolius* waar tot datum geen duidelike oorvleueling of enige intermediêre vorme gevind is nie.

Midde in hierdie verspreiding en variasie wat in die Oos-Kaapse broodbome voorkom is waarskynlik *E. horridus* wat tussen *E. longifolius, E. lehmannii* en *E. arenarius* ingedruk lê en intermediêre vorme met al drie spesies toon.

E. horridus beskik waarskynlik oor die grootste fenotipiese variasie van al die Oos-Kaapse spesies in sowel pinna, ragis en keël voorkoms. Plante van dieselfde kolonie in die sentrale *E. horridus* verspreidingsgebied kan ragis variasie vertoon vanaf die kenmerkende gekrulde ragispunt tot reguit of effe geboë punte. Eweneens kom pinnavorme voor wat wissel van die stekellose *E. lehmannii*-agtige tot tipiese *E. trispinosus*, asook plante met duidelik gedefinieerde gedraaide *E. horridus* pinnas. Pinnas kan ook wissel vanaf kompakte geordende tot uitgespreide deurmekaar vorme. Die voorste punt kan ook wissel vanaf 'n skamele 2 cm tot 5 cm van punt tot eerste stekel.

Addisionele variasie word by die keëls aangetref wat wissel van die tradisionele donkerbruin keël tot feitlik groen met weinig kleurbedekking. Hierdie kleurverskille kan nie aan grond- of reënvalverskille toegeskryf word nie aangesien plante in dieselfde grond en eweveel blootstelling aan reën en wind verskillende keëlkleure vertoon. Dit moet dus aanvaar word dat hierdie variasie geneties van aard is.

E. horridus oorvleuel met *E. lehmannii* by Glenconnor waar 'n intermediêre vorm voorkom wat soms 'n tipiese *E. trispinosus* voorkoms vertoon terwyl party plante na *E. lehmannii* en andere na *E. horridus* neig. Die gekrulde ragispunt is minder algemeen. Namate wes beweeg word na Perdepoort neem die stekels af totdat stekels op slegs enkele pinnas van sommige plante voorkom en die plante baie soos tipiese *E. lehmannii* plante vertoon.

In die Elandsriviervallei word *E. longifolius* aangetref met oorwegend stekels op hul groen blare en heel dikwels gekrulde ragispunte. Hierdie vorme word toegeskryf aan kruisteling met *E. horridus* wat aan die laer berghange en vlaktes aan die noordekant van die Elandsrivier voorkom.

Aan die oostekant word die sogenaamde blou *E. arenarius* aangetref in die oorgangsgebied tussen *E. horridus* en *E. arenarius*. Kenmerkend van die plante in die oorgangsgebied is die blou skynsel van die blare maar ook die tipiese groen keël en gekrulde ragispunt. Die grootte van die plante neem vanaf oos na wes af terwyl die groen keëlkleur behou word.

'n Bevolking plante wat die tipiese fenotipiese eienskappe van blou *E. arenarius* plante vertoon met gekrulde ragispunte en kompakte breë blou pinnas sonder enige duidelike draai in die stekels, is onlangs in die Zuurberge gevind waar dit midde-in 'n normale *E. longifolius* verspreidingsgebied voorkom. Manlike keëls is tipies donkerkleurig en klein in vergelyking met die van *E. horridus* en *E. arenarius*. Vroulike keëls was nog nie beskikbaar vir vergelykings nie.

E. longifolius lewer ook twee sogenaamde blou variante op. Die bekendste is seker die Kareedouw blou. Die plante vertoon 'n tipiese blou skynsel wat tot 'n mindere of meerdere mate deur ouer pinnas behou word. Met *E. lehmannii* oorkant die berg die naaste blou spesie aan hierdie bevolking van blou *E. longifolius* en as gevolg van die afwesigheid van stekels op die pinnas of gekrulde ragispunte, bestaan daar rede om te glo dat kleur in hierdie bevolking waarskynlik eerder van *E. lehmannii* afkomstig is as van *E. horridus*. Ondersteuning hiervoor word verder gevind in die blou *E. longifolius* plante van die Perdepoort omgewing waar *E. lehmannii* en *E. longifolius* langs mekaar groei. Hierdie *E. longifolius* bevolking toon die tipiese blou pinna-voorkoms wanneer nuwe blare geproduseer word. Die kleur word egter verloor namate die pinnas ouer word en 'n tipiese donkergroen kleur op 'n later stadium aanneem. Plante in hierdie kolonie toon egter meer dikwels tot 'n mindere of meerdere mate hakies soortgelyk aan dié van die Elandsrivier op hul pinnas.

In die geval van *E. lehmannii* kom hakies vry algemeen in 'n baie lae frekwensie dwarsdeur die bevolking voor en is dit nie tot spesifieke kolonies beperk nie.

Benewens die voorkoms van die ragis se krulpunt in *E. horridus* en sy intermediêre vorme kom hierdie ragiskrulpunt ook voor in *E. arenarius, E. latifrons* en sommige bevolkings van *E. trispinosus* in die gebied waar *E. arenarius* en *E. latifrons* aangrensend tot *E. trispinosus* aangetref word. Plante wat die neiging tot die terugkrul van stekels vertoon word ook vry algemeen saam met plante wat gekrulde ragispunte vertoon, aangetref.

Intermediêre vorme met *E. caffer* is nog nie in die natuur geïdentifiseer nie ten spyte daarvan dat daar 'n kolonie tussen die *E. lehmannii* en *E. longifolius* verspreidingsgebied in die Zuurberge voorkom. 'n Kolonie *E. caffer* kom ook in die verspreidingsgebied van *E. princeps* voor terwyl dit ook met *E. latifrons* en *E. altensteinii* oorvleuel.

Soortgelyk kan, ten spyte van oorvleueling, nog geen intermediêre vorme tussen *E. princeps* en *E. friderici-guilielmi* gevind word nie. *E. altensteinii* en *E. villosus* oorvleuel feitlik in hul totale verspreidingsgebied. Verskeie vorme van *E. altensteinii* kom voor en die

voorkoms van hibriede tussen hierdie twee spesies kan nie uitgesluit word nie.

Gegewe die voorafgaande, sal die beskrywing van nuwe spesies in die Oos-Kaap met groot oorleg en slegs na baie veldwerk oorweeg moet word.

NOTES ON THE CYCADS OF THE EASTERN CAPE

Summary (by Nat Grobbelaar) of talk by
M.R. Schwellnus

The distribution of any of the species of this region, except *E. cycadifolius* either overlap with the distribution of at least one other species or adjoins same.

The distribution of *E. horridus* overlaps with that of *E. longifolius, E. lehmannii* and *E. arenarius*. As a result, *E. horridus* appears to show the biggest morphological variation of all the Eastern Cape species. This variation is considered to be the result of hybridization. Characters of *E. horridus* that are most pronounced in the different intermediate forms include the bluish colour of the foliage, the downward curling of the apical part of the rachis and the spininess of the leaflets. All these characters do, however, not necessary manifest themselves in a particular intermediate group. In some cases considerable morphological variation is apparent between individuals of a given intermediate population.

Although a colony of *E. caffer* is known to exist between the distributional areas of *E. longifolius* and *E. lehmannii* in the Zuurberg, no anomalous forms of *E. caffer* that can be attributed to hybridization have been observed in this area. In other parts of the Eastern Cape, the distribution of *E. caffer* overlaps with that of *E. princeps, E. latifrons* and *E. altensteinii*. However, in none of these areas have possible *E. caffer* hybrids been observed.

Despite the fact that the distribution of *E. princeps* and *E. friderici-guilielmi* also overlap, hybrids between these two species have so far not been found in the wild. The distribution of *E. altensteinii* and *E. villosus* overlaps very extensively and various forms of *E. altensteinii* is known. It therefore is quite possible that these species also hybridizes in nature.

From the above, it is evident that extensive field work should be undertaken and considerable caution be exercised before any attempt is made to describe a new cycad taxon from the Eastern Cape.

VERANDERING IN BLAARVORM BY *CERATOZAMIA HILDAE*

Nat Grobbelaar
Posbus 15357, 0039 Lynn-oos, R.S.A.

Toe een van my *Ceratozamia hildae* plante vroeër vanjaar twee nuwe blare maak was ek verbaas om te sien dat hulle gladnie soos die tipiese blare vertoon nie. Soos op die meegaande foto (Figuur 1) gesien kan word, het die ou blare van die vorige seisoen die tipiese klossies van 3 tot 8 relatief smal pinnas op gereelde afstande op die rachis gedra. Die nuwe blare het egter soos blare van *Ceratozamia latifolia* vertoon met slegs twee teenoorstaande breë pinnas op gereelde afstande op die ragis. Naby die basis van die een nuwe blaar was daar egter een klossie van drie pinnas.

Figuur 1 *Ceratozamia hildae* **met tipiese ou blare en ongewone nuwe blare. (Figure 1** *Ceratozamia hildae* **with typical old leaves and unusual new leaves.)**

SWITCH IN THE LEAF SHAPE OF *CERATOZAMIA HILDAE*

Nat Grobbelaar
P.O. Box 15357, 0039 Lynn East, R.S.A.

When one of my *Ceratozamia hildae* plants recently produced two new leaves, I was amazed to notice that the new leaves were quite unlike the earlier typical ones. As can be seen from the photograph (Figure 1), the old leaves bore the typical clusters of 3 to 8 narrow leaflets at regular intervals on the rachis. The new leaves, on the other hand bore pairs of rather wide leaflets similar

to those of *Ceratozamia latifolia* at regular intervals on the rachis. However, near the base of one leaf a cluster of three leaflets can be seen.

BOTANICAL TERMS OFTEN ENCOUNTERED IN CYCAD PUBLICATIONS
Part 1

Nat Grobbelaar
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Received 1 October 1998

It is inevitable that botanical terminology that is not well-known to the layman will appear in publications relating to cycads, especially in articles in which novel species are described. To assist readers in this regard, a list of the more common botanical terms that readers of cycad literature might encounter have been collected from the glossaries of various publications which will be acknowledged at the end of the last part of the present list. For greater clarity, the definitions have been augmented with sketches. After each term, the Afrikaans equivalent is provided in brackets.

abaxial (abaksiaal) - The side of a lateral organ away from the axis; the lower side (dorsal side) of a leaf or cone scale.

abscission (afsnoering, onthegting) - Shedding of plant parts such as leaves either through old age or prematurely as a result of stress.

acaulescent (akoulies) - Without an above-ground stem.

accessory roots (bywortels, adventiewe wortels) - Lateral roots developing from the base of the trunk as opposed to those arising from the seed root system. (Synonym for "adventitious roots").

acropetal (akropetaal) - Progressing from the base towards the apex.

acroscopic (akroskopies) - Directed towards the apex of a leaf; the first lateral vein or leaflet branching off towards the apex of the leaf.

aculeate (gestekel, geakuleëer) - Bearing short, sharp prickles or spines.

acuminate (toegespits, geakumineer) - Tapering into a long, drawn-out point.

acute (skerppuntig) - Bearing a short, sharp point.

adaxial (adaksiaal) - The side of a lateral organ next to the axis; the upper side (ventral side) of a leaf or cone scale.

adnate (geadneer) - Fused together tightly.

aff. or affinity (aff. of affiniteit) - A botanical reference used to denote an undescribed species closely related to an already described species.

after-ripening (naryping) - The changes that occur in a dormant seed that renders it capable of germination.

alternate (afwisselend) - Arrangement of appendages, such as leaves or leaflets, in a single plane but on opposite sides of the axis at successive longitudinal positions.

anastomosing (anastomoserend) - Forming a network with crossed links; as in the venation of the leaflets of some cycads.

angiosperms (angiosperme, blomplante) - A group of plants that bear seeds that are enclosed in an ovary. (Synonym for "Flowering Plants").

anomalous (anomaal) - An abnormal or freak form.

apical dominance (hoofknop oorheersing) - The tendency of a stem apex, through the hormones it produces, to prevent branches or suckers to develop lower down on the same axis.

apiculate (geapikuleer) - With a short, pointed tip or beak.

apogeotropic (apogeotropies, apogravitropies) - Said of roots which grow upwards against gravity - as in coralloid roots. (Synonym for the more appropriate apogravitropic).

appendage (aanhangsel) - A small growth attached to an organ.

arborescent (boomvormig) - With a tree-like growth habit.

armed (bewapen) - Bearing spines, sharp teeth, prickles, etc.

articulated (geartikuleer) - With a joint in the attaching stalk.

asexual reproduction (aseksuele of geslaglose of vegetatiewe voortplanting) - Reproduction by vegetative means without the fusion of sexual cells. (Synonym for vegetative reproduction).

attenuated (geattenueer) - Drawn out.

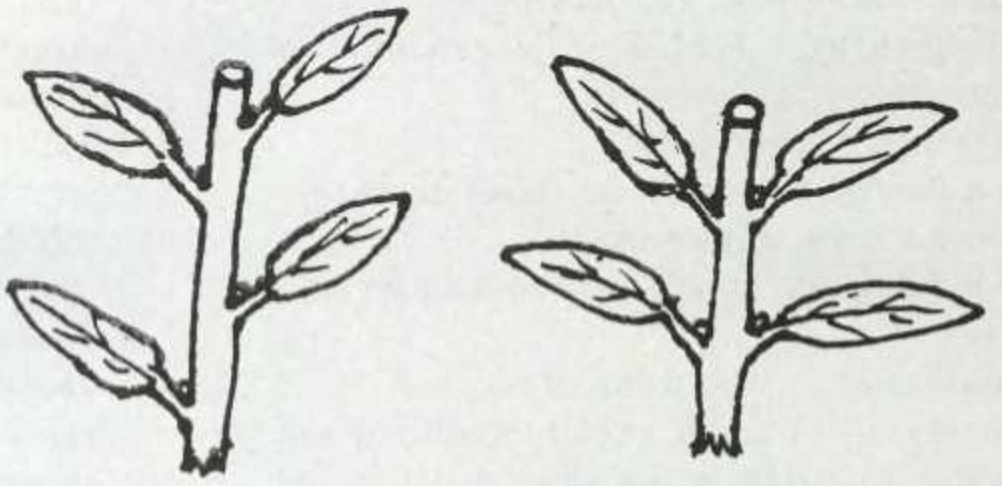
axil (oksel) - Angle formed between a leaf and the stem bearing it.

basipetal (basipetaal) - Progressing from the apex towards the base.

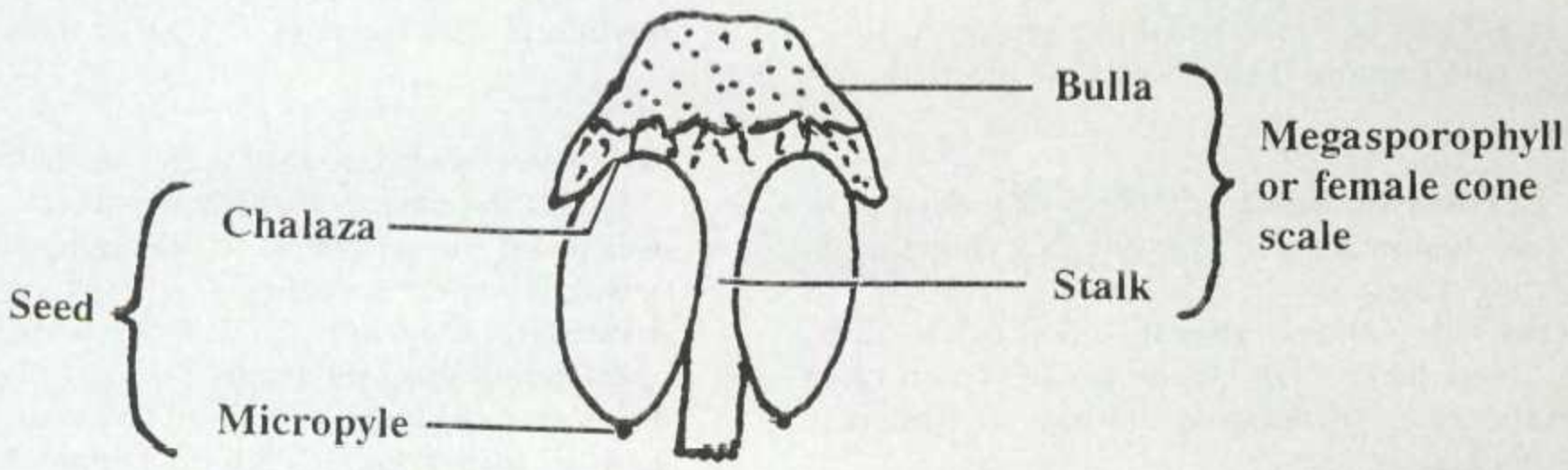
basiscopic (basiskopies) - Directed towards the base of a leaf; the first lateral vein or leaflet branching off towards the base of the leaf.

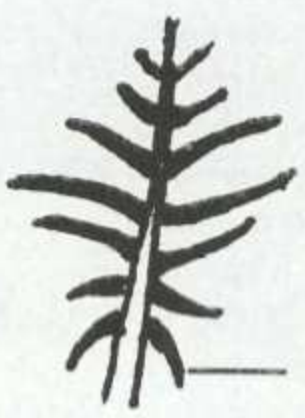
bifid (enkelspletig) - Divided into two lobes by a

Circinate



Alternate Opposite
arrangement of leaves





basiscopic leaflet

acroscopic leaflet

median cleft for more than half its length.

bifurcate (enkelgevurk) - Forked or divided into two lobes or sections.

bilobed (tweelobbig) - Two-lobed.

bisexual (tweeslagtig, hermafrodiet, biseksueel) - Both male and female sexes present.

blade (blaarskyf, lamina) - The expanded part of a leaf.

bole (hoofstam, stam) - The trunk of a cycad.

bract (skutblaar) - A small, greatly modified and specialised leaf occurring in the case of cycads, on the main stem where its initial function is to protect the stem apex; occurs also on cone stalks.

bulbil (bolletjie) - In cycads a vegetative aerial growth arising from the trunk and developing into a lateral branch.

bulbous (bolvormig) - Bulb-shaped or swollen.

bulla (boela) - The entire "head" of a male or female cone scale. Its outer face is usually divided into facets and may be ornamented to a greater or lesser degree with fissures, "hair", "warts" or tubercles.

caducous (vroegafvallend) - Falling off prematurely.

caespitose (polvormig) - Growing in a clump, as in suckering cycads.

calcareous soil (kalkryke grond) - Soil rich in lime.

callous (voetvlek) - In cycads applied to an often colourful patch of tissue at the base of leaflets in *Macrozamia* species.

callus (kallus) - A growth consisting of a mass of undifferentiated cells.

canopy (blaardak, blaargewelf) - The cover of foliage.

cataphyll (katafil) - A bract protecting the apical part of the cycad stem.

caudex (koudeks) - Term often used for the trunk of cycads.

chalaza (chalasa) - The end of a cycad seed where it was attached to the cone scale.

ciliate (gesilieer) - With a fringe of hairs.

circinate (gesirsineer) - Rolled up as in a flattened spiral.

clavate (knuppelvormig) - Club-shaped.

clone (kloon) - A group of vegetatively propagated plants with a common ancestry, such as all existing *Encephalartos woodii* individuals.

collar (kraag) - A narrow band at the very base of a leaf which is clearly separated in colour and/or texture from the rest of the leaf stalk or rachis.

compound leaf (saamgestelde blaar) - A leaf with two or more separate leaflets.

compressed (saamgedruk) - Flattened laterally.

confluent (saamvloeiend) - Leaflets remaining united and not separating.

congested (opgehoop) - Crowded close together.

contracted (saamgetrek, vernou) - Narrowed.

coralloid roots (koraalvormige wortels) - Coral-like, profusely branching roots which grow upwards and often extend above the soil surface; apparently universally present on cycads.

cordate (hartvormig) - Heart-shaped.

coriaceous (leeragtig) - Leathery in texture.

cotyledon (saadlob, kotiledon) - The seed leaf of a plant - much reduced and modified in cycads.

cross (kruis, kruising) - Offspring or hybrid.

cross-pollination (kruisbestuiwing) - Transfer of pollen from male plant's cone to female plant's cone.

crown (kroon) - The cluster of leaves at the top of a stem.

cultivar (kultivar) - A horticultural variety.

cyanobacteria (sianobakterieë) - A group of bacteria previously called "Blue-green algae".

cymbiform (bootvormig) - Boat-shaped.

deciduous (bladwisselend) - When leaves die back or fall off periodically (usually in winter).

decumbent (neerliggend) - Reclining on the ground with the apex ascending.

decurrent (aflopend) - The lower margin of a leaflet extending along the rachis.

deflexed (uitgebuig) - Curved downwards.

dehisce (oopspring) - Splitting open of a pollen sac when ripe and releasing the pollen.

dentate (getand) - Toothed.

denticulate (fyntandig) - Finely toothed.

depauperate (verpot) - A weak plant or one imperfectly developed.

determinate (bepaald) - With the definite cessation of growth in the main axis.

dichotomous (digotomies) - Forking into equal branches as in the leaflets of *Cycas micholitzii* and *Macrozamia stenomera*.

digitate (handvormig) - Spreading like the fingers of a hand from one point.

dimorphic (dimorfies) - Existing in two different forms: in many cases the leaves of seedlings and mature cycads are dimorphic.

dioecious (tweehuisig) - Bearing male and female organs on separate plants.

dissected (diep verdeel) - Deeply divided into segments.

distal (distaal) - Towards the apex or free end.

divided (verdeel) - Separated to the base.

dorsal (dorsaal) - Pertaining to the back; opposite of "ventral" - the lower surface of a leaf.

LETTERS TO THE EDITOR / BRIEWE AAN DIE REDAKTEUR

Dear Editor

CYCAD HABITATS: CHEMICAL ANALYSIS OF SOIL

I have been a member of the Cycad Society for a long time and like reading your magazine. I cultivate, among other plants, some species of *Cycas, Encephalartos, Zamia*, etc, - because of the Austrian climate only in pots. I have, however, some difficulty in cultivating them properly, which is obviously due to the soil.

In your magazine there are often descriptions of habitats, but the chemical analysis of the soil is always missing. Authors of specialised books fail to add this crucial information, too. Learning about insects pollinating the plants is not much help to cycad enthusiasts, neither are the detailed descriptions of the plants below colour photograohs or details about rain quantities and temperature. What would be of importance, however, is information about the soil.

Reading the book "Cycads of Africa" by Douglas Goode I find that most cycads are restricted to rather small areas. What could the reason be? There seems to be one answer only - an answer which is given by the cycads themselves: They need some special chemical compounds or minor elements that occur nowhere but in these areas, or at least nowhere else in sufficient quantities. Just think of some Banksiae or Proteaceae which grow in these countries and respond toxically to certain chemical elements.

Describing all my findings on this matter would go beyond the scope of this letter. I just want to point out that I have been able to find the right soil for my cycads only with the help of a geologist who has traced the chemical elements the plants need. A chemical analysis of the soil at the cycads' natural habitat would not only help enthusiasts to improve cultivation but also be of advantage for the plants growing in nature: With environmental conditions changing very fast these days, measures could be taken to ensure the survival of the plants whenever necessary (e.g. application of antagonists).

There is another item I would like to refer to. I often read about the frost resistance of certain palms. It should, however, be pointed out that the plants can only stand frost when being cultivated directly in the ground (and not in pots). The roots can thus store warm water during the day which rises to the leaves in frosty nights and preserves the plants from freezing to death. Cacti experts have found out about this fact.

I would, therefore, suggest that authors of articles of any kind of plants should supply a chemical analysis of the soil at the plants' habitats, e.g. the pH value, if there is lime, if there is potassium (K), manganese (Mn), magnesium (Mg), Ferrum (Fe), etc. This would be extremely helpful to cycad enthusiasts.

Hoping that you will take up my ideas and suggestions I remain

Yours sincerely

***Julius Brunner**, Postfach 4, A-2326 Maria Lanzendorf, Austria.*

Received 24 July 1998

COMMENTS ON JULIUS BRUNNER'S LETTER

Dear Editor

In response to Julius Brunner's request for information regarding nutritional requirements of cycads, I have to report that practically nothing is known about that aspect.

Julius suggested that soils of the natural habitats of cycads should be analysed. I fear that won't provide the answer. Cycads are mostly restricted in their present-day distribution, not because of any special chemical composition of their soils, but because of their metabolic nature as gymnosperms. Cycads, and indeed all gymnosperms, are slow-growing compared to angiosperms, which means that they cannot compete with angiosperms. World-wide, gymnosperms occur on the poorest of soils, so poor that angiosperms cannot compete with them. Because of their slow growth rate, cycads can painstakingly accumulate what little nutrients are available, and only produce cones or foliage once a sufficient amount of nutrients have been absorbed over a period of perhaps several years. Moreover, cycads in natural habitats often show various nutritional deficiencies, are usually undernourished, and seldom look as good as a well-tended one in cultivation. Analysis of soils in habitat have yielded some very misleading results. For instance, almost all African species are said to "prefer" acid soil but acid soils inhibit uptake of various nutritional elements, and plants do much better in a more or less neutral soil. The reason why they occur in nature on acid soil is not that they prefer it, but that all the soils in climatically suitable

areas available to cycads, tend to be acid. Asian and a number of New World cycads occur habitually on alkaline soils, again not by choice but of necessity because almost all the available sites in climatically suitable areas are on limestone formations. These species do not prefer these soils, but rather tolerate them. There may be a few exceptions (especially in *Cycas* and *Macrozamia*), where individual species developed special metabolic pathways to cope with otherwise unfavourable soils, but we know nothing about this aspect, and it does not seem to be anything as well developed as the strategies found in the Proteaceae or some chalk-loving angiosperms. I refer to chapter 9, "When dinosaurs invented flowers" in R. Bakker's book "The dinosaur heresies" (Penguin Books, 1988), in which the author explains how ground-feeding dinosaurs probably promoted growth and diversification of angiosperms because of their much faster growth rate as compared to gymnosperms.

Leaf analysis of wild plants may give some indication of their requirements; but if there are tolerable deficiencies in the natural habitat, that will influence the leaf composition and thus provide a false image of the plants' real needs.

I am afraid that "perfect natural conditions" is a myth. These plants are relics, fighting for survival, and they have to occupy any habitat too poor for their better-equipped competitors.

That does not mean that cycads cannot be voraceous feeders if provided with sufficient nutrients, and in cultivation they often out-perform their wild relatives. I would think that any well-balanced garden fertilizer with trace elements should keep them in good shape. "Well-balanced" is the key: it is easy to provide luxuriant foliage with excessive application of nitrogen, but potassium in sizable quantities is needed for cone production, so that an excess nitrogen can easily lead to a potassium deficiency which is clearly visible as a yellowing of the leaves. Similarly, phosphates are needed for root growth, and without healthy roots no amount of feeding will have any effect. At this stage of our knowledge I would tend to feed equal amounts of nitrogen, phosphates, and potassium, with a standard mix of trace elements. This *may* result in leaves being not quite as luxuriant as can be produced with very high nitrogen levels, but it would ensure that there is sufficient potassium available to replace that lost when cones are produced without having to drain the leaves of potassium, and, above all, that there is sufficient phosphate to promote healthy root growth.

Julius raised an interesting point about frost-resistance by circulation of warmer water within plants, but I don't think it can be substantiated by known facts.

***Piet Vorster**, Botany Department, University of Stellenbosch, Private Bag X1, 7602 Matieland, R.S.A.*

Received 14 September 1998

Dear Editor

As far as we know, all seedplants require the same 13 mineral elements for normal growth and reproduction. These are nitrogen, potassium, phosphorus, calcium, magnesium and sulphur in relatively large amounts. Iron is required in intermediate quantity whilst zinc, copper, manganese, boron, molybdenum and chlorine are required in trace amounts. However, for **optimal growth**, different plant species require these elements in different relative proportions.

Although it is easy to measure the absolute amount of these elements in a soil sample, the results generally are of little value in determining the nutritional status of the soil for a given plant species. The reason is that only a fraction of a given element in the soil can be *utilized by* a plant and is referred to as the **available** fraction of the element to the plant. Now, unfortunately we do not have a reliable method of measuring the fraction of an element in a soil sample that is available to a given plant species. In different soil types with the same absolute concentration of a given element, the available fraction of that element can differ extensively. For commercial crops, a relationship has been worked out for a given area between the results of a soil analysis and the fertilizer treatment that should be applied but similar work has not been done for cycads. In short, the results of soil analyses from the habitats in which cycads grow will be of practically no use to you in determining what fertilizer treatment to apply.

From my experience, the African cycads grow well in a very wide range of soil types and within a fairly wide pH range. Because nitrogen, potassium and phosphorus are generally suboptimal for the growth of most plants, the addition of these elements in a suitable form will generally improve the overall growth of the plants. Seedlings grown in compost-rich soil often develop iron deficiency symptoms and I regularly provide my seedlings with a chelated form of iron. Because all cycads appear to produce coralloid roots that can become infected with Cyanobacteria which fixes nitrogen symbiotically, such plants should not require nitrogen-containing fertilizers because they can incorporate atmospheric nitrogen gas into nitrogen-containing organic compounds such as proteins. The addition of high rates of nitrogen-containing fertilizers will generally cause the plants to stop fixing nitrogen.

Of very great importance is soil texture. Most cycads require a substrate that drains very well. A heavy soil,

especially when combined with too much watering, will often result in poor growth and even the death of many specimens no matter how fertile the soil.

Another point to remember is that apparently **all** cycad seedlings require a shaded environment for growth. High light intensities, as are commonly found in South Africa in the open, readily kills seedlings of most species that are less than about three years old. Many cycads are shade plants and should never be exposed to high light intensities.

I hope these comments will be of some help.

Nat Grobbelaar, P.O. Box 15357, 0039 Lynn East, R.S.A.

Received 16 September 1998

Dear Editor

SUGGESTIONS TO IMPROVE OUR SOCIETY

I think that the time is ripe for our Society to publish a **gloss magazine in full colour**. It is nearly impossible to identify different species with black and white photos. If we could publish a full colour magazine I am sure that our membership will grow.

In order to achieve this goal a lot of changes will have to be made to the present situation. First and foremost we will have to enlist much more members, and to realise this the following will have to be done:

South Africa will have to be divided into more regional branches to facilitate communication. These branches should at least gather quarterly and report their activities to our magazine. The membership list should be displayed according to regions, in conjunction with the postal address, and phone, fax and cell numbers should be supplied, to facilitate the task of the different branches. This will also accomplish better interaction between members. It will then be the duty of each branch to encourage cycad and palm gardeners to join the Cycad Society of South Africa.

A quarterly debit order form should be signed by present and new members to ensure that membership fees are paid on time. A copy of this debit order should be standard issue in each magazine, and should replace the existing Renewal of Membership form. The membership fee should be increased and paid quaterly, this will soften the blow if divided into four payments.

Seek out old members of the Society and ask them to rejoin. I have noticed that we lose a lot of members each year, the above form should help prevent loss of membership. A ten year database will have to be kept to determine who the lost members are.

The Palm and Cycad Societies of Australia have their own Web-site. This site offers the following advantages: joining their society, communication by E-mail, and direct contact to their seedbank and bookstore. Our Society should have been onto the Internet a long time ago, the advantages to this move outweighs anything. We can distribute our magazine on the Internet, to be downloaded at a price, this will reduce our postage and sell much more magazines. We can also reach more potential overseas members on the Net.

Devise an incentive scheme where present members will receive credit for introducing new members, for example, a third credit for every new member introduced. At the end of the year a special award should be given to the member who introduced the most members to the Society.

We as members should encourage other gardeners to plant cycads and join our Society. Make a point of inquiring about cycads at your local nursery, and demand that they should at least keep a few cycad species in stock, especially our own *Encephalartos* species.

We could ask other gardening magazines to promote our Society in every copy they publish, in exchange for advertising their magazines in "*Encephalartos*". Notes should be made of the advertisers in other gardening magazines, they should be approached to advertise in "*Encephalartos*" once we have a full colour gloss magazine.

If we have a full colour gloss magazine there is no reason why our magazine cannot sell in bookstores, we can always offer the magazine at a special price to our members.

If more regional branches are formed, the Gauteng area will have to be subdivided into quite a few branches. Present members should show more interest in their regional gatherings and outings, and encourage other members to join at these meetings. Invite non-members to these gatherings to stimulate their interest. Overseas and other Africa members should also try to recruit new members on our behalf, to ensure they receive a better magazine.

We as a Society must demand that all the Nature Conservation Departments in South Africa and Africa, should adopt one law concerning cycads. This law should be made more harsh concerning the cycads in the wild, but on the other hand should be more lenient concerning the cycads in nurseries and gardens. If the exchange of garden plants can take place without all the present red tape, a plant exchange corner can be established. This will also ensure bigger interest in our

magazine. This approach will ensure that more people become interested in cycads.

With more members we should receive more contributions for our magazine, the editor should be provided with a fax machine to make it easier for contributors to send articles in. If we are on the Internet contact can also be made by E-mail. The prints of the "Focus on ... " series can be republished in colour, to facilitate better identification.

We should think about including palms into our South African Society, this will ensure that we increase our membership. The Australian and American Societies do include palms. Most cycad collectors already have a fair amount of palms in their gardens at present.

Far less than half of the cycad collectors in South Africa are members of our Society. In each town and city there are countless owners of cycads and palms that do not even know that our Society exists. On the other hand there is a misconception that our Society is connected or affiliated to the Department of Nature Conservation. The uninformed believe that they will be prosecuted through our Society for garden plants that do not have the right permits. Quite the opposite is true, by reading our magazine they could be informed how to go about obtaining the right documentation for their plants. We as members should be proud of our Society and make a point of promoting our aims to other gardeners.

I may have overlooked some other ways to bring about a colour magazine, if someone comes up with better ideas, please let us hear about them. I would welcome comment from other members on the proposals I have put forward. It may be a good idea to include a referendum form in the next issue to test the feeling of our members.

Cycad greetings

John Kloppers, *Kleinwaterfontein, P.O. Box 24, 0470 Groblersdal, R.S.A.*

Received 30 July 1998

COMMENTS ON JOHN KLOPPERS' LETTER

Dear Editor

John Kloppers' letter is not the first on this subject received by us.

I agree with every point raised, and personally I turn green with envy every time I see one of the Australian cycad magazines with their beautiful colour photographs.

The nature of the problem is twofold:
1. Cost
2. Quality of available illustrative material.

I think all our members will agree that our membership fees are not inconsiderable. Money is becoming pretty scarce, in South Africa at least, and I personally would not be happy to see the cost of membership increasing substantially. At present ENCEPHALARTOS is printed by the University of Stellenbosch, at a cost markedly less than quoted by a number of private printing companies elsewhere. We have looked into the matter of colour reproduction, but that would increase our costs very considerably. As things are, almost all our membership money goes towards ENCEPHALARTOS, and last year only R13.02 of our subscription remained for all the other functions of the Society after paying for ENCEPHALARTOS, and it would cost us comparatively so much more to print ENCEPHALARTOS in colour. We do not think it is viable to reduce the size of our fonts.

It is a sad fact that cycads are exceedingly difficult to photograph succesfully. Our photographs may look nice at a cursory glance, but very few of them is suitable for reproduction, and still fewer find their way to the editor's desk.

It is certainly to the advantage of all of us to get more members for the Society, although not at any cost: we want *enthusiastic* members, and we cannot afford *cycad criminals*. More members certainly means that eventual colour reproduction will become more affordable. We do not allow members just to fade away when they don't pay their subscriptions, as manifested by reminders sent to defaulters. However, reminders also cost money, and we cannot afford to keep sending reminders indefinitely. As for lapsed members, their information is available in past editions of our annual address roster, but again we cannot do anything if they ignore our reminders.

More branches is certainly a good idea; but to be successful, someone must run them. It is a sad fact, manifested by every single election of office bearers in the past, that the majority of our members are not interested in serving the Society.

I cannot agree more that address lists are essential for keeping contact - after all, contact is what a Society stands for. However, it is a surprising fact that there are members who wish to remain anonymous, for reasons of their own.

We are indeed interesting in promoting our Society in other plant magazines and to exchange advertisements with them. In this connection see the advertisements of

The Cycad Society (U.S.A.), and the South African Palm Society elsewhere in this issue of ENCEPHALARTOS.

It is a good idea to get fax. facilities, but for whom: the President, Editor, Secretary, or all three? We as members will have to pay for it. E-mail is also very useful, but does not come cheap. Most members of the Council are in contact with one another by means of E-mail and fax., but these facilities are by virtue of their employment at universities and there is a limit to the extent to which it can be used for Society purposes.

We do not have the know-how to place ENCEPHALARTOS on the internet against payment, and I wonder if that will really be economically viable. Likewise, ENCEPHALARTOS is our Society publication, and we would like readers to join the Society in order to make an input and help the generation and dissemination of knowledge, rather than conveniently purchasing ENCEPHALARTOS at a bookstall and remaining at a distance. A real problem with selling in bookstores is that unsold copies can lose money for us.

The point on uniform, stricter, and more fair conservation legislation is one on which I personally feel very strongly. Over the years a number of initiatives were launched towards this end, but always unsuccessfully. ENCEPHALARTOS gets distributed to nature conservation authorities, and I invite them to state to us their views and plans in this regards.

Piet Vorster, Botany Department, University of Stellenbosch, Private Bag X1, 7602 Matieland, R.S.A.

Received 14 September 1998

[We do not have the addresses of the following Nature Conservation Authorities: Eastern Cape, Northern Cape, Mpumalanga Parks Board, Northern Province, Northwest, and Free State. It would be appreciated if some person or other could send their addresses to our secretary so that complimentary copies of ENCEPHALARTOS can be sent to them. - **Editor.**]

Dear Editor

I would like to compliment John Kloppers on his proposals. It is gratifying to sense the enthusiasm with which he proposes to increase the standard of the journal and the activity of the Society.

Several of John's proposals are not new. The use of glossy paper with coloured photographs was seriously investigated in 1992. With the size of our membership being what it is, the change was found to require such a substantial increase in membership fees that Council was of the opinion that its implementation would result in too large a loss of membership. We all would like to receive the type of journal that John has in mind. The fact of the matter is that we can't afford it under present circumstances. We require a lot of money to get the proposed scheme off the ground. Once it has been launched successfully it should be relatively easy to increase our membership substantially and this will lower the production costs per copy of the journal. However, it is difficult to estimate to what extent and how fast the membership will grow.

Our present advertisement rates are very low, yet the journal contains very few advertisements. With the proposed journal and a wider circulation and with a vigorous drive to recruit advertisements, we should do much better. Once again, however, it is difficult to gauge the income that will be generated in this way and in 1992 Council considered the risk too big.

Council has three options: (i) Implement the changes and simultaneously increase the membership fees sufficiently to cover the increased cost of producing the journal. The risk of losing many members is probably very real if this proposal is adopted and could cause a further escalation in the production cost per journal copy. (ii) Implement the proposed changes without a major increase in the membership fees. Dip into the accumulated fixed deposit reserves of the Society to cover much of the increased production costs of the journal. This will work only if the membership and paid advertisements can be increased sufficiently within a year or two to cover the increased production costs of the journal. (iii) Obtain the required funds for the implementation of the scheme from a wealthy benevolent member or outside organization and get the wheels rolling.

In all cases, the success of the scheme will largely depend on the recruitment of paid for advertisements. The canvassing required will necessitate the appointment of an additional official because the present ones, who are doing a thankless job magnificently at no cost to the Society, is already badly overburdened.

As far as John's suggestion re the creation of more Regional Branches is concerned, I must point out that Council has always welcomed the creation of more Regional Branches and the procedure for the setting up of a new Branch is simple and easy. However, the initiative **must** come from the group concerned to ensure viability. We used to have a Branch in the Northern Transvaal but it simply faded away. The Eastern Cape with its rich cycad flora also used to have an active Branch. Sadly this Branch also appears to have become completely inactive. Leon van Rooy has recently started the Lowveld Regional Branch and we hope it will develop into a prosperous Branch. For Council to

impose Regional Branches on communities is both unacceptable and doomed to failure. We require more people like Leon van Rooy and John Kloppers all over the country to initiate Regional Branches **and keep them flourishing.**

This is an important matter and I agree with John that Council should hold a referendum on all aspects of the subject. If almost all members will express their views in the referendum, Council will have a sound footing on which to decide the issue. From past experience, I must admit that I doubt whether more than about 20% of the members will respond to the referendum. With such a poor response, Council will be hard pressed to implement Options (i) or (ii) above, should the outcome of the referndum favour one of them. However, there can be no harm in going through the exercise. Our members might surprise us with their enthusiasm for a good cause.

About John's proposal to join forces with the Palm Society, I wish to point out that originally our journal was called the "Newsletter of the South African Palm & Cycad Collector". We went on our own for some good reasons and in retrospect I think it was a wise decision. A combined palm and cycad journal, as for instance the ones of Australia and New Zealand are dominated in its contents by material on palms. Such a combined journal is also much more difficult to administer successfully and smoothly.

John will also be pleased to hear that Council has recently agreed to making a fax machine available to both our Editor and our Secretary-treasurer!

***Nat Grobbelaar**, P.O. Box 15357, 0039 Lynn East, R.S.A.*

Received 16 September 1998

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Dear Editor

NATURE CONSERVATION RED TAPE

Early in November of 1997 my mother-in-law phoned me from East London to tell me that a friend of hers was going to build a swimming-pool, and that a two metre *Encephalartos altensteinii* was in the way. She was prepared to give me the plant as long as I was prepared to dig it up and do all the paperwork.

Now this is where the fun began. When I arrived in East London I went to the offices of the Eastern Cape Nature Conservation to organize the proper paperwork. The donor of the plant had a pink **Ownership Permit**, which should have been white, so she had to apply for a new permit. I was then told that this had to be done before we could proceed. I had to transport the nature conservation officer to the plant so that he could take measurements - it seems that they do not provide their officials with transport. Mpumalanga Parks Board informed me that they needed a copy of the **Microchip Registration** form before they could supply an **Import Permit**. At this stage we reached stalemate. After two weeks I had to tow back my empty Venter trailer to Groblersdal.

Three months later I received a phone call from the official concerned to tell me that the paperwork was ready. I phoned the donor and she informed me that her pool was already built and that the plant had been excavated.

In July 1998 (seven months later) I went to East London to purchase from another collector. I had to order and pay for **Microchips** well in advance. While I was busy with the paperwork on these plants I was told that my **Transport Permit / Export Permit** for the *Encephalartos altensteinii* was ready. The lady concerned informed us that the plant was dug up in December and that it was lying at the bottom of the garden. After an inspection by myself and the nature conservation official it was decided that the plant still had a chance to survive. We were back to square one, the previous **Transport Permit** had expired, and a new one had to be issued in conjunction with an **Export Permit**. I then had to take the conservation official to the plant to insert the **Microchip**, after which I was issued with a **Microchip Registration Form**. This form with the **Export / Transport** form had to be faxed to Mpumalanga Parks Board. I then applied for an **Import Permit** in writing from Mpumalanga. Now that I have finally reached home with the plant I have to ask the Mpumalanga Parks Board to add this plant to my **Ownership Permit**. The present permit has to be cancelled, and a complete new permit has to be issued, including all the plants I presently own.

Another interesting point is that I ordered twelve microchips, and used only six. According to the official established potted plants do not need microchips. The excess six chips remain my property but are kept in custody by Eastern Cape Nature Conservation, until such time that I again purchase cycads in the Eatern Cape.

The root system of the *Encephalartos altensteinii* had died down completely, and I had to saw a piece of the stem off to find living tissue. I just hope that this beautiful specimen of a plant has not been killed by the never ending paper war.

The above proceedings is a nightmare of red tape and unnecessary paperwork. All the above should be replaced by one single form, namely the **ID Cycad Registration Form**. Once an owner of a plant decides to sell or donate a plant larger than 150 mm, the following procedure should be followed:

1. Parks Board should come to applicant's garden and insert a microchip into the plant.
2. The new owner's name should be inserted on the ID Cycad Registration Form.
3. The present form should accommodate a change of ownership in advent that the plant change hands in future. If this is impossible a change of ownership should be supplied by the previous owner.
4. The new owner will be obligated to register this change of ownership within a stipulated time, failing to do so will render this document null and void.
5. If any plant larger than 150 mm is transported without an ID Cycad Registration Form it would be against the law.
6. With the latest surge of cycad thefts in gardens of the Gauteng Province, it should be made possible for a person to voluntary have a microchip inserted into his most valuable plants.
7. The endangered plants are only a small part of the nature conservation official's workload, but I believe that the paperwork of these plants take up a large part of their time.
8. The present permit system will gradually be replaced by the ID Cycad Registration Form.
9. Plants smaller 150 mm can change hands with an invoice/donation form supplied by the seller/donator, this will also be the transport permit of the plant.

It has become necessary that Nature Conservation organisations of all the provinces, and the Cycad Society of South Africa, put their heads together and come up with a uniform and practical law concerning endangered plants. This would make the lives of the plant lovers and the officials concerned much easier. It has become such a difficult process to obtain the correct documentation for cycads, that most people choose to break the law and transport plants illegally. This new law would remove a lot of friction between the two groups, and can only build towards a better conservation policy of our endangered flora in the wild.

Cycad greetings

John Kloppers, *Kleinwaterfontein, P.O. Box 24, 0470 Groblersdal, R.S.A.*

Received 30 July 1998

Geagte Redaktrise

DIE GOEIE OU DAE (THE GOOD OLD DAYS)

Die volgende advertensie het verskyn in die *Farmer's Weekly* van 25.5.1977: (The following advertisement appeared in the *Farmer's Weekly* of 25.5.1977:)

FOR SALE. — Cycads E. Altenstein II 0,6 m R25, 0,3 m and over R15. Permit No. 60/76. Box 93, Port Alfred. 6170. 44333K

FOR SALE: CYCADS
One 1 m 10 cm x 50 cm Natalensis
One 70 cm x 50 cm Natalensis
One 60 cm x 40 cm Villosus
One 50 cm x 40 cm Villosus
One 50 cm x 40 cm Ngoyanus
One 50 cm x 40 cm Lebomboonsis
One 20 cm x 20 cm Lenatus
Contact W. J. M. van der Westhuizen, Melmoth, telephone 169, or write Box 1, Melmoth. 3831. 44214K

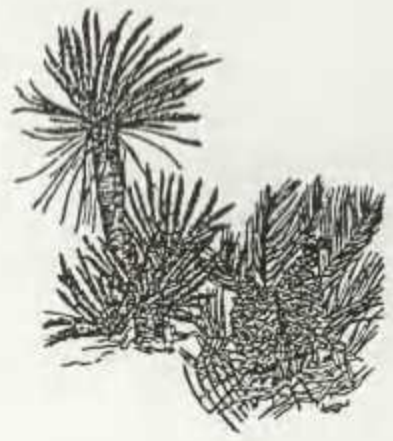
Op navraag is die volgende brief ontvang van die adverteerder: (In reply to my inquiry the following letter was received from the advertiser:)

> "I thank you for your enquiry about the E. altensteinii. The plants are from four feet to ten feet tall and the price is twenty-five rand per foot.
>
> I would however consider a reduction in price if you take a quantity."

Die prys wat uiteindelik betaal was, was R60 vir 'n 1.8 m stam, gehaal by die adverteerder. (The price eventually paid was R60 for an 1.8 m stem, which I fetched and transported myself.)

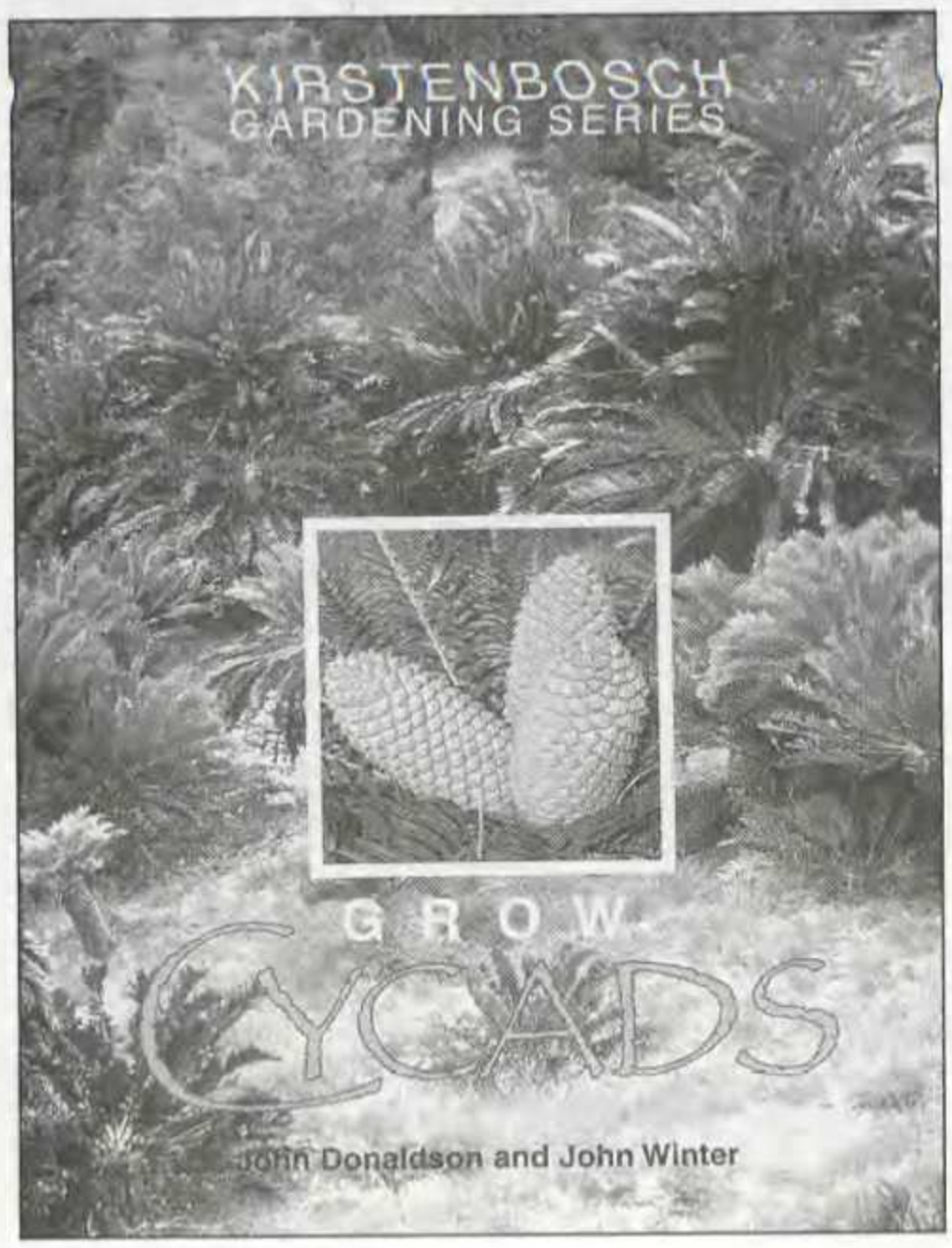
Piet Vorster, *Departement Plantkunde, Universiteit van Stellenbosch, Privaatsak X1, 7602 Matieland, R.S.A.*

Ontvang 24 Julie 1998



GROW CYCADS

Donaldson, John; and Winter, John.
Cape Town: National Botanical Institute. 1998. 36 Pages, numerous colour photographs, soft cover.
Available at R29.50 plus postage from National Botanical Institute, Private Bag X7, 7735 Claremont.



This slim volume is just what is needed for growing and propagating cycads. It is aimed at the novice, yet contains much reference material for the veteran grower.

Written by John Donaldson, entomologist and specialist on cycad-associated insects at the National Botanical Institute and a long-established member of this Society; and John Winter, former curator of the Kirstenbosch National Botanical Garden who was instrumental, *inter alia*, in propagating *Encephalartos latifrons* from seed,

As stated by the title, this is a guide to growing cycads, in particular South African species. The subject matter is treated under the following headings:

- ***Propagation from seed***, including collection of pollen, artificial pollination, harvesting and storage of seed, sowing and germination, and seed growing mixes.
- ***Vegetative propagation***.
- ***Cultivation***, in respect of soil, planting, watering, transplanting, and feeding.
- ***Container growing***, including growing medium, finding the right place, and watering.
- ***Pests and diseases***, and their control.
- ***Landscaping with cycads***.
- ***Cycads and the law***, answering questions commonly asked.
- ***Further reading***.
- ***Index***.

The booklet is printed on a semi-glossy paper which, being only moderately reflective, is pleasing to the eye. It is illustrated by colour photographs of wild and cultivated cycads throughout, and I must congratulate the authors on some of these photographs which are really excellent. However, often these are mere decorations which don't relate to the text and there is a

scarcity of pictures which add to or illustrate the topics treated. For example, there are no photographs of pollen collection, the tell-tale openings in pollen-receptive female cones, placing of seeds in the seedbed, germinating seeds, the process of severing suckers from plants, or the root system of an established plant; all factors unknown to the novice and so much easier to explain with a picture than by words. As such the photographs add to the visual appeal of the booklet, but also unnecessarily to the price.

It may sound ungrateful to criticize any aspect of such an excellent, necessary, and welcome publication, yet I would fail in my duty if I neglect to mention a few statements with which I don't quite agree.

In the introduction to ***propagation from seed***, the distinction between male and female cones is treated very superficially. Illustrations of the respective sphorophylls would have made it much clearer to novices. In ***collection of pollen*** I think it is not at all a good idea to collect pollen in a plastic bag, because it adheres to the inside of the bag. Over the years I have received several plastic bags of pollen which was always difficult to get out of the bags. In ***pollination of the female cone*** [what else?]. ***method 3***, it is advocated to pull a plastic bag over a female cone and blow pollen in through a puncture in the bag. I can guarantee that this won't work: apart thereof that the pollen is likely to adhere to the electrostatically charged plastic bag rather than the cone, the pollen will only be deposited on the outside of the cone rather than inside on the pollination droplets. It is also likely that water vapour will condense on the inside of the bag, which is really ruinous to

pollen. Any successful pollination would not testify to the success of this method, but is the result of pollinating insects carrying the pollen inside the cone. If there are no insects, there won't be any pollination. I should know, because I tried this method repeatedly using a non-charged paper bag. By vigorously shaking the bag after pollen injection, a cloud of pollen is created which settles evenly over the cone, yet in the Pretoria National Botanical Garden we never obtained a single viable seed through this method because, twenty years ago at least, there were no pollinating insects present. In ***harvesting and storage of seed*** it is suggested that the sarcotesta (fleshy seed coat) be softened in water for a few days. In my experience this does not work well, and it works better to ripen the sarcotesta in a plastic bag until it is so soft that it can be rubbed off the sclerotesta (hard seed coat). Goodness knows why a face mask is deemed necessary when cleaning seeds. In ***sowing and germination*** provision is made for a 200 mm deep tray to provide development space for the taproots. Growers may instead consider moving germinated seeds to individual containers as soon as the taproot starts developing because later transplanting does result in some damage. The section on ***cultivation*** is excellent, but I wonder why the authors don't **emphasize** raised beds for improved drainage in wet areas or on heavy soils - I have seen far too many drowned cycads, yet myself have never lost a plant in our very wet winters and on heavy shale soil using raised beds. In ***planting*** as well as ***transplanting*** it is recommended that liberal amounts of organic material be mixed with the soil. I am none too happy with that, because the organic matter oxidizes eventually with the result that the plant sinks down in the hole. Personally I prefer to add my organic material as a mulch. ***Feeding*** is stressed as important, and I cannot agree more. The recommended 3:1:5 mixture does however depend on local soil makeup. The "1" refers to phosphates which are essential for root growth, and the ratio of phosphates could perhaps be increased as much of our trouble in growing cycads stems from poor root systems. I definitely question the very heavy application of 1 kg of fertilizer per plant twice a year. The amount will have to be watered in exceedingly well to prevent burning the delicate coralloid roots (not treated at all in the booklet) which are situated near the soil surface. I find that it is difficult enough to prevent damage when applying 50 g of fertilizer under the canopy of each plant. As for a kilogram of slow-release fertilizer twice a year, clearly the authors have never had to spend their own hard-earned money on this fiendishly expensive though wonderfully useful stuff. In ***pests and diseases*** many readers will be pleased to see illustrations and recommendations of treatment of the dreaded shrivelling of emerging leaves, featured on more than one occasion in "*Encephalartos*" (see *Encephalartos* **48**: 27–29). Some useful hints are provided under ***landscaping***, though the authors fail to address the mistake which we all make: we under-estimate the size of the mature plants, so that our gardens become impenetrable jungles as our plants mature.

I have dwelled at length on my few points of dissent, but they are really minor. This booklet is a stout effort, and provides in a real need. I strongly recommend it to all interested in growing cycads, whether they are experts or novices, and trust that it will stay in print for many years to come. Finally, I wish to thank the authors for writing it.

Piet Vorster
Botany Department, University of Stellenbosch, Private Bag X1, 7602 Matieland, R.S.A.

NEW CYCAD PUBLICATIONS

PANT, D.D. 1997. **The aerosporic nature of the pinna base humps of *Macrozamia*.** *Phytomorphology* 47(4): 345–351.

[The presence of the whitish, yellowish or reddish pinna-base humps in many species of *Macrozamia* (Pant & Das 1995) is discussed. The structure of the humps of *Macrozamia* is compared with that of lenticels and more closely with that of the aerating organs found in the petioles of some ferns as reported by Mettenius (1858), Bower (1923) and Davies (1991). Bower (1923) termed such structures as "pneumathodes" or "pneumatophores" and Mettenius (1858) and Davies (1991) called them "aerophores". The present author prefers the the former name "aerophore" and point out that on structural grounds these humps in *Macrozamia* leaves are neither "callosities", as they were called by Seward (1917) and Schuster (1932), nor can they be termed "glands" as described by Lamb (1923) and Chamberlain (1935) but their structure and location indicate that possibly they are aerophores. He further considers that the "glandular collars" described by Stevenson (1991) in petiolules of *Zamia manicata* may also be aerophores.]

Author's address: 106 Tagore Town, Allahabad-211 002, UP, India.

VAZQUEZ-TORRES, M. & VOVIDES, A.P. 1998. **A new species of *Ceratozamia* (Zamiaceae) from Veracruz, Mexico.** *Novon* 8(1): 87–90.

[*Ceratozamia morettii* is described from a cloud-forest environment in Veracruz, Mexico. The main morphological characters are illustrated, and comments on related species are made. The new species differs from others in the genus by the near prostrate habit, circinate vernation of the leaves, and wide leaflets with translucent venation. This taxon is apparently related to a group of species that are relatively small-trunked, branched, produce few leaves, and have relatively small strobili. The non-sympatric species of the group also inhabit moist to very moist habitats, as in the case of *C. miqueliana*, *C. microstrobila*, and *C. mexicana* var. *robusta*.]

First author's address: Inst. Invest. Biol., Univ. Veracruzana, Apdo, Postal 294 Xalapa, Veracruz 9100, Mexico.

Compiled by ***Nat Grobbelaar****, P.O. Box 15357, Lynn East, 0039 South Africa.*

NEWSPAPER / MAGAZINE CLIPPINGS
KOERANT- / TYDSKRIFUITKNIPSELS

PRETORIA NEWS
FRIDAY JULY 31 1998

13 held as police bust cycad smuggling syndicate

A cycad smuggling syndicate was smashed last weekend when police arrested 13 people and seized 164 of the prehistoric trees valued at R300 000, the Endangered Species Protection Unit said in Pretoria yesterday.

It said the breakthrough came after a special undercover police effort, dubbed Operation Jurassic, which started 18 months ago.

A number of vehicles and equipment were confiscated.

The suspects included a policeman. During the operation, police infiltrated syndicates active in the Eastern Cape, Gauteng, Northern Province and Mpumalanga, the unit said.

The trap was sprung after a transaction between the smugglers and police posing as dealers.

The unit said its fight against illegal trade in cycads was far from over, adding it was being hampered by a lack of money. This rendered the unit unable to follow up all tip-offs it received.

Operation Jurassic uncovered illegal trade in shellfish, and abalone worth R36 000 was confiscated.
– Sapa

Marketing the spirit of Africa

Marketing indigenous cycads. Doug Watson (Doonholm Nursery) and Jeremy Christensen (Braaks) beside a mature *Encephalartos lebomboensis.*

Partnerships are the key to development. Last month, it was my privilege to see the initiation of an extraordinary venture in cycad conservation and marketing between the Mlambo Community, Mpumalanga Parks Board's (MPB) and Braaks Environmental Products (BEP).

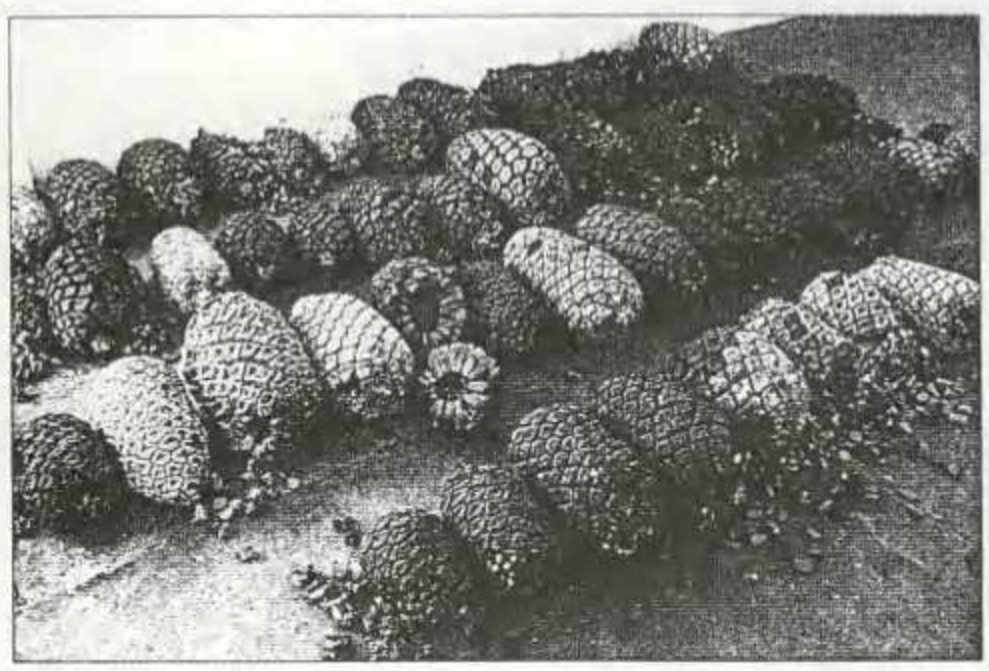
The aim of the project is to conserve an existing cycad population of century old *Encephalartos lebomboens*is that thrive on high rocky outcrops in the Lebombo Mountains along our Eastern border and to thereby prevent the continued removal of these ancient cycads for sale in Gauteng for huge profits. To achieve this, the project has involved the local Mlambo community in the building of the Mjove Cycad Nursery.

With seed capital and horticultural advise from the MPB, the Mlambo community has erected a large, simple and effective shade cloth nursery in the foothills of the Lebombo Mountains near Mananga. The nursery has been erected by the community on ground granted by the local chief. It is here that seed will be germinated and plants grown into juvenile cycad plants, suitable for selling. So far there are some 9 000 seedlings available for sale and it is anticipated that between 5 000 and 24 000 cycad seeds will be harvested annually.

Marketing plants is often as crucial as growing the plants themselves. The Mlambo Community and MPB have therefore joined forces with Jeremy Christensen from Braaks Environment Products. He has commissioned an attractive label which will fit onto the 'baked bean' can containers which are being collected by school children in the area and planted up with indigenous cycad seedlings.

A local potter in the Mlambo Community has been commissioned to throw several hundred clay pots and decorate them with a single strip. This will create a second, more upmarket range of pots for the cycads. All the cycads will be purchased 'upfront' by Braaks and redistributed through Braak's marketing network to garden centres and retail outlets countrywide.

Christensen says, "The proposed marketing strategy for the Mlambo cycads differs from the traditional cycad nursery where plants are normally sold after 2 to 10 years of age. Our proposal is to market the 'baby' cycads into a



Cycad cones harvested this year for propagation are held temporarily at the MPB's Phindulwandle Nursery 20km east of Malelane.

The cycad seedlings await 'Spirit of Africa' launch packaging and distribution to garden centres nation-wide in late September.

Gerhard Strydom, a horticulturist from the Mpumalanga Parks Board offered the technical advise necessary for the Mlambo Community to set up their nursery, harvest cones and propagate seedlings.

fashion market (along the lines of 'Love Palms'), where the customer may include townhouse dwellers, who can own a baby cycad and one day plant it out into their gardens".

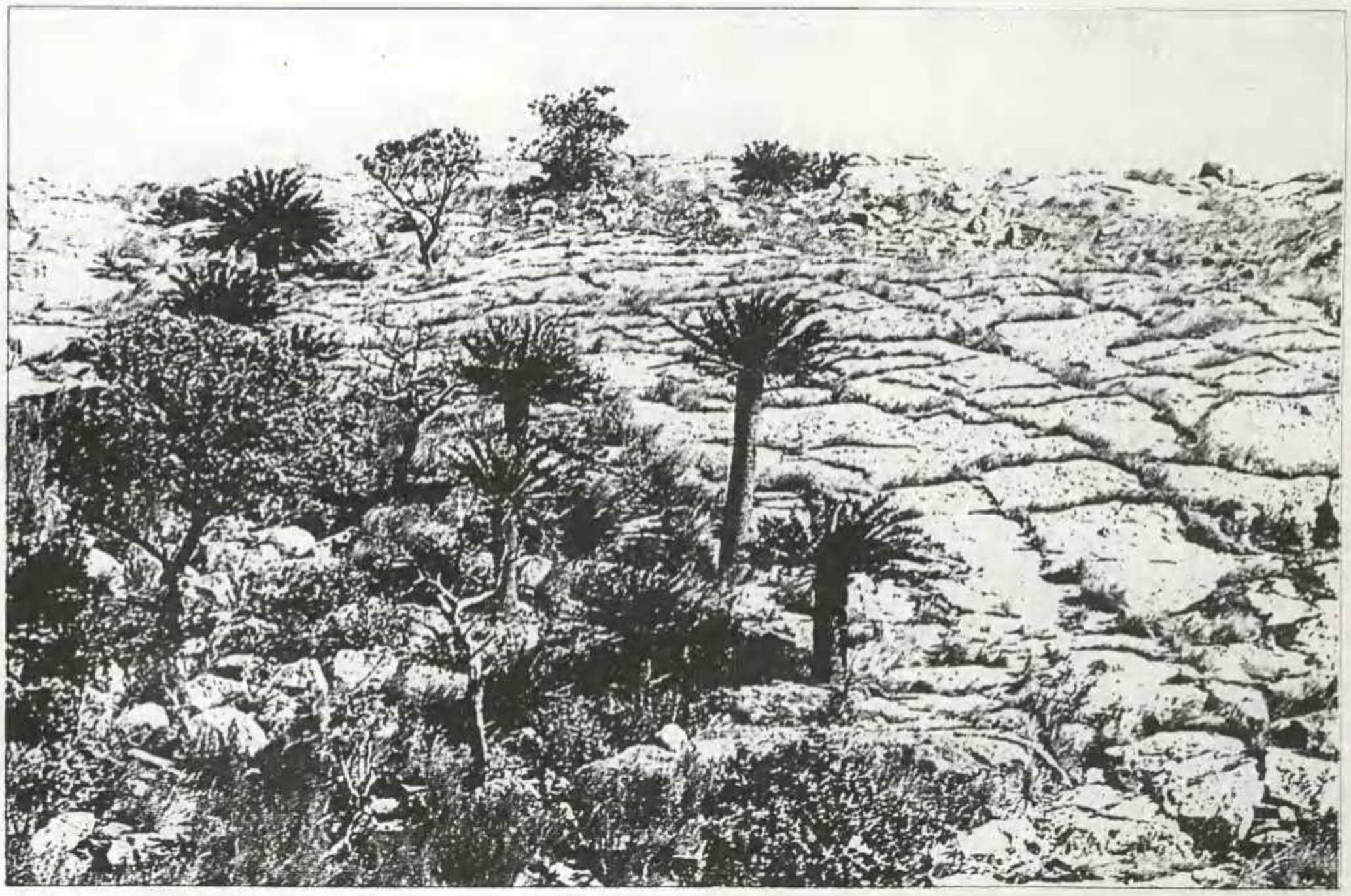
Even *Encephalartos lebomboensis* seedlings remain protected plants and the Mpumalanga Parks Board has had to obtain CITES approval to issue certificates for the plants. Garden centres will be empowered to issue certificates provided by BEP and the plants will therefore be sold legally, both locally and overseas.

Garden Pavilion has already placed an order for the cycads and will launch a campaign to market the cycads in their retail network of 46 nurseries nationwide in September this year. Most other large garden centres are likely to follow this marketing initiative as this project has attracted intense press interest.

For the first time in decades, indigenous cycads are set to become fashionable again. After all, supporting the conservation efforts of the community and promoting the preservation of *Encephalartos lebomboensis* is a strong message for marketing the spirit of Africa.

Kay Montgomery

A local potter trained by Portuguese missionaries from the Mlambo Community has been commissioned to produce a range of clay pots for the cycad seedlings at his Mbuzini Pottery.



Helicopter view. The threatened colony of ancient cycads *(Encephalartos lebomboensis)* cling to remote rocky outcrops and cliffs high in the Lebombo Range where they have escaped attention for thousands of years. Photo: Jeremy Christensen.

kay montgomery
GRASS ROOTS

GARDENING

Conserving indigenous cycads through cultivation

It has finally happened! A wave of commercially grown indigenous cycads are now available to gardeners. After 20 years of trial and error, the "conservation through cultivation" campaign embarked upon by local growers is set to take indigenous cycads out of a twilight zone of unscrupulous traders and into the world of sustainable garden plants.

Often described as living fossils, cycads date back to the time of the dinosaurs and have survived changing climates and, in this century, forced removal on a tragic scale. In 1977 South Africa's Nature Conservation authorities banned the removal of cycads from their natural habitat. Huge publicity was generated and all owners of indigenous cycads were given a grace period in which they had to apply for permits to "legalise" their plants.

In retrospect, the effect of the legislation was disastrous. Cycad nurseryman Steve Trollip recalls: "What in fact happened was that those people who were aware of where cycads grew merely used this time to remove thousands of cycads from mountains and valleys around South Africa. More cycads were removed from habitat in this grace period than in the previous 100 years."

EXPERT: Nurseryman Steve Trollip

The battle between unscrupulous cycad traders, local villagers seeking relief from rural poverty and nature conservation hotted up after 1977, and no one was to emerge with honour. Trollip says: "Many mistakes were made. Cycads considered to be too accessible to the public were removed by nature conservation for "their own good". They were replanted in places where it was thought they would grow and flourish. Sadly this did not happen, and in one instance an entire colony of very rare cycads (*Encephelartos inopinus*) was virtually wiped out after a translocation by the authorities."

Since the early 1970s, the presence of indigenous cycads in local private gardens has been an uncomfortable reminder of excessive plunders made by all sides in the cycad war. Indeed, most people will tell you that they bought their cycad from an existing collection or that it was rescued from a kloof before the construction of a new road.

Conservation through propagation has always provided a light at the end of the tunnel. But it has taken years to achieve. Learning how to propagate the various indigenous cycads has been a lifetime

of work for many dedicated cycad growers. The good news is that stocks of nursery-propagated cycads have been built up to a point where thousands of small plants are available.

Trollip, of Grass Roots Palm & Cycad Nursery, is a Brits-based nurseryman who has spent years collating a generation of cycad propagation techniques, experience and knowledge. In the process he has built up a major collection of nursery-grown indigenous cycads, including seedlings and bigger plants of both the common and rarer varieties. He now intends to market indigenous, nursery-grown cycads for gardeners.

"Cycads are unjustifiably called slow-growing plants," he says. "Some species can produce two to three sets of leaves a year, while others produce leaves only once every three to five years. The golden rule of growing cycads successfully is that they must be planted in well-drained soil.

"The thinner, grey-leafed cycads grow in full sun and are quite hardy to cold. Broader, green-leafed cycads prefer shaded to semi-shade areas in general and are much more sensitive to cold. Wider, grey-leafed cycads are able to withstand full sun and are also quite hardy to cold (for example, *Encephelartos horridus* or *E. lehmannii*)."

DINOSAUR PLANTS IN THE GARDEN: Indigenous cycads have finally been propagated for gardeners in an attempt to reduce the pressure on mature cycads still living in their natural habitat

Cycads can be grown successfully in the garden or as container plant "By planting more cycads we ensure a better chance for their survival," Trollip says. These are his guidelines for growing cycads:

- Water cycads once a week in summer.
- Water cycads every third week in winter.
- Fertilise plants three to four times a year using a 3:1:5 or 5:1:5 fertiliser.
- Feed cycads twice a year with bonemeal.
- Never allow the plant to become waterlogged.
- Keep an eye out for aphids on young, soft leaves.
- Look out for scale on older leaves and the underside of leaves (especially on the *Cycas revoluta).*
- Transplant cycads in containers every three to four years.

Interested in nursery-grown indigenous cycads? Trollip hosts the first of what he hopes will be an annual sale of seedlings and larger plants. Date: Saturday July 25 from 8am-5pm. Venue: Grass Roots Palm & Cycad Nursery, outside Brits. For directions, phone (012) 252-7582/7235 or 082-771-8497.