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INTERNATIONAL GERANIACEAE GROUP

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The International Geraniaceae Group
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Membership runs for 12 months from the date of joining.

Membership Rates 2020
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Cover picture – Pelargonium moniliforme – Gloria Chen

Editorial

Once bitten by the plant bug, only two questions remain that seem to matter in one's life. Number one: where do I get that special plant? Number two: how do I grow it?

Now, the annual IGG Seed List has been providing even for those very specialised growers among us. When I seriously got into pelargoniums and sarcocaulons myself, the publication date of the List became more important than Christmas. As my collection grew, and beginner's luck wore off, I started to take more interest not just in *what* I grew but how to grow the plants *well*.

For many, including myself, this has been proving remarkably difficult – we may well have done all the usual mistakes of watering plants when they should not have been, and not watering them at all when many require some degree of moisture during periods of rest. We learn through mistakes, of course, but discussions with fellow enthusiasts that we report on in this issue might also be helpful. Everyone grows plants in a different climate and different growing conditions, some grow them in miniature pots, some never stop watering, and others still let plants experience freezing temperatures of down to -5 ºC. Knowing the extremes that plants can endure tells us a lot about what might be those optimal growing conditions.

And so the idea was born to conduct surveys among pelargonium growers, related to both sowing and growing. Can any general advice be developed based on what works well for most? It turns out that it can, and we present this in a couple of articles, one focussing on growing from seed, and the other one on general cultivation practices. We focus on pelargoniums, as some species particularly in this genus continue to puzzle us with their unusual temperature and water requirements.

I hope you enjoy this Newsletter at least as much as it has been a pleasure to work on – a big thank you to all who contributed.

Matija Strlic, Chairman and Editor

IGG News

Some of you may have noticed that in the last Newsletter, we introduced the new Group role of *IGG Representative East Asia*. This followed many years of internal consultation and discussion, and seeing that our member numbers have been growing very nicely particularly in East Asia it felt that a regional representative could become very helpful.

The idea is to help new members become better acquainted with the way that the Group works, assist with translation where needed, as well as assist with promotion at events and in the social media. We are extremely pleased to announce that **Patrice Hsu** has joined us in this capacity, and without any delay, he already translated the Seed List guidelines into Chinese (available online). Patrice has also written a few lines to introduce himself in this issue. We are truly looking forward to working with Patrice, thank you for taking on the role!

We also announced in the last Newsletter that **Elena Ioganson** has taken on administration of the Facebook Group of the International Geraniaceae Group. I am really pleased to say that Elena kindly agreed to write a short summary for each Newsletter, featuring the most liked, most commented, most interesting and most beautiful posts.

This is such a relief indeed, as the amount of exciting information that is being published in the online Group is truly overwhelming and archiving it has been proving to be quite a challenge. I hope that this way, we manage to keep at least a small selection of the posts in a slightly less transient medium.

Which brings me to the topic that I may continue to dwell on for the foreseeable future unfortunately: the IGG would really appreciate any digitally minded members willing to assist with the website. Two items require urgent attention, the website forum and the galleries. Please do let us know if you might have the skills and the will.

Matija Strlic, Chairman and Editor

Self-portrait: IGG Representative East Asia

I started growing *Geraniaceae*, and caudiciforms more generally in 2016. My particular interest is in the genera *Pelargonium* and *Monsonia* due to their exquisite caudices and diversity of forms.

I remember my first pelargonium, *P. curviandrum* and I was so fascinated by how ethereal its hairy leaves with the exposed tuber were. Then I realized how big a genus *Pelargonium* is and I began collecting various species I got interested in and am still collecting. In 2018, I was excited to join the IGG where so many experts and enthusiasts share beautiful photos and knowledge, which I try to learn from as much as possible. I want to say a thank you to Elena, who helped me so much with *Pelargonium* identification. Thanks also to Jan and IGG members running the seed exchange programme, through which I managed to obtain so many of my dream species.

I only got to know recently from Matt that member numbers from East Asia were rapidly increasing. I was happy to see that enthusiasm about *Geraniaceae* has also spread to Taiwan. Many Taiwanese grow them currently but there is also a lot of frustration with the long humid summers and the relatively short growing seasons. We have to make a lot of adjustments to achieve better growth and to see them flower.

As the IGG Representative, I hope to break down the language barrier for those who speak Mandarin and are less familiar with English and I hope that together we enjoy the beautiful *Geraniaceae* that nature has brought to us.

Patrice Hsu, IGG Representative East Asia

Group Forum Report

Since the beginning of the (northern) summer, the activity of the Geraniaceae Group on Facebook has decreased slightly, perhaps this is only of transient nature. In June, about 1,300 members actively participated in the online conversations, and we saw more than 220 posts per month on average. It would be good to see more activity and more posts from the IGG members. These may not necessarily be photos of flowering plants, any post on *Geraniaceae* species will do, as well as questions, suggestions, or other interesting notes.

G. subargenteum, credit: A. Clarke.

P. incarnatum, credit: M. Strlic.

There are always a lot of posts with requests for plant identification. When making such requests, it is useful to add good quality photos of the plant as a whole, of the flower(s) and of the leaves. To recognise a species, it is always useful to take more photos

than we think we need. It was nice to see that with the onset of summer, the number of posts about geraniums increased, which is excellent, there are so many beautiful plants in the genus. Many discussions were triggered by the beautiful photos contributed by **Andrew Clarke**, **Alexander Naumenko**, **Stephen Morley**, and **Elena Ioganson**. This month, the posts with most responses were those of **Matija Strlic** and **Brigitte Stisser** featuring *P. incarnatum* - a beautiful species that is quite difficult to grow.

P. incrassatum, credit: E. Ioganson.

There were many positive reactions on my post featuring *P. incrassatum* in the wild, as well as of several other rare species found in the nature by **Erica Häderli**. Thanks to **Sylvan Janssen** for the post featuring his experience of growing the much-desired *P. boranense,* to **Patrice Barboutie** for *P. luridum,* and *P. tricolor* by **Lorenzo Sparti**. All of these attracted a lot of interest among the Group members.

Elena Ioganson, Geraniaceae Group Forum Administrator

Growing pelargoniums from seed

The wealth of experience that our members have about growing pelargoniums from seed is only matched by the number of queries we obtain on this topic. Growing pelargoniums from seed is hugely rewarding, and it may look challenging at first, especially as it may appear counter-intuitive to sow in the autumn. Yet, many characters only develop fully if plants are grown from seed, such as tuberous roots or caudices. In addition, some species can be propagated using cuttings only with difficulty, either because cuttings of slow-growing succulent plants are difficult to obtain or because they are generally difficult to root, as is the case with campylias. Finally, the only way to appreciate hybrids is of course by sowing the seeds.

What follows is a selection of methods as contributed by a number of reputable growers. The methods vary considerably, not only because different species/sections require slightly different conditions for germination, but also because some pelargonium seeds can be difficult to germinate. We often hear about seeds germinating only after months or even a year, which means that at that particular moment, the conditions necessary for germination were met.

The general rule is to sow winter growing species in the autumn and summer growing ones in the spring, so that they have a long period of growth ahead of them before the first period of rest. Within this general rule, however, there is a lot of opportunity for experimentation and optimisation.

The open sowing method, Patrice Barboutie, Paris, France

First thing to stress is the quality of seeds: at harvest, these should be mature and firm. The simplest method is to sow seeds directly into the substrate, complete with husks and wings. It is only slightly more complicated to take the actual seeds from their husks using a needle. This helps to ascertain the quality of seeds and to reduce the risk of the

husks rotting away while the seedlings are developing. Broken seeds are of no use and should be discarded. The same goes for malformed, soft seeds. When examining the quality, be aware that this is tricky as the seeds easily bounce off hard surfaces. I use a sheet of white paper to see the seeds if dropped, and having good lighting conditions is helpful.

There are several possible ways to treat the seeds, although this is not strictly necessary. The seeds can be scarified using a scalpel or a very fine abrasive paper to open the seed coat and allow the water to enter. Again, it takes a bit of practice to avoid injury and to avoid crushing the seed. For my part, I do not scarify the seeds.

To break the dormancy, I pour hot water on the seeds and leave them to soak for 12 hours in this water, then immerse them in an aqueous smoke extract for 24 hours. After that, the seeds have swollen, and the fastest may already have germinated. I drain them gently before planting.

Seeds are then put into 6- or 8-cm pots depending on their number. The substrate must be freely draining, and consists of 70% seedling substrate and 30% of not too fine sand. The substrate must remain moist. The seeds are put on a 1-mm layer of sand, planted about 2 cm apart in all directions and covered with the same sand. The pots are placed in a light place at 20 °C. The germination takes from 3–4 days to about 2–3 weeks. The best time to sow summer-growing pelargoniums is from February to May when the days are getting longer.

The winter-growing species in sections *Ligularia* and *Cortusina* and the *Hoarea* and *Polyactium* geophytes, I sow at the end of summer, sticking to their natural cycle. At this time of year, the days are warmer, the nights are cooler and the humidity in the air increases. This variation in temperature between day and night promotes germination. Sowing at this time of year brings many benefits:

- The plants grow quickly and can develop good sized tubers that can easily withstand the summer rest period

- The temperature and light at the end of summer are just right to sow without the help of any additional heating or artificial lighting.

The seedling pots are placed in a mini outdoor greenhouse on my balcony sheltered from direct sun. The mini greenhouse is open at night to maximize the temperature change, and I close it in the morning. The fastest seeds germinate in 3–8 days and the slower ones take up to three weeks.

Until the seedlings are well developed, I avoid manipulating them as much as possible. I prefer to repot them directly into a larger pot for adult plants to avoid the stress of transplanting.

The cold enclosure method, Valerio Ceccarelli, Frascati, Italy

I did not use to sow for many years, but I have recently experimented with various techniques and obtained increasingly satisfactory results. My current best practice works well for all the plants that I am interested in, from cacti to South African bulbous plants, and obviously Geraniaceae as well.

I now mainly use the enclosure method, i.e. where the pot with seeds is either enclosed in a bag or otherwise covered after sowing. I use semi-transparent rigid plastic storage boxes. I sow seeds into individual boxes, i.e. one taxon per pot, using a very simple mix of fine pumice and peaty topsoil, stripped of all non-decomposed parts, in a 50/50 proportion. I also tested substrates that I normally use for adult plants, by mixing natural volcanic soil (collected in my field) and sandy quartz soil, and obtained good results but with more compact seedling growth than when the standard compost is used.

Nothing is removed from the seeds, I sow with the husk intact, and leave the curled tail attached. The larger seeds I place on the soil with the fingers and for the smaller ones, I use surgical tweezers. The seeds are not pushed into the soil too deeply, and I do not pre-treat them in

any way, e.g. by soaking in water or in chemicals. I do not use any pesticide, except for adhesive strips to catch sciarids and whiteflies.

In the past, I used to use aquarium gravel as the last layer, but nowadays I prefer small-sized pumice, to help the seedlings grow upright. I then mist the seeds in order to wet the tails and enable the seeds to drill themselves into the substrate.

Finally, I fill the box with a diluted fertilizer solution (50% nominal concentration) using rainwater, to about 2 cm, and close the lid. I find that high humidity favours the germination process, and that this is even more necessary if the seeds are not very fresh. Previously I kept the box closed for longer but, especially with sarcocaulons, stale humidity can be harmful. There is some risk of mould development and to avoid this,

I start to gradually open the lid after approx. 20 days, and then remove it completely. I shade the small seedlings at least for the first two months. Finally, I repeat fertilization three months after germination.

I do not put much weight to temperature because I usually sow in specific periods of the year that suit particular plant groups best. The spring species are sown in April, when in Frascati (Italy), we typically have about 20 °C maximum daily temperature and 9/10 °C minimum night temperature. I use somewhat higher temperatures for the Malagasy and equatorial species (such as *P. quinquelobatum*).

The winter-growing species are sown in late September and since all my plants are kept outside, including the most delicate species, the night temperatures may drop to as low as -4/-5 °C for a few days.

Sowing the sub-tropical *P. boranense*, Michel Bourhis, Crozon, France

I should say at the very beginning that as far as pelargoniums are concerned, I am not a specialist. For about the past thirty years, I have been fascinated by succulents, in particular those with caudices and euphorbias generally. By chance, four or five years ago, a collector friend of mine introduced me to caudiciform pelargoniums (e.g. *P. cotyledonis*) and in particular *P. boranense* which he could not manage to keep. He gave me a specimen, which turned out to be straightforward for me to grow and reproduce, and I recently donated a hundred seeds for the next IGG Seed List!

The practice of growing pelargoniums that I follow is very simple. I have been fond of all-mineral substrates (pumice, chabazite-type zeolite, pozzolano etc.) for about 15 years. I sow the seeds of all the plants that I grow into very fine chabasite (0.7–2 mm) and do the same with *P. boranense*. I keep the tails of the seeds and I plant them vertically in the substrate that I constantly keep moist. I try to keep the pots at about 18 – 25 °C and do nothing else. Germination is random,

from a few days to a few weeks, even for seeds produced by the same flower! I water the young seedlings throughout the summer.

I use no seed pre-treatment, no pesticide. In about June, I start repotting them into deeper pots and this year, I added about 20% of potting substrate. I keep several plants in order to be able to donate seeds.

The pre-germination method, Jan Movitz, Uppsala, Sweden

I have been growing pelargoniums for 20 years, most of them from seed. The majority of my plants are winter growers from the Western Cape. Growing such taxa is quite a challenge in Northern Europe at 60º N latitude. From November to February, we experience extremely weak winter sun. Extra artificial illumination is necessary and in my greenhouse I have three LED rigs making it possible to provide artificial lighting only for 250 7 x 7-cm pots. Therefore I can only focus on growing small plants such as hoareas and other small species within other sections of the genus. Of course, I also grow other pelargoniums but without extra artificial light.

Late autumn to early winter (October-December in the Northern hemisphere) is the best time to attempt germination of winter growing pelargoniums. Perhaps summer growing species germinate better during the summer, although in my experience, they can be germinated similarly to winter growers.

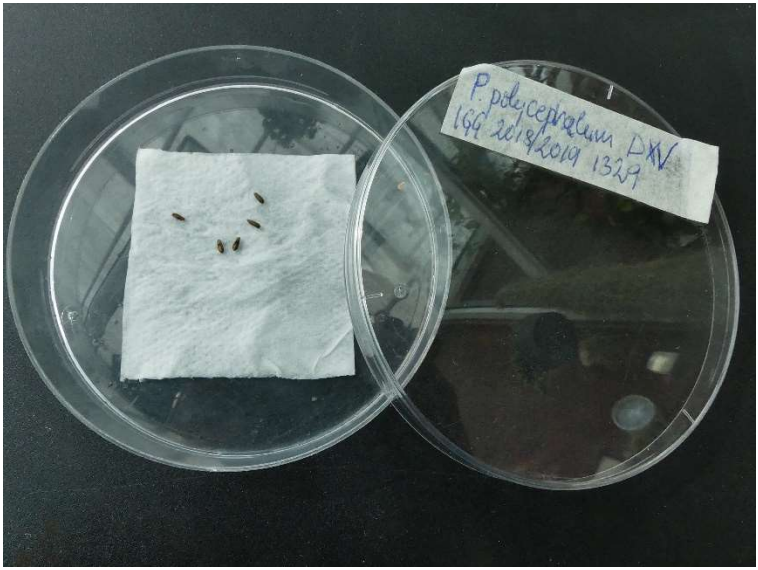
There are many procedures that can be used to germinate pelargonium seeds, e.g. in soil with or without the husk, or treatment with hot water. For the last 15 years I have been practising the so-called petri dish method. There are several advantages of this method: full control of the germination process, which is good if one has only very few seeds. If one seed is infected by mould or bacteria, it can easily be removed before the other seeds become infected. Moreover, germination is rapid and takes place in 1 – 14 days. This method also works for monsonias, including sarcocaulons:

1. Remove the wing and the husk from the dry seeds with pointed tweezers. Below: seeds with and without wings, and without husks.

2. Cut off a part of the seed coat using a sharp scalpel. Cut off 0.2 – 0.6 mm depending on the size of the seed.

Be sure to cut off the pointed part of the seeds, as the rounded end contains the embryo. This is a little tricky since the seeds easily scatter around. I use a wetted finger to hold on to the seed while cutting it.

3. Place the seeds in a glass or a plastic petri dish on a piece of wetted paper tissue. I use disposable plastic petri dishes, which I clean afterwards and recycle.



4. Place the petri dish at 15 – 18 ºC in a light position but not in direct sunlight. Keep the paper tissue moist but not soaking wet.

5. Some species germinate after 24 h, others need longer. Hoareas normally germinate after 1-2 weeks. When the roots grow to 4 – 15 mm, plant the seeds into a pot. The root is placed into the soil surface with the seed above it, regardless of whether the leaves have started to develop or not. The pots are watered and placed in an incubator under artificial light. The photo below shows three seeds ready for planting on, on a piece of black tissue to improve visibility.

I use a substrate consisting of equal parts of ordinary potting sbstrate and coarse sand (0 – 8 mm). It is important that the drainage is good so the roots can easily grow without rotting. Instead of coarse sand I sometimes use fine pumice.

The hot scarification method, Veronica Olsson, Uppsala, Sweden

I usually start the process of germination in mid-October in order to get small plants by early spring. I put the entire seeds, 3 – 5 per species, in small, 15 – 20-ml plastic cups. I then fill the cups with hot water that I pour directly from my tap, about 50 ^{o}C. After one to two days, I discard the water.

In this process, the husk becomes softer, which makes it easier to press the seed out. Depending of the section, I put 3 – 5 seeds in a small pot with porous, slightly moist soil and cover the seeds with 1 – 2 mm of the substrate. The pots are then left in a warm place, 22 – 23 ^{o}C, and kept moist until the cotyledons are visible. Thereafter it is time to put the pots in a cooler and lighter place.

In my experience, most of the seeds germinate within 1 – 3 weeks, seeds from sections *Peristera* and *Reniformia* germinate quickly and so do *Hoarea* seeds, even if only a few germinate at the same time. The seeds of section *Pelargonium* germinate very slowly, which is why I water the pots with 50 – 100 ml of boiling water after just a few days, with very good results.

Summary

A few strategies appear to be quite successful for all. Firstly, it seems that the seeds either need time to soak up water or a germination inhibitor needs to be washed out, which is why a period of high humidity, e.g. in an enclosed environment or in a petri dish appears to be quite a successful strategy. Scarification methods using hot water or cutting the seed coat may also help.

Secondly, diurnal temperature variation seems to be important particularly for winter growers, while summer growers seem to be less particular. Success can be achieved by sowing early at the start of the growing period giving the young plants a long first season, but we have seen that this is not strictly necessary.

It is encouraging that none of experts uses pesticides even in this early and tender period. Removal of seed coats and husks may be advisable so these do not rot, but this appears to be all that is really necessary.

What is absolutely important though is to check the quality of seeds – these need to be firm and round, as good seeds are the guarantee for high quality plants.

Matija Strlic, Ljubljana, Slovenia

On *Pelargonium* cultivation practices

One of the most often asked questions concerned with pelargonium cultivation is related to their growth period. Most species seem to require a period of rest, but it is sometimes difficult to determine whether this should be the summer or the winter. Some species strictly observe their natural annual rhythm, some can be tricked into growing during the summer even if naturally they mostly occur in regions with winter rainfall. Many of us have learned through trial and error, and in many cases the decision depends on many parameters, most often the natural climate and availability of light. In this article, we look at the diversity of cultivation methods as used by 18 successful growers who responded to a survey distributed in June 2020.

Climate aspects

The geographical distribution of respondents (Fig. 1) is reflected in the wide range of their responses. The majority (11 responses) came from regions with fairly harsh winters where pelargoniums cannot normally be grown outdoors, therefore, collections need to be kept in greenhouses or on windowsills, and in one case, in an entirely enclosed space with artificial lighting. All of these growers always water by hand, meaning that the period of growth can be controlled by watering.

Several responses (5) came from regions with Mediterranean climate, meaning that plants can often be grown outdoors or in somewhat sheltered conditions throughout the year, and may receive natural rain in the winter. Plants are often left exposed to freezing temperatures, though only for a short while. These fortunate growers leave the plants to be watered by natural irrigation, though this is often complemented by manual watering.

Two responses came from Taipei with sub-tropical climate, where plants are grown at min 8-10 ºC in the winter but may be exposed to humid heat in the summer.

Fig. 1: Geographical distribution of respondents: Los Angeles and San Jose (USA), Barcelona (Spain), Rome (Italy) and Athens (Greece) enjoy Mediterranean-type climates with winter rain and usual minimum winter temperatures of around freezing, Taipei has sub-tropical climate with mild winters and humid hot summers, the rest are in regions with harsher winters that normally require plants to be grown indoors during the winter.

The period of the year when plants are at rest is very important to most growers, although one of the respondents keeps plants at minimum winter temperatures of 16 – 17 ºC and waters them throughout the year with no fixed period of rest. This is certainly a very interesting method though it appears to be quite exceptional compared to the rest.

Certainly, in nature, all plants normally experience a dry and a wet period, even those found outside the main area of distribution, which is South Africa and Namibia. No pelargoniums are naturally found in tropical climates with constant growing conditions and although some may be found in very mild climates, e.g. Madagascar or the Soqotra archipelago, they still experience a dry and a rainy season. This normally stretches from early spring to late autumn, though in some regions, e.g. in Ethiopia, there are two distinct rainy seasons, spring and autumn, with dry summers and winters. The problem is that in South Africa and Namibia, where the vast majority of species occur naturally, the rainy season (and thus the period of growth) can be either winter or summer (Fig. 2).

Winter or summer irrigation?

Plants growing exclusively in the winter-rainfall regions are normally winter-growers regardless of where we grow them. These are most geophytes from the section *Hoarea* and many from *Polyactium*, but also many shrubby species from sections *Cortusina, Otidia, Jenkinsonia* etc. Knowing the natural climate is thus the first important step as this often determines which species are likely going to like water in the winter and which will prefer it in the summer. If conditions can be ensured with ample winter sun and sufficient warmth to keep the plants above freezing, then the best first step is to assume that most of the species naturally occurring in the Western Cape Province, Namaqualand and S Namibia up to Aus, should be cultivated as winter-growers.

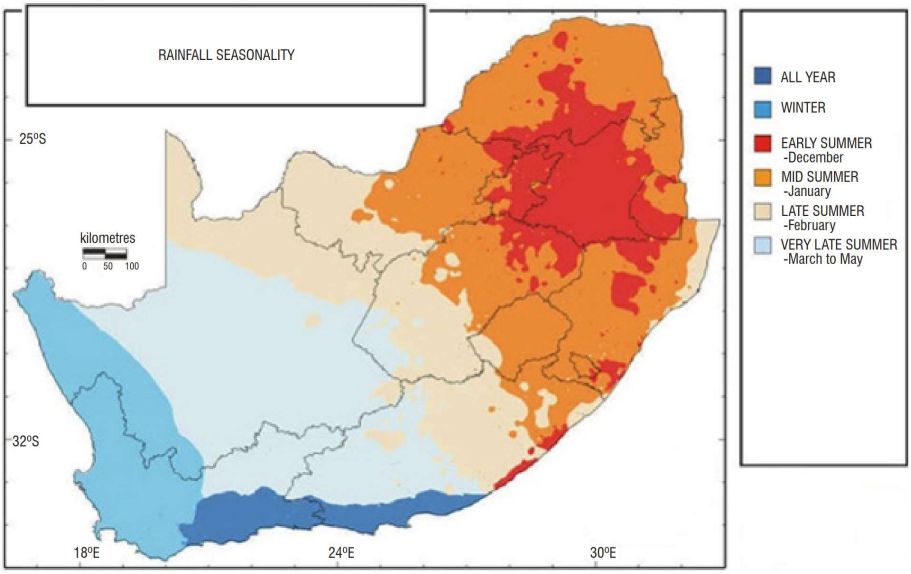


Fig. 2: Rainfall regions in South Africa. ©C.M. Botai, J.O. Botai, A.M. Adeola (2018), CC-BY [1].

The difficulties arise from the fact that many species are found in areas where rain can fall in any period of the year, or may be distributed in

areas with winter-rainfall only as well as in areas with rainfall at any time of year (e.g. *P. parviflorum*, *P. xerophyton* etc.), and these tend to be opportunistic and can be switched from winter to summer growth. This is beneficial as in many temperate climates summers are associated with long hours of sunlight which results in healthier growth.

The other important parameter is the amount of water, of course. However, this tends to depend on so many parameters such as substrate type, type and size of the container, heat or plant age, that it is difficult to give even general guidance. Few pelargoniums grow in seasonally wet conditions (though some do, from large shrubby section *Pelargonium* species to small *Hoarea* geophytes) and thus tolerate copious amounts of water. Most need a moist but not a wet substrate to grow. Since many species have quite deep roots, some growers exclusively water from below thus potentially reducing the risk of loss. The other option is to plant the tip of the tuber slightly above topsoil level, however, this may not be advisable in climates with very hot and sunny summers as the growth tip can get scorched.

Many pelargoniums grow in seasonally dry conditions, of course. The dry season (whether summer or winter) is normally the period of rest. Many pelargoniums can withstand long periods of dryness and have developed various strategies to cope with drought, either tubers or very deep root systems to wedge themselves in rock crevices to access what little moisture remains there. In cultivation, this would need to translate to deep pots, which is not particularly practical, however, we also rarely leave our plants entirely dry for months or years at a time. Geophytes and stem succulents seem to be most resistant to drought, although after a few years of drought, hoarea tubers tend to dry up in nature.

Winter conditions in cultivation

Few areas where pelargoniums are naturally found experience long periods of cold and even snow cover. *P. endlicherianum* from central

Turkey is one such species, requiring a very porous substrate to withstand water during sub-zero winters. No large species grow in the high Drakensberg mountains, though many do at their foothills and may occasionally get winter snow, as do the species from the Roggeveld plateau around Sutherland or those in the high mountains of the Western Cape Province. However, such snowfall is usually not persistent and many of these species are tuberous so that even if the leaves freeze through, the plant survives.

In cultivation, the reported minimum winter temperatures are as low as -5 ºC, which is consistent with the above. However, persistent temperatures below freezing over a couple of days will eventually kill most pelargoniums, especially when wet. It is worth remembering that even on a cold south African winter day, as soon as the sun rises, the temperature increases rapidly. In the central Karoo with winter morning temperatures down to -10 ºC, the days can be pleasant at 25 ºC or more. For species such as *P. sidoides*, *P. tragacanthoides, P. ionidiflorum* or *P. aridum*, these would be quite usual daily extremes.

However, there is a problem with such low temperatures in greenhouses where there is insufficient natural sunlight during shorter winter days. If a greenhouse does not heat up during the daytime for several days in a row, then the resulting high humidity eventually causes mould to develop. This can be devastating and may lead to rapid loss of many plants. There are two ways out of this: either the temperature should be a kept a bit higher, or watering should be withheld during those months.

At the other end of the scale, some growers keep their plants quite warm during the winter, either because of the general climate (e.g. in subtropical Taipei) or because the plants are kept in an otherwise heated indoor space. It would thus seem that pelargoniums tolerate a wide range of winter temperatures, though given that the majority keep their plants between 0-10 ºC minimum temperature, this could be taken as good practice. We have explored elsewhere how winter temperatures affect the onset of flowering in hoareas [2], meaning that the minimum

winter temperature is a parameter that seems to trigger important mechanisms in the annual cycle of a plant.

On the other hand, if growing pelargoniums from warmer climates, e.g. *P. boranense, P. quinquelobatum* or *P. cotyledonis*, it would be advisable to keep the temperatures at the upper end of the minimum temperature interval suggested above. Most of the warmer-climate species are summer growers and do not require much water during wintertime and may thus tolerate occasional drops in temperature if dry.

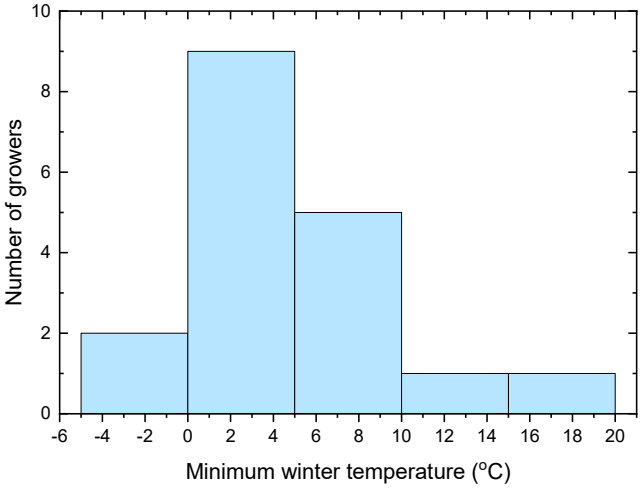


Fig. 3: Minimum winter temperatures experienced by pelargonium collections as grown by the respondents. It is worth noting that the lower values are often experienced for only brief periods of time in the early morning.

Sunlight and artificial illumination

An often-encountered problem in cultivation is lack of winter sun. Especially in very harsh climates, collections are sometimes overwintered in warm indoor spaces that are almost exclusively artificially illuminated – this is of course extremely important for the winter-growing species but may be beneficial even for plants that are resting as some may retain leaves and thus a low level of

photosynthesis. About a third of growers (Fig. 4) use artificial lighting to help their winter growers get through the darker winter months.

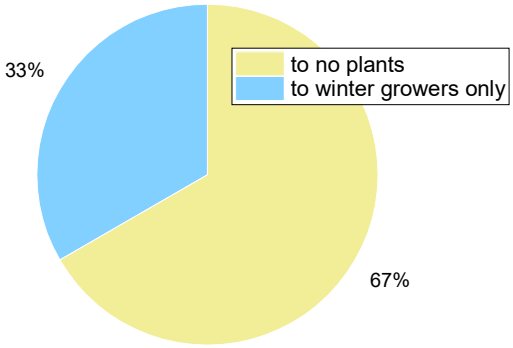


Fig. 4: Proportion of growers using artificial lighting for winter-growers.

What is certain is that without sufficient sunlight, most growth will become etiolated. This is a particular problem with succulent species where cultivated plants sometimes barely resemble those in the wild [3]. However, can there be too much sunlight?

Fig. 5: Red leaf margins (left) as a consequence of light (possibly heat) stress on *P. cucullatum* ssp. *strigifolium*. On the right: the same plant at the side of the bush less exposed to direct sun and probably experiencing the same temperatures.

Red colouration on leaf margins is often desirable, although it is rarely consistently observed in all specimens of a taxon [Fig. 5]. It was used as

a character to separate *P. laxum* ssp. *karooicum* from ssp. *laxum,* but we now know that even in ssp. *karooicum*, it is a transient feature and related to heat/light stress [3]. Stressed plants are often seen as more aesthetically pleasing as they resemble naturally grown specimens more closely, although they may flower less abundantly.

In nature, many species grow on southern slopes that are less exposed to sun, and many grow in the shade of other plants. Some get shade during the period of rest when grasses take over the veld, so for many small species it wouldn't be advisable to expose them to long period of heat during the period of rest, especially if grown in small pots.

Adult plants are much more forgiving, and the succulent, shrubby otidias and cortusinas may withstand blistering heat without water for a couple of months. Many growers will say that it is not a bad idea to leave summer-growers outdoors during a continental or a sub-tropical summer, exposed to natural rain and sun, while in Mediterranean summers they may need some extra water.

Cultivation practices compared

Given the range of natural conditions in which pelargoniums thrive, it is no surprise that there is no single piece of advice that works for everyone. In our survey, we looked at the more commonly grown species in order to obtain comparative data, and we obtained multiple responses for all the taxa in Fig. 6. Each bar consists of a number of responses although the total is always 100% of growers who cultivate the taxon in question. Their actual number is also evident from the plot. There is a slight possibility for a taxon to be misidentified, however, the larger the number of growers per bar, the more reliable the advice.

Geophytes: sections *Hoarea* and *Polyactium*

The vast majority of hoareas are distributed in winter and some in year-round rainfall regions. Only one is included in Fig. 6 (*P. longifolium*)

and this is invariably treated as a winter grower. It is possible that some hoareas can do well if watered at other times of year, depending on how hot the summers get, especially since some species, such as *P. aestivale* or *P. campestre* extend well into Eastern Cape Province. It is normally the case that hoareas flower during the period of apparent rest though if watering is continued during springtime it is possible that flowers appear on plants still with green leaves even if this is rarely the case in nature. Also, elevated temperatures during the period of winter growth are known to speed up the appearance of flowers [2], therefore, these may no longer be comparable to when plants normally flower in nature.

Geophytic polyactiums, on the other hand, can be switched from winter to summer growth, as exemplified by *P. triste* and *P. lobatum* in Fig. 6, although more than 90% or growers treat them as winter growers, which would be in line with their distribution in nature. On the other hand, many geophytic polyactiums are either naturally summer growers, e.g. *P. luridum* or *P. schlechteri*, or occur in areas with mixed rainfall, e.g. *P. schizopetalum* or *P. caffrum*, so can be grown in either period of the year, as is the case with *P. luridum*, which the surveyed growers treat as winter or as summer growing almost to equal extents.

Stem succulents: sections *Otidia* and *Cortusina*

Most of these species are distributed in winter-rainfall regions and would be normally expected to behave as winter growers. However, some extend into regions of year-round rainfall, e.g. *P. parviflorum*, *P. alternans*, *P. carnosum* and *P. laxum* ssp. *karooicum*, and some also occur in summer rainfall regions, e.g. *P. laxum* ssp. *laxum.* It is not a surprise that the latter is grown as a summer grower by a small majority of growers, therefore, and that the rest are grown mostly as winter growers, though not exclusively. It can be assumed that *P. echinatum* or *xerophyton* behave similarly given that both have similarly broad distributions in nature and especially the latter extends well into Bushmanland. The coastal cortusinas are discussed below.

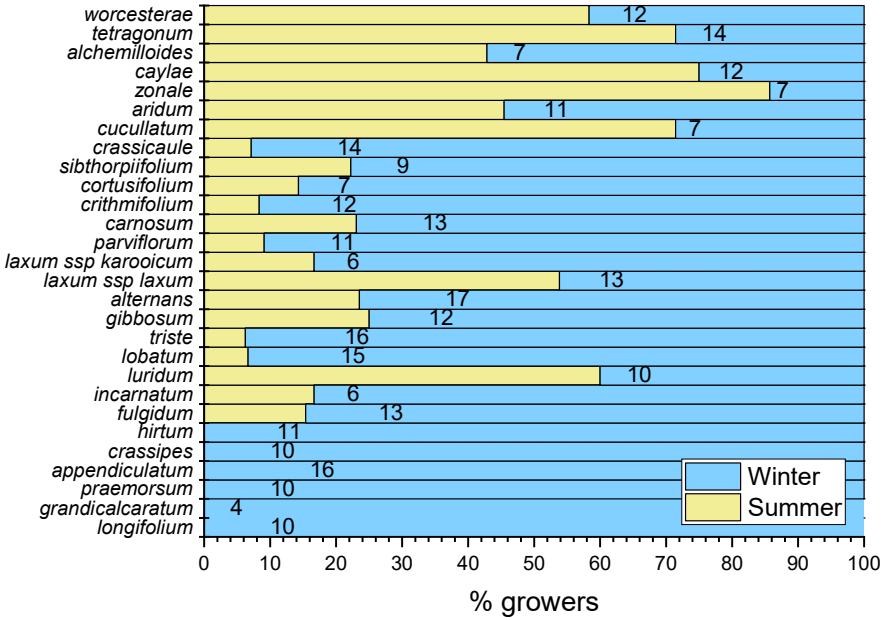


Fig. 6: A comparison of cultivation practices of 18 growers of species pelargoniums. "Winter" indicates that plants are watered mostly during wintertime, and "Summer" during summertime. The number of growers cultivating a taxon is indicated by the labels.

Shrubby pelargoniums from the Richtersveld and Namaqualand

These two regions are almost exclusively winter-rainfall regions although the extreme east of Namaqualand is in the transition zone already. In addition, natural rainfall is very scant. The shrubby species that are confined to these two regions and do not extend elsewhere, such as *P. praemorsum* or *grandicalcaratum* are considered as winter growers by all (Fig. 6).

Shrubby pelargoniums from coastal and fynbos regions

Species that grow close to the coast in the winter-rainfall region behave very interestingly. It could be hypothesized that this is due to the fact that in coastal areas fogs can help plants thrive during times of the year

when rain is less frequent. It is not unusual, therefore, that species such as *P. gibbosum* or *P. fulgidum* appear to be successfully grown as summer rainfall species by some.

Similarly, some cortusinas that are found exclusively in coastal zones, such as *P. sibthorpiifolium, cortusifolium* or *crassicaule* (or *mirabile*/*mirandus*), can be successfully grown during summers, although not so by growers with hot Mediterranean summers but mostly in temperate and sub-tropical climates.

Interestingly, shrubby plants from the Western Cape behave very differently. All inland ligularias (i.e. with the exception of *P. fulgidum*, which is an almost exclusively coastal species), seem to be treated as winter growers, as exemplified by *P. crassipes, hirtum* and *appendiculatum*. Campylias are species often found in the high mountains of the Western Cape, areas with higher rainfall. It seems that this enables them to occasionally switch the period of growth: *P. incarnatum* can be grown in the summer (though again this may not be successful in a hot Mediterranean summer).

The large plants from sections *Pelargonium* and *Cicconium* appear to be more flexible: in nature, *P. cucullatum* is exclusively found in winter-rainfall areas, yet it is successfully grown as a summer grower by most (Fig. 6). Many of these species grow in moist, shaded situations, which perhaps makes them more adaptable to cooler, temperate summers. Also, many taxa straddle the transition zone between winter and year-round rainfall regions, which makes them additionally adaptable.

Year-round and summer rainfall species

These are probably the easiest to decide on (if not grown), and species such as *P. worcesterae, alchemilloides, zonale, aridum*, *tetragonum* or the Malagasy *P. caylae* are mostly grown as summer-growers. Pelargoniums from regions along the Great Rift Valley, such as *P.*

boranense, quinquelobatum or *christophoranum*, while summer-growing, may need higher temperatures to overwinter well, e.g. 15 ºC.

Conclusions

General conclusions are difficult as cultivation success depends on more parameters than heat, light and water. However, it is possible to see patterns in how plants that naturally occur in areas that exclusively receive winter rainfall find it difficult to switch the growing season while those that occur in coastal areas or areas in year-round rainfall are more forgiving. However, this also depends on the nature of the summer climate where the plants are cultivated: switching a winter grower to a summer growing plant appears to be less successful in hot and dry summers than in more temperate, humid summers.

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Calendar for 2020

No meetings planned.

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Publication dates and deadlines

The International Geraniaceae Group Newsletter is normally published on the first day of each quarter i.e. 1st January, 1st April, 1st July, 1st October. However, the timeline is changing due to the planned publication of the *Geraniaceae Journal.*

Suggestions for articles are welcomed by the Editor at any time. The deadline for agreeing articles or news items for a particular issue is six weeks before the mailing date given above.

While material provided is generally used in the next Group Newsletter, the Editor reserves the right to decide the timing of its use. The Editor also reserves the right to judge both the suitability and content of all material submitted for publication.

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