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Clivia

News



Clivia News**NPO no. – 139-860 | SARS PBO Tax Exemption no. 930036393****THE CLIVIA SOCIETY MANAGEMENT**Website: www.cliviasociety.comInformation: infocliviasociety@gmail.com

POSTAL ADDRESS: P O BOX 1383, Roosevelt Park, 2129 Johannesburg

MANAGEMENT COMMITTEE: 2019/2020

Chairman	Glynn Middlewick: Mobile: +27 82-650-1463; e-mail: gcmidd@mweb.co.za
Vice-Chairman	Dave Garriock: Mobile: +82-799-5206, e-mail: david.garriock@akzonobel.co.za
Secretary	Joy Woodward: Mobile: +27 072-487-7933 or 021-671-7384; e-mail: capeclivia@ibox.co.za
Treasurer	Clayton Jonkers: Mobile: +83- 267-7206, e-mail: clayton.jonkers@crowehorwath.co.za
Extra Member	Hennie van der Mescht: Mobile: +27 79 493 1719; e-mail: hvdmescht@vodamail.co.za
Publications	Glynn Middlewick: Mobile: +27 82-650-1463; e-mail: gcmidd@mweb.co.za

INTERNATIONAL CONTACT PERSONS

Australia	Lisa Fox, 88 Mangans Road, Lilydale, VIC 3140, Australia Tel. +61 417 087 667; e-mail: lisa.fox@gmail.com
New Zealand Clivia Club	Alick Mc Leman clivia@xtra.co.nz >
United Kingdom	Steve Hickman: Riseholme, 54 Greenside Lane, Hoyland Nursery, Barnsley, South Yorkshire, S 74 9P Z, United Kingdom Tel: 044 0771 718 2169; e-mail: stevenhickman@btconnect.com
Europe	Aart van Voorst: Tel: +031 25 252 9679; Frederik Hendriklaan 49, HillegomTE 2181, Netherlands; e-mail: a.vanvoorst@snelnet.net
USA	David Loysen, 208 Shaw Hill Road, Stowe, Vermont, VT 05672, USA Tel. +1 802 253 2528; e-mail: shawhill208@gmail.com

PORTFOLIOS

Public Relations Officer	Carrie Kruger: Mobile: +83-343-1288, e-mail: utopia@mweb.co.za
Judging Standards	Hennie van der Mescht: +83-511-9519, email: hvdmescht@vodamail.co.za
Registrar of Clivia names	Lisa Fox, 88 Mangans Road, Lilydale, VIC 3140, Australia Tel. +61 417 087 667; e-mail: lisa.fox@gmail.com
Research	Felix Middleton: Mobile: +27 84 701 9915; e-mail: felix.middleton6352@gmail.com
Website Administrator	Lisa Fox, 88 Mangans Road, Lilydale, VIC 3140, Australia Tel. +61 417 087 667; e-mail: lisa.fox@gmail.com
Upload to Website	Lisa Fox, 88 Mangans Road, Lilydale, VIC 3140, Australia Tel. +61 417 087 667; e-mail: lisa.fox@gmail.com

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INSIDE



From the Editor

The publications continue to be produced and paid for by the members and these should provide some compensation in the way of entertainment for enthusiasts. The content depends on the submissions by the members. I was pleased to receive two articles from the United States which are greatly appreciated. Our next Clivia News will include photographs of the various flower show entries in July and September. Some images of the interspecific flowers that have flowered this year have been downloaded from the Northern Clivia Club WhatsApp Group.

A decision was taken at the Annual General Meeting in May 2021 to change the publication date of the Yearbook to November of each year. This would allow for photographs of flowers of the current year to be included in the 'Photographic Competition'. The next Yearbook will be published in November 2022.

The current Clivia News has several interesting items. These include one by Paul Kloeck finding worms on the clivia leaves that were not *amaryllis* caterpillars. Felix Middleton gives us an article on his Zoom presentation of the role of the miniata gene in interspecific breeding.

The first article from the United States, by Michael Riska, is on the generation of new growth from rhizomes. The second article from the USA is one by Don Kuonen on helping free the clivia radicle from the seed sheath. Carrie gives us an article on her selfing of clivia interspecific plants. Helen Sanders keeps us amused with her Clivi-Arta cartoon. Ruan Bing gives an overview of her visit to a clivia show in Anshan, China. Pieter Saayman gives us feedback on his breeding of 'Summersong', a Chinese blush clivia.

Three errors with regards to labels for the Society Photographic competition are listed with the correct captions.

The obituaries of Sakkie Nel and Koos Geldenhuys are included.

Enjoy your read. 🌸

Glynn Middlewick



FRONT COVER: (Photographers from left to right) Gerhard Faber, Ian Radmore, Carrie Kruger, Jurie Lintvelt, Hilton Atherstone, Karel Stanz, Francois van Rooyen, André du Toit & Vickus Theron



Back Cover: (Photographers from left to right) George Mann, Jaques van Eck, Aquarius, Chris Welgemoed, Felix Middleton & Cora de Kock

From the Chair

The challenge of the Covid pandemic continues to frustrate us all. Uncertainty with regards to the holding of physical shows, places us all in a difficult position. As physical meetings are not allowed for safety reasons, some members feel that their local clubs have not offered them much this year. The Clivia Society publications and the Zoom sessions continue to provide some relief in the absence of physical meetings and shows.

Some of the decisions taken at the Annual General Meeting in May 2021 will be of interest to members. The uncertainty of the Covid pandemic has led the decision to postpone the Clivia Society Quadrennial Conference until September 2023. A problem with postal costs for international members has become evident. The local postal service is a joke, but the use of a courier service is expensive. Bulk posting to some destinations with DHL courier service has worked well but the cost is not covered by the current subscription fee. Raising the subscription fee is a problem with many members and may dissuade them from renewing their subscription with the Clivia Society. A simple solution would be to supply digital copies, which would avoid any delays in delivery. Many members enjoy the hard copy editions. A compromise is possible. Clayton Jonkers has worked out a possible choice for international members. 🌸

Glynn Middlewick



Karel Stanz



Francois van Rooyen

Clivia flowering dates

Records kept by Ray Topp of Johannesburg.

These dates reflect the date on which the majority of the clivia in his garden showed buds appearing between the leaves of his clivia plants.

2005 15th July	2010 25th July	2015 -	2020 3rd Aug
2006 5th July	2011 Not recorded	2016 6th Aug	2021 5th August
2007 26th June	2012 20th July	2017 -	
2008 20th July	2013 20th July	2018 30th July	
2009 3rd August	2014 -	2019 1st Aug	

The dates may have some relevance in deciding on an ideal show date for the Johannesburg Club.

Obituary: Elias Jacobus Geldenhuys

11th June 1947 – 12th February 2021

Koos, as he is known in the clivia fraternity, was born in Groblersdal on 11th June 1947. He attended school there until Standard 8. His family was then transferred to Cradock, where Koos completed his matric at the Cradock Boys High School. He joined Nedbank when he left school and after 15 years of service there, he decided to change careers and joined the Department of Agriculture in the Directorate of Finance and Provisioning Administration as a Deputy Director.

Koos inherited his love for plants from his late father. He started collecting Aloes as a young man, but the frequent transfers as a bank employee interfered with the building up of his plant collections. He left Nedbank in 1981 and moved to Pretoria. He started off collecting orchids, mainly Cymbidiums. His first introduction to clivias was in 1993. He developed his collection mainly by growing plants from seed.

His collection was meticulously labelled and the plants were evenly spaced and the collection was well looked after.

Koos' married Fransie in 1969. Fransie hails from Steytlerville in the Karoo. They have one son who now lives in New Zealand.

Koos joined the Northern Clivia Club in 1994 and he soon became involved with club and Society affairs. He served as the Society Treasurer for about three years and as Treasurer of the Northern Clivia as well. He had a keen interest in formalising the judging routine at the club. Together with his fellow committee he was instrumental in developing a guide for judging clivias. He served as the judging representative of the Clivia Society for several years.

The Northern Clivia Club rewarded him with an Honorary Life Membership for his various successful roles at the club.

In 2010 Koos retired to a farm in Albertinia where he continued growing clivias. Despite being relatively isolated on his farm, he continued participating as a judge at various clivia shows.

In 2020 Koos was diagnosed with an inoperable brain tumour.

On behalf we wish to offer our condolences to Koos' wife and son. 🌸



Koos Geldenhuys

Obituary: Izak Hendrik Johannes Nel

19th April 1945 – 23rd March 2021

Sakkie, as he was known in the clivia fraternity, completed his schooling at Kenhardt High School and then started his first job in Santam Bank.

Sakkie was one of 15 children and his mother passed away when he was only 15 months old.

In 1968 he started his first job in the bank. He was transferred several times during his banking career. Sakkie met his wife, Esme van Schoor and married her in 1968.

His first exposure to clivia plants was in 1996,



Sakkie Nel

when he and his wife Esme were given a clivia plant by their neighbour.

Sakkie and Esme joined the Northern Clivia Club in 1998.

In 2003 Sakkie retired from Absa Bank after a career of 40 years. He stopped smoking and

learned to appreciate the scent of the clivias.

He published his first article on clivias in 2003 and followed this up with an article about 'Clivias on Stamps'. Sakkie, in addition to clivias, had a healthy collection of stamps, knives, walking sticks and silver coins.

In 2008 Sakkie was appointed the Public Relations Officer of the Clivia Society, a post he held until 2012.

Sakkie was an active contributor of articles for the Clivia Society publications and had more than 50 articles published.

One of Sakkie's favourite hybrids that he bred was 'Griet'. The parentage was 'Coba', a neighbour's plant, with Nakamura yellow pollen. The plant is unusual in that it has stripes along the length of the tepals. 'Griet' bloomed in 2006. He self-pollinated the flowers and 10 seeds were produced, which he gave to his friends.

Sakkie served in various roles in the Clivia Society. He was the United Kingdom representative for the two years 2015 and 2016. He was also responsible for the distribution of the Society



'Griet'

publications for several years. He served as the Clivia Society Treasurer for eight years and retired when health issue became more problematic. He was awarded an Honorary Life Membership of the Clivia Society in 2019.

He passed away in March 2021 and is survived by his wife Esme.

On behalf of the Clivia Society, we wish to offer our condolences to his wife Esme and his family. 🌸

Errata

Apologies for the incorrect captions of three of the entries submitted for the Clivia Society Photographic competition.

The first image is an entry from Helen Sanders which was attributed incorrectly to her husband. This photograph won first place in the 'Other Clivia Pictures Category'.

The second error was the caption for a second placed interspecific entry. The second placed entry was submitted by Andrew Kajewski.

The third error was the caption for a 'Highly Commended' award, which was submitted by Carrie Kruger. 🌸



Helen Sanders – First place in the 'Other Clivia Photographs Category'



Interspecific Category – Second place awarded to Andrew Kajewski



'Highly commended' – Carrie Kruger

Worm Wizardry

Paul Kloeck 2021

The end of March is a quiet period at 'Clivia Kingdom', our clivia nursery in Nelspruit.

The early autumn period has far less evidence of diseases and pests. On our return from a vacation during this period, our gardener notified us that there were lots of worms on the clivia plants in our garden. Expecting the worst from the *amaryllis* caterpillars, we went to inspect the plants.

We do use insecticides on the clivias in our shade houses, but don't use insecticides on our garden plants.

What we found was hundreds of yellow and turquoise larvae on the clivia leaves. There was some evidence of leaf damage by the *amaryllis* worm, but there appeared to be no leaf damage by these newly discovered larvae. The larvae were merely using *Clivia* foliage as a surface on which to pupate.

It was frightening to observe the number of pupae in addition to the larvae on the *miniata* leaves. My first thought was whether the *amaryllis* worms were now pupating on *Clivia* leaves!

We inspected the worm infested clivia in our garden. The clivias in this area are planted under indigenous trees. All the clivias in this area were covered by larvae and pupae. Surprisingly, none of the clivia leaves had been eaten by the larvae and obviously the leaves were merely a surface on which to pupate.

Joe Grosel helped us identify these pests as *Rhenea*, which had targeted six Cape Ash trees nestled in one corner of our garden. On inspecting the worms, most of the damage to the Cape Ash had already been done and most of the caterpillars had transformed into pupae, which had attached themselves by silk threads to the leaves of *miniata* plants. (Figure 6,7 & 8)



Figure 1. Leaf damage by the *amaryllis* caterpillar

The caterpillars are larvae of the *Rhenea michii* moth which lay thousands of eggs.

These eggs are typically laid in periods of high rainfall following on from long periods of drought.

The Cape Ash, the tree of choice for the *Rhenea* moths lay thousands of eggs on the soft fleshy leaves. The hatching caterpillars have voracious appetites defoliating the trees entirely in a very short period of time to form a mass of worms which fall down and search for a surface on which to pupate. Joe Grosel, who recorded a similar outbreak in Polokwane in 2019, and mentions this in his article, (published in The Lark – Issue 23 May/June 2019, Newsletter of Birdlife Polokwane). He claims that he could actually hear the caterpillars chewing the leaves from 15 metres away, after which they either crawled down the bark of the tree or fell down to form a carpet of worms on the ground.

Ekebergia capensis (Cape Ash, Dogplum, Essenhout) is an ideal indigenous tree under which to plant Clivias. They are most attractive and grow quickly to a height of 10 to 20 metres.

Adjacent to our Cape Ashes is a bed of several thousand *clivia gardenii*. Although some of them had the odd *Rhenea* caterpillar and pupae on



Figure 2. Pupae of the *Rhenea michii* larvae



Figure 4. *Rhenea* larvae

their leaves, most had damaged leaf margins which was clearly attributed to something else. (Figure 9) The foliage damage in the

gardenii section was attributed to the Elegant Grasshopper, (*Zonocerus elegans* – Figure 10) which has also been abundant following the heavy rainfall experienced during Cyclone Eloise. These grasshoppers exude a nauseating toxic liquid when disturbed. We have all six species of clivia growing under different indigenous trees. Damage to the leaves was only noticed on the *gardenii* plants, which is the species of choice of this grasshopper.



Figure 3. A close-up of the *Rhenea* larvae



Figure 5. *Rhenea michii* moth



Figure 6. Pupae on the leaves of the *Clivia gardenii*



Figure 7



Figure 8. *Rhenea michii* pupa



Over the past 15 years we have never noticed *amaryllis* caterpillars on *gardenii* foliage while *robusta* appears to be the clivia species of choice for the lily borer. Is *Brithys pancrati*(*crini*) telling us something that scientists should take note of? *Clivia nobilis* is also not targeted by the *amaryllis* caterpillar.

After this initial infestation, no further damage has been noted to the clivias in our garden. 🌸



Figure 9. Grasshopper damage to leaves

Left: Figure 10. *Zonocerus elegans*



Below: Carrie Kruger



Above: Francois van Rooyen
Karel Stanz



Cliviamart

Contact
Elize Strumpfer
Cell: 073 619 7356
Web: www.cliviamart.co.za

To self or not to self?

Carrie Kruger, Utopia Clivias SA

“To self or not to self” – this is often a question raised by new and experienced growers of *Clivia*.

A single interspecific plant has a large gene pool and with this in mind breeding results are never guaranteed.

Therefore, it is advisable to grow all these crosses to flowering size and to select the superior plants. Unfortunately, we do not all have the space to do this.

We have flowered self-pollinated F2 plants that are far superior to their parent plants. This is proof that self-pollination may be a good option if you are unsure of what pollen to use on a specific plant.

Here is an example of our experiences with self-pollination using an interspecific plant we have named 'Jupiter'.

'Jupiter' was one of our first interspecific seedlings, acquired from the late Johan Conradie

of Stilbaai, South Africa. It was bred from (*C. gardenii* x *C. miniata*) x (*C. miniata* x *C. gardenii*). When it flowered in 2012, we simply selfed the plant as it flowered out of season and the flower was not exceptional.

This selfing produced only five seeds and these were subsequently planted in 2013. Low seed count is common when you self-pollinate Clivias, as many of them are sterile to their own pollen. These selfed seeds tend to grow slower than hybrid crosses and the seedlings are more prone to rot.

The first of these crosses eventually flowered in 2018. We marked her 'Sibling A'. 'Sibling A' was later renamed 'Planet Earth'. The flower is beautiful with large, open, bell shaped flowers on a small compact neat plant. This was in sharp contrast to the long-leaved parent plant. The flower colour is an apricot yellow-cream on the inside of the tepals and an apricot pink blush on



Figure 1 'Jupiter'



Figure 2 'Sibling A'- 'Planet Earth'

the reverse side of the tepals. A significant green infusion is evident on all the tepals. 'Sibling B' flowered in 2019 and was also impressive, but not as special as 'Sibling A'. It was a pastel pink

with a slight green overlay and to nice open flowers. We decided not keep this plant and sold the plant that season.

'Sibling C' flowered in 2020 and this flower was amazing. Although not as compact as 'Planet Earth', the colours on this flower were outstanding. It was a mixture of mustard and pink with prominent olive-green stripes that intensify as it matures. She was named 'Callisto', after one of Jupiter's many moons.



Figure 3 'Sibling B'

The other 2 seedlings should flower soon, a not uncommon feature in some interspecifics and may take up to six years to flower. Interspecifics often make offsets before their first flower.

In our experience with self-pollination, many



Figure 4 'Sibling C'-'Callisto'

clivias, especially interspecifics, are sterile to their own pollen and when there is a successful pollination, not many seeds are formed, but the results, although few, may be rewarding. 🌸

Incredible Plants

Clivia plants & seeds

George Mann

082 414 4891

gjmann2@gmail.com





A photograph from the archives of the Northern Clivia Club. Some good looking guys there!



Ngome *gardenii* – Val Thurston



Anita Maree



Carrie Kruger

Clivi-Arta

Helen Sanders



Clivia Clones from Stems, Rhizomes and Plants

Michael Riska

Past NACS Board Member and Lifetime Honorary Member

never throw away valuable Clivias that may have the possibilities of producing clones or need to be rehabilitated.

Some *Clivia* offsets are attached to the stem by a long rhizome. I can cut off a piece with roots and put fungicide on each cut end, then plant it in my Clivia soil, longitudinally, half buried with as many roots as possible.

Sometimes we have a small Clivia stem with roots and no leaves. I simply plant it with some of the stem exposed, treat it with fungicide and wait.

Offsets can sometimes be attached, adjacent to the stem and despite all efforts to be careful, the offset is removed without any roots. In this case, I treat the plant base with rooting hormone and plant in moist sand. Roots are often seen in a few months.

Should you have a plant with the apical meristem dying, but still has good leaves attached to the stem, there is no reason to



Figure 1



Figure 2



Figure 3

throw it out. Sprinkle cinnamon or use peroxide in the centre. In the case of the plant shown, wait until it sends up some good offsets.

When a plant stem with roots sends up more than one offset, divide the stem and offsets into several new plants. Treat the cut surfaces with fungicide.

I sometimes come across a piece of stem with small offsets but rotted roots. Clean thoroughly with peroxide, dip in rooting hormone

Figure 4

and simply plant in *Clivia* soil or sand.

We have the patience to hybridize plants, germinate them from seed, with no guarantee of the outcome, so too should we grow valuable *Clivias* from viable pieces. Try some of the above methods and be patient and wait for the rewards. 🌸



Figure 5



Figure 6



Francois van Rooyen

Interspecific –
Carrie Kruger



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Carrie Kruger
Tel: 044 343 2183
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info@utopiaclivias.co.za

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Breeding with ‘Summersong’ – a Chinese Blush

Pieter Saayman

In our early days of *Clivia* collecting we bought and imported some Chinese plants through eBay. The internet in South Africa was so unreliable that we were seldom successful in purchasing plants from the auctions on Ebay. In 2010, we saw the listing of an offset of ‘Summersong’ (‘Anshan Blushed Yellow Daruma’) on Ebay. The colouring was beautiful and rare and we never thought that we would be successful in our bid.

Much to our surprise and delight the morning after the auction, there was an invoice from the seller confirming we were the new owners of the plant. We proceeded to pay the seller, arranged the necessary import permit and a week later we took delivery of the plant.

The offset was potted up and in 2012 rewarded us with its first flower. Initial excitement turned to concern as the flower buds became dark pink in colour. When the first flower opened we were

rewarded with a beautiful large cream throat and just a light blushing of pink on the inside tips of the tepals.

Now the challenge began. What plant could we pollinate or which pollen should we use on this beautiful plant. This colour form was new and there was little or no information available about breeding with it. From the little information we could get, we understood that a group of blushed plants developed from an attempt by the breeder to develop short compact yellow plants.

From further discussions with Eddie Pang, we now know that ‘Summer Song’, ‘Angel City’, ‘White Butterfly’ and other Anshan blushed yellow Darumas were purchased in 2007/2008 from various breeders in Anshan City in China by Mr Zhang Yang (a reseller) and these were then sold on to various other breeders in China. Therefore, unfortunately, no detailed information



‘BKF Snow Monarch’ 2019



'BFK Snow Monarch' 2020

of the origin of the plant is available.

With this first bloom, I decided to try a selection of crosses. Two of the flowers were

self-pollinated. A few more were pollinated with a lightly blushed yellow flowering plant from Mr Hattori. The third cross I made was with the pollen of a green 'Hirao'. The purpose was to test for any Group 2 genetics that may be included in 'Summersong' and also to develop a green throat in the offspring.

I then used 'Summersong' pollen on a similar coloured large-throated pink pastel we had called 'Pink Tourmaline', as the colours looked similar. I also put some of its pollen on 'Emma

Charlotte', a Charl Malan interspecific plant we have that also has a very large white throat. The idea here was to breed a blushed compact



'BFK Snow Queen'



'BFK Snowrose'

interspecific plant. To test 'Summersong' for any Group 1 genetics, I put the pollen on a Group 1 broad-tepal yellow flower.

Neither the Group 1 nor Group 2 crosses produced any unpigmented seedlings, but the number of seeds produced was small and the possibility of any yellow genetics in 'Summersong' cannot be totally ruled out.

In 2018 we started flowering the first seedlings from these original breeding attempts. From the cross 'Pink Tourmaline' x 'Summersong', three out of the ten seedlings flowered initially – one with the most beautiful broad-tepal pink blush with the palest green throat – colours extremely hard to capture on camera. The second one bloomed a soft apricot colour and the third was a yellow flower – perhaps a poor blush as it had a deeply pigmented base.

One breeder saw the blushed plant just after it opened and exclaimed with amazement. This plant is known as 'BFK



'EmmaCharlotte' x 'Summersong'



'Hattori blushed yellow'

Snow Monarch'. We decided to keep the BFK abbreviation for all the other blush siblings as well. In 2019 we flowered the balance of the seedlings from this cross, another four seedlings had blushed flowers. ('BFK Snow Queen', 'BFK Snow Rose', 'BFK Snow Fall' and 'BFK Snow Kiss') and three more were oranges. From this limited result, we obtained 50% blushed flowers.

Of the 'Summersong' x 'Hirao' cross we only planted 5 seeds. One flowered in 2018, a disappointing orange with no green in the throat, so it was discarded. In 2020 another two flowered – one more orange and

one which flowered pink with a green throat, a pleasant surprise. I have continued my breeding program with the pink – green-throated plant.



'Pink Tourmaline'



'Summersong' x 'Hattori Blush 3'

I have subsequently put 'Summersong' pollen on the 'Hirao' plant hoping for a stronger green colour in the next generation of flowers.

The 'Summersong' x 'Hattori Blush' crosses flowered for us in 2019. Of the ten we originally planted only seven survived. These seven plants produced four of a blush colouring and three were orange. From this limited result it seems like we also got about 50% blushes out of this 'Chinese Blush' x 'Japanese Blush' cross. It will be interesting to see whether pollination of these blushed seedlings with a 'Chinese blush' will produce a higher number of blushes in the next generation.

Of the selfed seeds we planted, only one survived'. This plant bloomed in 2019 and looked similar to the mother plant but having some



'Summersong' x self



'Summersong'

keeled tepals.

The 'Emma Charlotte' x 'Summersong' cross only produced a few seeds of which one flowered in 2019 – a lovely versicolor interspecific with deep pink on the outside of the tepals.

The crosses we made using the pollen of 'Summersong' onto a Group 1 yellow, as well as crosses with other Chinese blush plants, have not yet flowered.

I am often asked to which 'Group' my 'Summersong' and the 'Chinese blushes' belong. From the breeding results we have had and discussing this idea with fellow breeders, I do not believe that they belong to any defined group. The results we have, tend to suggest that it is a distinct colour pattern that is inherited and not a mutation. This inheritance occurs whether 'Summersong' is used as a pollen or berry parent, but it is not a dominant trait.

All the seedlings produced from 'Summersong' are pigmented. The colours of the offspring vary. There is evidence of a distinct large-throated

feature in all the flowers that produced the blushed colours, whether they arise from the pollen or berry parent. The rest of the seedlings produce orange flowers. Most mutations are recessive and produce 100 percent orange flowers when crossed with 'incompatible' plants. These 'Chines Blush' plants produce a percentage of blushed flowers in most crossings.

An interesting feature of this 'blush' colour type is that the blushed flowers are all pink in colour, not orange. Is the blush colour more than 'colour pattern inheritance' or is there genetic modification of the colour as well?

Obviously, at this stage, our results are based on limited quantities of seedlings. Also, these results are all from one specific plant, 'Summersong', and may not hold true for other Chinese Blushes; only time will tell. Some other breeders working with different Chinese blushes have reported similar findings in their results. For now, the journey continues, and we look forward to the next generation of seedlings flowering from our breeding efforts with this beautiful plant. 🌸



Bronwynn Engelbrecht



Gerhard Faber



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My trip to the Clivia Show in Anshan

Ruan Bing

The three-day exhibition in Anshan ended on the 3rd May 2021. Participants from several cities attend the show. More than five hundred staff are involved in the presentation of the show.

The three - day event has more than 50,000 visitors. The show provides the opportunity for growers to share cultivation methods with each other and network and form useful contacts for future breeding. The prices of clivia vary from 100 yuan to several hundred thousand RMB. 🌺



(Anshan *Clivia* with wide, short, round, flat and hemp series unique to Anshan)



Flowers for all Seasons – are *Clivia* hybrids the solution?

Felix Middleton

The findings as documented in this submission are based on observations from a finite but hopefully representative sample of crosses. Nature often surprises us with exceptions to the rule. And this is especially true when working with *Clivia* hybrids.

To most gardeners, *Clivia* are regarded as spring flowering plants. In recent years however, *Clivia* hybrids, better known as interspecifics, have been promoted as plants that flower in winter. This has opened up a new interest for members and allowed clubs to have separate interspecific shows in winter. The size of these shows have grown with the increase in interest in the interspecific flowers, which provide flowering clivia in July in the Southern Hemisphere. The pendulous species of *C. gardenii* and *C. robusta* also flower from March to July. The objective of this study is to investigate the flowering time variation for the different F1 interspecific hybrids of *C. miniata* and pendulous species.

What is a hybrid?

In botany a hybrid is defined as the offspring of two plants of different species or varieties. Its meaning and worth is not always the same for the different professional disciplines.

- Conservationists regard hybrids as the cross between any two species, an undesirable occurrence in nature. As atypical specimens, they are disliked for they are not easily accommodated in the binomial nomenclature. Due to their rarity and genotypic variability, they cannot be managed in the customary diversity maintenance and preservation practices.
- A natural interspecies hybrid is a rare find for a botanist. The type and number of traits in common with the parents provide insights into natural selection and therefore the sequence of events leading up to specification. The 'gardenii-robusta' grouping may be used as an example. Although botanists have formally separated the group in two species, we often find plants that are intermediaries of the two

extremes. This may be indicative of a more recent divergence or a divergence still in progress.

- Plant physiologists and geneticists use interspecies hybrids to investigate the processes and traits that define and differentiate species. For instance, nectar production is evident in the pendulous species of *Clivia* but not in the upright *C. miniata*. However, some varieties of *C. miniata* produce a scent, a trait often associated with nectar production. Could it be that the sweet aroma observed in some *C. miniata* is an artifact persisting from the common ancestor that it shares with the pendulous species? The importance of traits and relationship between traits such as nectar production and scent can be investigated by evaluating interspecies crosses. Furthermore, the genetic relationship between species can also be evaluated by comparing the F1 progeny from crosses between species or groups within a species. This is particularly useful when large-scale molecular marker fingerprinting is not available or feasible. For example, the F1 progeny from a cross between a *C. miniata* and a midlands type *C. gardenii* is clearly different from the progeny when *C. miniata* was crossed to an Ngome form of *C. gardenii*. This demonstrates that the Ngome form of the *C. gardenii* group differs genetically from the midlands *C. gardenii* group.
- To a plant breeder who specializes in pre-breeding techniques, an interspecific hybrid is regarded as an intermediary to be used to transfer traits from a wild relative to a domesticated variety. For example, we can improve the resilience of domesticated *Clivia* by the introduction of the genes of the thick leathery leaf Pondoland blue leafed *Clivia*. The F1 generation will not produce the spectacular flower shape of the domesticated *Clivia*, nor be stable for the leaf type of the Pondoland *C. miniata*. Through successive backcrossing and selection cycles, hardy strains of *Clivia* can be produced that are true breeding for these traits.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
2011								Vroegop		Magoebas.		
2012				Vroegop	Vroegop	Ngome			Vroegop	Magoebas.		
2013				Vroegop	Vroegop					Graskop		
2014				Vroegop	Vroegop			Blinkwater Boshcomb	Blinkwater Boshcomb Dwesa	Karkloof Sabi Quora Quora		
2015				Vroegop	Vroegop Boshcomb Oribi Port Alfred	Ngome		Oribi	Eshowe Blinkwater Dwesa	Sabi	Boskraal	
2016				Vroegop		Mariepskop Mkambati Mkambati		Morgans B.	Morgans B.	Mkambati	Boskraal	
2017					Vroegop Oribi	Ngome	Ngome		Blinkwater Boshcomb Oribi	Sabi	Boskraal	
2018						Oribi Mkambati Kei River						
2019						Mkambati				Addo		
2020						Port St. J.		Port St. J.	Port St. J.		Boskraal	

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
<i>C. gardenii</i>				GAR								
<i>C. robusta</i>					ROB							
Ngome <i>C. gardenii</i>					NGOME GAR							
<i>C. miniata</i>								MIN				
<i>C. nobilis</i>						NOB			NOB			
<i>C. caulescens</i>						CAUL				CAUL		
<i>C. mirabilis</i>											MIR	

Key to color coding:

- C. gardenii*
- C. robusta* (Swamp)
- C. caulescens*
- C. miniata*
- C. robusta* (Cliff)
- C. nobilis*
- C. mirabilis*

Table 1: Peak flowering times of *Clivia* species in habitat

• A plant breeder who focuses on yield and therefore the production of superior varieties will regard a hybrid as a cross between two unrelated elite individuals or strains. For instance, crossing a group 1 yellow *Clivia* with a group 2 yellow may produce a hybrid that will be suitable for crossing with both group 1 and group 2 yellows – known as a universal donor for yellow.

For the purpose of this discussion, we will define a hybrid as the first generation cross between a *C. miniata* and one of the pendulous *Clivias*.

Flowering time of *Clivia* in nature

The table below records the *Clivia* flowering times in nature. The first part of the table is a summary of peak flowering times noted at different sites over a period of several seasons. Different species or groups are colour coded to simplify the interpretation of the data. This was by no means an exhaustive study as only a few locations were visited. Some members may have

observed different peak flowering times at other sites. The number of data-points are adequate to provide a rough indication of key differences between the species. In general, the flowering times of the various species in a greenhouse environment correlates with this.

The second part of the table can be used as a summary of the spread of flowering times. If we only consider true species, we find that flowers are usually absent during the months from November to March. I include the month of November in this lack of flower period as very few of us own *C. mirabilis* or have successfully grown, let alone flowered, this species in culture. For those enthusiasts living in the summer rainfall region, the period of November to March is known as the trouble-free days. We have adequate heat and water and this is an ideal time to transplant our *Clivia* plants. From April onwards, fungi, mealie-bug, drought and frost, challenge our *Clivia* cultivation. The question that arises is whether it is possible to overcome these

challenges and have *Clivias* blooming throughout the year.

Evaluating crosses between *Clivia* species

As indicated at the beginning of this contribution, we will only be looking at F1 hybrids between *C. miniata* and the pendulous species. Finding examples of crosses where the pendulous species used in the cross would be representative of a typical form of the species is virtually impossible. Breeders generally select and breed with the atypical forms of a species. The results from this study might therefore be slightly biased as we have used the flowering times of F1 hybrids created in breeding programs. We hoped that by including crosses from different breeding programs and evaluating the outcome from different genetic sources of a species, we would find a result that can be regarded as a good general description for the species.

It was important to include crosses with a typical *C. miniata*. The modern open flower varieties that we regard as *C. miniata* are more domesticated than their natural relatives. Many *miniata* have genetic elements of pendulous species from previous hybridising. We know that the first *Clivia* breeding took place at the Kew Gardens where the *C. nobilis* was crossed with a *C. miniata*. This material was likely the basis for many breeding programs in Europe and the Middle East. We hoped to include crosses where the *C. miniata* were more closely related to their wild relatives.

Reciprocal crosses

At first, we attempted to separate data collected from reciprocal crosses. From past experience we know that some traits, especially leaf characteristics, are not inherited in the same way depending on whether the pendulous species is used as berry or pollen parent. The original plan was to ascertain if flowering time was also affected by maternal inheritance. In the end we grouped the data together as the number of crosses where the *C. miniata* parent was used as pollen parent were limited. It is evident that breeders prefer to use the pendulous species as the pollen parent as emasculation is simpler in the recently opened *C. miniata* flowers.

Sample size

Many breeders only use one or two superior plants from their pendulous stock to create

interspecific hybrids. We therefore needed to include data from several breeding programs to ensure a representative sample of genotypes for each species. The objective was to evaluate the crosses from several breeders throughout the year and over different seasons. The flowering dates for each separate F1 interspecific cross was plotted per month. As soon as 16 data-points were recorded for any specific month, the evaluation ended. By doing this we not only determined the peak month of flowering for each F1, but we could also show the magnitude and spread of exceptions to the peak flowering periods. To date we have not attained the 16 data-point per month goal for all species, but we have enough data to enable analysis of the data. Not many breeders have been working on *C. mirabilis*, so we could not find the peak month or representative spread of their flowering times.

Flowering time of *Clivia* F1. (*C. miniata* crossed with pendulous species)

Table 1 is a representation of when hybrids flower. The month is depicted above each column and the last two digits of the year is noted for each data-point. The color coding of each data point is indicative of a specific breeding program. For instance, the yellow data-point at the top of column one on the table is for a *C. gardenii* F1 (*C. miniata* by *C. gardenii*), that flowered in January 2017 at Clivia Kingdom in Nelspruit. At this point, I would like to thank all the breeders and enthusiasts who contributed to this exercise. Also included are the flowering dates of *Clivia x nimbicola* in nature as supplied by Attie Le Roux. To complement this, the flowering dates of *Clivia x nimbicola* from greenhouse observations by different breeders were also documented. *Nimbicola* plants are not all true F1 plants and certainly include plants from advanced generations of selfing or even backcrossing. However, the results are interesting and corroborate the findings for true (*C. miniata* by *C. caulescens*) F1.

Months where there is a lack of color in the greenhouse

The peak flowering times of *Clivia* species and hybrids are summarized in table 3. The flowering season of the F1 generation (*miniata* by pendulous species) of the autumn flowering pendulous species moves ahead into winter, whereas the peak flowering of F1 generation (*miniata* by

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
F1: <i>C. gardenii</i>	17				13	12 13 13 14 15 12 14 14 16 14 14 15 15 15 16 13 10 16 14 17 11 12 12 18 17 13 17 13 14 17 14 14 14	13 13 13 14 17 14 15 16 17 17 17 18	15 16 17 08 17 11 13 11				
F1: Ngome <i>C. gardenii</i>					16	17	13 13 13 14 17 14 15 16 17 17 17 18	12 12 12 13 17 15 13 15 15 17 16 16 16 17 18 17 17 17		17		
F1: <i>C. robusta</i>					15	13 14 15 16 18 15 21 17 17 17 13	16 16 16 14 17 17 13 13 17 18 18 18 20	16 11 16			16	
F1: <i>C. caulescens</i>	13 17 17 17 18 17 17 17	12 18 18	15 16 18 18 16	18 18 20 20	17 16 18 18 19 20 21	17 17 18 17 18 18 21 21	17 17 18 18 18 18 19 21 21	17 17 17 18			17	
F1: <i>C. nobilis</i>	13 17 21	18 19 21 21	18 18 21	20	13 14 16 16 16 18 18 19 20	14 17 14 17 14 12 16 17 17 14 17 15 15 15 16 14 17 17 14 14 18 15 14 14 18 18 18 19 21 21 18 21	16 18 20 17 17 14 18		12 20			17 17 20
F1: <i>C. mirabilis</i>	18 18	17				18			09 17 19 19 20 20 20 20	16 20	17	
<i>Clivia x nimbicola</i> in nature	09 09 09		09 09	09 09 09 09 09	08 08 08 08 09		08 08 08 08 08 08 08 08 08 08 08 08 08 08 08 08 08 08 08 08	08 08 08 08 08 08 08 08 08 08 08 08	08 08 08 08 08 08 08 08 08 08 08 08			
<i>Clivia x nimbicola</i> in culture	18 18 13 14 13 18	18 18 18 18 18	13 18 18	18 17 18	18 18 18 18 20 20 21	18 20 14 18 18 21	18 17 16 16 14 15 15 17 18 18 18 18 18 18 18 18 18 20				17 17	17 16 18 18

 Table 2: Peak flowering times of *Clivia* F1 hybrids (*C. miniata* by pendulous species) as observed in different breeding programs.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
<i>C. gardenii</i>				GAR								
<i>C. gardenii</i> F1						GAR F1						
<i>C. robusta</i>					ROB							
<i>C. robusta</i> F1							ROB F1					
Ngome <i>C. gardenii</i>						Ngome GAR						
Ngome <i>C. gardenii</i> F1							Ngome GAR F1					
<i>C. nobilis</i>						NOB*			NOB			
<i>C. nobilis</i> F1						NOB F1						
<i>C. caulescens</i>						CAUL*				CAUL		
<i>C. caulescens</i> F1						CAUL F1						
Nimbicola							Nimbicola					
<i>C. mirabilis</i>											MIR	
<i>C. mirabilis</i> F1									MIR F1			
<i>C. miniata</i>								MIN				
* Secondary peak in flowering												
Period devoid of flowers												

Table 3: Summary of peak flowering times for *Clivia* species and *Clivia* hybrids. (F1 Hybrids - *C. miniata* crossed with a pendulous species).



Figure 1: F1 progeny from a cross between a typical *C. gardenii* and an orange *C. miniata*. Not many breeders use the typical form of *C. gardenii* in their breeding programs.



Figure 2: F1 from a cross between a superior blush *C. gardenii*, from habitat, and an orange *C. miniata*.



Figure 3: F1 from a cross between an Ngome *C. gardenii* and an orange *C. miniata*. The flower count and light colour of the *C. gardenii* parent is evident in the progeny.



Figure 4: F1 where Ngome *C. gardenii* was used as pod parent in a cross with a domesticated *C. miniata*. Unfortunately the domesticated *C. miniata* parent was the result of a backcross with elements of *C. caulescens* in its genetic makeup. Flowering data was therefore not included in the study.

pendulous) of the spring flowering pendulous species is a month or two earlier. As a general rule, the F1 generation of interspecific plants, flower midway between the peak flowering season of *C. miniata* and the respective pendulous plants. At first glance we do not extend the flowering season of *Clivia* with *Clivia* hybrids, but instead saturate the winter months with flowers, where previously the Ngome form of *C. gardenii* was the only plant flowering. However, if we revisit table 2, we see that although there is a peak flowering for most of the F1 generations (*miniata* by pendulous), there are many F1 (*miniata* by pendulous) generations of the spring flowering species that flower in the months of November to March. Most of these hybrids consistently provide out of season flowers annually.

Summary

It is quite easy to fill your greenhouse or garden with color during the months of April to October. Mid-winter, specifically the month

of July, was regarded as a quiet period of the flowering calendar as only a few enthusiasts owned the Ngome form of *C. gardenii*. In recent years this gap has been filled by F1 interspecifics that flower during this time.

The trick is to find or create plants that will flower from November to March. One way to do this is to identify the '*Clivia x nimbicola*' clones that flower out of season and purchase one of those from a reputable breeder. Alternatively, buy F1 seed from *C. miniata* crosses with *C. nobilis* or *C. caulescens*. Several of the progeny are likely to flower out of season. In my experience '*C. miniata* by *C. nobilis*' F1 can be used to obtain flowers late in the year whereas several '*C. miniata* by *C. caulescens*' F1 may flower at the beginning of the year. There is still not enough information available about the peak flowering times of the '*C. miniata* by *C. mirabilis*' F1. Preliminary data may suggest that that this cross will successfully provide flowers in your greenhouse in the off-season. 🌸

Come on, Man... GERMINATE!

Don Kuonen

This article suggests a way in which to encourage your clivia seeds to germinate. I'm admittedly a novice clivia grower, but I've germinated lots of seeds. I have learned at least one trick that I think many of you would be interested to know about. I remember reading about this procedure in some of the clivia literature, but I can't remember where, and therefore, can't cite the author.

I've germinated clivia seeds in potting soil, vermiculite and Ziplock bags, and I find the ziplock bag to be the easiest and most convenient. Using cleaned seeds, I put them in a Ziplock bag with a folded paper towel. Half a towel is suitable, folded to lie flat in the bag. Place the seeds on one side of the paper towel. Moisten the paper towel with a teaspoon of a fungicide solution. I use a Mercaptan solution, and sometimes a shot of Daconil (chlorothalonil – Bravo). Label the Ziplock with a marker pen to identify the cross and the date of the start of germination. Place the Ziplock bag in a warm place. If the paper towel shows spots, either red or black – evidence of fungus, replace the towel with a new one in a new Ziplock bag. Moisten with a fungicide solution and seal the bag. There will be a flush of germination in about 3 - 4 weeks, and those seeds can be removed and potted up. The remaining ungerminated seeds are what we are concerned about in this article.

Examine the ungerminated seeds, and you may notice that the radicle looks like it's under a bump in the seed coat. This is, I assume, the



Figure 1: These seeds had the seed coat over the radicle removed. This picture was taken 12 hours later, and you can see radicles emerging from the seeds. The picture is not very clear, so the radicles are circled to identify them.

radicle pushing against the seed coat and trying to grow but not being able to burst through. Using a sharp knife or razor blade, make a "V" shaped cut with two strokes just above the radicle, but far enough away so you don't damage the radicle. Then using the blade, lift the seed coat up at the point of the 'V'. The seed coat is a translucent thin layer and peel this back towards the radicle. You can peel back a small part, as long as you expose the radicle.

Replace the seeds into the Ziplock bag and return to a warm place. There should be a visible radicle emerging from the seed in a very short time, which can be as little as 12 hours. When the radicle is big enough, transfer the seed to a growing medium. 🌸



Interspecific – Francois van Rooyen



'Gems Happy Kids' – Francois van Rooyen



Sue Kloeck



Sunbird feeding – Gerhard Faber



'Blushing Belle' – Maggie Webster.



Bronze 'robusta' – Hilton Atherstone



'Golden Cluster' – Chris Smit



Francois van Rooyen

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CONTACT DETAILS OF SOUTH AFRICAN CLUBS AND INTEREST GROUPS

Border Interest Group	Peter Miles: Cell: +27 83-463-6229; e-mail: petermalcommiles@gmail.com
Cape Clivia Club	Joy Woodward: Cell: +27 72 487 7933; e-mail: capeclivia@ibox.co.za
Eastern Province Clivia Club	Marius Meyer: Cell: +61 405 4501; e-mail: e-mail: marius@mlea-ec.co.za
Free State Clivia Club	David Fourie: Cell: +27 72 614 3091; e-mail: fouriedm@telkomsa.net
Garden Route	Karl Rost: Cell: +82 887 4429; e-mail: karlrost@lantic.net
Joburg Clivia Club	Glynn Middlewick: Cell: +27 82 650 1463; e-mail: gcmidd@mweb.co.za
KwaZulu-Natal	Alfred Everson: Cell: +27 83 304 0826; e-mail: alfredeverson0001@gmail.com
Lowveld Clivia Club	Secretary: Morne Dorfling Cell: +27 83-282-8053, e-mail: mornedorfling75@gmail.com
Northern Clivia Club	Johanita Snyman: Cell: +27 84 656 1809, e-mail: johanita.snyman@gmail.com
Northern Free State Clivia Club	Jan Schmidt: Cell: +27 83 407 5563, e-mail: jan.schmidt@absamail.co.za
NKZ-N (Newcastle) Interest Group	Alfred Everson: Cell: +27 83 304 0826; e-mail: Alfred.Everson@arcelormittal.com
Overberg Clivia Interest Group	Felicity Weeden: Cell: +27 78 710 9485; e-mail: fillylilly@telkomsa.net
Vryheid Interest Group	Nico Grobbelaar: Cell: +27 84 273 1632; e-mail: jannic5603@gmail.com

