

## AUSTRALIAN NATIVE PLANT SOCIETY(AUSTRALIA)

### HIBISCUS AND RELATED GENERA STUDY GROUP

JUNE 2011 NEWSLETTER NO. 23 ISSN 1488-1488



The image above is a bloom of *Hibiscus forsteri* from Cape York Peninsula, whilst the scan on the right is a pressed specimen flower of a pink/red *Hibiscus heterophyllus* grown from self set seed of a natural variety called 'Rosie'. The lobed leaves occur on all parts of the plant and are of a shiny, firm texture. This form comes from the Capricornia Region of coastal Queensland and flowers mainly during October.

This Newsletter is the third and final for the year 2010/2011. Our \$10-00 annual subscription is due on the 1<sup>st</sup> July 2011 for the year ending 30/6/2012 and a renewal form will be enclosed with the Newsletter. I am trying to get all the material together in a PDF file so that I will have the option of electronic mail. I am not very computer savvy so keep fingers crossed.

Our Mt. Isa member, Alison Fraser has kindly provided an up-date on species found around her area. Please note that the two *Bombicella* section species referred to as 'Fraser No. 1 and Fraser No. 2 are as yet un-described. On our recent field trip (winter 2010) we relocated a species at Poddy Creek near Middleton in central Queensland first seen by David Hockings about 1975. It is considered to be the same or a form of Fraser No. 1. Alison gets around quite a bit and has the following to say following her recent fishing trip to the Gulf – "We had unusually windy and cold weather during May and the fishing at Karumba wasn't very good during our recent trip. It seems that most of the country was in the grip of a cold snap. The strong southerlies have subsided now and we are hoping for calmer weather during June."

My proposed field trip to Cape York Peninsula with David Hockings had to be cancelled due to health issues. This is a disappointment, but we will try again in June 2012. In the mean time Bowen Member Walter Willcox will be travelling throughout the Cape with a look-out for Hibiscus populations that he will record on his GPS. This will be handy information for our seed collecting at a later date.

One of our Brisbane members, Dr. Elwyn Hegarty has moved to Armidale in N.S.W. Her house in the city is on more than an acre of land, so perhaps she will save some space for some of our annual Hibiscus such as the *Trionum* complex. We note that she has joined the local APS and wish her well in the invigorating New England climate.

*Gossypium nelsonii* was observed at three sites during last year's trip to the Gulf and reported in Newsletter No. 20 page 6. It was also seen during my 2002 trip along the Plenty Highway and crossing the Tanami Desert in the Northern Territory. I was fascinated to read about the discovery and naming of this species when reading the Alice Springs News Online. I contacted the Managing Editor who referred

me on to Alex Nelson, who kindly gave permission to print his article titled 'A hypothetical species'. Your Study Group Leader is in possession of an interesting paper titled "The Cleistogamous Breeding System: A Review of Frequency, Evolution, and Ecology in Angiosperms" by Theresa M. Culley and Matthew R. Klooster. As this condition is mentioned in Alex Nelson's article and also frequently observed in *Hibiscus meraukensis*, a summary will be attempted in the next Newsletter.

### **Hibiscus Oxalate Analysis.**

This important initiative was undertaken by our Study Group with thanks to all participants including Dr. Dion Harrison, Dr. Ross McKenzie, Colleen and Geoff Keena. The beginnings of this study go back to Newsletter No. 18 page 9 with the following entry : "Native Hibiscus, especially *Hibiscus heterophyllus* and some introduced/naturalised species of Hibiscus have long been used as a food source in this country. I have become aware from a Study Group Member that there is a perception in the horticultural landscape industry that *Hibiscus heterophyllus* is a poisonous plant. I consider that this is a serious misconception. As a Study Group, I believe we should address the question of safety in Hibiscus, particularly *Hibiscus heterophyllus*, both as bush tucker and in modern usage. Suspected toxic levels of oxalates in young and old leaves is a particular issue that needs to be examined".

Our National Co-ordinator of Study Groups, Geoff Lay has written in part as follows : "The temperatures are dropping rapidly in Melbourne and it looks like we'll have another real winter. After all the drought years we've almost forgotten what frozen windscreens look like. ....The next biennial ANPSA conference is coming up in Adelaide. It will be at the Westminster School, Marion from 2<sup>nd</sup> to 7<sup>th</sup> October next. It would be wonderful if there was a wide variety of Study Groups putting on displays to show members what you do and entice new members. Margaret Lee, (e-mail is [leemarg@tpg.com.au](mailto:leemarg@tpg.com.au)) who is on the 2011 Conference Committee, would like to know whether your Group wishes to mount a display at the conference, and if so, your requirements, so that she can make arrangements to hire appropriate space and equipment. Please let her know if you require a trestle or power point. As the longer serving study group leaders would know, there is a subsidy available to help with transport to the conference. .... Those study group leaders interested in applying for the subsidy need to contact Margaret Lee.

At the conference, it is suggested that 7.30 pm on Tuesday 4<sup>th</sup> October be for study groups to meet and 7.15 to 9.15 pm on Wednesday 5<sup>th</sup> for study group leaders to have a meeting. Any comments on either meeting should be brought to Margaret's attention, with a copy to me."

It is impossible for this study group leader to attend due to health issues. Do we have a member willing to attend in my place? If not we should make arrangements to have a display mounted. Any ideas please!

It is time to get on with the newsletter.

With best wishes .....  ..... (Geoff Harvey) – Study Group Leader

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## A HYPOTHETICAL SPECIES.

By Alex Nelson

“Gossypium” is the genus name of a small group of native shrubs that produce attractive blooms, usually with lilac petals surrounding mauve centres.

There are four species in Central Australia, the best known being *Gossypium sturtianum* – Sturt’s Desert Rose – the floral emblem of the NT. Two other species, *Gossypium australe* and *Gossypium bickii*, are often seen in bloom on roadsides. The first grows tall and spindly, up to 2 metres; the latter form a low compact bush. The fourth species, *Gossypium nelsonii*, is also widespread but is barely known – its discovery is a most unusual story in science.

Gossypiums are members of the large plant family Malvaceae, which includes Hibiscus and also Cotton, one of the world’s most important crop species, so they are often subjects of scientific research.

In July 1966, George Chippendale, the first government botanist in the NT, departed Alice Springs for Canberra. His former assistant, Des Nelson (my father), managed the Northern Territory Herbarium until the arrival of botanist John Maconochie in April 1967.

It was during this period that a letter arrived from Paul A Fryxell of the US Department of Agriculture, based at Texas A & M University, and a world-leading authority on Malvaceae. Fryxell was especially interested in Gossypiums – he had specimens and seeds of the three known species in Central Australia and had grown them, but he was certain there must be a fourth species, intermediate between *G. australe* and *G. bickii*.

Fryxell described a hypothetical species, providing details of height and appearance; he requested information about this species. Appearance, habitat, locality, and insect activity – especially ants, as Gossypiums produce nectaries that attract them – should it be found.

My father undertook to search for the unknown Gossypium, keeping an eye out during his travels in the region.

In July 1967 he collected a Gossypium specimen at Painta Springs, on Bond Springs Station. It had no flowers and was tentatively described as *Gossypium australe* although it seemed different.

More specimens and seeds were collected from four plants at the same site on 16<sup>th</sup> April 1968 – the plants were described as “funny” (odd) and “queer”; again there were no flowers. The seeds were sent to Fryxell in Texas, who raised the plants under cultivation, observing that they readily set fruit and seed without flowering – a process called cleistogamy.

The closely related *Gossypium australe* and *Gossypium bickii* are sometimes cleistogamous, too, but usually they flower before producing seeds (which is called chasmogamous – try these terms in scrabble!). As expected the unknown, specimens were intermediate between *G. australe* and *G. bickii*, but attempts to hybridize these two species failed – it was clear a new species had been found, in a manner virtually unheard of in science.



Des Nelson with *Gossypium nelsonii* at Bond Springs Station

Des Nelson collected more specimens for Fryxell from Pinta Springs (Bond Springs Station) in January 1973, and this time there were two flowers, one of these became the “type specimen” used to formally describe the new species. In the Australian Journal of Botany 1974, Fryxell wrote : “it is a pleasure to name this new species for D.J. Nelson of Alice Springs, who has collected the material on which the description is based” . He noted, “evidently the balance is tipped strongly in favour of cleistogamous flowering in *G. nelsonii*, which may account for the fact the species has not previously been recognised”.

This proved accurate – the explorer William H Tietkins had collected a specimen at Glen Helen in 1889, and *G. nelsonii* is now known to occur from Ormiston Gorge over a distance of 1,100 km to near Richmond in Queensland.

However, doubts arose in Australia about the status of this species. In the seminal book, Flora of Central Australia, published in 1981, local botanist and co-writer Andrew Mitchell listed *Gossypium nelsonii* as synonymous (the same) with *Gossypium australe*, but provided no reason for this change. The doubts remained until Paul Fryxell visited the Centre in 1987, together with J McD. Stewart of the University of Arkansas and L.A. Craven of the CSIRO’s Australian National Herbarium. After studying collected specimens and live plants at various sites in Central Australia, they unequivocally re-asserted the status of *Gossypium nelsonii* as a separate species in November 1987.

## REPORT ON NATIVE HIBISCUS SPECIES AROUND MOUNT ISA (April 2011)

By Alison Fraser, Mount Isa Study Group Member

The Mount Isa area has had above average summer rainfall spread over a fairly long period. We have not had any serious flooding like other parts of Queensland but our dams are full and the countryside is looking very green. Such seasons do not necessarily produce good variety in plant growth. The spinifex (*Triodia sp.*) and other grasses grow thickly and often crown out smaller shrubs and ephemerals. This is good for the cattle but not so good for plant hunters. Many species of plants around here, including Hibiscus, need fire to clear the ground and help germinate the seeds. If good rain follows, there can be a resurgence of species that haven't been seen for ages. Such years are relatively rare, and this isn't one of them. I have recently visited some populations of the species listed below and have to report that most are in decline in relation to past years. All the photos in this article were taken on these visits.

***Hibiscus burtonii***: This very small species is rare in these parts and I have found only a few small, fairly widely separated populations. It grows on red, stony/clay flats, usually under or near the shelter of trees. The tiny 1.5 cm diameter pale mauve flowers, minute epicalyx, globular capsules with several dark green stripes and seeds with long blonde hairs are distinctive features. The numbers in each population are declining.

***Hibiscus leptocladus***: This open, spindly shrub is uncommon. One small population on a hillside near Mica Creek had disappeared in recent years, but a fire swept the area last summer and there is now a good number of young plants growing. Many may not survive the dry season. The very small epicalyx segments to about 2 mm long are distinctive, but sometimes almost hidden by the stellate hairs.

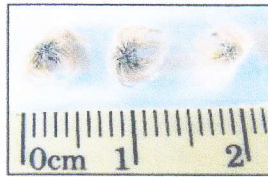
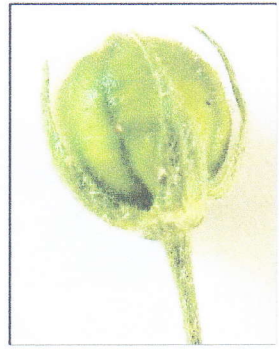
***Hibiscus meraukensis***: This sparsely scattered species tends to pop up as small groups or isolated individuals with no obvious habitat preference. It is the tallest Hibiscus species around here and is therefore more noticeable than the others. Apart from small differences in the amount of pink on the edge of the petals there is no notable variation between individuals. One large population I knew of has died out completely, and generally there seem to be fewer plants than in some past years.

***Hibiscus pentaphyllus***: Around ten years ago I found one small population of about 6 plants of this spreading, untidy Hibiscus. Over a couple of seasons the plants died out and the species was not seen again until recently. There is now just one plant which is struggling against the dense grass on the creek bank. The bright yellow flowers with deep maroon centres are quite attractive and the very long, narrow and spreading epicalyx segments are distinctive.

***Hibiscus sturtii***: This is the most common Hibiscus around Mount Isa but it is not very noticeable due to its small stature. It grows mostly on stony slopes and hillsides and tends to hide amongst the spinifex tussocks and other grasses. It is doing reasonably well this year. The few plants that are flowering now have very small blooms. The cupular epicalyx distinguishes it from similar pink flowered *Bombicellas*.

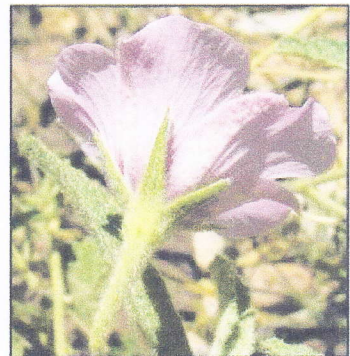
***Hibiscus (unnamed Bombicella)***: This plant is referred to as 'Fraser No. 1' by Geoff Harvey. It is usually an upright, spindly shrub to about 1.2 m tall, but can be more bushy in suitable seasons. It occurs in several widely separated populations. Most plants in 'The Cascades' population are in poor condition and the numbers are declining. Predation by insects is a problem, as with many Hibiscus.

***Hibiscus (unnamed Bombicella)***: This plant is referred to as 'Fraser No. 2' by Geoff Harvey. I have also found it in several widely separated places. It is a small, compact shrub and would make an attractive rockery plant if it could be induced to grow away from its natural habitat. However, I suspect that the chances of success would be very slim. The 5 to 7 narrow-spathulate epicalyx lobes and seeds with tufted short hairs are distinctive features. The numbers are declining.



*Hibiscus burtonii*

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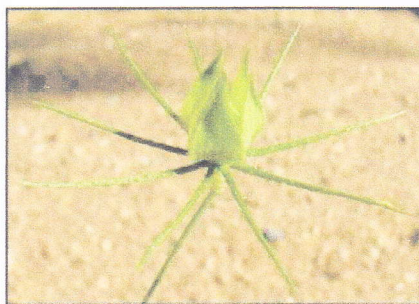
*Hibiscus leptocladus*

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*Hibiscus meraukensis*

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*Hibiscus pentaphyllus*

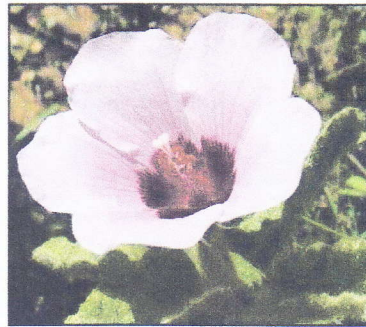
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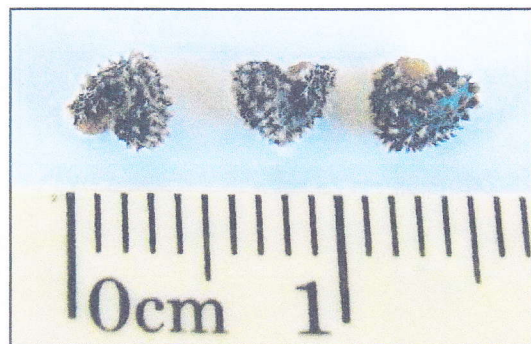
*Hibiscus sturtii*



*Hibiscus* 'Fraser No. 1'



*Hibiscus* 'Fraser No. 2'



## RECENT CORRESPONDENCE

Recent correspondence with Mrs. Gill Muller of South Australia, who is on the move to Port Elliot has been most interesting. She specialises in information labels for two large nurseries and is leader of "Australian Plants for Containers" Study Group, probably to be restarted in due course. The initial correspondence concerned two varieties of Hibiscus she had been growing since 2000 and propagated for sale by the nurseries. From images supplied they turned out to be Hibiscus Hybrids as follows : quote from Encyclopaedia of Australian Plants by Rodger Elliott and David L. Jones, page 364 – "Two cultivars which originated in cultivation from different variants of *H. heterophyllus* crossed with *H. splendens* are also grown.

'**Wirruna**' arose at Black Rock, Vic. As the result of deliberate hybridization (L.A.Craven) using an attractive yellow flowered variant of *H. heterophyllus*. It is a vigorous, bushy shrub 4-5 m tall with large, attractive salmon-pink to pale orange flowers. It grows well and freely over a long period. A hibiscus sometimes sold as 'Sunset Glow' may be identical.

'**Pink Ice**' arose a chance hybrid in a garden at Lawnton, Qld (Jan Sked) from a white flowered *H. heterophyllus*. It grows about 5 m tall and bears large pink flowers which are much paler towards the centre. This is a vigorous free, flowering cultivar well suited to subtropical and warm temperate regions. It responds well to hard pruning. Propagation of all variants of this hybrid must be from cuttings. Cuttings of firm young growth generally strike readily. See images below. It is interesting that these hybrids derived from Australian East Coast species are doing so well in Adelaide and protected parts of Melbourne.



Hibiscus hybrid 'Pink Ice'



Hibiscus hybrid 'Wirruna'

As grown by Gill Muller in Adelaide



Hibiscus hybrid 'Wirruna'



## Oxalate Analysis of Australian Native Hibiscus

By Dr Dion Harrison, Dr Ross McKenzie, Colleen Keena and Geoff Harvey

### Introduction

Native hibiscus, especially *Hibiscus heterophyllus* and some introduced/naturalised species of hibiscus have long been used as a food source in this country. Many web references tell us that native hibiscus (and exotic *Hibiscus rosa-sinensis* for that matter) are edible, particularly the flowers, while other references mention roots and the leaves (also see Ref #1). Some Study Group members make and enjoy drinks, syrups and jams made from the blooms of *Hibiscus heterophyllus* and its crosses. Others have been known to frequently chew up a leaf of *Hibiscus acetosella* or *Hibiscus heterophyllus* when in the garden, with no adverse reactions and have even been using them as salad greens for their tangy, acid flavour. However, our Study Group became aware that there was a perception in the horticultural/landscape industry that *Hibiscus heterophyllus* is a poisonous plant. This perception is largely based on online references citing one experience where someone consumed the leaves (or tea derived thereof) of *Hibiscus heterophyllus* which coincided with severe kidney pain. The assumption was that the leaves, whether young or mature, might contain a high concentration of soluble oxalates. Therefore the Study Group commenced a preliminary investigation into the question of safety in Australian *Hibiscus*, particularly *Hibiscus heterophyllus*, both as bush tucker and in modern usage by having the amounts of soluble and insoluble oxalates measured in the leaves and petals.

### Methods

Petal and leaf samples were collected between November 2009 and May 2010. Samples were dried prior to assay for both total and water-soluble oxalate contents. Oxalate assays were conducted *gratis* by the Biosecurity Sciences Laboratory (DEEDI, Primary Industries & Fisheries) at Coopers Plains. All results are expressed on a dry weight basis. The study included the following five different *Hibiscus* accessions:

- 1) *H. heterophyllus* selection (White Local) is a small growing shrub originally sourced by Arnold Rieck from Ipswich (to the west of Brisbane CBD). It has been propagated and sold by nurseryman Pete Bevan for a number of years. The white flowers of this selection have been used to make jams and syrups by a number of Study Group members with no adverse effects noted following consumption.
- 2) *H. heterophyllus* (Quarry) was sampled from the roadside along Wivenhoe-Somerset Rd near Splyard Creek between Fernvale and Somerset Dam. This white flowering plant was included as a comparator to the other *H. heterophyllus* specimens.
- 3) *H. heterophyllus* Mt. Crosby Cliffs is one of Colleen Keena's selections from the Mt Crosby area west of Brisbane and is grown for its attractive white flowers with pronounced red-pink veins on the backs of the petals. It has also been used to make jams and syrups by a number of study group members with no adverse effects noted following consumption.
- 4) A *H. divaricatus* selection which originated from near Marlborough in Central Queensland was included as a species comparator to the next plant, 'Citrus Haze' hybrid. *H. divaricatus* has gold flowers and narrow leaves.
- 5) *H. heterophyllus* x *H. divaricatus* hybrid 'Citrus Haze' is one of Colleen Keena's hybrids that has yellow flowers all year round and was included because the petals are also considered good for eating and have been used to make good jam and syrups by Study Group members.



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## Results

The results of the oxalate analyses are presented in Table 1. The overall average **water-soluble oxalate** concentrations for all specimens sampled was **0.49% DW in leaves** (range 0.09-1.59%, n=15) and **0.79% DW in the petals** (range 0.31-1.53%, n=18). *H. heterophyllus* (Quarry specimen) had the highest oxalate readings: **total oxalate** content of up to **2.48% in petals** and **1.68% in leaves**; **water-soluble oxalate** content of up to **1.53% in petals** and **1.59% in leaves**. However, the average oxalate content for this specimen was considerably less (see Table 1). *H. divaricatus* Marlborough had the lowest average water-soluble oxalate content for both petals (0.48%) and leaves (0.09%).

**Table 1. Oxalate content of native *Hibiscus*.** Data are means (range in brackets) as a percent (%) of dry weight.

Species	Accession	Total Oxalate as % Dry Matter.		Water soluble oxalate as % Dry Matter.	
		Petals	Leaves	Petals	Leaves
<i>H. heterophyllus</i>	White local	1.65 (1.19-2.35)	2.03	0.81 (0.55-1.06)	1.54
<i>H. heterophyllus</i>	Quarry	1.82 (1.16-2.48)	1.30 (0.87-1.68)	1.05 (0.75-1.53)	0.79 (0.43-1.59)
<i>H. heterophyllus</i>	Mt Crosby Cliffs	1.20 (0.81-1.56)	1.04 (0.66-1.29)	0.66 (0.31-1.04)	0.33 (0.17-0.69)
<i>H. divaricatus</i>	Marlborough	1.01	0.60 (0.47-0.72)	0.48	0.09 (0.09-0.09)
<i>H. heterophyllus</i> x <i>H. divaricatus</i>	Citrus Haze	0.97 (0.80-1.09)	0.77	0.74 (0.68-0.77)	0.10

Nb. 1 gram fresh leaves = approximately 0.24 grams dry weight; 1 gram fresh petals = approximately 0.075 g dry weight.

## Discussion

From a human health and domestic animal perspective, the **water-soluble oxalate is the significant form** (usually just called soluble oxalate). Soluble oxalate concentrations of 2.0-2.5% and above in plant dry matter pose a threat to hungry ruminants (sheep, goats, cattle). Based on the water-soluble oxalate content of *Hibiscus heterophyllus* found in our study (highest concentration detected was 1.59% dry weight in leaves), it is very unlikely such concentrations would poison these animals. Interpreting these data from a human health perspective is more difficult because information on this subject is scanty, so clear guidelines are difficult to obtain. Poisoning of humans by soluble oxalate is very rare. Most of the few cases known have been associated with eating **leaves of rhubarb** that have been reported to **contain about 7% soluble oxalate** (70 g/kg). Stewed rhubarb stems (leaves removed) contain about 0.3-0.6% soluble oxalate. **Poisonous doses of soluble oxalate (as oxalic acid) for human adults are reported to be 10-15 g and for children 5-10 g.** Children poisoned by rhubarb in one case ate 20-100 g of leaves, the oxalate content of which would be about 1.5-7.0 g **soluble oxalate**. These results suggest that for *Hibiscus heterophyllus*, you would need to consume about **8.7 kg of fresh petals or 2.6 kg of fresh leaves for a 10 g dose of soluble oxalate.**

Another way of looking at human susceptibility to soluble oxalate poisoning is to examine the oxalate content of common foods and beverages not known to cause problems. **Black tea**, the beverage with the most soluble oxalate in one review examined, is reported to contain 375-1450 mg oxalate/100 g = **0.3-1.5% soluble oxalate. This soluble oxalate concentration is comparable to what we found in dried samples of *Hibiscus heterophyllus* (0.7-1.59% in petals and 0.17-1.53% in leaves).** Infusions of black tea contain varying concentrations of soluble oxalate depending on the amount of tea leaves used and the time infused. In one study, 2 g of tea infused in 100 ml of water for 15 minutes produced an oxalate content of 12-17 mg oxalic acid/100 mL. Cooked spinach, the vegetable with the most soluble oxalate, is reported to contain 33.3-168 mg/100 g = 0.0333-0.168% soluble oxalate. On the other hand, fruit of carambola (star fruit) can contain 80-730 mg oxalate/100 g = 0.08-0.73% and have fatally poisoned kidney failure patients but not normal humans.

## Conclusion

Using these rather limited data, we suggest that native Hibiscus leaves or flowers used as a food or beverage are unlikely to pose a health risk to healthy humans in terms of its oxalate content. However, on the basis of the reports of poisoning by carambola fruit and adopting a cautious approach, we suggest that humans with poor kidney function should not eat this material or drink tea made from it.



## Acknowledgements

We thank Brian Burren, Senior Scientist, (DEEDI, Primary Industries and Fisheries) for kindly conducting the oxalate analyses.

## References

1) MP Hegarty, EE Hegarty & RBH Wills (2001). Food Safety of Australian Plant Bushfoods. RIRDC, Australia. [http://www.sgapqld.org.au/bush\\_food\\_safety.pdf](http://www.sgapqld.org.au/bush_food_safety.pdf)

## NOTES ON AUTHORS, 'OXALATE ANALYSIS OF AUSTRALIAN NATIVE HIBISCUS'

**Dr. Ross McKenzie** – Worked for 36 years as a veterinary pathologist, toxicologist and research scientist with the Queensland Department of Primary Industries. He is also a retired conjoint senior lecturer from the University of Queensland where he taught toxicology to veterinary students for 14 years. He has recently completed a book on “Poisonous Plants, Fungi and Cyanobacteria of Medical and Veterinary Importance to Australia” soon to be published through CSIRO publishing.

**Dr. Dion Harrison** – is a research scientist with the University of Queensland. His expertise includes plant breeding/genetics, molecular biology and biochemistry. Much of his 15 years research experience has focused on Australian native plants.

**Colleen Keena** – is a specialist teacher who taught in Papua New Guinea as well as Queensland. Since 1975 she has worked tirelessly to grow and popularise native Hibiscus. With her husband **Geoff Keena** who contributes with photography, they have authored many articles and used species and crosses in various ways, e.g. as edible plants for screening and windbreaks. The Keenas' very informative website, currently being upgraded, can be viewed at [www.hibiscus.org](http://www.hibiscus.org). Colleen has agreed to be the corresponding author for the **Oxalate Article**, her email address being [colleenkeena@pobox.com](mailto:colleenkeena@pobox.com).

**Geoff Harvey** – a retired agriculturalist and nurseryman who has had a close association with Hibiscus, both exotic and native for many years. He has been leader of the Hibiscus and Related Genera Study Group since 2003 during which time 23 Newsletters have been produced.