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A.S.G.A.P. CYCAD, ZAMIAD AND PALM STUDY GROUP
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To whom it may concern 1994/95
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This year so far has been very productive in terms of research of our cycadales. Dr. Ken Hill on cycas in particular and David Jones, whose versatile botanical writing has extended well into the field of zamiad research.

From America comes also the news that further from what L.A.S. Johnson has done to place a genus Boweniaceae, putting Bowenia is something exclusive. Stevenson has now created a family Zaminae to include Stangeria of Africa and Bowenia here. A really good step forward.

From now on I will be updating what we already know, so wherever you are, I would appreciate any information we can include.

- Len Butt
Leader

23 May 1994

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DPI
QUEENSLAND
DEPARTMENT OF PRIMARY INDUSTRIES
SOUTH EAST REGION

Dear Len

DEALING WITH THE CONFLICT OF INTEREST BETWEEN THE CATTLE INDUSTRY AND THE CONSERVATION OF CYCADS

I have read your recent article on cycads ("The other side of the coin") in the SGAP (Qld Region) Bulletin **32**(3):24-25, 1993 discussing this issue and I am moved to write to you about it in the hope that we can start something positive.

First, I should tell you of my background. I have worked as a veterinary pathologist for the DPI at ARI Yeerongpilly for 21 years. I have had a long-standing interest in the effects of poisonous plants on livestock and am presently the curator of the DPI Poisonous Plants Database and chairman of the Queensland Poisonous Plants Committee which meets under the aegis of the DPI. I am also a member of the Australian Conservation Foundation, The Wildlife Preservation Society of Queensland and SGAP. So you can see that I receive inputs from both sides of the argument.

I have not personally investigated or carried out research into cycad poisoning of cattle in Queensland, but I have access to all the available information generated by such research within this department and most of that generated by other organisations. I am interested in reducing the impact of plant poisoning on the livestock industries and I am interested in doing this in ways which minimise or avoid damage to populations of native plants. With cycads this is a tall order. Cycad poisoning of cattle is a serious concern for graziers in some parts of tropical coastal Queensland and the top end of the Northern Territory. It is one of the major plant poisoning problems for graziers in these areas. To date, control of the problem has been the original one of destroying the plants. I agree with you that better means of control need to be found before we end up with additions to the list of endangered plant species. And yes, we do need to control the problem because it reduces the production of the cattle industry and Australia desperately needs all the export dollars it can muster to deal with our balance of trade deficit - but, I hasten to add, not at the expense of the botanical heritage of the country.

I recently wrote a short review of the situation for one of our officers who wanted an article for his local newsletter to stock owners. I enclose a copy for your information. You can see from the section on status of cycads where my sympathies lie.

My main purpose in writing to you is to encourage you to put forward possible practical alternatives to killing cycads that can be suggested to graziers whose cattle are at risk of poisoning. I would appreciate it if you and your study group could make sugestions and comment

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on some ideas of mine for dealing with this problem in a practical way so that both the graziers and the cycads win if possible. In my opinion, we can not expect most graziers with cattle at risk of cycad poisoning to feel very strongly about protecting the plants. Their income is being threatened if not actually reduced. Counter arguments for protection of the plants need to carry as much weight as possible in economic terms to stand a chance of being accepted.

Despite past listing of cycads (*Cycas*, *Macrozamia*) as noxious plants in regulations administered by the Lands Department in Queensland, currently no native species are included in their list of "declared" plants (A step in the right direction in my view). This means that land holders are no longer obligued by legislation to destroy cycads. I have checked this with my contacts in the Lands Department. Of course, this does not of itself alter the attitudes of graziers and consequently what is really happening in the bush.

I note your suggestion for the harvesting of fronds for use by commercial florists. To my knowledge (I have limited contacts in the floristry industry), this is currently done with *Bowenia serrulata* and less commonly with *Macrozamia* spp. (probably *M. miquellii*), but the volume of material traded is low and probably easily meets or even exceeds demand in the local market. It may be possible to promote the use of fronds to florists and thus to build up demand in the local floristry industry, but there is probably only a small potential here. Do you have any suggestion along these lines? Because cycad fronds have a very long shelf life as cut stems (much longer than any other "greenery" used by florists in my experience (10 years as a part-time florist's assistant), there may be an export market for them. Do you have any thoughts on this aspect of the matter? Perhaps such a market exists and I don't know of it. If a substantial market for fronds of *Cycas media* could be established, some cattle producers at least would have an incentive to preserve some populations of these plants. However, I don't see it as a general solution.

You will see that, in the enclosed article, I have suggested removing plants from selected paddocks. Do you think that it would be possible to involve the nursery industry in a scheme to remove the plants alive for sale for landscaping or for sale by general nurseries? There are plenty of the Japanese cycad, *Cycas revoluta*, being sold and used in this way (I've even seen *C. revoluta* used at the Yulara resort near Uluru in central Australia) and I think the native species should be promoted instead for patriotic reasons. I think that selection of populations for removal from grazing lands should be done in consultation with soil conservation experts and botanical authorities to ensure that worse problems are not created in order to solve the original problem. If a scheme like this could be established, both the graziers and the nurseries might benefit for very little cost of operation. It would need a bit of thought to iron out the difficulties. I see the need for the blessing of the Department of Environment and Heritage (DEH) through permits and for collaboration between the local graziers' organisations (UGA, Cattleman's Union) and local nurseries to avoid flooding the market and to allow orderly expansion of the market if that is appropriate.

In considering either of these suggestions we must recognise that legislation administered by the DEH in Queensland will have an impact on the commercial use of cycads. I understand from the Queensland Herbarium that 11 taxa of *Macrozamia* and 6 taxa of *Cycas* are listed as rare or endangered in Queensland, so that permits will not be granted for any future exploitation of populations of these plants. As I understand it, the DEH may negotiate with local land holders about conservation of threatened populations on private land. This may well involve situations where cycads are browsed by cattle and are considered a threat to animal health by the graziers concerned. Naturally, I do not speak for the DEH and they should be consulted for the current legal situation. I have discussed these issues with the botanical authorities in DEH. They have

expressed some concern about removal of whole plants, as this is against their basic philosophy of conservation. They tell me that a conservation plan for the cycads is being written by DEH and that collection and sale of common species of cycads from private freehold land is likely to be allowed legally through a wildlife harvesting licence and certain protocols set out in a code of ethics for collection of plants from wild populations. This will be part of the regulations (presently being drafted) of the new nature conservation act.

I note your suggestion that alternative sources of nutrition could be used for cattle in conditions where they now eat cycads. I would appreciate any further information that you may have on *Opuntia ficus*. I am a bit wary of such suggestions, however, because they usually involve graziers in substantial expenditure, which is a disincentive to action. Net economic benefit would need to be very clearly demonstrated before adoption of such measures could be expected. Money to run a well-designed assessment of such an idea is extremely hard to come by these days, and I doubt if it could be obtained at all. I am also somewhat wary of suggesting the promotion of large numbers of exotic plants into habitats which are basically undisturbed.

Until we know what the toxin is that produces the spinal cord damage in cattle and can measure it in the plants, we will not be in a strong position to fine tune the management practices of graziers to avoid exposing cattle in those periods of the year when they are at most risk of poisoning. All we can advise at present is avoiding access to young fronds and fruiting plants. Money to run these studies is also hard to come by, but Professor Alan Seawright of the University of Queensland has obtained some limited funds for work on the toxins. This money has become available because of the interest of the medical fraternity in the nervous disease on Guam thought by some experts to be linked to consumption of flour from ill-prepared *Cycas circinalis* fruits or from inhalation of the pollen from these plants.

I have considered the possibility of teaching cattle to avoid eating cycads by conditioning them to associate an unpleasant taste with eating cycads, thus causing them to avoid the plants. Some studies in North America have shown promise with other plants, and I thought it may be worth trying here. Of course, such an approach may be difficult to establish as part of the normal routine of running a cattle station, even if we could get it to work under experimental conditions. Unfortunately, I have no funds to run such research at present.

So, you can see from this letter that I welcome suggestions for solving this problem, despite the absolute lack of funds for research into solutions. I look forward to hearing from you with the responses of yourself and your study group to my questions. Perhaps there may be a glimmer of hope for a horticultural solution.

With kind regards,

Yours sincerely

Ross McKenzie

Dr RA McKenzie
PRINCIPAL VETERINARY PATHOLOGIST

Encl.

Cycads and Zamia Poisoning in Tropical Queensland

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Status of Cycads. Cycads (zamias) have grown on earth for at least 250 million years. This plant group is older than the dinosaurs and, unlike them, is still surviving in the Americas, Africa, Asia and the Pacific as well as in Australia. These plants form an important part of the botanical heritage of our country. The species we have here grow nowhere else in the world. We have a serious responsibility to society to preserve viable populations of these plants in their natural habitats. Even though we know that these plants contain toxins which are capable of poisoning livestock and people, we are not justified in the wholesale killing of them. We need to develop management systems which allow us to minimise the damage that zamia poisoning can do to our livestock enterprises while preserving the plants for future generations of humans to appreciate. This is a very difficult task, but should be faced squarely. Cycads are stately and beautiful plants and deserve respect and preservation.

Cycads in Queensland. The cycads which grow in Queensland can be divided into the species of *Bowenia*, *Cycas*, *Lepidozamia* and *Macrozamia*. All have the potential to poison livestock, but only a few are now a serious hazard. The two species of *Bowenia* and the two species of *Lepidozamia* are of restricted distribution and are a minor or no threat to grazing animals. Records of livestock poisoning exist for four of the eight *Macrozamia* species in Queensland, namely *M.lucida*, *M.miquelli*, *M.moorei*, and *M.pauli-guilielmi*. Of the 9 *Cycas* species recognised, the main livestock poisoning species recorded is *C.media* which is distributed throughout coastal tropical Queensland.

The Toxins and Livestock Affected. Several different azoglycosides, all containing methylazoxymethanol (MAM), occur in these plants and are responsible for the liver damage and intestinal damage caused by these plants. The toxin or toxins responsible for damage to the nervous system are unknown. Cattle, sheep, horses and pigs have been poisoned. Most cases occur in cattle.

The Conditions of Poisoning. Cattle commonly eat leaves, particularly when the leaves are young and other feed is dry or scarce. Under similar conditions, seeds are commonly eaten by sheep and cattle.

The Effects of Poisoning. Two kinds of poisoning may occur after eating cycads: injury to the gastrointestinal tract with liver damage; or damage to the nervous system causing incoordination of the hind quarters known as zamia staggers or "rickets".

The first kind of disease may result in diarrhoea followed by loss of appetite, weight loss and death from chronic liver damage. Animals with this gastrointestinal form may have cirrhosis of the liver and jaundice at *post mortem* examination.

The second kind, zamia staggers, causes a tendency to drag the hind limbs,

stumble, knuckle over on the hind fetlocks or fall. The animals are otherwise normal. The condition is irreversible. No changes may be seen in zamia staggers cases at *post mortem* examination except microscopic change in the brain and spinal cord.

Management to Reduce Poisoning. There is no effective treatment for these poisonings. Animals should be kept out of paddocks containing numerous cycads, particularly when feed is scarce or when the plants have seed or young leaves. In areas where cycads are widespread, it may be feasible to remove the plants from selected paddocks and to set these aside to use when cattle are most at risk of poisoning.

Research Needs and Prospects. In future, if we can identify the toxins responsible for damage to the nervous system, we could measure the variations in toxins in the plants through the seasons. This may help graziers to fine tune their management of livestock to avoid the periods of most risk of poisoning. Research is needed on preventing livestock from eating cycads when pasture conditions are dry.

Research is expensive and the outcomes are always uncertain. The funds for research are limited and usually applied to large problems such as land degradation or diseases which threaten exportable commodities across large areas of Australia. Problems, such as cycad poisoning, which are seen by funding bodies as regional in nature do not attract support. Prospects for funding of research specifically on cycad poisoning at present are very poor. It may be possible to adapt lessons learned from other research on cattle husbandry in the tropics to reduce the impact of cycad poisoning on livestock production in Queensland.

For Alan Laing, DPI Ayr. 16 November 1993.