

CLIVIA

SEVENTEEN



Editor
Joubert van Wyk

EDITORIAL

Our thoughts go to the families of Keith Rose, Jurie Swart and the others in our midst who passed away this past year. All of them were great contributors to *Clivia* in their respective ways.

A great thanks to all the article contributors of this Yearbook and also to the Photographic Competition participants who sent in magnificent pictures, which all makes for a very interesting and informative read. There nine entrants that submitted: 24 photos in the *Miniata* category; 12 photos in the Pendulous specie category; 19 photos in the Interspecific category; 20 photos in the Single flower category; and 20 photos in the Other category. The competition appraising was done by three very capable judges: Claude Felbert, Gordon Fraser and James Haxton. The judges did not know who the entrants were, or for that matter who the other judges were. I compiled a folder, by category, of all the photos that had been submitted, with each photo linked to a number. Each judge received a flash drive with all the photos and a spreadsheet where they were required to enter their scores per photograph. I received the scoresheets back from the three judges, combined the three scores of each photograph thereby making each judge's contribution count a third toward the final score. Congratulations to all the different winners, runners-up and second runners-up. In many cases the competition was so fierce that there were only a few points between the different positions. I look forward to ever increasing quality contributions in next year's competition. A fine balance to be struck between the photographer's photographic skills and the subject.

It has been an honour to serve *Clivia* for another year as editor of the *Clivia News* and to be editor of Yearbook 17. This year has been successful from a publication's perspective, albeit a rather difficult one – sometimes barely



'Gorgeous Girl' (1), a Keith Rose selection

scraping together sufficient material for publication purposes, usually a few weeks after the indicated submission date.

Two quotations ascribed to Warren Buffett caught my eye the other day, and I have been wondering about them for some time now from a *Clivia* perspective:

"Diversification is protection against ignorance. It makes little sense if you know what you are doing."

and

"Tell me who your heroes are and I'll tell you who you'll turn out to be."

Line breeding and the very targeted crossing of specific parent plants versus near random crossings come to mind in respect of the first quote. I certainly am very aware of my ignorance. And the second, the behaviour, values, views and philosophies of our mentors, leaders and the people we look up to. I believe it is important that we remember to make place for all the different kinds of people who have an interest in *Clivia*, through our tolerance of one another and the love we have for nature and for our *Clivia*.

Fruï flores!

Joubert van Wyk

26 May 2016

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2014 CLIVIA SOCIETY CONFERENCE - PAPER

'Appleblossom' – the way forwardBy *Wayne Haselau**(2014 Conference Paper dedicated to John Winter)***Introduction**

I am a professional fly fishing guide and spend most of my year travelling. My base is Morgan Bay in the Eastern Cape, South Africa. My home is close to numerous *Clivia nobilis* habitats as well as to the most southerly known locality of *Clivia miniata* on the Kei River. During the off-season I am able to focus on my other passion, *Clivia*. Over many years I have established a *Clivia* biodiversity collection. The success has been with the help of prominent fellow *Clivia* addicts such as Sean Chubb, Hein Grebe, Andrew Harding, Francois Van Rooyen, Val Thurston, Felicity Weedon, Attie Le Roux and the late Fred van Niekerk, to name a few. My nursery, "Wild Coast Clivias", specialises in pendulous habitat species. We also have many unusual and unique habitat *C. miniata* plants. Many of these *C. miniata* are select clones originating from the Transkei and acquired over time from other breeders and collectors. My other plants have been selected from habitat seed grown at our nursery in Morgan Bay. The nursery has a number of original

*Clivia* growing in forest on scree on river bank

'Appleblossom' clones or Q complex plants. We also have some "new" 'Appleblossom' clones which are now part of our breeding programme. There was a time when mystery surrounded the Q complex plants and for many years little was known about these sensational, sought-after plants. Record prices were paid by breeders for offsets of these rare plants in the late 1990s and early 2000s.

History

John Winter's discovery of the Q complex plants, consisting of eight wild-collected, uniquely coloured, blush habitat *C. miniata* clones from the Qhora River area in the southern Transkei in the mid-1990s, is now legendary. The discovery of these lovely and unusual clones created a sensation, especially when it was discovered that they bred true when crossed with each other. Ian Brown was the first to flower an 'Appleblossom' from seed and although of unknown parentage, he named this plant, 'Woodland Pink Blush'. John Winter collected these plants as part of the South African National Botanical Institute (SANBI) sanctioned programme to bring rare habitat clones back to Kirstenbosch. He did so very successfully over a period of many years,



'Dwesa Yellow' habitat clone compatible with 'Appleblossom' and very hardy



Google Map of Qhora river mouth, Southern Transkei showing forest patches



John Winter at Cape Show with his 'Appleblossom'-strain plants

travelling extensively throughout South Africa, having visited many *Clivia* habitats. SANBI offered seed from these early 'Appleblossom' crosses and labelled them as 'Transkei Mutating Colony'.

On retirement John maintained a close connection with the Kirstenbosch Botanical Gardens, working extensively with his *Clivia*, which were housed in a special tunnel at the Gardens. It was here that he raised the first *C.*

mirabilis in cultivation from seed. The resulting seedlings he distributed far and wide. Many of the seedlings were sent to overseas growers. I had the good fortune to spend quality time with him there, pottering around in his tunnel amongst a fabulous collection of habitat *Clivia* plants. He bred with his collection extensively and quite obviously his focus was on his collection of Q

complexes and Q crosses. He was the first to breed hybrids with *C. mirabilis* and produced these crosses as well as the first *C. nimbicola* crosses. During these impromptu sessions in the tunnel we discussed the Q complex plants at length. Our discussions were very informative and I learned a great deal during the time we spent together. I have included a description of the eight known Q complex plants as I understand them.

The Q complex plants, a brief description:

Q1: A medium-sized plant with narrow leaves and an unusual fairly small flower, which is a white and yellow with a faint pink blush. A very distinctive clone that fades to almost white with age. It is difficult to establish in cultivation and does not like to be disturbed, however once



'Levundu' one year later



Peter Miles with garden clone 'Appleblossom' ex
Levundu Forest

established it is a solid plant that forms offsets readily.

Q2: The famous mother of the Qs and the plant that inspired the name 'Appleblossom'. It has lovely flowers which remain slightly closed and blush deep pink as the flowers mature. It breeds true to type. Q2 fetches high prices, up to R15 000 has been paid for a mature plant! I purchased such a plant which did not flower true to type and I suspect that it may have been a selfed individual. John Winter had the plant and was trying to figure out where it originated from. He, however, became ill and no further progress on the origin of this plant took place. Q2 is an attractive large plant with narrow leaves. It is a fertile parent and breeds well with other 'Appleblossom' clones especially when crossed with Q4. Moderate formation of offsets occurs, unfortunately with a tendency to rot.

Q3 is a little known, underrated clone which is also quite rare. This clone breeds well and typically has a well-rounded umbel of perfect shape, open pink and white flowers. The flower count is generally higher than that of the rest of the group, often with 20 plus flowers in the head. It breeds well and has great potential for further breeding work. It is a fairly small compact plant.

Q4: Rare and the big daddy of the group. It



Q2 selfed

is a large plant with the large, open, superbly coloured flowers in pink and white. This clone has broader, heavier and tougher leaves but is very reluctant to make offsets. As a result it is still very rare in cultivation and is possibly the most valuable clone for breeding purposes. It is a slow grower and will also rot if not cultivated carefully. It is highly likely that it will self itself true to type.

Q5: Is a fabulous clone. It has full heads of lovely pink and white flowers. It is a medium-sized clone with great breeding potential. It is very similar to Q3, however the flowers are more textured and don't open fully. It is similar to Q3 although slightly larger. When viewed side by side, the differences between the flowers are obvious. This plant forms a moderate number of offsets.

Q6 is the largest plant of the group with large upright broader leaves and heads of fairly spidery yellow and white flowers suffused with pink. It is the most common 'Appleblossom' form in collections as it offsets well and as such is the Q plant most often used in breeding. John Winter selected out a plant from the original clump of plants collected in the wild which was infinitely superior to the standard plant. He



Q3 Sanbi Kirstenbosch. Photo: Ian Coates

called it Q6A and this is the plant he worked with extensively. It is a larger and more vigorous plant with better quality flowers. He believed it to be a self-pollinated or original plant from habitat that was growing within the original habitat clump.

Q7: Sadly most of the material in collections of this clone is possibly diseased, having a white viral pattern on the leaves. I was told that the original habitat plant was also infected with virus, however John was adamant that this was not so. It was possibly collected without any virus and became contaminated later in cultivation. It is the most yellow of the Q series plants and is a smaller compact plant. Q7 is valuable for future breeding programmes as it is yellowest of the Qs. Mr Masami Uno of Japan is a fanatical breeder of 'Appleblossom' and has a superb 'Appleblossom' plant he bred from Q7.



Qhora Estuary: note heavily forested valley and misty hills. Classic Southern Transkei *Clivia* habitat

Q8: This is a very interesting clone according to Sean Chubb. The plant is a wild-collected clone, originating close to one of the original Qs as a wilding. It matured and flowered some years later at Kirstenbosch and was named 'Peach Glow' by John Winter. It is a peachy coloured 'Appleblossom' and is rare in cultivation. I have not had the privilege of seeing it in flower.

The above is a rough guide of the eight different Q habitat clones. Please be aware that unless you have an accurate, detailed providence you cannot be sure that the plant you have or want to purchase is in fact a true Q clone. The Q complex plants are all habitat plants. When acquiring Q complex material, do so from a reputable source. There are a number of new and undescribed habitat 'Appleblossom' clones. Of these undescribed clones little is known. Since 2005 "Wild Coast Clivias" has acquired a number of Q complex plants as well as a few of these newer clones and we use the prefix TB or 'Transkei Blush' when describing them. One of these named clones is 'Transkei (B) Grandslam', a superior form with a large full head of pink and white flowers that forms offsets readily. A number of offsets of this clone have been placed in heritage and biodiversity collections for safe-keeping. Some of its seedlings have matured and flowered and are very similar to the original clone.

Habitat and ecology

I am fortunate to have travelled to *Clivia* habitats throughout southern Africa. Most of my effort was simply to learn as much as possible about *Clivia* and their fascinating ecology. As a result of all the information I have gained during my many travels, I have decided to write a book on *Clivia* habitats. Many of the visits to habitat sites have been in the Transkei and as such I have learned a great deal about the regional *Clivia* distribution and ecology in

this often remote and inhospitable region.

In the southern Transkei and the Eastern Cape, *Clivia* are sometimes found close to the sea, often growing on coastal dunes just above the high water mark. The habitat from which the Qs originate is no exception, with many plants growing in the coastal forest close to the sea. The Eastern Cape coast is known for its strong winds and there is almost always wind blowing in these *Clivia* localities. As a result there is constant air movement in these habitats which ensures that water very seldom, if ever, lies on or around plants for any length of time. Wind movement and the presence of epiphytic lichens growing on the leaves of wild *Clivia* in many habitats help protect the plants from fungal pathogens. It is believed that these lichens produce anti-fungal chemicals and aid in the absorption of water. The coastal forest habitat provides a protected environment, especially with regards to proximity to water which helps buffer the changes in ambient temperature. The plants grow in scree (rocks) allowing further stabilisation of the growing environment. Rocks help to buffer temperature changes and hold moisture around the roots (i.e. rock mulching is a known landscaping and permaculture technique). Proximity to the sea and the estuaries moderates temperature and provides good humidity, keeping the associated *Clivia* cool, even during the hot summer months. *Clivia* in very heavy shade are often reluctant to flower, showing a fine line between too much and too little shade in the wild.

The narrowness of the river gorge and the heavily forested banks provide between 50% to 80% shade which varies only according to position and/or aspect and the season. In many colonies it is possible to see how positively *Clivia* plants respond to the increased light available when a large canopy tree such as a Wild plum (*Harpyphyllum caffrum*) falls over. The increased light often results in a mass show of flowers in the season following such an event. *Clivia* in this environment are found growing mainly on rock under the forest canopy. The locality from which the known 'Appleblossom' Q clones originate



'Qhora Lobster Orange' Appleblossom

and where the other newer clones were found is west facing. Plants here grow on rock and scree under a moderate to heavy forest canopy. Drainage is consequently very sharp (good) with *Clivia* plants rooted in leaf litter and Dassie dung. Dassie or Rock Hyrax are often closely associated with wild *Clivia* as they frequent the same steep rocky habitats and their droppings provide much needed nutrients for *Clivia*. Forest habitats are generally poor in nutrients and there is a great deal of competition among the various forest plant species for these essential and scarce resources. In this particular locality *Clivia* are in some instances rooted entirely in Dassie dung amongst the rocks. I mention this fact as when researching this area, the habitat was once described to me by an old Transkei trader as "Yes man, there were these white flowers growing there amongst the Dassie dung". We used to see the *Clivia* plants there when we went fishing.

When taking into account all these environmental factors, it follows that plants from this locality and similar localities in the Transkei



'Suzette Too', Appleblossom complex hybrid

and KwaZulu-Natal are particular about their growing conditions in cultivation. Every grower has his or her own particular recipe for success. I have found that the use of clay pots is a big help when attempting to grow these Q complex clones. Cutting longitudinal slots down the side and to the base of the pot further enhances the drainage potential. Using gravel chips and coarse bark as a major part of the potting medium ensures further good drainage. Plants from these localities enjoy a great deal of wind movement and stagnant air is not suitable for the growth of these plants. Providing good air movement in a greenhouse or shade house is essential. Growing the plants under 50% to 70% shade cloth is optimal. The deciduous nature of many coastal forest trees means that in winter when the hours of sunlight are limited, there is more light available to understory plants. The fallen leaves of such forest trees provide the much needed nutrients to understory plants as well as serving to mulch them. This helps to retain moisture and reduce heat loss. Bear this in mind when planning a winter regime in cultivation!

The plants

Why these wonderful wild clones occur specifically here in the Southern Transkei is not clear. The presence of two species, *Clivia nobilis* and

C. miniata, together in this habitat is almost unique! In some places the two species are found literally growing side by side and although the two species have different flower shapes, one pendulous and the other open, they flower at the same time in spring. The two species have predominantly different pollinators, *C. nobilis* the sunbirds and *C. miniata* butterflies. There is a small black solitary bee that collects pollen on both species. It is this solitary bee which I have written about in the past that moves pollen freely between the two species and is extremely common in this locality. I believe cross-pollination in the wild has given rise to a hybrid-swarm

with interbreeding producing some plants with obvious interspecific traits. It seems quite obvious that this free mixing of genes between the species has in some way had a role to play in creating this unique mutating colony. It is within this genetically diverse colony that the blush 'Appleblossom' plants occur. Scientists tell us that *Clivia nobilis* has a great deal more potential colour variation in its genes, because apparently the anthocyanin pathways in *C. nobilis* are far more varied and developed than in *C. miniata*. This is interesting as it means that by combining the genes of the two species there are better chances of colour mutations developing.

The 'Appleblossom' strain as it is now known, consists of eight known named clones, the so-called Qs numbering one to eight with each one of these plants being unique. What is however not common knowledge is that there are more wild or habitat blush clones from this immediate area.

Most of these other plants originate from wild collected seed and in some instances from offsets and wildlings from mature plants in the habitat. Over the years, local traders and fisherman visiting the area collected attractive or unusual plants to take home to their gardens. In fact, most of the recently discovered "new"

clones have been found in suburban and farm gardens in the Eastern Cape, as well as in the gardens of trading stores in the Transkei. Fortunately, we have the providence of these plants in most cases, as is the case with the now-famous 'Dwesa Yellow' *C. miniata* clones. Peter Miles is a passionate *Clivia* grower and breeder and recently he discovered a superb 'Appleblossom' clone in a garden in East London. We followed the providence of this special clone and it turns out that it was collected from a forest that no longer exists. The Levundu forest was part of the Qhora catchment, close to Willowvale in the Southern Transkei. Unfortunately, this forest has been destroyed and this *Clivia* is our last link with it.

Sean Chubb has questioned the fact that the '4 Marys' group of Blush clones is separate from 'Appleblossom' group of plants. I agree with his claim. They are morphologically very similar and DNA testing in the future may be able to throw some light on this mystery. Gordon McNeil purchased the collection of Gladys Blackbeard which originates from Grahams-town in the Eastern Cape. Gladys Blackbeard was a pioneer *Clivia* grower and started her collection in the 1940s and 1950s. Living in the Eastern Cape she would have had access to *Clivia* from many areas. The 'Appleblossom' locality on the Qhora river in southern Transkei is only a couple of hundred kilometres away from Grahamstown, as the crow flies. There is a famous hotel there called the Kob Inn which has been a popular holiday destination for a long time. I believe it is highly likely that there is a connection between these two groups, albeit it is only speculation at the present time. The spontaneous appearance of a blush *Clivia* almost identical in appearance to 'Appleblossom' in McNeil's collection seems just too much of a co-incidence. It has become clear



Qhora river valley landscape – searching for Levundu forest!

that the 'Appleblossom' gene is a mutation, which although not presently fully understood, presents itself spontaneously amongst progeny of normal or orange flowered plants on occasion. To conclude, it is highly likely that the '4 Marys' clones are genetically compatible with the known 'Appleblossom' clones, as they may have the same origins and consequently the same genetic make-up. The Transkei has a wonderful and largely unexplored *Clivia* gene pool and the unique blush *Clivia miniata* clones of the 'Appleblossom' strain are no exception.

The future

The 'Appleblossom' complex presents a unique opportunity to current and future breeders. The blush genes of these wild clones are strong and constant, and although their breeding patterns are not currently fully understood, it is obvious from early results that this special group of plants will have a great influence on *Clivia* breeding in the future. Established breeding techniques such as line breeding could result in future 'Appleblossom' breeding programmes which produce sought after traits such as short, broad-leafed plants with large umbels of broad tepalled blush flowers. Personally, I enjoy larger well-formed plants and although the current trends are for more compact plants, I hope to improve on the wild forms by producing robust plants with both larger flowers and larger numbers of flowers in the umbel. Some of the problems associated with growing 'Appleblossom' plants is that



Select clone broad leaf full petal (Q2 x Q4)

they are slow-growing and may be inclined to rot. By breeding to improve on the hardiness and disease resistance of these plants and by incorporating traits such as leaf-variegation, rapid growth and good offset production, the future for this group is bright.

Conclusion

John Winter's 'Appleblossom' legacy will have a lasting influence on future *Clivia* breeding and the introduction of new clones into established breeding programmes can only bolster the currently available gene pool. It is essential that specimens of all original habitat clones are preserved in heritage and biodiversity collections for future generations and the 'Appleblossom' complex is no exception. It is important not to lose these valuable, original clones in uncontrolled and frenetic Q x Q x Q breeding scenarios. While most of the current breeding programmes are of this type, more sophisticated

techniques may be of benefit to future breeding programmes. If we are ever going to fully understand these plants and their breeding habits, it is of paramount importance to label plants correctly and to keep records of providence and stud books. Preserving the providence of this founding stock and keeping pure habitat *Clivia* clones as well as named clones resulting from breeding programmes will be vitally important to future breeders.

Finally, I think it is important that a group of specialist growers and/or breeders form a dedicated APPLEBLOSSOM WORKING GROUP to share knowledge and material. Such a group could facilitate easy co-operation internationally amongst serious breeders and help conserve these precious wild clones for further generations.



'Transkei (B) Grand Slam'

Clivia species: Quo vadis

By Johan & Paula Spies

Our interest in the validity of *Clivia* cultivar names started when we obtained 'Cynthia's Best' from four reputable *Clivia* collectors/breeders and discovered that we had at least three totally different "cultivars". Since we both worked in laboratories where DNA research is conducted and Forensic Science is part of the graduate course, we decided to employ the forensic methods in establishing the validity of cultivar names in *Clivia*.

In Forensic Science, 13 markers can be used to identify an individual (± 1 in a million chance for a wrong identification). To make the identification more reliable some laboratories increased the number of markers to 18 or even 21 in some cases (1 in many billions chance for a wrong identification). The DNA markers help to construct a "DNA profile" that is unique to every person (except identical twins, which can be considered to be clones of one another). In the process you can also determine whether two people are closely related (share the majority of loci {the individual marks observed in a profile}). Since all plants belonging to a certain cultivar are supposed to be genetically identical (they should be clones {offshoots} and therefore mimic human identical twins), we tried to construct a few profiles of well-known cultivars and include 1-2 other species (other than *C. miniata*) to confirm that our profiles for related plants (cultivars of the same species) differ from other species. For this type of study you need markers that provide sufficient variation to separate slightly related individuals from unrelated individuals, yet they should be stable enough to indicate relationships between slightly related individuals (3rd cousin twice removed). Then the shock: we observed much more variation within *C. miniata* than between a *C. miniata*

plant and members of other species!

More than five years of intensive research then followed. More and more gene regions were investigated, and more and more species were included. The overall result remained: our knowledge of what a *Clivia* species is, is at fault! For example: 'Eshowe Yellow', a well-known yellow *C. miniata*, is more closely related to *C. gardenii* than to any *C. miniata*! This result contradicts everything we think we know about *Clivia*. So an even more intensive molecular study on *Clivia* followed and this paper will handle some of the issues raised.

Clivia x var. *citrina*

In several species the yellow forms of the species have been described as a separate taxonomic unit, variety *citrina*. The molecular studies indicate that there is no justification for such a separation. Although the code of botanical nomenclature makes provision for such separation, there is no logical reason to do so. It is just as absurd as to group all blue-eyed people in a separate race in humans (with apology to some guy named Adolf). It is pointless, so why do it? You would have the same justification to separate all broad leaved plants in one variety or all variegated plants in another! Then tens of letters can appear in the *Clivia* Newsletter on suggestions of what to do with broad leaved variegated plants!

Clivia mirabilis

This species is really a species. It means that variation within this species is much smaller than the variation between any individual of this species and a member of another species. This study further indicated that this species is not the evolutionary forefather of *C. nobilis* as has been suggested, but that they both developed from the same ancestor (sister species is the term scientists use).

If we accept the assumption that a species shows the most variation at its point of origin, another interesting deduction can be made from these results: the point of origin of *C. mirabilis* is in the Western Cape, not the Northern Cape as initially thought. Almost no genetic variation exists in the Oorlogskloof area where *C. mirabilis* was discovered. The variation increases as you move through the mountains until the highest degree of variation is found on the south-western margin of the species distribution.

Clivia nobilis

Another fascinating result: although this species contains a very high degree of morphological variation, all samples studied provided exactly the same DNA profile. These plants represented different morphological traits and came from different geographical areas. *Clivia nobilis* is consequently a "good" species and cannot be confused with any other. Although some *C. nobilis* and *C. mirabilis* plants may look very similar (especially young plants), their DNA profiles will easily separate the two species.

C. nobilis (potentially distinct from *C. x cyrtanthiflora*) was not included in this study. Our first specimen (provided by Ken Smith) succumbed to a bacterial infection after rodents almost totally destroyed the plant. Helen Marriott tried to provide me with seeds and our postal service delayed delivery for more than two months. The seeds germinated and died in the envelope before they could be sacrificed to science!

Clivia caulescens

The last of the well-defined species contains much more internal variation than the previous two species. However, this variation within the species is still less than the variation between plants from this species and any other species. A closer look at the results suggest that this species can be subdivided into three geographical groups, the northern (roughly north of God's Window), Mariepskop and southern (God's Window and areas

south of it) groups. At this stage there is no justification for a formal taxonomic division of *C. caulescens*.

Another interesting fact is that *C. caulescens* is also a sister species to *C. mirabilis* and *C. nobilis*. The ancestral species must have had a very wide distribution to produce this result.

Clivia x nimbicola

This mist dweller represents the natural hybrids formed between *C. miniata* and *C. caulescens* on Bearded Man Mountain. This hybrid species was poorly represented in this study, owing to the Department handling Nature Conservation repeatedly losing our applications to collect a small leaf sample from plants on Bearded Man. From the limited number of plants included it appears as if *C. caulescens* is usually the pod parent.

Introgression occurs in this area. Introgression entails the repeated hybridization followed by backcrossing to one particular parent. Since *C. caulescens* acts as the pod parent, *C. x nimbicola* will act as pod parent in the next generation. With *C. miniata* acting as the pollen parent in every generation, you find *C. miniata* looking plants in this area with some *C. caulescens* genes in them.

New *Clivia* species

A new, as yet undescribed, species exist near Ngome in KwaZulu-Natal. Up to now these plants were classified as *C. gardenii* and even *C. gardenii* var. *citrina*. The yellow, blush and orange flowering specimens are all one new species, with a closer relationship to *C. caulescens* than to *C. gardenii*. More specimens from Swaziland should be studied to determine the total geographical distribution of this species.

Clivia chaotica

This is the only way to describe the remaining three species of *Clivia*! Let us try to decipher the chaos.

Clivia miniata

Clivia miniata is the well-known open flowered species. Unfortunately plants from this species hybridized with plants from *C. gardenii* and

C. robusta. In many instances molecular techniques cannot separate these three species. Consequently, you will experience more hybrid vigour if you cross *C. miniata* with any of the "real species" than in hybrids with the "related" species. We need to study more plants to see whether one can find meaningful results in this group.

Clivia gardenii

This species is better delimited as *C. miniata* and three different groups can be identified. For lack of better knowledge, we can talk about the "real" *C. gardenii*, the *C. gardenii* x *C. miniata* and the *C. gardenii* x *C. robusta* groups. Once again more plants and more genes should be studied before we will be able to solve this problem.

Clivia robusta

Apart from hybridization with both *C. miniata* and *C. gardenii* this species can be subdivided into four genetically different groups. The first group is, according to our interpretation, the "real" *C. robusta*, previously known as "swamp *gardenii*". As the name indicates plants from this group grow in swampy areas. A morphologically similar group grows in dry areas, for example on the cliffs in Oribi Gorge. These two groups are not merely different ecotypes, but contain molecular differences suggesting that they should at least represent two different subspecies. The third group con-

sists of 'maxima'. This is clearly a separate entity as the late Fred van Niekerk suggested. The 'maxima' group shows molecular similarities with a wide range of plants, such as the Mzamba collection and even *C. gardenii* plants collected by Francois van Rooyen near Olifantsfontein. This suggests that these diverse plants may be morphologically different remnants of the ancestral species from which all the species developed. The final group in *C. robusta* is actually not *C. robusta*, but misnamed *C. gardenii* specimens. It may be that some people confused the name "swamp *gardenii*" and renamed any *C. gardenii* plant growing in swampy areas, *C. robusta*.

In conclusion we can state that much progress was made with the molecular work on *Clivia*. *Clivia mirabilis*, *C. nobilis*, *C. caulescens* and the new Ngome species are well-defined. *Clivia robusta* should be further divided into two species, with one consisting of two subspecies. However, more studies are necessary to delimit *C. miniata* and *C. gardenii*. When this process is completed we can start to construct a database for the identification of cultivars. Thankfully we will not be available for those tasks (due to retirement). We can already see the arguments on whose 'Cynthia's Best', 'Bronze Green Boy', 'Chubb's Peach', etc. is the "real" one that should be used to construct the database! Our sincere sympathy to our successors!

CLUB SHOWS

Cape Clivia Club Show 2015

By Felicity Weeden, and photos by Claude Felbert

The 2015 Cape Club Clivia Show was a resounding success. This was Chris Smit's first term as show manager and he achieved an excellent outcome. I believe

that he will go from strength to strength in the future.

The venue in the Tygervalley shopping centre is very attractive, providing an excellent

Best on Show
– Piet Theron
(George) Pastel



First Runner Up – Piet Theron (George): Orange red



Second Runner Up – Jim and Linda McDermott: Orange multitepal



Best Peach – Riél Lotter



Best Own Breeding – Felicity Weeden: Orange red

setting for the show. A record number of 365 plants were benched by 26 exhibitors and the standard of the exhibits was generally very high, proving a challenging task for the judges from Johannesburg, who judged in exchange with the Cape's judges who did the honours in Johannesburg. We also enjoyed a large increase in visitors to the show, which is very encouraging.

The winners were:

Best On Show – Piet Theron (George):

Pastel

First Runner Up – Piet Theron (George):

Orange red

Second Runner Up – Jim and Linda

McDermott: Orange multitepal

Best Peach – Riél Lotter

Best Own Breeding – Felicity Weeden:

Orange red

People's Choice – Leon Blom: Yellow



People's Choice – Leon Blom: Yellow green throat

green throat

Best Single Flower – Jan and Ceciel Pohl

Best Leaves – Leon Blom

Eastern Province Clivia Club Interspecific Show 2015

By Dawid Botha

The Eastern Province Clivia Club's Interspecific Show was held on 18 July 2015 at Sherwood Garden Centre, Port Elizabeth. The number of entries continues to grow as interest in the interspecific flowers improves. The public and attending members voted for the best interspecific and species plant on display.

The honours for Best Interspecific went to Carrie Kruger with her beautiful plant 'Chameleon'. The name was chosen because the flower changes colour as it ages. Second Best on Show went to Gideon Botha for a very unusual compact and open pink interspecific. The best species flower was awarded to Carrie Kruger for her *Clivia gardenii*.

More pictures of interesting *Clivia* seen at the mini show.



Best Interspecific, Carrie Kruger

Second Best on Show,
Gideon Botha, pink
interspecific





Best Species Flower was awarded to Carrie Kruger for her *Clivia gardenii*



Other interesting flowers

Yellow interspecific





C. gardenii, orange



Bi-colour



C. 'Chameleon' close up

Below: Trading and talking,
plant sales



Eastern Province Clivia Club Spring Show 2015

By Dawid Botha (Chairman/Show Chairman)

Our show was held on the 19-20 September 2015 at Sherwood Garden Centre, Port Elizabeth. It seems like the show date was spotted on and we had 18 entrants with a record total of 225 plants. Judges were Piet Theron (Head Judge), Mark Joubert and Dawid Botha. Learner judges were Marius Meyer and Glenn Miles. The entry forms had more categories than previous years to showcase to the public the difference in flower colours and forms available. It is always a challenge to stay abreast of new breeding trends and getting them categorized, so that they can shine in

their own right. A big orange umbel will always be a winner and should never disappear from cultivation.

This year the plants were displayed on a lower platform. This presented the plants in a more natural way to the observer. The weather was sunny and warm and a large number of visitors attended the show. During judging Piet Theron mentioned that they were spoiled for choice. This in itself made it very difficult to choose between the quality plants up for judging. Luckily, as all judges know, there are always those umbels that stand head and shoulders above the others in sheer size and splendour.



Show area



The winning table



Lester de Beer with his winning plants



Lester de Beer: Best on Show: *C. miniata* orange broad tepals

The judging results of the show:

Lester de Beer: Best on Show: *C. miniata* orange broad tepals;

Second Runner-Up to Best on Show: *C. miniata* apricot

People's Choice: *C. miniata* bi-colour;

Glenn Miles: First Runner-Up to Best on Show: *C. miniata* bronze;

Marius Meyer: Judges' Choice: *C. miniata* green; Richard Johnstone: Best Beginner:

C. miniata red/dark orange.

The sales stalls were brimming with flowering *Clivia*, seedlings and seeds that enticed the potential growers. As usual the quality and unusual plants were spotted first and quickly sold at bargain prices. After the show at the prize-giving, Willie Le Roux and his lovely wife Cynthia were honoured for 15 years of selfless service to the club and its members. A collage of Willie's own favourite plants and happy *Clivia* memories was also handed over at the function.

I must thank my committee, Marius Meyer (Vice chair), Gideon Botha, Brenda Ferreira (Treasurer), Mark Joubert, Tinus Sonnekus and

my wife Scherine (Secretary) for all the selfless time spent on preparations and presentation of the show.

To those members who helped with the setting up of the show area, a big thank you.



Glenn Miles



First Runner-Up to Best on Show, *C. miniata* bronze



Marius Meyer



Judges' Choice: *C. miniata* green

People's Choice: *C. miniata*
bi-colour



Second Runner-Up to Best on Show:
C. miniata apricot



Thanks also to those members who helped man the club tables. Without you there would not be a show. Thanks to Ever-Grow for donating some goodies to the show winners.

It will never be possible to showcase every plant at a show. This report includes some of the other highlights of the *Clivia* fashion show.



Richard Johnstone: Best Beginner:
C. miniata red/dark orange



Hand over of gift





Free State Clivia Club Show 2015

By André du Toit



Orange green throat – André du Toit



Pastel bi-colour – André du Toit

Winner leaf plant category



Orange – Stefan Ferreira



The Free State Clivia Club show winners for 2015.

From left to right: 2nd Runner Up – Stefan Ferreira with a bronze green throat, Best on Show – Hennie van der Mescht with a compact yellow and Runner Up – André du Toit with a group 2 yellow x 'Hirao'



'Ghost' – André du Toit



'Bruintjie' – André du Toit



First flower – Stefan Ferreira



Pastel – Stefan Ferreira



Yellow green throat – Stef de Swardt



Bronze green throat – Stef de Swardt

Garden Route Clivia Club Interspecific Show 2015

By André Meyer. Photographs: André and Anette Meyer

The 2015 Garden Route Clivia Club Interspecific Show took place on 25 July 2015 at the Outeniqua Research Farm in George. The weather leading up to the show was unsettled causing some plants to bloom early and others late. The number of entries was down on the previous year but the quality of the plants was good. The judges were Koos Geldenhuys and Rita van Rooyen, members of our club.



Second Best on Show:
Carrie Kruger (Cat 7 1st
Flower)



Best on Show:
Carrie Kruger (Cat 4
Peach, Pastel, Pink)



2015 show winners, Carrie Kruger (left) and Kerneels Buitendach

The winners were as follows:

Best on Show: Carrie Kruger (Cat 4 Peach, Pastel, Pink);

Second Best on Show: Carrie Kruger (Cat 7 1st Flower);

Third Best on Show: Kerneels Buitendach (Cat 6 Own Breeding).

The show was well attended by 33 members and 8 guests. Dr Johan Spies gave a very informative talk on the different *Clivia* species and the DNA testing that his research team has been conducting on these.



Third Best on Show: Kerneels Buitendach (Cat 6 Own Breeding)

Garden Route Clivia Club Show 2015

By André Meyer

The annual *Clivia miniata* show was held on 26 and 27 September 2015 in the Outeniqua Primary School hall in George. This was a special occasion as it was the 10th anniversary of the Garden Route Clivia Club. The weather was very kind and visitor attendance of more than 800 over the one and a half days was similar to that of previous years. The visitors had a keen interest in the two workshops on *Clivia* growing. Some of the comments in the visitors' book are:

- Amazing!
- Very interesting
- Excellent

The plant/seed sales area was very busy and sellers were satisfied with their sales.

Exhibitors participated in 56 categories and 348 plants were benched for the show which is a big improvement on the 291 of the previous year when some unseasonal weather impacted

upon the availability of plants. The committee changed a couple of categories for the show to encourage own breeding as well as newer trends in *Clivia* breeding. The judges for this show were Hennie van der Mescht (Free State Clivia Club) and Leon Blom and André Swart from the Cape Clivia Club. They were very impressed with the quality of the plants.

This was the last show co-ordinated by Fanie van der Merwe who has been the show director for four years. All the club members wish to thank Fanie for a job very well done. All the volunteers who work so hard to make this show such a success also deserve a very big thank you.

Gerhard and Karen Faber achieved the extraordinary feat of winning Best on Show (BoS) Gold, BoS Silver and BoS Bronze with some fabulous plants. Willie Freund won BoS Own Breeding whilst Piet and Jeanette Theron won the People's Choice award.



Variegated narrow leaf – Fanie van der Merwe



Any other flower
not included on list
– Gerrit & Sussurah
van der Merwe



Ghost – Kobus &
Ida Esterhuizen



Picotée – Ricky & Noelia Jardim



Bi-colour – Gerhard & Hester van
Copenhagen



Small flowers – Piet Claassen



Multitepal any colour –
Gerhard & Karen Faber



Own breeding any other colour – Ricky & Noelia Jardim



Best on Show Bronze – Gerhard & Karen Faber



Best on Show Gold – Gerhard & Karen Faber



Best on Show Own Breeding – Willie Freund



Best on Show Silver – Gerhard & Karen Faber



People's Choice
– Piet & Jeanette
Theron

Snapshot of
exhibition area



2015 Show-winners: Show director
Fanie van der Merwe with Gerhard & Karen Faber



Public attending workshop at our *Clivia* show

Joburg Clivia Club Show 2015

By Glynn Middlewick

The *C. miniata* show is the highlight of the Joburg Clivia Club calendar. The opportunities for promoting the Club are endless. The Joburg Club has both a Flowering *Clivia* plant division and a Non-Flowering *Clivia* plant division on the show tables.

The number of entries in 2015 was larger than the previous year and we had the privilege of having judges who were non-members of the Joburg Clivia club assessing the plants. The winning plant of the flowering section was that of Chris Viljoen with a superb three umbel orange with a green throat. The first runner-up was awarded to Rassie Erasmus with a narrow tepal orange flower with a green throat. The second runner-up was awarded to Corra and Dawie van Heerden for a yellow *Clivia miniata* flower.

The non-flowering *Clivia* plant division was won by Paul and Sue Kloeck with a superb Light of Buddha plant. The first runner-up was awarded to Neil Rossouw for a variegated plant. The second runner-up

was awarded to a large broad leafed plant, the owner of which was Johan Etsebeth.

Congratulations to the winners and a big thank you to all entrants for the time and effort spent ensuring the high quality of show plants on display.



Best on Show Flowering 2015: Chris Viljoen



JCC Clivia without flower Best on Show: Sue Kloeck



Best on Show non-flowering: Paul & Sue Kloeck



First Runner Up to Best on Show 2015:
Martiens Erasmus



Second Runner Up to Best on Show 2015:
Corra & Dawie van Heerden

Lowveld Clivia Club Show 2015

By Ian Radmore

The LCC annual Interspecific and Pendulous show was held at Ian Radmore's smallholding (Genade) on 18 July 2015. The show was a "closed" show in that it was not advertised to the general public. Members could, however, bring along any interested parties to the event. Fifty-five plants were entered by 10 exhibitors. Judging was done by a panel of judges consisting of members of the LCC. A plant of Paul Kloeck won Best on Show whilst Attie le Roux showed the first and second runner-up plants. Ian Radmore was awarded Judges' Choice.

The 2015 *C. miniata* show was held at the Botanical Gardens Educational hall over the weekend of 4-6 September. One hundred and twenty five plants in total were entered in the show by 15 members, of which three members were showing plants for the first time. Despite the low number of plants entered, the judges were impressed by the diversity and quality of the plants. The entries were judged by Piet Theron and Dawie Strydom. In the "plants with flower" section, Best on Show and First Runner Up were awarded to Clivia Kingdom (Paul Kloeck) with his well-known 'Blushing

Virgin' and a seedling of 'Blushing Virgin'. Second Runner Up was awarded to Louis Lotter with an 'Andrew Gibson' F1 bi-colour. Judges' Choice was awarded to Clivia Kingdom (Paul Kloeck) with a green centre Tipperary peach and People's Choice also went to Paul for 'Blushing Virgin'.

In the "non-flowering" section, Best on Show was awarded to Avalon Clivia's (Ian Radmore) for a *C. miniata* variegated plant whilst First Runner Up was awarded to Sue Kloeck and Second Runner Up went to Attie le Roux. Judges' Choice also went to Attie le Roux.

The Saturday sales and attendance figures were very low due to persistent rain throughout the day. Sunday, however, made up for it, with the highest attendance figures ever recorded on a Sunday. In total, approximately 202 members of the public visited the show during the weekend. Unfortunately, despite all our efforts, we are not seeing an increase in show attendance figures. We mainly see the same people at our annual show every year and it does not seem as if the public is becoming more interested in *Clivia*. Maybe the change in date will have a positive effect on attendance figures in 2016. Two members had individual plant sales stalls and one member, a stall selling clay pottery, whilst five members opted to sell plants and seeds through the Club Stall.



Lowveld Clivia Club Show winners 2015



'Blushing Virgin'
Best on Show



'Blushing Virgin' F1
Sibling 1st Runner
Up Lowveld Clivia
Club Show 2015

People's Choice



Lowveld Clivia Club
Show winners 2015





Best on Show *Clivia* without flower, Lowveld Clivia Club Show 2015



'CK Peach Demon', Judges' Choice, Lowveld Clivia Club Show 2015

Northern Free State Clivia Club Show 2015

By Ben Nel

A total of 190 flowering plants was displayed at our *miniata* show. Ten club members entered plants for the show. A record number of 538 visitors visited the show. This total is almost double the number of visitors of the previous year.

Piet Laubscher and Christo de Beer officiated as judges for the show.

Stefan Ferreira entered the Best on Show as well as the Second Runner Up to Best on Show.

Steven van Loggerenberg entered the Runner Up to the Best on Show.

André Steyn entered the special prize item.



Best on Show



Runner Up to Best on Show



Special prize



Prize winners

Northern Free State Clivia Show 2014

By Jan Schmidt

Below is a photo of the late Hannes van Rooyen with the three winning plants that he entered into the show. Best on Show is 'Mozart Yellow'. First Runner Up is 'Mozart Cameron Peach'. Second Runner Up is a 'Piet Multitepal Red'.



Hannes van Rooyen



Hannes van Rooyen's winning plants



Trophies made by
Johan Olivier



Northern Clivia Club Show 2015

By Christo Topham

Our annual show is surely the highlight on the calendar of the Northern Clivia Club and 2015 was indeed a special year. We hosted our show at Anton van Wouw Primary School in Nieuw Muckleneuk.

Flowers are not made by singing "Oh, how beautiful" sitting in the shade (Rudyard Kipling). A lot of work was indeed been put in by exhibitors and organizers to enable the public and members to:

- Enjoy a spectacular display of *Clivia*
- Purchase *Clivia* plants or seeds for their garden or prestigious collections (remember the Indian proverb "All the flowers of all the tomorrows are in the seeds of today").

Our exhibition plants were as usual beautiful and the number of new colours seen continues to astound. The quality of the show plants far exceeded our wildest dreams and expectations. This led to

judges having a very challenging time selecting the winners from amongst all the exquisite plants and we would like to sincerely thank the judges for their hard work and effort. Congratulations



The winning plant of Anton and Rina Potgieter

to the eventual winner, Anton and Rina Potgieter.

The seller area was as usual a hive of activity. This is a very important area and it is here where bargains can be picked up and where new friendships are formed and old friendships rekindled. Not even the persistent rain could dampen the spirits of the buyers or sellers. A great time was had by all.

We also had our annual auction where members could bid on some of the best specimens of *Clivia*.

We would like to extend our biggest thank you to the organisers, exhibitors and sellers.



The previous owner Rina Potgieter and the new owner of the winning plant, Peter Lambert.

Overberg Clivia Show 2015

By Felicity Weeden. Photographs by Felicity Weeden

The Overberg Clivia Show, held in the NG Kerkzaal in Hermanus, has become a sought after Spring event for many locals.

This year was exceptionally successful with nearly 150 quality plants displayed by six exhibitors.

The hall and sales areas were particularly colourful and attractive and we enjoyed about 30% more visitors than last year.



First Runner Up (Yellow green throat) – Felicity Weeden



Second Runner Up (Yellow) – Felicity Weeden



Winners of Overberg Show. The winners from left are Felicity Weeden, Pieter Kok and Gerrit Rohlandt

Best on Show (Peach) – Felicity Weeden

The winners were:

Best on Show (Peach) –

Felicity Weeden

First Runner Up (Yellow Green Throat)

– Felicity Weeden

Second Runner Up (Yellow) –

Felicity Weeden

Best Leaves – Pieter Kok

First Runner Up Leaves –

Gerrit Rohlandt

Second Runner Up leaves – Pieter Kok

People's Choice – Felicity Weeden



People's Choice was a stunning orange with a 33cm umbel, and also on show was an outstanding blush short broad leaf from André du Plessis. The winners from left to right on the podium are Felicity, Pieter and Gerrit.



People's Choice – Felicity Weeden left. First row: Best Leaves – Pieter Kok, First Runner Up Leaves – Gerrit Rohlandt, Second Runner Up leaves – Pieter Kok



Toowoomba Clivia Society Inc. Spring Show 2015

By Brian Steven

The Toowoomba Clivia Society Inc. once again held its annual *Clivia* show in Toowoomba, Australia during the city's annual Carnival of Flowers week in September. The society is one of three *Clivia* clubs in Australia, the others being in Melbourne and Sydney.

This non-competitive tenth annual Toowoomba show was held in the TAFE Horticultural Pavilion and ran for six days, which must make it one of the longest running *Clivia* shows in the world, if not the longest!

Despite the longevity of the show, the 200 odd display *Clivia* remained in a good condition, with only a couple looking worse for wear over the time. With Toowoomba's mild winter weather and good growing conditions last summer, the *Clivia* proved their toughness by putting on one of the best flowerings for many years.

Members found it very hard to keep up with the demand from the public of flowering *Clivia* seedlings and seed. Once again the venue was shared by our society and the Society for Growing Australian Plants. These two displays complement each other with one exhibiting and selling Australian native plants and the other *Clivia*.

From the comments of the visitors, the Toowoomba Clivia Society Inc. can be proud of its efforts in 2015. Asking the visitors for their thoughts on the show, the same answers seemed to come up, which were "they couldn't believe the diversity of the types, colour and forms of the *Clivia* on show."

The Toowoomba Clivia Society Inc. has over 80 members and is attracting



'Kimberley Dream'

members from other areas across Australia, all receiving the bi-monthly newsletter. With Toowoomba growers over the past few years buying good seed and seedlings from overseas and southern states, the standard of *Clivia* in Toowoomba has increased as the years go by. Toowoomba is proud of the title "The *Clivia* Capital of Australia."

Among the great display of *Clivia* this year many stood out, such as Heather Samuelsen's 'Green Eye', which won the public vote for the Kevin Walter's Memorial Trophy for the Best



Kevin Walter's Memorial Trophy



The crowd

European Peach

Presented *Clivia* in the show, Eileen Zahnow's beautiful European peach 'Superb', Lyn and Huxley Althaus's 'Kimberley Dream' and the myriad of European peaches from the proven 'Anderson's Peach', 'Jelena,' 'Jordan Apricot', Doug Manteit's 'Monty's Peach', and 'Lurline' breeding.

The society's show is a free entrance show, but the society encourages the visitors to donate a gold coin in our wishing well. Over \$2000 was collected and the charity recipient was RACQ Careflight, a helicopter service for emergency patients and acci-



dent victims.

The society is looking forward to next year's show, which hopefully will be bigger and better than ever. For those contemplating coming to Toowoomba for the show, it is held during the Toowoomba Carnival of Flowers week which is the last full week in September, 2016.

More show crowds

Vryheid – Ngome Interest Group Annual Show 2015

By Rex Duke

The Vryheid – Ngome Interest Group show was held on Saturday, 12 September 2015 in the grounds of the Nieu Republiek Primary School and hosted a traditional Boere Mark with stalls offering from pancakes to *Clivia*. The stalls were spread around the school grounds and a good profit and time seemed to be had by all. Jeanrie Lotter, our able Secretary, arranged a Miss *Clivia* competition for the younger generation with various entrants for Petite, Little, Junior and Miss *Clivia*. The *Clivia* Show drew 200 entries from 13 exhibitors for 42 categories, proving to be the biggest show in KwaZulu Natal this year. The judges, Hennie van der Mescht and Andre du Toit from Bloemfontein, acquitted themselves well in awarding the medals and were on hand to offer guidance and assistance to enthusiasts after the judging had been completed.



Chairman Piet van Wyk

The results were as follows:

- Best on Show – Ben van Niekerk
- First Runner Up – Thomas Kleu
- Second Runner Up – Ben van Niekerk
- Most points on Show – Louis Lotter 88 points
- First Runner Up – Leon van Rooyen 41 points



TK Yellow with Green Throat



Winners Ben van Niekerk, Thomas Kleu and Louis Lotter

Special mention must be made of a seasoned club member who sold a 'TK Yellow' with green throat to a new beginner member of the club on the Friday before entries closed allowing her to enter it as the new owner. He obviously knew that the plant was a winner, which it proved to be, receiving Gold in its class and to top it all it was the Judges' Choice. It is in this spirit that new members are attracted to the hobby and ensures the growth of the club.

Piet van Wyk thanking judges Andre du Toit and Hennie van der Mescht



Miss Clivia - Sarah-Lee Groening and Ashley Reimers

ARTICLES

The story behind an early *Clivia* painting

By John van der Linde

Marianne North was an eminent British botanical artist of the 19th century. She visited South Africa in 1882-3. While on her travels she painted this picture of a pendulous *Clivia* (see opposite page). It was labelled: "391, *Clivia* and Grapnel Plant". The plants were stated to be *Harpagophytum procumbens* and *Clivia nobilis*. But is this a *C. nobilis*? Read on!

First, something about Marianne North: She was born in 1830, the eldest child of Frederick North, a well-connected and wealthy Member of Parliament. She had her first lessons in oil painting in 1867, when 37 years of age. She described painting as "a vice, like dram-drinking, almost impossible to leave off once it gets possession of one".

Her father died in 1870. Marianne was 40 and unmarried. What to do with her life? She decided to use her inheritance to finance what she really wanted to do – paint flowers in their natural settings. This meant travelling abroad and her choice was to do that alone.

Her first journey was in 1871 to the United States, Canada and Jamaica. Over the next 12 years Marianne North travelled to Brazil, Tenerife, Japan, Singapore, Borneo, Sri Lanka and India. At her father's friend, Charles Darwin's, suggestion she visited Australia, Tasmania and New Zealand.

Not only are her paintings remarkable but she was also a keen observer of people and a superb travel writer with a great gift for description. Her sister edited her journals into three volumes, "Recollections of a Happy Life: Being the Autobiography of Marianne North". I quote liberally from that work in this article. Marianne probably learned "networking" from her father. She always carried letters of introduction to ambassadors, governors, ministers, missionaries

and other people who could help her.

She landed in Cape Town in the spring of 1882, probably in late August. The voyage by steamer took 18 days. She was immediately captivated by the spring flowers then in bloom. She writes of "myriads of small flowers: oxalis of the most dazzling pink; yellow, white and lilac heaths, bulbs of endless variety; gazanias and mesembryanthamums".

Regarding the lady herself, it was said of her: "She inspired respect wherever she appeared, and good men everywhere were ready and eager to help her". Here is just one example of many that she gives in her journal. The well-connected Miss North records a lunch in Cape Town with the Governor of the Cape Colony, Sir Hercules Robinson. He offered to send her in a warship to "seek the welwitschia". She gracefully declined. Her journal says "I thought it was asking too much of Government good nature..."

During her stay in the Cape Colony she visited and painted in Darling, Malmesbury and Ceres. She went to Tulbagh (where "they talk of Beaufort West as we talk of London"). I am going to fast-forward you now. She wrote "Port Elizabeth is far more like a capital than Cape Town; it is full of life and work, very clean and neat..."

She travelled on past Grahamstown, Port Alfred, Queenstown and King Williamstown, painting all the way. She reached Port St Johns in late March 1883. There she was hosted by the official British Resident, with the grand title of Administrator of Pondoland. She had her host's study for a bedroom. I quote: "A native hut, with the extra luxury of a calico lining to its ceiling, which prevented the scorpions from falling on the top of my head".

She adds: "On the other side of my hut



were the rolling waves and golden sand, only separated by a narrow belt of milk trees, with ferns, lilies, and a sort of dracaena under them, tangled with convolvuluses. It was very peaceful

to wake the next morning amid all this, and to be in no hurry". What a wonderful description of Wild Coast scenery!

While waiting for a ship bound for Durban



Looking seaward from the mouth of St John's River, Plants: *Aloe Strelitzia augusta* (now *alba*)

she spent her time painting. This was when she painted the picture shown at the beginning of this article. Although *C. gardenii* had been named at least 30 years previously, it was still far less well-known than *C. nobilis*, so it is not surprising that she should have described the plant she had painted as *C. nobilis*. Since the painting was done in early autumn, sometime in late March or early April, it is far more likely that the plant pictured is an early-flowering *C. gardenii*, or maybe even a *C. robusta*. After all, she was in *robusta* country, Pondoland, at the time. Certainly, the leaves of the plant pictured do not look like those of *C. nobilis*.

Eventually, on 11 April 1883 a steamer arrived and she left for Durban, arriving the next day. A tram ride took her to the Marine Hotel. Does that name ring any bells with readers of this article? I remember staying there in the 1970s; big fat cockroaches and a huge bath with shiny brass taps. A multi-storey parking garage and office block stand on that site today. Such is progress!

From Durban Marianne North travelled by rail to Tongaat to visit Katharine Saunders, who painted a picture of the first yellow *Clivia miniata* that was discovered in the wild. Marianne North spent six weeks in Natal. It isn't clear from her journals how long she spent with the Saunders family. We do know that the two ladies sat painting the same subjects together, including beach plants. They had much in common: both loved music and sang; they had both travelled; they were skilled observers; both had enquiring minds; and a thirst for knowledge.

Eventually it was time for Miss North to go; she took the ship from Durban on 22 May 1883, on her way home to summer in England. Her last great journey was an expedition to Chile in 1884. After that she retired, worn out from her travels. She was only 60 when she died in 1890.

A total of 832 of her paintings are housed in the Marianne North Gallery at Kew, in England. These paintings are a unique snapshot of the



Part of the "Residence", St John's, Kaffraria Plants: White Pear



Looking up Stream from the mouth of the St John's River

world's natural habitat more than 100 years ago. Many of the species she painted have since disappeared. She was, quite literally, documenting a vanishing world.

I wonder whether, in her later years and sitting in her armchair, she had happy memories of her painting expedition to South Africa, her time in Port St Johns and meeting with Katharine Saunders and of their painting together, in warm, far off Tongaat?

The interested reader can view her flower paintings at: <http://www.kew.org/mng/gallery/index.html>. The edited version of Marianne North's autobiography "The recollections of a happy life" can be found at: https://archive.org/stream/recollectionsofh01nortuoft/recollectionsofh01nortuoft_djvu.txt

Also, there is a short summary of her life in a YouTube clip at https://www.youtube.com/watch?v=7ISDS4fFC_g

Soil analysis part I: Soil reaction and *Clivia* husbandry

By Felix Middleton

Soil reaction or pH (potential Hydrogen ions) is defined as the negative logarithm of the activity of hydrogen (H⁺) and hydroxyl (OH⁻) ions in a solution. In laymen's terms, it is a measure of acidity or alkalinity on a logarithmic scale of 1 to 14. A pH of 7 is regarded as neutral, below 7 is acidic and above 7 is alkaline.

As a rule, soils in moist climates tend to be acidic and those in dry climates are alkaline. High precipitation leaches significant amounts of exchangeable bases from the surface layers of the soils resulting in a domination of H⁺ ions. Alkaline soils occur when there is a comparatively high degree of base saturation. Salts like carbonates of calcium, magnesium and sodium skew the equilibrium towards more OH⁻ ions. For example, when salts such as sodium carbonate go into solution and hydrolyse in the soil, it gives rise to alkalinity.

Soil pH is a key variable in plant husbandry as it affects many chemical processes associated with growth and development. It affects nutrient availability to the plant by controlling the chemical properties of the nutrient. The optimum soil pH range for most plants is established as between 5.5 and 6.5. However, many plants have adapted to grow at pH values outside this range.

Correcting soil pH

Generally speaking, it is easier to make soils more alkaline than it is to make them more acid. Lime is used to correct an acidic soil. Different soil types react in different ways to the application of lime. You will, for example, need to add more lime to clay soils than you will to sandy soils to achieve the same result. The addition of rock sulphur, ash from a fireplace, sawdust, composted leaf litter, grass clippings, bone meal, crushed marble, or crushed sea

shells may be used to lower the soil pH.

An alkaline soil in itself does not have a direct effect on plant development but affects nutrient solubility and availability to the plant. Plants differ in their ability to tolerate high pH soils. In moderately alkaline soils, some plant roots can secrete high levels of acids into the soil. This lowers the pH immediately around the roots and increases nutrient availability.

In addition to the indirect effect where an acid soil restricts access to water and nutrients, it can also have a direct effect on plant growth. When the soil pH drops, aluminium becomes soluble and toxic to cells. Furthermore, a low pH impedes microbial activity. Many plants benefit from nutrient release by microbes in the soil.

Soil pH has been proven to affect colour expression in the flowers of certain plants. For example, the flowers of old variety Hydrangeas (Christmas roses) tend to be blue when plants are grown in acid soils of pH 5.2-5.5 and pink when grown in more alkaline soils of pH 6.0-6.2. Although soil pH has been suggested by some to be a contributing factor towards the degree of blushing of light colour *Clivia*, this notion still needs to be corroborated.

Soil reaction of *Clivia* growing mixes

Most *Clivia* growers state that a pH of around 6.2 is optimal for *Clivia* growth. However, this has not been tested extensively and is only accepted as most commercially available potting mixes are of this pH and *Clivia* survive in all but a few commercial mixes.

So how do we test what is the best pH for *Clivia* without embarking on a tedious and expensive experiment where we grow plants in soils of different pH? As a preliminary study we can test potting mixes from growers whose plants thrive and compare it with the results from growers whose plants do not do as well.

This comparison is complicated as growers with plants that do not thrive often neglect their charge in general and the lack of success may be due to some other factor other than soil pH alone. A more practical method is to go to the source and test the pH of soils where the plants grow naturally. Although this has the advantage that we can obtain results in a short period of time it has the potential disadvantage that the exercise can become expensive due to the distribution range and often remote location of wild *Clivia* species.

Sample collection

Natural occurring populations of *Clivia* were visited during 2015 in an attempt to document and photograph all six species in habitat. These trips were mostly scheduled during the flowering season which started with the flowering of the Midlands *C. gardenii* in April and ended with *C. mirabilis* in November. A total of 15 different locations were visited and soil samples were collected at 13 of these. Although this might not constitute a representative sampling of all the different habitats, it is representative of the *Clivia* distribution as a whole and should at least show tendencies toward soil reaction. Permission to collect soil samples was only rejected at one of the sites visited. Consent to take a soil sample at Oorlogskloof was initially granted; however upon arrival I was told that I needed a sample collecting permit to sample in a nature reserve. Unfortunately we could not reach the authority that gave me permission to collect samples in time to collect a sample at this location. I am grateful to the farmers, land owners and guides who allowed me to take soil samples while documenting the plants in habitat.

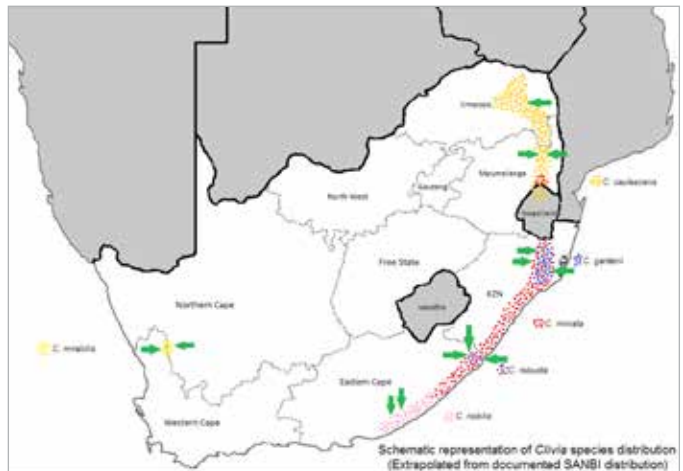
Small samples of soil

or growing substrate (< 250cc) were taken from the surrounding area near healthy growing plants while making sure that the roots were not disturbed or damaged. Fourteen diverse potting mix samples were also tested and included in the comparison. The potting mix samples were submitted by, or collected from various *Clivia* enthusiasts.



C. miniata growing in a thin layer of leaf litter on a rock

Map of South Africa depicting distribution of *Clivia* and showing approximate locations where the soil samples were taken



Analysis of the samples

As the samples were not all collected at the same time, we analysed them in three consecutive sets. Two random samples from set 1 were included in set 2 and 2 samples from set 2 were included in set 3. These were used as checks. In all 4 of these pair-wise comparisons the pH did not differ by more than 0.2 units, confirming the repeatability of the results between the sets.

Samples of 75cc were dried at 60°C for 12 hours, weighed and then soaked with 150cc distilled water (pH 6.8). The saturated sample was left for two hours at 60°C after which the runoff was carefully decanted and filtered with the use of laboratory grade filter paper. The saturated soil sample was weighed directly after the runoff was decanted and then at intervals for 30 days thereafter to study evaporation trends between samples. The pH of the runoff was taken directly after filtering.

Results of the pH test

Refer to Table 1 for a summary of the soil reaction results. Soil reaction of all but two of the potting mixes were between or close to the pH range of 5.5 to 6.5 which is regarded as optimum for plant growth and development. The other two were on the acidic side which could be attributed to the large fractions of partly composted pine bark and pine needles in these mixes. It should be noted that these two potting mixes are known to work well for *Clivia*, as was communicated by the respective suppliers.

The range of soil reactions for samples taken from habitat is much more varied with the highest being 7.8 and the most acidic being 3.4. An interesting observation is that the environments with soil with the lowest pH are those in high rainfall areas, corroborating the leaching principle as stated in the introduction. This is especially obvious for *C. robusta* which grows in marshy or peaty environments. On the other hand, soils from the dry, arid regions where *C. mirabilis* grow are alkaline.

Observations and assumptions

It would be easy to conclude from this



C. robusta growing in a marsh. The pH of these soils are generally low due to leaching

association study that the pendulous species, except for *C. mirabilis*, prefer a more acid environment and that *C. mirabilis* and *C. miniata* prefer more alkaline environments. Please remember that this assumption is based on an association between two variables which may be related in more complex ways. A study where *Clivia* are grown in media of similar composition but where only the pH differs could validate or discredit the observed differential response to soil reaction.

A more likely conclusion is that *Clivia* are not as sensitive to soil reaction as are other ornamental plants. The perceived correlation between pH and species is due to the respective habitats which co-incidentally have different pH characteristics due to associated climate or geology. Let us consider the differential soil response between the *C. nobilis* and *C. miniata* habitat at the Qorha river in the Transkei. The substrate where the *C. nobilis* grow is significantly more acidic than that of the *C. miniata*. The soil samples were taken

Table 1.1: Soil reacion (pH) of habitat collected as well as potting mix samples

Key to color formatting of cells:

3.0-3.4	Very Acidic
3.5-4.4	Acidic
4.5-5.4	Moderately Acidic
5.5-6.4	Horticulturally Recommended
6.5-7.4	Neutral
7.5-7.9	Moderately Alkaline

Species	Location	pH	Notes on habitat	Description of sample
<i>C. miniata</i>	Qorha river - Transkei	6.3	In leaf litter	Habitat
<i>C. miniata</i>	Qorha river - Transkei	6.4	Between rocks	Habitat
<i>C. miniata</i>	Central Transkei	7.8	On a rock	Habitat
<i>C. miniata</i>	Central Transkei	6.2	In leaf litter	Habitat
<i>C. miniata</i>	Ahrens - Natal	6.0	in leaf litter below cliff	Habitat
<i>C. miniata</i>	Ngome - Northern Natal	6.6	On a rock	Habitat
<i>C. miniata</i>	Oribi - natal	6.0	Between rocks	Habitat
<i>C. mirabilis</i>	Western Cape	6.9	Southern ravine	Habitat
<i>C. mirabilis</i>	Western Cape	6.8	Northern ravine	Habitat
<i>C. mirabilis</i>	Northern Cape - Site 1	5.3	Middle of population	Habitat
<i>C. mirabilis</i>	Northern Cape	6.9	Middle of population	Habitat
<i>C. mirabilis</i>	Northern Cape	7.1	Edge of population	Habitat
<i>C. mirabilis</i>	Northern Cape	6.4	Under cliffs	Habitat
<i>C. gardenii</i>	Ngome - Northern Natal	3.9	On dry slope	Habitat
<i>C. gardenii</i>	Ngome - Northern Natal	4.3	In shade	Habitat
<i>C. gardenii</i>	Ngome - Northern Natal	5.5	On rock	Habitat
<i>C. gardenii</i>	Ahrens - Natal	5.7	On cliff	Habitat
<i>C. gardenii</i>	Ahrens - Natal	4.7	In leaf litter below cliff	Habitat
<i>C. robusta</i>	Oribi - Natal	3.4	On cliff	Habitat
<i>C. robusta</i>	Port Edward - Natal	5.0	Well drained site	Habitat
<i>C. robusta</i>	Port Edward - Natal	3.8	Water logged site	Habitat
<i>C. caulescens</i>	Sabi - Mpumalanga	4.0	in Pine plantation between rocks	Habitat-plantation
<i>C. caulescens</i>	Sabi - Mpumalanga	4.5	in Pine plantation	Habitat-plantation
<i>C. caulescens</i>	Tzaneen - Limpopo	4.3	On granite rocks	Habitat
<i>C. caulescens</i>	Tzaneen - Limpopo	4.5	In leaf litter below rocks	Habitat
<i>C. caulescens</i>	Sabi - Mpumalanga	7.6	On cliff	Habitat
<i>C. caulescens</i>	Sabi - Mpumalanga	7.5	Below cliff	Habitat
<i>C. nobilis</i>	Qorha river - Transkei	4.8	In leaf litter	Habitat
<i>C. nobilis</i>	Qorha river - Transkei	3.8	Between rocks	Habitat
Domesticated Clivia	Gauteng	4.2	Potting mix (T mix with bark)	Potting mix
Domesticated Clivia	Natal	4.4	Potting mix (Pine mulch)	Potting mix
Domesticated Clivia	Gauteng	5.4	Potting mix (Earth 2 Earth)	Potting mix
Domesticated Clivia	Gauteng	5.5	Potting mix (Sand and manure)	Potting mix
Domesticated Clivia	Gauteng	5.6	Garden mix (Sand and manure)	Garden mix
Domesticated Clivia	Natal	5.6	Potting mix (40% vermiculite)	Potting mix
Domesticated Clivia	Gauteng	5.7	Potting mix (undisclosed mix)	Potting mix
Domesticated Clivia	Natal	5.7	Potting mix (Bark and manure)	Potting mix
Domesticated Clivia	Western Cape	5.9	Potting mix (Bark only)	Potting mix
Domesticated Clivia	Natal	6.0	Planting (Platt garden mix B)	Garden mix
Domesticated Clivia	Gauteng	6.0	Potting mix (undisclosed mix)	Potting mix
Domesticated Clivia	Natal	6.3	Potting mix (Complex mix)	Potting mix
Domesticated Clivia	Gauteng	6.3	Seedling mix (ProGro Cocopeat)	Seedling mix
Domesticated Clivia	Natal	6.3	Composted wattle bark	Toxic mix



The dry and arid environment where *C. mirabilis* grow. pH of soils from this type of environment is generally high

less than 100m from each other. The differential response between samples that were taken between these seemingly similar environments suggest that at least for these two species, a preference to pH may be valid. However, on reflection, the *C. miniata* at the Qorha site generally grow in wetter conditions in shade whereas the *C. nobilis* flourish in dryer areas in more sunlight. There is very little overlap between these two species in this area. *C. nobilis* is adapted to the dryer environment, irrespective of the prevailing pH of this micro-environment.

A good example that may corroborate the insensitivity to pH theory is that of soil samples



C. caulescens growing and thriving in a pine forest in the Sabie area.
The pH of the substrate is low in these forests

taken within *C. caulescens* habitats. In most samples the pH was very low. However, natural habitat samples taken from the Sabie area are uncharacteristically alkaline. In addition, many



Typical habitat of *C. caulescens* in the Sabie area; high on rocky ledges in moist areas. The pH in this specific environment was unusually high



Seemingly similar substrates from the Qorha site. The two samples on the left were taken within a *C. miniata* population. The two samples on the right from *C. nobilis* which were growing nearby

plants in the Sabie area survive and even flourish in pine forests that border the natural habitat. Substrate pH in these pine forests is very acidic.

Conclusion

I believe that *Clivia* are more tolerant of extremes in soil pH than many other ornamental plants. The differential response of species in habitat to soil pH is likely due to chance association of pH to the habitat micro-environments or micro-climates rather than an adaptation of *Clivia* species to pH *per se*. This said, it may not be a bad idea to use an alkaline substrate for growing the notoriously difficult *C. mirabilis*.

Soil analysis part 2: Comparing growing mixes and *Clivia* habitat substrates

By Felix Middleton

Although the main objective of the soil sampling experiment was to evaluate pH of potting mixes and habitat samples, we also noted and compared physical characteristics of the growing media.

Composition

It is clear that *Clivia* potting mixes are formulated to enable aeration and not to imitate the characteristics of the substrate as found in the *Clivia* habitat. Most potting mix formulations use partly composted pine bark as a foundation, an alien element to the *Clivia* natural habitat. In addition to the bark foundation, many mixes also contain sand and composted organic material. The sand is said to help with aeration but is usually just added to give weight to the mix as pots and especially bags tend to be unstable when only filled with bark. The compost is added as a source of organic nutrients and to buffer the mix against any nutritional imbalances. Other components like coconut fibre, peat, vermiculite, perlite and sawdust may be added to assist with moisture management.

Potting mix

The formulations of the submitted or sampled *Clivia* growing mixes varied in complexity. Table 2.1 notes a few of the mix formulations that were disclosed by enthusiasts. There is no universal recipe, all have been formulated to suit the specific requirements of the respective growers. Watering regime, prevailing macroclimate, availability of mix components, pot size and even pot stability is taken into

consideration when formulating a mix.

Measuring the physical attributes of growing media

Differences in attributes of the submitted and habitat samples are presented in Table 2.2. We calculated and compared the following six attributes in an attempt to find an ideal growing substrate:

1) Percentage organic matter – An estimate of the organic matter as a percentage of the total soil sample

This attribute is often used to describe the health of a soil or growing substrate as organic matter improves the soil structure by increasing aeration. It can also improve the ability to retain water and store nutrients.

2) Dry weight – Weight of the growing substrate after drying at 60°C for 12 hours

The weight is expressed as the weight in grams of a litre volume of soil. A light soil tends to make the planting pot or bag unstable. On the other hand, a heavy soil results in higher transport costs when moving plants. One concern was that the structure of a sample can



Diversity in potting mixes used by enthusiasts. The number below the mix corresponds to the sample numbers in Table 2.1

Table 2.1: Clivia growing mix formulations as disclosed by enthusiasts

Mix	Components	Ratio	Notes
2.15	Bounce Back™, Commercial potting mix, Partially composted pine bark, Composted cattle manure, Bone Meal	2:2:2:2:1	Plants are healthy. Grower resides in a area with little rainfall. Watering is controlled and waterlogging in this seemingly compact substrate is not a problem.
4.01	Composted pine bark, Old kraal manure, River sand	2:1:1	River sand is added to weight the pots otherwise they tend to fall over
1.13	River sand, Dolomitic crush, Raw horse manure	1:1:1	For clivias in garden
1.12	Course river sand, Raw horse manure	1:2	For clivias in pots which dries out quickly
1.17	Composted pine bark. Composted sheep manure	2:1	Grower resides in a low rainfall area. Although mix is less aerated, plants are watered in such a way as to prevent waterlogging
1.08	Partially composted course pine bark, General compost, Fertiliser	1:1:pinch	Commercial veggie mix. Used in an area with high rainfall. Grower facilitates drainage by elevating plants on tables or places bags on a layer of course gravel.
2.14	5-20mm sieved partially composted pine bark, Slow release fertiliser	1:pinch	Needs constant watering but plants are exceptionally healthy due to no waterlogging.
1.07	Composted Wattle tree bark	1	Test substrate: said to be toxic
X1	Garden top soil, compost, acid compost, river sand, composted cow manure, Bounce Back™	2:2:2:2:1:1	Mix lasts for a year, then repot
X2	Pine needles, Milled pine bark, Bone meal	1:3:pinch	Poor growth in seedlings
X3	Pine bark, Chicken Manure	10:1	1cm sized pine bark works well
X4	Old potting soil, Compost, Potting mix, Acid compost, River sand, Swimming pool sand, Composted cow manure, Bounce Back™, Bone meal, Polystyrene	5:5:3:3:2:2: 2:1:1:5	Left in bags for at least 2 months to decompose
X5	Course river sand, Composted pine bark, Cymbidium orchid mix	2:1:1	Better suited for <i>C. mirabilis</i> and variegated clivia which have a higher susceptibility to fungal disease

be compromised during the process of extraction, transporting and drying. For example, the soil aggregates made by earthworm activity provides a porous aerated substrate. Breaking these fragile structures would result in a sample that has denser structure, weigh more and would absorb less water than in nature. We took care to disturb the natural structure as little as possible.

3) Saturated weight
– Weight of the sample when fully saturated with water

The weight is expressed as the total weight in grams of a litre volume of soil. A wet soil is substantially heavier than a dry substrate and will also influence the transport cost when moving plants.

4) Absolute moisture holding capacity as volume per volume

Amount of water that the growing substrate can absorb and hold. The holding capacity is expressed in millilitres water in a litre volume of soil. The holding capacity will influence watering scheduling. The lower the capacity, the shorter the intervals between watering.

5) Moisture holding capacity as percentage

Amount of water expressed as a percentage of the weight of the growing substrate. The holding capacity is expressed as the weight of water compared to the weight of the saturated sample.

6) Days to 50% moisture loss

The rate of moisture loss differs between soil types. The rate depends essentially on the total surface area of individual soil particles. The larger the particles the lower the overall capillary attraction and the easier for the soil to lose moisture through evaporation. Dense



C. mirabilis growing in a sandy soil. Note the earthworm activity

soils with fine structure or large amounts of porous composted organic material generally dry out slower than soils that consists of course river sand.

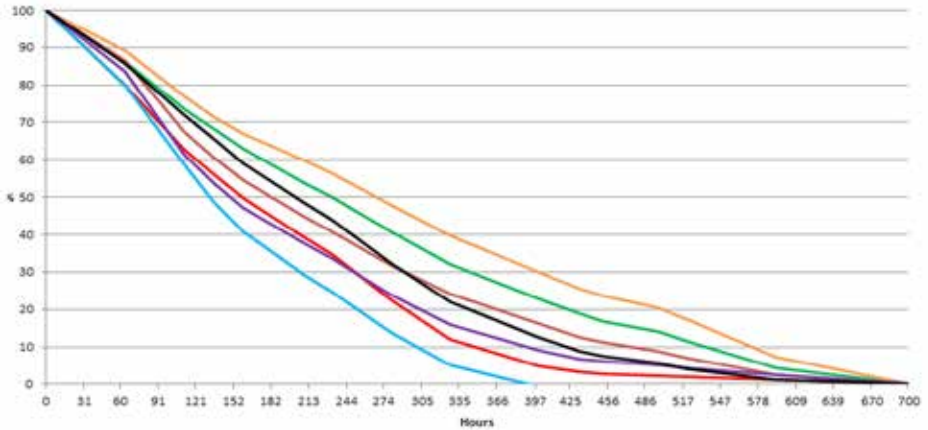
Results of the comparison

Contrary to popular belief, not all habitat *Clivia* grow in substrates which are high in organic matter. On average, soils from habitat contain much less organic material and are thus also heavier. The moisture holding capacity per weight is similar between habitat samples and artificial planting mixes but the latter generally dry off quicker.

There is a correlation between the percentage organic material present and the water holding capacity. Additionally, a negative correlation exists between the percentage of organic matter and sample weight. Soils with a higher percentage of organic content show a higher percentage per weight water retention but on average weigh less.

The four samples that dried out the quickest had a high organic content. Furthermore, these soils did not retain a large amount of water. Although course pine bark is often used to facilitate aeration, these types of substrates are less porous than compost and dry out

Percentage moisture loss over time



Differences in the rate of drying out for 7 *Clivia* growing mix samples. Moisture loss is a function of not only the amount of water in the substrate but also an ability to retain the water

very quickly, requiring frequent watering. It is interesting to note that there is no significant correlation between the samples that took long to dry out and the amount of organic material in these samples.

There is a definite correlation between dry-out rate and absolute moisture holding capacity for the high and low moisture losing samples only. Samples with intermediate dry-off rates

show no such correlation. For these samples we can therefore not estimate a moisture loss rate based on the absolute amount of water in the substrate alone. Water scheduling can only be calculated on a system of trial and error. Special attention should be taken when growing plants in soils with intermediate moisture holding capacity and long dry-off rates as these may easily become waterlogged from overwatering.

Composted Wattle bark as substrate

In an attempt to formulate a cheap growing mix, the author, against his better judgement and ignoring the cynical remarks from fellow enthusiasts, planted several *Clivia* plants in a growing mix consisting exclusively of Black Wattle bark. It was known from past experience that *Clivia* roots are not affected by Wattle bark as they grow into this substrate when it is used as ground covering in a greenhouse. The mulch



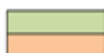
Comparison between a plant grown in Wattle bark (right) and a control plant from a similar genetic background

Table 2.2: Comparison of physical attributes of habitat collected and potting mix samples

Key to color formatting of cells:

Exceeding one standard deviation unit of mean

Lower than one standard deviation unit of mean



Sample number	Species	Location	Organic material in sample	Dry weight	Saturated weight	Moisture holding capacity (vol./vol.)	Moisture holding capacity (%)	Days to 50% moisture loss
Unit of measure >>>			%	g/L of soil	g/L of soil	ml/L	% of weight	days
3.05	C. miniata	Qorha river - Transkei	75%	518	857	340	40%	9
3.07	C. miniata	Qorha river - Transkei	50%	457	901	444	49%	10
3.01	C. miniata	Central Transkei	5%	561	1001	440	44%	10
3.02	C. miniata	Central Transkei	99%	102	491	389	79%	9
3.06	C. miniata	Ahrens - Natal	30%	847	1267	420	33%	9
2.11	C. miniata	Ngome - Northern Natal	20%	341	953	612	64%	14
1.06	C. miniata	Oribi - natal	10%	862	1265	403	32%	8
2.05	C. mirabilis	Western Cape	5%	1000	1308	308	24%	8
2.06	C. mirabilis	Western Cape	10%	745	1170	425	36%	11
2.07	C. mirabilis	Northern Cape	60%	405	848	443	52%	12
2.08	C. mirabilis	Northern Cape	10%	883	1226	343	28%	8
2.09	C. mirabilis	Northern Cape	90%	216	584	369	63%	9
2.10	C. mirabilis	Northern Cape	5%	882	1237	354	29%	9
2.03	C. gardenii	Ngome - Northern Natal	10%	763	1106	343	31%	9
2.04	C. gardenii	Ngome - Northern Natal	5%	760	1153	392	34%	9
2.12	C. gardenii	Ngome - Northern Natal	5%	830	1306	476	36%	11
1.01	C. gardenii	Ahrens - Natal	60%	385	844	460	54%	9
1.02	C. gardenii	Ahrens - Natal	60%	336	899	564	63%	12
1.03	C. robusta	Oribi - Natal	70%	259	799	540	68%	11
1.04	C. robusta	Port Edward - Natal	60%	474	1047	573	55%	11
1.05	C. robusta	Port Edward - Natal	40%	437	1016	579	57%	11
3.12	C. caulescens	Sabi - Mpumalanga	80%	244	709	465	66%	9
3.13	C. caulescens	Sabi - Mpumalanga	99%	147	471	323	69%	7
2.01	C. caulescens	Tzaneen - Limpopo	60%	330	941	612	65%	9
2.02	C. caulescens	Tzaneen - Limpopo	80%	260	847	587	69%	13
3.08	C. caulescens	Sabi - Mpumalanga	50%	291	841	550	65%	11
3.09	C. caulescens	Sabi - Mpumalanga	20%	419	807	388	48%	10
3.03	C. nobilis	Qorha river - Transkei	95%	129	592	463	78%	10
3.04	C. nobilis	Qorha river - Transkei	50%	366	849	483	57%	10
Average for habitat soils			47%	491	943	451	48%	9.9
1.10	Domesticated	Gauteng	90%	239	645	406	63%	9
1.14	Domesticated	Natal	99%	284	685	401	59%	8
1.11	Domesticated	Gauteng	99%	165	486	321	66%	7
1.13	Domesticated	Gauteng	65%	485	1003	519	52%	10
1.12	Domesticated	Gauteng	35%	960	1342	382	28%	8
2.13	Domesticated	Natal	60%	197	775	578	75%	11
1.16	Domesticated	Gauteng	99%	339	777	437	56%	8
1.17	Domesticated	Natal	99%	210	675	465	69%	10
2.14	Domesticated	Western Cape	100%	183	381	197	52%	5
1.08	Domesticated	Natal	90%	324	756	432	57%	10
1.15	Domesticated	Gauteng	70%	691	1113	422	38%	9
2.15	Domesticated	Natal	90%	259	710	451	64%	11
1.09	Domesticated	Gauteng	99%	58	602	544	90%	12
1.07	Domesticated	Natal	99%	110	434	324	75%	7
Average for growing mixes			85%	322	742	420	60%	8.9



Exceptional root development in a Wattle bark growing mixture. Note the offset developing to the left in the root mass

is a deterrent against the unwelcome growth of weeds, algae and ferns. Results showed that Wattle bark contains a substance that hinders, but does not prevent development of *Clivia* plants. Plants grown in Wattle bark grew slower than the control group, had narrower leaves and developed a sickly yellow colour. They did flower though and have survived for the past two years. It came as a great surprise

that the root development in the Wattle bark was superior to that from the control group. There were even offsets forming in the Wattle bark.

I am aware of only one other substrate that has a detrimental effect on the growth of *Clivia*. An out of bonds soil reaction (pH) was said to be the cause of the damage. However, upon closer inspection of the substrate it became clear that the plants were essentially being baked in the media. The compost component of the mix was still breaking down.

Conclusion

Clivia grow in almost any substrate provided that we manage the irrigation in such a way that the substrate does not stay wet. Furthermore, *Clivia* are very forgiving to extremes in soil reaction and also imbalances in nutrient and toxins, as evident from the Wattle bark experiment. No wonder it is jokingly referred to as a plant suited for bachelors. As the plant is so forgiving, you need not seek out the most expensive growing media on the market. Use what is available to you and formulate your mix to suit your specific situation. If it works, do not fix it. If you want to make it better, tweak it by making small changes to what you already know works. Some important considerations:

- There is no one-size-fits-all mix for *Clivia*
- Manage your water scheduling to prevent waterlogging
- Compost should be mature before adding it to the mix
- If a mix works for ornamental plants, it will work for *Clivia*.

Clivia mirabilis and its water balance

By Connie & James Abel

Clivia in their habitats have always ranked high in our interests. The habitats are invariably in very scenic areas and one can but puzzle over their complex inter-relationships with climate, topography, soils and companion vegetation. Some years ago, on the internet, we came across the attached SA rainfall map from the University of KwaZulu-Natal. It is striking how in the summer rainfall region on the right, the dark blue 1 000+ mm per annum rainfall areas give an accurate image of the location of the five eastern *Clivia* species. From the north, the positions of such well-known habitats as Soutpansberg, Magoebaskloof, Mariepskop, Barberton, Ngome, Midlands and Kei Mouth are indicated by appropriate lettering. Several of these areas are commonly referred to as being "in the mist belt". Exceptions in this region are the too-cold high Drakensberg escarpment on the Lesotho border (east of 'Les') and the too-hot Zululand coast (centre right). Also striking is the habitat's temperature related inverse correlation of latitude and altitude, with the latter dropping steadily from 1800 m in the north to sea level in the south.

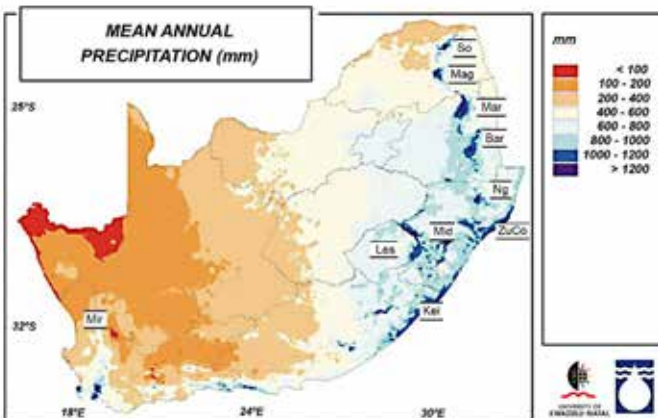
The description in 2002 by John Rourke in



Bokkeveld escarpment map

Clivia Yearbook #4 of a new species *C mirabilis* from the Northern Cape was exciting news for all *Clivia* enthusiasts. This was from the Bokkeveld escarpment in the Oorlogskloof Nature Reserve in the Northern Cape (see 'Mir' on map). The existence of a few more populations in the vicinity has subsequently been reported. Two major surprises were, firstly, that this new species was found more than 800 km distant from the

closest of the eastern species and, secondly, in an "arid Mediterranean climate with a winter rainfall of just 414 mm pa". Rain was stated to start in April and fall mainly between May and September. Ian Coates reports having been soaked during October and November visits, and Mandy Schumann says "mist and some rain do continue through the





Knersvlakte and Oorlogskloof map



On the flats, approaching the escarpment. A feature here is the cloud encompassing the escarpment. Photo Ian Coates



C. mirabilis habitat leading up to the sandstone cap in the background. Photo Ian Coates

summer months. The Bokkeveld Plateau is considered a transition zone of the summer and winter rainfall areas, so we also receive some of the summer thunder storm downpours. For example, this year in January, the Hantam National Gardens, just south of the town [Nieuwoudtville], recorded 54 mm for January".

Two major climatic adaptations of *C. mirabilis* are the very rapid maturation of its seed, to fit in with the different rainfall pattern, and its thick roots of about 20 mm where the mass of dead velamen cells provides an excellent storage mechanism for any surplus moisture.

With regard to origins, Felix Middleton has written: "So far it seems as if *nobilis* and *mirabilis* are very closely related. Both have, and segregate for, unique traits such as the leaf median stripe, the V shaped cross section of the leaf, the notch on the leaf tip, a mostly large flower count, darker red flowers as well as serration on the leaves (I observed a *C. mirabilis* with coarser serration than any *nobilis* that I have ever encountered). Although some of these traits have been reported for the other species, the occurrence is very low. My opinion is that you have two types of *Clivia*, the rough *mirabilis-nobilis* types and then the sissy soft leaved types that grow in moist forests. Which group is closer related to the ancestor I do not know. Many botanists regard the group with more diversity as indicative of the origin of a group, whilst those with less variation are spinoffs trying to populate a niche environment. Of all the species,

mirabilis has the most variation of all, so it could be closer to the predecessor. On the other hand, most of the Amaryllis family are bulbous, showing that the family originally developed within a semi-arid environment. *Clivia* do not have a pronounced bulb and therefore could have developed further, to grow in moisture rich environments. *C. mirabilis* may therefore be a species trying to re-colonise arid environments. Just food for thought”.

With initial perceptions of the “aridity” of the area, from 2010 our attention was drawn to five other potential sources of moisture besides measured rainfall, namely fog, dew, plant interception, escarpment effect and the sandstone aquifer. This started with reading the research paper “Fog and Dew in the Succulent Karoo” by Matimati I *et al* in September 2010 in *Veld & Flora*, pp 140-141.

The map on page 68 shows the Oorlogskloof Nature Reserve (situated between 538 and 915 meters above sea level) on the edge of the Bokkeveld escarpment (right), about 100km from the Atlantic (lower left). The research was conducted in the Knersvlakte flats (top centre), between the escarpment and the sea at approximately 200 m altitude. The flats are well known for the dense fogs that arise from the onshore winds from the cold Benguella current in the nearby ocean. The research site has a rainfall of 149 mm pa. Use of appropriate equipment and procedures included:

- weighing lysimeters for accu-



Mist overhanging *C. mirabilis* habitat and escarpment.
Photo Ian Coates



Contrasting vegetation on opposite sides of the Oorlogskloof.
Photo Roger Dixon



Another “wet slope”. Photo Felix Middleton

racy, and

- isotopic analysis of stem xylem moisture to distinguish whether it originated from rain, fog or dew.

Matimati and his colleagues found that:

Fog and dew: On quartz-gravel soil, fog and dew precipitated an additional 253 mm of water for a total of 402 mm pa, an increase of 170%.

Plant interception of fog and dew: On quartz-gravel soil with plants of the dwarf succulent *Agyroderma pearsoni*, the additional precipitation was 460 mm for a total of 609 mm pa, an increase of 308% of moisture.

Clivia, with their leaves funneling run-off to the centre of the plant, are certainly “waterwise”, although we are not aware of any quantification of their water interception ability.

Copies of Matimati *et al*'s paper are available on request by email from jcabel@absamail.co.za.

Escarpment or rain shadow effect: As prevailing onshore winds of moisture laden air rise over land, pressure and temperature drop and relative humidity rises towards saturation, resulting in the formation of clouds and the precipitation of mist (synonymous with fog), dew and rain. This is the escarpment effect which increases all of the above three forms of precipitation, in this case firstly over the flats and then over the Bokkeveld escarpment, home to *C. mirabilis*. This is the origin of the fog for which the west coast is so well known. The deeply incised re-entrants into the escarpment in *C. mirabilis* country are well illustrated in the Google Earth view on page 67, and ideal for “milking the breeze”. The populations described by John Rourke

C. mirabilis at the base of the sandstone cliff.
Photo Ian Coates



C. mirabilis habitat below the escarpment on a western aspect.
Photo John van der Linde



Wetland in the Oorlogskloof Nature Reserve.
Photo Mandy Schumann



were “under the eastern cliffs”, i.e. on western aspects facing the sea breezes.

Mandy Schumann’s statement that “mist and some rain does continue through the summer months” has further relevance here. There will be days of mist without rain, and those days will extend the “wet season”, through the mechanisms highlighted by Matimati *et al.*

Sandstone aquifer: Lena van der Merwe first pointed out to us that the cap of the escarpment is a 30 m thick layer of Peninsular Formation Sandstone, which serves as a massive aquifer. The sandstone has a porosity or water capacity, if saturated, of about 20%. Over-simplistically, this is equal to 6 000 mm of water or 15 times annual rainfall!

The effect of this aquifer has been summarized by Roger Dixon as follows:

“*C. mirabilis* grows at the bases of sheer sandstone cliffs, in the afro-montane forest. They grow associated with *Haemanthus*, *Zantedeschia* and other plants which like to have moisture, but can tolerate a few dry spells. The



A flowering *C. mirabilis* on the edge of a raging torrent after rain. Photo Ian Coates

sandstone talus at the base of these cliffs acts as a moisture trap, and, although it may be dry on the surface, the wicking moisture percolating upwards keeps the humic sandy soil cool. The sandstone layers here are semi-horizontal, and water percolating through the layers encounters joints along which it can flow, so a lot of water which is collected on the escarpment can find



A flowering *C. mirabilis* enjoying a humid environment against its mossy backdrop. Photo Ian Coates



In contrast, a *C. mirabilis* in a dry river bed. Photo Felix Middleton

its way out horizontally into the talus at the base of the cliffs”.

John van der Linde has sent us a photograph of a *C. mirabilis* habitat on the western aspect of the valley. He says “One *mirabilis* location was owned by the late Mias Volgraaff, whose occupation was drilling for water. As such he had geological knowledge. He pointed out to us that the *mirabilis* were concentrated on a specific part of the hill side, not to the left and not to the right. He said that was where the underground water flowed down”.

A benefit of the underground water will be that, beyond rainfall, seasonal moisture availability will be extended as seepage steadily takes place.

It is clear from the above that *C. mirabilis*, in terms of its water balance, benefits from these factors in terms of both volume and length of season, and it may well join the over 1 000 mm pa band of its cousins. However, their moisture availability will also be greater than just rainfall, due to some or all of the above factors.

The above has been sketched with a broad brush, and for the Oorlogskloof there has been



A *C. mirabilis* seedling on a typical rough seedbed, showing the top of its thick root. Photo Ian Coates

no quantification.

A feature of *Clivia* populations in habitats is that they are usually limited in size (less than a hectare) and their boundaries are surprisingly abrupt. The reason for these boundaries is not evident to casual observation, and must be due to undetermined micro-environmental factors, perhaps soil, climate, aspect or other subtle influences.

Consequently any accurate quantification of *C. mirabilis*'s natural moisture regime will long remain beyond our reach.

With appreciation to the many *Clivia* friends who have contributed in discussion, and with special mention of the local knowledge freely shared by Mandy Schumann, detailed specialist advice from Felix Middleton and the experienced guidance and photos of Ian Coates who, incidentally, first featured in our *Clivia* publications in the *Clivia Club Newsletter* #2.1 January 1993, edited by *Clivia* Society founder Nick Primich.

Note: The despicable actions of some self-proclaimed “enthusiasts” who have blatantly stolen plants from the habitat, sometimes with the excuse of “saving them” [in their own collections!], are and will continue to be a serious threat to the survival of *C. mirabilis* and other *Clivia*. For this reason, we have avoided any directions to specific habitats.



C. mirabilis standing proud in the slanting rain.
Photo Ian Coates

Hybridizing and the quest for ‘Susan 4’

Text and photos by Felicity Weeden

I have been fortunate to have been able to breed with interesting plants and have had some interesting results. In earlier days it was believed that ‘Ella van Zyl’ would always revert to orange. However, crossing it to a pale apricot with a green throat produced my earliest peach with a green throat called ‘Dooley’. The name was coined because when it first flowered the peduncle was cracked, causing the umbel to hang down, so “Hang down your head Tom Dooley” came to mind! The nice thing about breeding with ‘Ella’ is that the offspring retain the perfect umbel and often display diamond dusting.

Christo Lotter gave me a dozen or so seeds of his cross between his ‘C10/16’ and ‘Tienie’s



‘Dooley’



‘Symphony in Green’



'Green Goddess'

Treasure'. The results were stunning. Most of the plants were bronze with green throats. The flowers were all the same shape but the umbels varied considerably. There were a few oranges, but most were of outstanding quality. Crossing between the best bronzes such as 'Green Queen' and 'Symphony in Green' produced some dark bronze flowers with no green at all.

The very best plant from this group, 'Green Goddess', is a superb plant. It is a big robust broad leaf plant and produces a variable umbel of huge flowers, usually light bronze with a green throat. Breeding with 'Green Goddess' has produced such superb plants as 'Outrageous' and 'Audacious', both bold plants producing enormous umbels with recurved flowers light bronze with a green throat of a superior quality.

Breeding with Ansie le Roux's lovely pink, registered as 'Ansie's Delightsome', also known as 'Nommer Y' or more commonly as 'Delightsome'

has also been most satisfying. When crossing it with 'Gladys Blackbeard', Les Brown's 'L4' and Ian Brown's 'Powder Puff', lovely pink/pastel flowers appeared. All of these stunners are named with the 'De' of 'Delightsome' to identify them, as in 'Delightful', "Delovely", and 'Delicious', and so on in order to recall what the pod parent is. A number of gold awards have been achieved in this breeding line, including a Best on Show.

Red, of course, is an enigma. I was fortunate that a friend brought back a particularly fine dark orange/red plant purchased at a Dutch market, and I was the lucky recipient. Named 'Red Lady', this super plant is compact in nature with thick tepals and it flowers twice a year. I crossed this with 'Foxy Lady' (Best on Show 2002 and 2008) and produced 'Red Fox'. This is a truly magnificent plant which always flowers early – so has never been on show – and has huge umbels of dark orange/red. It is a healthy plant

and flowers beautifully every season. Top of the Pops! Crossing 'Red Lady' with Bing Wiese's 'Perfecta' strain, has produced some very fine reds. The flowers in the 'Perfecta' crosses are more cup-shaped and are usually quite large, and are displayed on excellent big umbels.

There has of course been much breeding with 'Hirao' and to date I have seen some outstanding results. I crossed a Nakamura coral-coloured plant with my 'Perfect Pastel'. When the resulting seedlings flowered, I was delighted to have first, 'Remus', a super bronze with a green throat, and then 'Romulus', a lovely pinkish brick with a green throat, come into bloom. I pollinated both of these plants with 'Hirao' and have some lovely results. By far the best seedling that has flowered so far is called 'Venus', a cross between 'Romulus' and 'Hirao' which bloomed last year, and won Best Own Breeding. It is a most unusual and attractive flower, almost appearing to have a white overlay.



'Outrageous'



'Delightsome'



'L4'

Breeding with 'Suzette Too', a very fine pink, which is a cross between 'Kirstenbosch Supreme' and, it is believed, 'Appleblossom', some superior quality peaches and near beige, with huge umbels have been produced and won gold, and Best Own Breeding. So, as can be seen, I have been blessed with some lovely breeding material. But there is one plant that I would very much like to retrieve and its name is, of all things, 'Susan 4'.

Years ago I was fortunate enough to view a *Clivia* of great beauty. This lovely pastel flower had wide tepals of the most stunning shade of



'Powder Puff' – Best on Show

pinky/apricot. Unfortunately when I saw it in bloom there were no colour cards in circulation, so I am unable to correctly identify the colour. The plant was fairly compact with wide round

tipped leaves and a good umbel. The owner simply named it '4', but it became known as 'Susan 4'. The breeding remains somewhat obscure, but it was believed that this plant was an F1 hybrid between a *Clivia miniata* and a *Clivia nobilis*. I believe that this is possibly one of the very finest *Clivia* that I have seen, despite the advent of Louis Lotter's 'Holy Moly' and Pikkie Strumpher's '777'; and a superb newcomer of my own, called 'Serendipity'.

I was fortunate in that I was able to procure some pollen of 'Susan 4' and was also favoured on two occasions with four selfed seedlings. The seedlings were slow and quite difficult to grow. Two were interesting oranges with a poor form and crinkled tepals but one turned out to be a very nice pink pastel with flaring trumpet-



'Delightful'



'Delovely' Second Runner Up



'Red Fox'



'Remus'

shaped flowers called 'Pink Promise'. The last seedling, after malingering for years and rotting off repeatedly, finally flowered at about nine or 10 years of age. The colour came true to 'Susan 4' but again the flower is a flared trumpet of unusual and unsatisfactory form.



'Romulus'



'Suzette Too' Best on Show 2011 CCC



'Venus'



'Susan 4'



'Suezette Too' - Peach seedling No. 2



'Serendipity'

I named this last one 'Suzanna'. However, I believe that this plant could be put to successful hybridizing use.

I used the pollen from 'Susan 4' on an interesting plant that turns rose as it ages, a plant that Les Brown was particularly proud of called 'L4', and produced 'Sweet Sixteen' and 'Sixteen's Sister'. How did I come up with the names? Well 'Susan 4' x 'L4' can be thought of as $4 \times 4 = 16$. So 'Sweet Sixteen' automatically followed, and when the sibling flowered the



'Sweet Sixteen'



'Sixteen's Sister'



'Pink Crystals'



'Pink Poppet'



'Pink Chiffon'



simple thought was "Sister"! Both these plants were slow to mature and flower, but both have perfect umbels with small pink recurved flowers with fairly short broad leaves. Both 'Sweet Sixteen' and 'Sixteen's Sister' have won gold on show.

There are a number of successful 'Susan 4' crosses including 'Pink Poppet', 'Pink Crystals', 'My Pet' (a cross of 'Gladys Blackbeard' x 'Susan 4'), 'Pink Chiffon' and 'Pale Promise', all of which are pink

'My Pet' - 'Gladys Blackbeard' x
'Susan 4'



'Serendipity'

flowers, and 'Fascinating Four', with a perfect small and round orange umbel with very recurved flowers. I have tried backcrossing and

sibling crosses and every trick in and out of the book, but I have not been able to reproduce 'Susan 4'. I will attempt some new crosses

on 'Suzanna' and hope against hope that at last I will succeed in retrieving 'Susan 4'. I would dearly love to reproduce this flower because of its peculiar beauty. The Quest for 'Susan 4' goes on!



'Fascinating Four'

PHOTOGRAPHIC COMPETITION 2016 WINNERS



Winner *C. miniata* 'Green Lady' – Carrie Kruger



First runner-up *C. miniata* 'Bella Crystal' – Carrie Kruger



Second runner-up *C. miniata* 'Reflex' – John Hunter



Winner Pendulous species *C. nobilis* – Helen Marriott



First runner-up Pendulous species *C. nobilis* – Helen Marriott



Second runner-up Pendulous species Yellow *Caulescens* – Carrie Kruger



Winner Interspecific *Cyrtanthiflora* – John Hunter



First runner-up Interspecific *C. caulescens* x *C. mirabilis* – Helen Marriott



Second runner-up Interspecific 'Marina' – Carrie Kruger



Winner Single flower *C. miniata* (bronze) x 'TKO' – Helen Marriott



First runner-up Pastel Ghost – Carrie Kruger



Second runner-up Single flower 'Desiré' – Kerrie McElroy



Winner Other *Clivia* photos: Grown from seed from Nakamura best variegated seed – Michael Riska



First runner-up Other *Clivia* photos: A bud of a bronze – André du Toit



Second runner-up Other *Clivia* photos – Carrie Kruger

PHOTOGRAPHIC COMPETITION 2016
SOME CONTRIBUTIONS



Miniata 'Maroon' x 'Hirao' – Helen Marriott



C. miniata – Helen Marriott



Interspecific – Johan Steynberg



C. miniata 'Crème de la Crème' – Kerrie McElroy



C. miniata 'Jade Fantasy' – Kerrie McElroy



C. miniata Conway parti-color 'Nancy Marie' – Michael Riska



C. miniata 'Covina Pink' – John Hunter



C. miniata 'Four Marys' – Dawie van Heerden



C. miniata 'Shakira' – Dawie van Heerden



C. miniata – Johan Steynberg



C. miniata 'Charl's Green' F2 – Carrie Kruger



C. gardenii Pendulous species – Photo by Jan Pohl



C. gardenii 'Hobbit' Pendulous species – Helen Marriott



Cyrtanthiflora Interspecific – John Hunter



Clivia Nobilis x *Mirabilis* Interspecific – Carrie Kruger



Nobilis Blush Pendulous species – Carrie Kruger



Interspecific – Jan Pohl



Interspecific 'Bellissima' – Kerrie Mc Elroy



Interspecific 'Belle Jade Forever' – Kerrie Mc Elroy



Interspecific Cyrtanthiflora – John Hunter



Interspecific 'Coral Peach' – Carrie Kruger



Single flower 'Gypsey Girl' – Jan Pohl



Single flower K. Russell's 'Green Girl' x 'Green Dream' – Helen Marriott



Single flower *C. miniata* 'Marble' – Helen Marriott



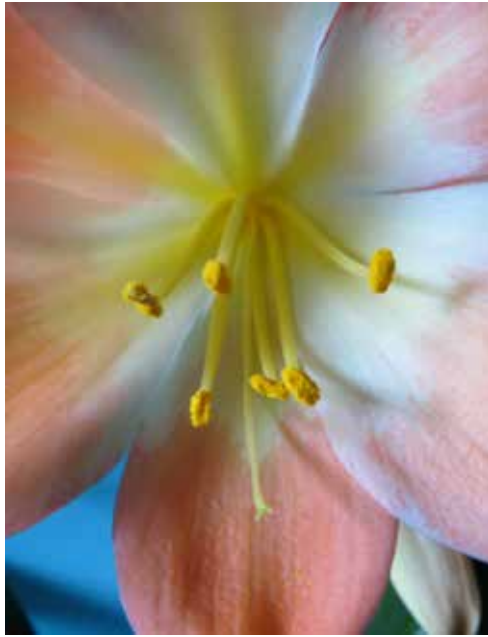
Single flower 'Jealous Guy' – Kerrie McElroy



Single flower Multitepal from James and Connie Abel just starting to open – Michael Riska



Single flower 'Vida' – André du Toit



Single flower White centred Pink – John Hunter



Single flower Broad petal 'Hirao' – Carrie Kruger



Other *Clivia* photos *C. nobilis* – Johan Steynberg



Other *Clivia* photos 'Greenflash' – Jan Pohl



Other *Clivia* photos Bud of *C. interspecific* 'Madelyne Rose' – Helen Marriott



Other *Clivia* photos Platter of berries – Helen Marriott



Other *Clivia* photos A bud of a yellow throat – André du Toit



Other *Clivia* photos 'Gem's Morganite' x Red *Robusta* – John Hunter



Other *Clivia* photos 'Gem's Morganite' X Red *Robusta* – John Hunter



Other *Clivia* photos 'Morning Star' – Dawie van Heerden



Other *Clivia* photos 'Hotlips' – Carrie Kruger



Other *Clivia* photos 'Tana's Green' – Carrie Kruger

PHOTOGRAPHIC CONTRIBUTIONS – Carrie Kruger



'Chiba Yellow' x 'Vico Peach' f1, breeder Charl Malan, grower and photographer – Carrie Kruger



Clivia miniata 'Carrie's Green' breeder Nakamura grower and photographer – Carrie Kruger



'Ghost' x 'Florid White Lips', grower and photographer – Carrie Kruger



Interspecific 'Her Majesty', grower and photographer – Carrie Kruger