Passiflora

ONLINE JOURNAL

ISSUE NO. 5 | DECEMBER 2014

sub sole sub umbra virens

THIS MONTH'S ISSUE Passiflora punctata. The ghost of Constance Eliott. A trip to Colombia. Growing Tacsonia in Italy. Passion flowers from Argentina and more.

Letter From the Editor

In the Northern Hemisphere, spring is not far away. As daily low temps rise, daylight hours increase, and nurseries are stocked with this year's crop of plants, it's tempting to purchase any *Passiflora* species or hybrid that we don't yet have on sight. It's in our nature as enthusiasts and collectors to acquire and admire the many beautiful and unique varieties of the genus *Passiflora*. But, there is a pitfall that we should all strive to avoid. That is becoming a hoarder without regard for health and longevity or market demand.

Few Northern Hemisphere enthusiasts live in regions where the conditions year round mimic the environment of the endemic populations of *Passiflora* species. True, these factors need not be exact duplicates for most species to thrive, but some do prohibit continued success after the spring has passed. For instance, many subgenus *Tacsonia* species favour what is generally considered "cool" summer weather with moderate to high humidity. During the spring these conditions are met widely around the globe; however, summers in some regions become uncomfortable for humans; let alone some of the more fragile members of this subgroup. Conversely, when winter arrives, deep freezes and light frosts alike can claim many species, which are simply not adapted for these elements having evolved in locations that may never see a single ice crystal. "Zone pushing" is a practice which sets horticultural skill against nature. While this practice helps to establish both personal and regional limitations, the extreme of this is irresponsible collecting, which essentially sentences a given plant to an early demise.

These issues do not make the species and hybrids of the genus *Passiflora* any less desirable. In fact, it can make them more so. But, it's critical not to mistake lack of distribution for "rare".

"Rare" is a word that is too often stamped on to online plant auctions and misinformed websites to garner attention and ask high prices. Simply because a plant is not frequently grown in a particular locale, does not make it rare. And, as aforementioned, there may be very good reason for the infrequent availability of the particular species or hybrid. A rare species is one which is endangered or threatened; one which the planet Earth risks losing forever. These species deserve our attention, but again, do not warrant inclusion into collections where they simply cannot exist for environmental reasons (except when artificial greenhouse protection is an option.) Doing so, only hastens extinction.

The Passiflora Online Journal is an advocate of education and knowledge regarding all things *Passiflora*. Learn your limits, which are by no means a reflection of the greenness of your thumb, but instead an inexorable trait of your climate and a particular plant's evolution. Share your collection with others and propagate truly rare species into the hands of caretakers who are fortunate enough to live in regions that can sustain healthy growth perennially. Through them you will have completed your part in rescuing gems of the *Passiflora* world from the cusp of extermination. The knowledge that you've saved a plant indefinitely should be more valuable than owning one for just one quarter of a year.

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ISSUE 5 DECEMBER 2014

ISSN 2046-8180

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Front Cover: *Passiflora vitifolia with Aratinga solstitialis* 2014 © Darren Osgood

Back Cover: *Passiflora trifoliata*, near Base camp Alpamayo (5747m) at 4150m Cordillera Blanca, Peru © Marijn van den Brink

We invite submissions from all *Passiflora* enthusiasts, from cartoons, garden tales, recipes and growing tips to articles about new species and hybrids and reports of wild collecting trips. Please contact the editor as above. Articles in any language are welcome but will be translated and published in English only for reasons of space.

We reserve the right to edit or refuse articles and ask contributors to note that we may be able to offer scientific peer review depending on the topic. Please note that contributors are not paid. Letters to the editor for publication are also welcome.

Note that new species should first be submitted to the appropriate scientific botanical journals so that the validity of the name is established, after which time we may carry an article about them. If you wish to formally register a hybrid, which is optional, you should apply to the Passiflora Cultivar Registrar who, if your application is accepted, will publish your hybrid in the Passiflora Society International Journal & Newsletter.

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Publisher's address:
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Contents Issue 5

P. 'Party Animal'

P. 'Crimson Tears'

How to keep Tacsonia alive in Trieste

By Bruno Gasparini

P. tarminiana

The flowers of Supersection *Tacsonia* are among the most beautiful of the *Passiflora* genus. the colours range from pink to red to orange with some white varieties existing as well. The dimensions of the flower may extend to 15 cm in length and 18 cm in width. Many, such as *P. sanctae-barbara*e from Equador, are not under cultivation. *P. parritae* is apparently extinct in nature, but fortunately cultivated, where it thrives and blooms beautifully at Strybing Arboretum in San Franciso California. Other outstanding *Tacsonia* not easily found in cultivation are *P. amazonica*, *P. anostomosans*, *P. coactili* (which is very much sought after), *P. insignis*, and *P. jamesonii*.

These plants come from the Andes, mainly between the heights of 1500-3500 meters in Colombia, Equador and also some in Peru.

According to experts, their cultivation is difficult at latitudes outside their origin as they cannot tolerate temperatures higher than 30°C. Yet I found *P. tarminiana** growing wild in Tasmania, often erroneously named *P. tripartita var mollissima*, where summer temperature certainly exceed 30°C, and it is infesting Hawaii and New Zealand as well Therefore there must be a different explanation.

I believe that what matters more than the day temperature, is the day to night difference. At the altitude where *Tacsonia* generally live, the daily maximum temperature may be quite high, especially if exposed to the sun; however minimum temperatures at night drop to levels approaching freezing point. How does one achieve these conditions in cultivation?

My experience: The first task with all *Passiflora* is to get them to survive. Apart from a few, such as *P. caerulea, P. incarnata*, and some of their hybrids, a lovely and apparently healthy plant full of buds can suddenly collapse with no way to revive it. There often does not seem to be a reason for such a sudden death! For the majority, back up cuttings are the answer. But with *Tacsonia* this can be very troublesome, as many are very difficult to root!

My first experience with this supersection occurred in the late seventies. At the time, I had a greenhouse full of orchids. I happened to purchase seeds from Thompson & Morgan, who sold the seeds as *Passiflora mollissima*, and one plant came up. It was planted in the ground of the hot greenhouse along with Vandas, *Cymbidium*, and many other tropical species. This *Passiflora* thrived beautifully, reached about 4 meters, bloomed, and bore fruit; the nuisance was a severe attack by red spider mites, which turned the leaves red. The greenhouse was heated and watered automatically. The mere presence of the red spider suggests that conditions were rather dry, yet the plant lived until we closed down. However, *P. tarminiana* was recognized only in 2001 and, as the two species are quite similar, it is possible that I grew *P. tarminiana*.

I never thought of *Passiflora* again until a few years ago. As before, I tried *P. tripartita var. mollissima*, but this time it was a disappointment. Plants from seed and adults purchased in the UK all died. One did manage to reach over three metres in length. It was planted in a 25 cm pot and kept in a container where some bottles of ice were turned upside down every day to keep the roots cold. All was well, until the Bora came and lasted six days. The Bora is a typical wind in our town, which is very strong from the east-northeast. The plant collapsed in the gusts.

The next year I tried again and also bought some plants from Torsten Ulmer. I set up a misting system above them, but unfortunately the soil became waterlogged and I lost nearly all of them. Try again, Joe! I purchased some more plants and set them in a large container (1 m x 30 cm x 30 cm) with a misting system, which I am currently using. The plants grew beautifully. However, 2009 was a very cold winter, and despite having insulated them, they all died.

More plants were purchased in 2010 (someone may suggest that I am a little stubborn). This time I used three containers, and a cable inserted in the ground assured that roots would not freeze. Outside I renewed the insulating protections, and this time all plants survived through the winter. They have also now survived the summer.

When the temperature really starts to build, sometimes by the end of May, a pipe suspended above the plants

provided with very fine nozzles is regulated by a timer to generate a mist twice in the night and four times during the day. The duration of each misting changes according to the temperature forecast. Furthermore, a 16 mm black pipe used for drip watering is wound five times inside a large container.

When the night temperature is forecasted to go over 20°C, every night the container is filled with bottles which are kept in the freezer for one day, which is meant to increase the cooling effect of the mist. This year I intend improving the misting system, by using an electric timer with 20 programs commanding a hydraulic electronic valve. In this way, the misting will be effective 20 times in 24 hours.

A cotton sheet is kept over the plants. This has a dual effect: it shields the plants from the heat, and by being watered periodically prevents the soil from being saturated and soggy; another thing *Passiflora* loathe! The compost is a 50/50 mixture of coarse loam and perlite. When I saw

P. tarminiana growing wild in Tasmania, I noted that in the gardens there is an abundance of Rhododendrons, Azaleas and Camellias; hence the soil must be acidic. One can make soil more acidic either adding coarse peat or chemicals such as sulfur or iron sulfate.

During the hot months, only some plants grow well, but when the night temperatures drop to 15°C or less, and day temperatures do not exceed 25°C, which is about mid

September, then the plants grow quickly until the end of November. Then the vines are pulled down and covered with insulating matter. I use three large plastic bags filled with the bubble wrap that is used for packaging. This leaves enough light to keep the plants protected until mid March when heavy frost is no longer expected.

At the moment the *Tacsonia* in my collection are:

P. antioquensis
P. 'Coral glow'
P. 'Coral sea'
P. 'Divertido'
P. 'Ex Menton'
P. x exoniensis
P. 'Fantasma'
P. 'Golden glow'
P. 'Hetty Nicholas'

P. manicata
P. 'Mission Dolores'
P. mixta "red"
P. 'Pinky'
P. pinnastipula
P. cuatrecasasii
P. Sp. Columbian *Tacsonia*
P. Sp. Equador
P. 'Strybing Pink'
P. tarminiana
P. tripartita var mollissima
P. tripartita var.azuensis
P. 'Wilgen K. Verhoeff'
P. 'Wilgen R. Robertson'

Bruno Gasparini is aged 76; born in Venice, Italy living

in Trieste; passionate lover of nature and particularly of orchids and mushrooms. Some of his articles written on mycology are inserted in the IPNI and Index Fungorum. He has recently become a lover of *Passiflora*.

*Editor's note: The original text suggested that this was *Passiflora tripartita var. mollissima* based on a census of the vascular plants of Tasmania issued by the Tasmanian

P. tarminiana

Herbarium in 1999. However, it is more likely to be *P. tarminiana* which at the time was not separated.

See *Passiflora tarminiana*, a new cultivated species of Passiflora subgenus Tacsonia Coppens d'Eeckenbrugge, G.; Barney, V.E.; Jørgensen, P.M.; MacDougal, J.M. (2001). Novon (Novon, Vol. 11, No. 1) 11 (1): 8–15.

P. tarminiana

P. manicata © 2007 Anne Norman

P. tarminiana

‘A silent dance in Colombia’

By Neil Gale

The old road to Cali

It was raining cats and dogs as I ran for cover in the Bogota Botanic Gardens. In the bandstand, there were three women gardeners practising their dancing, albeit without any music. Before I knew it, they had invited me to join them and a silent dance was my welcome to Colombia.

I had long wanted to visit Colombia and I had the chance in the Spring of 2010 of a three week trip. The *Passiflora* genus reaches its highest diversity here with current counts at 167 species out of nearly 600 in total. The plan was to visit the Pacific coast forests looking for plants and butterflies with *Passiflora* high up on the agenda. This would take me into the fabled Chocó forests, among the wettest rain forests in the world. A friend in Cali Zoo had suggested that I take the old road from Cali down to the coast. My taxi driver from the airport, with the very un-Spanish sounding name of John, agreed to take me the following day.

We made an early start driving up into the mountain mists at about 2000m, past huge Umbrella plants (*Schefflera*) with massive, drooping leaflets and trees brimming with Bromeliads. Soon the road turned to dust and the tall rainforest closed in on us. On one of the steep road cuttings I spotted the leathery leaves of *P. auriculata* sprawled over the baking-hot rock face. The black berries of this vine were exquisitely sweet and would make a fine fruit if it weren’t for their small size. A little further down, there was a flowering *P. cisnana*, the mainland sister species of *P. rubra*, (identification pers. comm. Boza & MacDougal), the leaves of which were being eaten by a Flame caterpillar (*Dryas julia*), a prodigious herbivore of the genus. The poor road condition meant that it was almost just as quick, and much more fun, to walk in front of the taxi looking for plants. We carried on for a couple of hours like this and John soon started to realise that he might not get back to Cali that night. On a faster stretch, we saw two men scrambling up a road side cutting. They could only have been looking for plants. I’ve learnt to stop and ask whenever I see anything remotely related to what I’m doing. They had harvested two diminutive slipper orchids that they were going to sell in the local market, leaving the rest for the future. I followed one of them a short way up into the forest. We entered into a deep, shady ravine dripping with ferns, Melastomes and Begonias. At the far end, something caught my eye that warranted closer inspection. I scrambled up the stream and stood up to see the huge, drooping leaves of *P. macrophylla*.

This member of the *Astrophea* tree group is a charismatic odd-ball of the genus and a star of these Pacific coastal forests. The Brobdingnagian leaves can exceed a metre in length, all the more strange as there are just four or five of them at the top of a very thin stem. The leaves are usually held drooping down but when the plant is fertile, they are lifted up slightly allowing the pollinators and bat dispersers free access to the flowers and fruits. Underneath this plant were the developing fruits, which finally convinced the orchid hunters that it was indeed a passion plant. It is probably no coincidence that such leaves have evolved in some of the wettest forests on earth.

Fifteen years ago, I had spent nine months in the same Chocó forest region but two hundred and fifty miles further to the south in Ecuador. Although I didn’t know its name at the time, the individual *P. macrophylla* treelets still stand out in my memory. In the wet season there, I measured 10 cm of rain a day for months on end, enough to give a severe weather warning in the UK on any of those days. It’s not only the excessive water availability but also the extra cloud cover that protect the leaves from dehydration. It would be wrong, however, to think that these plants exist in waterlogged conditions. The slopes of the Andes are steep and rocky with the thinnest of soils

P. macrophylla

P. macrophylla

and all the rain drains rapidly into the numerous streams and rivers.

We carried on a couple more hours down the road with the raging river far down in the valley below, at times the car going over pure rock, another time under a 20m waterfall that thundered onto the top of our car. Every twenty minutes it seemed the vegetation changed again and the powerful heat of the lowland tropics was becoming ever more noticeable. The aptly named *P. chocoensis* was here in bud. A longwing caterpillar probably 'The Postman' (*Heliconius melpomone*) was eating the leaves. There was also a particularly attractive variegated *Decaloba* species, '*P. occidentalis sp complex*.' with oblong, tricuspid leaves and two large black leaf glands at the petiole apex. This pair of apex glands seemed to be a feature of many of the *Decaloba* vines here.

It was getting dark and my thoughts turned to where to stay for the night. We were very close to the coastal town of Buenaventura, a town with a lovely lilt to its name but with an unsavoury reputation within Colombia. John decided it was better if he found me a place in one of the nearby villages while he took the new road back to Cali.

The following morning I waded across the river and went searching for forest. There were more *Passiflora* to be found in the farmland known as "fincas" than in the primary

P. occidentalis sp complex

P. occidentalis sp complex

forests. Just metres from the river was a *P. arbelaezii* smothering a low bush. This endearing vine had small, egg-shaped leaves that fell in curtains from the top of the bush. It had yellow and green striped fruits and the distinguishing feature of flowers on its tendrils. This species is a good example of butterfly egg mimicry, with small yellow egg-size lumps at the end of the tendrils.

The second area that I visited in the Chocó was Quibdo, the wettest city on the planet with an astonishing 13m average rain a year. A nearby village, Tutunendo, recorded the absurd amount of 26 metres of rain in 1974, the world record. I arrived in Quibdo after having flown over a couple of hours of rain forest. Needless to say, it was raining. I arranged to go out the next day to a nearby forest with three young and capable botanists from Quibdo University. Although the forest had been logged, it still looked fairly intact. Epiphytes were everywhere on the branches, moss and ferns on the vertical trunks. If it weren't for the size of the canopy trees, one could easily have thought that this was a montane forest and not a lowland forest. There turned out to be quite a rich diversity of *Passiflora* in this area. Almost immediately, we found a fruiting plant of *P. palenquensis* growing on the path-side. This was a rampant vine with attractive shiny leaves with prominent yellow venation. The egg-sized fruits stood out with their three large, pale bracts. *P. nitida* was probably the most abundant passion vine here, along with an unidentified *Astrophea* climber. At one point we came across a *P. ambigua* with a single


P. arbelaezii

stem making its way high into the tree canopy. There was one vine of *P. vitifolia*, a widely distributed species that herbarium curators get tired of seeing collected, as every novice biologist spots the conspicuous red flowers. Among the smaller *Decaloba* section species '*P. occidentalis sp. nov. ined.*' was fairly common on the logging tracks.

After having gone down from 2000m to sea level, I was keen to see some of the high altitude *Tasconias* that grow in the Andes in the southern part of the country. I had plotted their distributions on Google Earth before coming out. There were exotic and exciting names like *P. leptomischa* and *P. cremastantha*. The nearest town to these species was Popayan, a mountain town 2000m up in the Department of Cauca.

I arrived at midday and took a taxi downtown asking the driver on the way how best to get to the mountains to the south and whether he knew of any car hire places. I spent a frustrating couple of hours waiting for the taxi driver to come back. Luckily I waited, as he told me that if I went to the mountains in the south I would run straight into a guerrilla roadblock as they owned the mountains around there. I asked him about further to the north and he told me a similar story. I was immensely disappointed but in a way equally relieved to hear this news. I was learning that I couldn't just pick random locations on a map and just go there in rural Colombia. As it was I had done several days asking in Cali about the area. The only remaining safe road was the one up to Purace National Park which I knew would have been well-covered by botanists.

I ran to the bus station in the cool morning air only to see the bus drawing out early. That had me dashing around trying to find a taxi to go after the bus but they were few and far between. Finally I found one and after a thrilling twenty-minute chase, the taxi driver flagged down the bus and the journey continued at a slower pace. With gaining altitude breath-taking vistas would suddenly open up. Local families in brightly coloured ponchos filled up the bus. After a couple of hours we arrived at Purace village.

The bus stopped outside a school where the windows had been stoned up. Bullet marks were spattered all over one of the walls. A cold chill went down my spine as reality dawned on me. Here was I looking for pretty plants and these people were living in fear and being shot at. I couldn't get the thought out of my mind. The bus stayed for what seemed like an eternity before it moved off and started to climb again towards Purace. The air was chilly and mist started to roll in hiding the 4600 metre high snow-clad volcano. Arriving in the park headquarters, I was immediately told that the park was closed due to guerrilla activity and that I had to leave, although the park guards didn't seem overly concerned. Luckily the next bus


P. palenquensis


Unidentified Astrophea

going back was in two hours time so I had a good chance to look around. The vegetation was small, stunted forest decorated with *Tillandsia*, moss and lichens. There were no *Tacsonias* to be seen but vistas of flat páramo studded with silver *Espeletia*. A small minibus took me to the park edge where the páramo ended and I could start a long walk back down to Popayan.

The sun came out on the green cattle fields and the temperature was that of an English spring day. After half an hour, I spotted an orange *Tasconia* flower at the top of one of the road-side trees. It was *P. mixta* with its horizontal flowers, a Purace form with a gorgeous shade of salmon-pink. The five anthers were arranged in a graceful curve all pointing downwards so that they brush the top of the hummingbird's head with pollen. A neighbouring Vallea bush, that is sometimes cultivated in the extreme south west of England, gave an indication of the limited area that this vine might grow in the UK. I found two more vines in a short stretch of the road but then nothing else in hours of walking. There were plenty of other plants to keep me occupied and everyone I asked about security would say that their place was safe so I had completely forgotten my initial worries on the way up. I hopped on a bus coming down the hill and asked to get off again when I saw another vine. It turned out to be a P. ligularis, a popular fruit in Colombia.

At the end of the day, on one of the steep road cuttings there was a single *P. alnifolia* vine with lustrous green leaves. Nearby was *P. manicata* with immature fruits. It was completely dark by now and I realised that I shouldn't have got off that bus as it was the last one of the day. I didn't hold much hope of anyone giving me a lift but there is always someone at hand to help in tropical countries, and after half an hour one of the road contractors took me back to Popayan.

Before I left Colombia, I had the chance to have a look around the Bogota Botanic Gardens. They had planted


P. alnifolia

plenty of *Tacsonias* growing through shrubs including two very large *P. parritae* neither of which were flowering. I was quietly surprised to see that behind the scenes they had a sizeable *Tacsonia* re-introduction programme up and running with trays of seedlings and young plants being propagated up; these all destined to be planted back in the wild or near villages in suitable habitats. The *Tacsonia* mountain regions are seriously deforested with widespread agriculture and high population densities. Despite these challenges, I left with the distinct impression that the *Tacsonias* were in good hands.

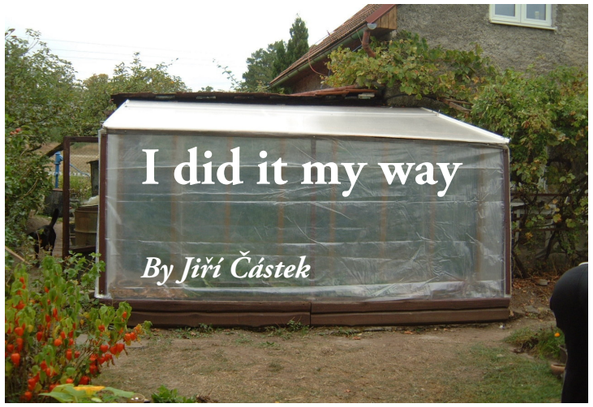
Colombia had been a trip rich in positive experiences both from its plants and forest perspective and the humanity of its people. I hope one day that I'll be able to return and see some more of its natural treasures.

Neil Gale is a botanist who specialised on tropical rain forest ecology. Twelve years ago he set up The Magic of Life Butterfly House in Aberystwyth, Wales.Here he grows a number of *Passiflora* both for the flowers and as caterpillar food plants for Longwing Butterflies.

Thanks go to John MacDougal for help with identification.
http://magicoflife.org/

P. mixta

Landscape where *P. mixta* is found.



I did it my way

By Jiří Částek

In the distant past I was lucky enough to inherit a weekend house with a garden near where I live in Prague. Among my hobbies gardening started to become the main one. The garden was situated about 400m above sea level in a freezing hollow and I soon found that I could not grow what I would like. I longed to grow exotic plants such as *Citrus* and *Fuchsia*. Those at home were taking up too much space, and I was feeling that something needed to be done! Being a member of two gardening societies and visiting several exciting greenhouse growers showed me the way.

The first problem was gaining planning permission from the local council to build a small greenhouse for "growing tomatoes and other warmth-requiring plants." I got it but with many limitations such as no chimney and no electric outlet inside. A good place to position the greenhouse was close to the garage where a three-phase electricity outlet was already installed.

Next, I had to find the supplies to build it. I had heard about a liquidation garden center in Prague and was lucky enough to get greenhouse frames with glass for a good price. Also, I found a tool shop that had a sale of unused frames with suitable wood profiles so I decided to use them for construction. My idea was to build a greenhouse with a 1.5 metre deep foundation to give good temperature conditions for overwintering the plants.

Digging out the slate ground was not a pleasant way of spending weekends, but I was young and worked until dusk and soon finished it. Polystyrene sheets proved to be a good solution for shuttering and they were an effective insulator. Iron girders were then embedded into the concrete creating a skeleton for fixing wooden pillars. A carpenter then made me grooves in the wood for fitting glass windows inside so it was not necessary to use putty.

I preserved the wood by applying three coats of hot flax boiled oil and then a top-coat of marine lacquer. Iron parts were coated with asphalt-latex emulsion with a rust inhibitor. The walls were glazed with 3 sheets of glass and the roof covered with single glazed greenhouse frames. The back wall was covered with polystyrene sheets and asphalt cardboard with aluminum foil on the surface. Also old mirrors were used to help reflect the light inside.

My neighbours commended it, but they stated the opinion that it is a pity to use it for growing because it could be an excellent place to play the card game Marriage. I stuck to the original plan as my knowledge of card plays is poor and I would have gambled away both the greenhouse and my trousers.

Finally, the base of the greenhouse was filled with a mix of compost, molehills, peat and cow dung, and the first tomato plants were put in. I was happy to see that they grew quickly. At that time while I was away several heavy rainstorms came, and I was glad that the tomatoes were under glass, but next weekend when I went back I was shocked! I found a lake of water instead of tomatoes. So I had to fill the hole with sand and raise the plant bed by 40 cm.

The problem of heating in the winter now had to be solved. As it had to work unattended, an electric accumulator stove seemed to be the right solution, but available heaters were too big for the purpose. I succeeded in buying some heating bricks and thermostats and used them to construct my own heater with two independent heating circuits 800 VA powered by different phases of electric current;one thermostat to switch on at 3°C and the second at a slightly lower temperature.

As well as citrus trees, in a free draining soil, I tried to grow various plants such as camellia, oleander, fuchsia, fig, yucca, musa basjoo, and pomegranate trees. Especially attractive to me were *Passiflora,* some of which I had at home. There, on my only free north-facing window, I could grow only ones that were easy to grow. Among them *P. morifolia*, *P. x belottii*, *P. x allardii*, and *P. capsularis* showed the best results. Some others such as *P.* 'Sunburst', *P. vitifolia*, *P. racemosa*, *P. alata* and *P. edulis* were growing well but not flowering.

In the greenhouse, my attempts with *P. edulis* were also unsuccessful because the temperature of the soil dropped too low. I expected *P. caerulea* to be hardy enough to try and in a free draining soil it worked wonders. During one season the trunk thickened up to 2 cm and the flowers were wonderful. In the next year the wonders continued. Strange "grass" appeared on the whole surface of the ground and the soil was full of roots apparently belonging to *P. caerulea*. The nutrients in the soil were exhausted and I had to remove all the plants and change the soil. In spite of careful work some runners reappeared, but finally my fight with the beast was successful.

I started to look for a well-behaved and relatively hardy passion flower on the Internet and was lucky to discover *P. herbertiana* from Australia. It was exactly what I wanted; no runners, easy flowering and fruiting without hand pollinating with edible fruit. It was simply my favourite plant. The taste cannot be compared with *P. edulis* but with some added lemon juice the taste is good to me. . It flowers the whole season and even in the winter it creates buds. The flowers stay open several days too. Other *Passiflora* in containers such as *P. x violacea* 'Victoria', *P. incarnata*, and *P.* 'Avalanche', proved to be hardy enough to withstand the temperature dropping to near to freezing point. I put *P. actinia* into free draining soil, and this year it has already grown quite big.

In winter the ground and shelves of the small 3.5m x 2.5m greenhouse are packed with over-wintering plants including my wife´s pelargonia. In May the risk of frost has past, and the jungle is moved outside to garden. Then I bring non-hardy *Passiflora* such as *P. x allardii* and *P.* 'Inspiration' inside to get bigger and more colourful flowers. Grape and citrus plants serve as a trellis for their vine-shoots.

P. herbertiana

In 2011 the Czech & Moravian Club of *Passiflora* enthusiasts organized a visit to Bettina and Torsten Ulmer's nursery in Germany, which was a great experience. There were hundreds of *Passiflora* displayed in the labyrinth of rows with many of them flowering. My interest was particularly oriented towards those that could withstand the cold overwintering in the greenhouse. Over the 2011-2012 winter *P.* 'Wilgen Verhoeff' survived in a perfect state, and *P.* 'Blue Stripper' started well in the spring. *P. tucumanensis* was planted in the soil but was attacked by fungal disease. Fortunately I rooted the spare plant that is now OK. I was not sure if *P. 'Inspiration',* which is a polyploid remake of *P. 'Incense'*, has the same hardiness so I smuggled it into the south oriented window among my wife´s plants.

Though the greenhouse is small and the choise of *Passiflora* is very limited, due to setting the electrical heating as low as possible, I'm allowed to enjoy the hobby of planting a number of these remarkable flowers and fruits.
I am happy to have it.

Jiří Částek is an amateur Czech greenhouse *Passiflora* and Citrus grower; admin of www.cmkpm.ic.cz.

The ghost of Constance Eliott*

By Myles Irvine

P. 'Constance Eliott'

The common passion flower, *Passiflora caerulea*, normally produces flowers with white petals and sepals but is named, caerulean meaning blue, after its striking blue-tipped corona filaments. If you sow enough seed, the odd flower with pale blue or even pure white corona filaments will come up. White flowers can also occur as a sport on a stem of a plant with otherwise blue flowers. William Napper, of the Lucombe, Pince & Co Nursery**, Exeter UK, discovered a white-flowered plant in Devonshire in his travels in 1882. The nursery propagated it as *Passiflora* 'Constance Eliott' for sale in 1884.

In "The Garden" July 23th 1890 (Vol 38 page 370), Napper notes that a Mr Fuller laid claim to having originated the plant from seed of *P. caerulea*, but a Miss Morris, of South Hill, Lustleigh, Devonshire, wrote firmly to William Napper in 1887 advising that in 1879 she had found a stump of a plant in her garden, which she presumed to be *P. caerulea.* She watered it well and revived it to pick "the lovely white bloom" in the first week of September. Indeed, as with some modern day hybrids and cultivars the waters are muddied. Fuller apparently gave Lucombe, Pince & Co Nursery sole rights to his plant in 1882, but the flowers were not always pure white and the plants were thrown away.

This pure-white fragrant form of the species today causes considerable confusion as, of course, only cuttings from the original plant should have the same name. In practice however, any white cultivar of *P. caerulea* is called *P.* 'Constance Eliott'. Some of these are free-flowering and others less so. Some set fruit easily and others hardly at all. It is often used in hybridizing as a pollen donor, as it is thought to give a wider range of offspring than crosses with *P. caerulea*, though they may be a little less hardy.

One such white cultivar of *P. caerulea* has been selected and named by Cor Laurens in 2002: *P.* 'Avalanche'. It was described by John Vanderplank in the 2003 Passiflora Society International Hybrid and Cultivars Register as, "A selection of *P.* 'Constance Eliott'. Vine: vigorous and free flowering. Leaves: large, five lobed. Flowers: very large, 10-15 % larger than 'Constance Eliott', all white with a tint of pink."'

Note that *Passiflora* 'Constance Eliott' is often misspelt *Passiflora* 'Constance Elliot', 'Constance Eliot' or indeed

Gardener's Chronicle, Vol. XX1 January to June1884

FIG. 133.—PASSIFLORA (CŒRULEA) CONSTANCE ELLIOTT: FLOWERS IVORY-WHITE. (SEE P. 700.)

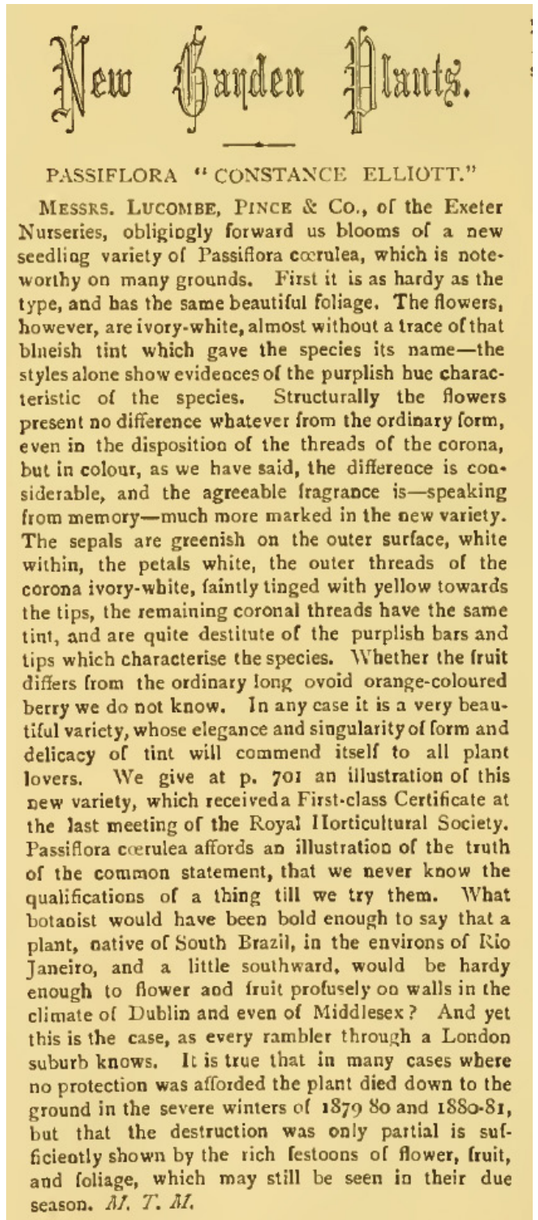
Passiflora 'Constance Elliott'. To remind myself which is correct, I think of Constance as a 'little' girl; that is one 'L' and two 'T"s. Dr Les King uses the mnemonic 'English Lady Is Obvious Taxonomic Teaser'. So who was the plant named after? And why, well over a hundred years after the cultivar was originally named, is there still ongoing confusion regarding the correct spelling?

To explain...

Samuel Eliott, a Quaker, was the nursery manager and later proprietor of Lucombe, Pince & Co. Emily Constance Eliott, born Emily Constance Lang in 1853, was his wife.

It was either her, which Napper suggests, or their daughter Constance Mary Cerise Eliott, born 25th April 1880, seen on left below with her aunt Mary, in whose honour the plant was named.

Either way, the correct spelling is "Constance Eliott". All others spellings are incorrect. The 1891 St. Thomas, Exeter, Devon census shows Emily Constance Eliott, wife of Samuel Eliott. The Devon History Gazetteer and Directory listing for Samuel Eliott confirms the spelling. Present day descendants, such as her great, great, granddaughter, Kirstie Eliott, share the same spelling.



New Garden Plants.

PASSIFLORA "CONSTANCE ELLIOTT."

MESSRS. LUCOMBE, PINCE & CO., of the Exeter Nurseries, obligingly forward us blooms of a new seedling variety of Passiflora cœrulea, which is noteworthy on many grounds. First it is as hardy as the type, and has the same beautiful foliage. The flowers, however, are ivory-white, almost without a trace of that blueish tint which gave the species its name—the styles alone show evidences of the purplish hue characteristic of the species. Structurally the flowers present no difference whatever from the ordinary form, even in the disposition of the threads of the corona, but in colour, as we have said, the difference is considerable, and the agreeable fragrance is—speaking from memory—much more marked in the new variety. The sepals are greenish on the outer surface, white within, the petals white, the outer threads of the corona ivory-white, faintly tinged with yellow towards the tips, the remaining coronal threads have the same tint, and are quite destitute of the purplish bars and tips which characterise the species. Whether the fruit differs from the ordinary long ovoid orange-coloured berry we do not know. In any case it is a very beautiful variety, whose elegance and singularity of form and delicacy of tint will commend itself to all plant lovers. We give at p. 701 an illustration of this new variety, which received a First-class Certificate at the last meeting of the Royal Horticultural Society. Passiflora cœrulea affords an illustration of the truth of the common statement, that we never know the qualifications of a thing till we try them. What botanist would have been bold enough to say that a plant, native of South Brazil, in the environs of Rio Janeiro, and a little southward, would be hardy enough to flower and fruit profusely on walls in the climate of Dublin and even of Middlesex? And yet this is the case, as every rambler through a London suburb knows. It is true that in many cases where no protection was afforded the plant died down to the ground in the severe winters of 1879 80 and 1880-81, but that the destruction was only partial is sufficiently shown by the rich festoons of flower, fruit, and foliage, which may still be seen in their due season. *M. T. M.*

Constance Mary Cerise Eliott

The confusion originates from a simple typographical error, probably by the typesetters of the "Gardener's Chronicle", Vol. XX1 January to June 1884, who incorrectly spelt it *Passiflora* 'Constance Elliott'.

Taxonomist John MacDougal, in PSI Vol 1 No 2 1991, notes that an article by W. Napper in "The Garden" July 23rd 1890 (Vol 38 page 370) confirms that the correct spelling is *P.* 'Constance Eliott'.

He notes that, "'According to the International Code of Botanical Nomenclature, despite the fact that the name was originally published with two 'L's, the correct spelling of the botanical name of this plant is with one 'L'. The Code directs us to change the traditional use to the correct use. A trifling error perhaps, but the ghost of Constance Eliott may haunt all those who ignore her plea to correct history."'

There is an excellent article by Trevor Wood in the NCCPG Devon Newsletter, Summer 2008, regarding the disputed history of the cultivar's origins, but unfortunately the name again is misspelt 'Elliott'. Many thanks to Emmett Brown for finding this article, as it provided the last piece in the puzzle.

The RHS plant database has been updated to show the correct spelling of *P.* caerulea 'Constance Eliott', so hopefully the ghost of Constance Eliott can now rest in peace.

Emily Constance Eliott

Emily Constance Eliott

* With thanks to John MacDougal for the title.

** From the Exeter Council website:
"Pince's Gardens stands on the site of William Lucombe's nursery founded in 1720. The most famous introduction of this notable nursery was the Lucombe or Exeter Oak, a semi-evergreen hybrid of the Turkey Oak and Cork Oak. In the 1820s, the nursery became 'Lucombe, Pince & Co.' was famous for its "Wonder of the West" strain of cinerarias, calceolarias, and an extensive rockery. By late Victorian times, the gardens were regarded as one of Exeter's finest sights; drawing visitors from far afield to admire its exotic plants (palms, orchids, other sub-tropicals). The 45 yard long pergola of mature wisteria was one of the main features of the nursery in the 1880s and is still the most impressive feature to this day.

In the nineteenth century the nursery was renowned for its vast glasshouses packed with orchids, gardenias, and rare palms. The nursery was sold in 1890 to the Exeter Nursery Company. In 1912 the City Council bought the site and converted it into a pleasure ground."
Today the park is home to Pinces Bowls Club and Pinces Croquet Club.

Thanks to both Kit Brown and Kirstie Eliott for their help in reseaching this article.

P. 'Avalanche' © *Jiří Částek*

Passiflora punctata L. and its capricious lamina's[1] shapes in Northern Peru

by Boris Esquerre Ibáñez
Universidad Nacional Pedro Ruiz

Gallo, Lambayeque, Peru

In many plant groups there are almost permanent characteristics, allowing taxonomists to differentiate them very well. In other groups, this in not the case, and some genera and species have been the subject of extensive synonymy. *Passiflora* is one such group.

Polymorphism in *Passiflora* is well known, especially in the subgenus *Decaloba*[(1)], however it was something new to me. My studies of *Passiflora* in northwestern Peru allowed me to demonstrate it in a number of species including one I share here, *Passiflora punctata L.*

Previous works have described great foliar morphological variation among *Decaloba* such as *P. suberosa*[(2)] and *P. exoperculata*[(3)]. Here we describe, for the first time, remarkable polymorphism in the foliage of *Passiflora punctata* at several collection sites near each other in Northern Peru. Due to habitat destruction and climate change, the genus *Passiflora,* amongst others, is becoming a greater focus of research.

During expeditions to the Lambayeque, Piura ,Cajamarca and Amazonas Departments of Northern Peru, I recognized a remarkable foliar polymorphism in *Passiflora punctata.* This was reported at the 14th National Congress of Botany in Peru[(4)].

Among the varying samples, three models of blades were observed: a "horned lamina" (when the apex of lateral lobes exceed the apex of the mid lobe), an "equidistant lamina" (if the three apexes of lobes are almost equal) and an "anchor lamina" (if the apex of mid lobe surpasses the lateral apexes). (Figs. 1 & 2) It is an intriguing hypothesis that these three models of leaf morphology may be applied to all *Decaloba* with leaves that are wider than they are long.

Also observed were two color variations with different pigmentation on the adaxial face of the leaves: normal green and variegated with white spots. (Fig. 3) I have seen plants with variegated leaves usually when they are young, but also in new shoots of old plants. It is worth mentioning that the variegated leaf form appeared mostly in low coastal areas and valleys areas with dry and hot weather with the unvariegated leaf present in samples taken over 800 meters above the sea level and in wet conditions.

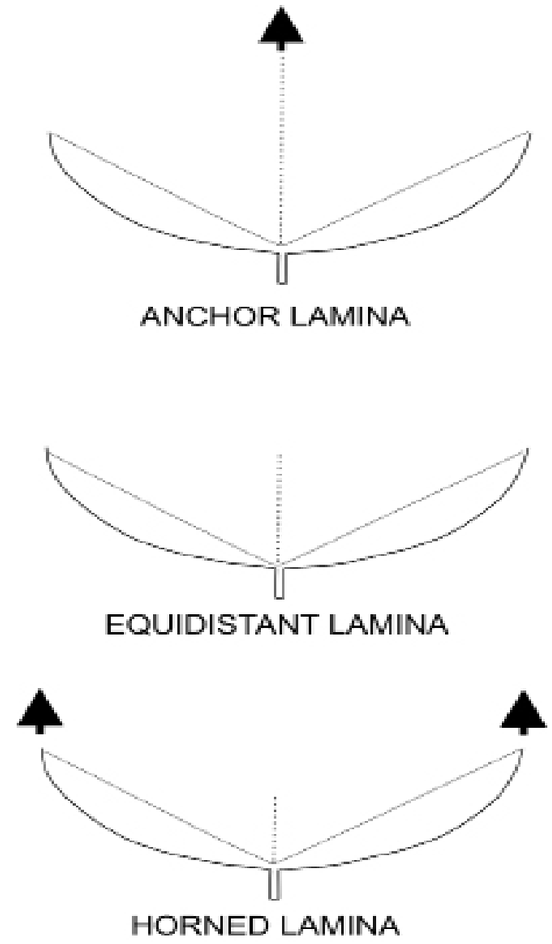


Fig 1. Models of polymorphism to limbo margin in *Passiflora punctata* L. : Anchor lamina, Equidistant lamina and Horned lamina.

Furthermore the anthocyanins, the pigment that gives purple color on abaxial surface of leaves, in my observations has been predominant in plants growing in shady places or poor light. (Fig. 4) Therefore, I suggest that factors such as plant age, light supply, water, and soil type can modify leaf morphology over time in P. punctata.

Finally, I observe variations in the depth of color of the flowers, as happens regularly in many plant species. Some specimens in this passionflower have more anthocyanins in sepals and petals than others, the greenish to purplish-brown coloration in androgynophore, operculum, styles and stamen filaments; and the corona filaments with whitish-cream to yellow on the distal portion. (Fig. 5) These changes are also probably caused by environmental factors.

As has been previously described in *Passiflora*, the impetus for morphological variation within a species is probably due to some combination of natural and anthropogenic stress

Natural stress factors include plant-plant and plant-animal interactions, e.g. the co-evolution of the *Passiflora* group with Heliconiini Lepidoptera. It is proposed that these butterflies have forced species of *Passiflora* to change the shape of their leaves to avoid being detected by the female butterflies that seek to lay eggs. This avoids the caterpillars devouring the foliage when they emerge from the eggs; all this in many years of shared evolution, however this is only part of this interesting theory [(5,6)].

Anthropogenic stress factors, on the other hand, are a consequence of the continued intrusion of man in its habitat, i.e. the disruption of normal cycles in the plant's ecosystems, for example the disorderly rural settlement, road construction, deforestation, open pit mining, etc.
Both alterations may lead to metabolic stress, which may in turn can cause changes such as foliar polymorphism[(7).]

The combination of these two types of stress may be the cause of this marked phenotypic plasticity observed in *Passiflora punctata L.* in our study area. To be clear however,

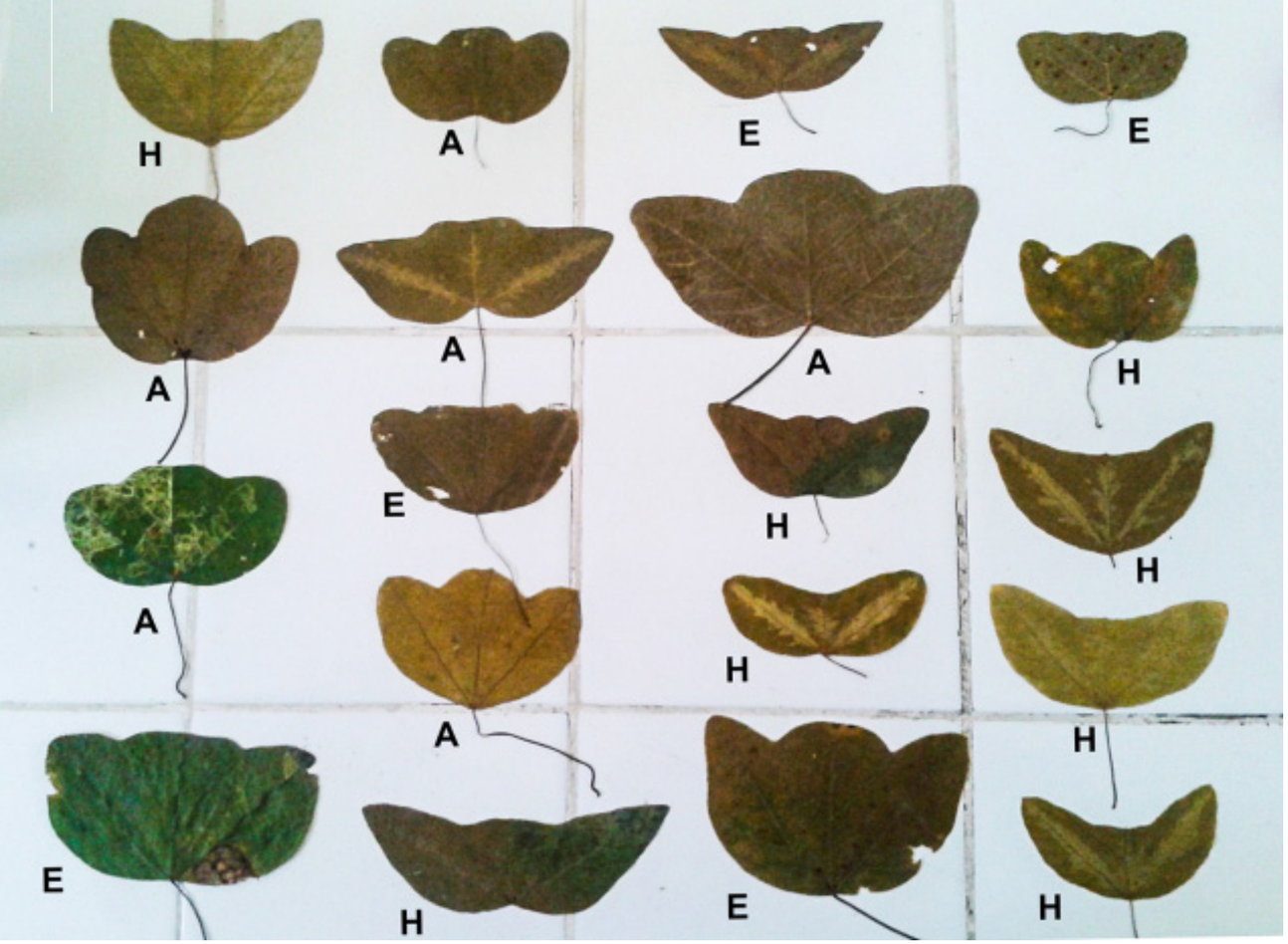


Fig 2. Polymorphism of the leaf margin and variegated leaves of some specimens of *P. punctata* from Northern Peru: Anchor lamina (A), equidistant lamina (E) and horned lamina (H).

this paper is intended only as an observational report. The ultimate causes for these variations are left as a topic for future research.

All this leads to one conclusion: it is possible that the features of many groups of plants are not as stable as were described in books, or as we see in catalogues and magazines. Rather, the characteristics of each plant are their adaptive answer to changes in their environment.

If we change, why not plants?

Literature cited:

(1) Ulmer, T. & MacDougal J.M. 2004. *Passiflora*: Passionflowers of the World. Timber Press. Portland.

(2) Killip, E.P. 1938. The American species of Passifloraceae. Publications of the Field Museum of Natural History. Botanical Series 19 (1,2): 1-613.

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(4) Esquerre-Ibañez, B. 2012. Percepción local de la variabilidad foliar en *Passiflora punctata* (Passifloraceae) en la Región Lambayeque y zonas adyacentes. En: Libro de Resúmenes XIV Congreso Nacional de Botánica "Dr. Abundio Sagástegui Alva". Universidad Nacional de Trujillo. Trujillo-Perú.

(5) Gilbert, L.E. 1975. Ecological consequences of a coevolved mutualism between butterflies and plants. In Coevolution of Animals and Plants. Ed. L.E. Gilbert and P.R.Raven. Boulder, Colorado: International Congress of Systematics and Evolutionary Biology. Austin: University of Texas Press. 210-240.

Fig 3. Normal and variegated leaves in *P. punctata*

Fig 4. Anthocyanin concentration on the abaxial side in leaves: without (above), with (below)

(6) Gilbert, L.E. 1982. The coevolution of a butterfly and a vine. Scientific American 247: 110-121.

(7) Gianoli, E. 2004. Plasticidad fenotípica adaptativa en plantas. En: Hernán Marino Cabrera, Fisiología Ecológica en Plantas (pp. 13-25). Valparaíso. Chile. EUV.

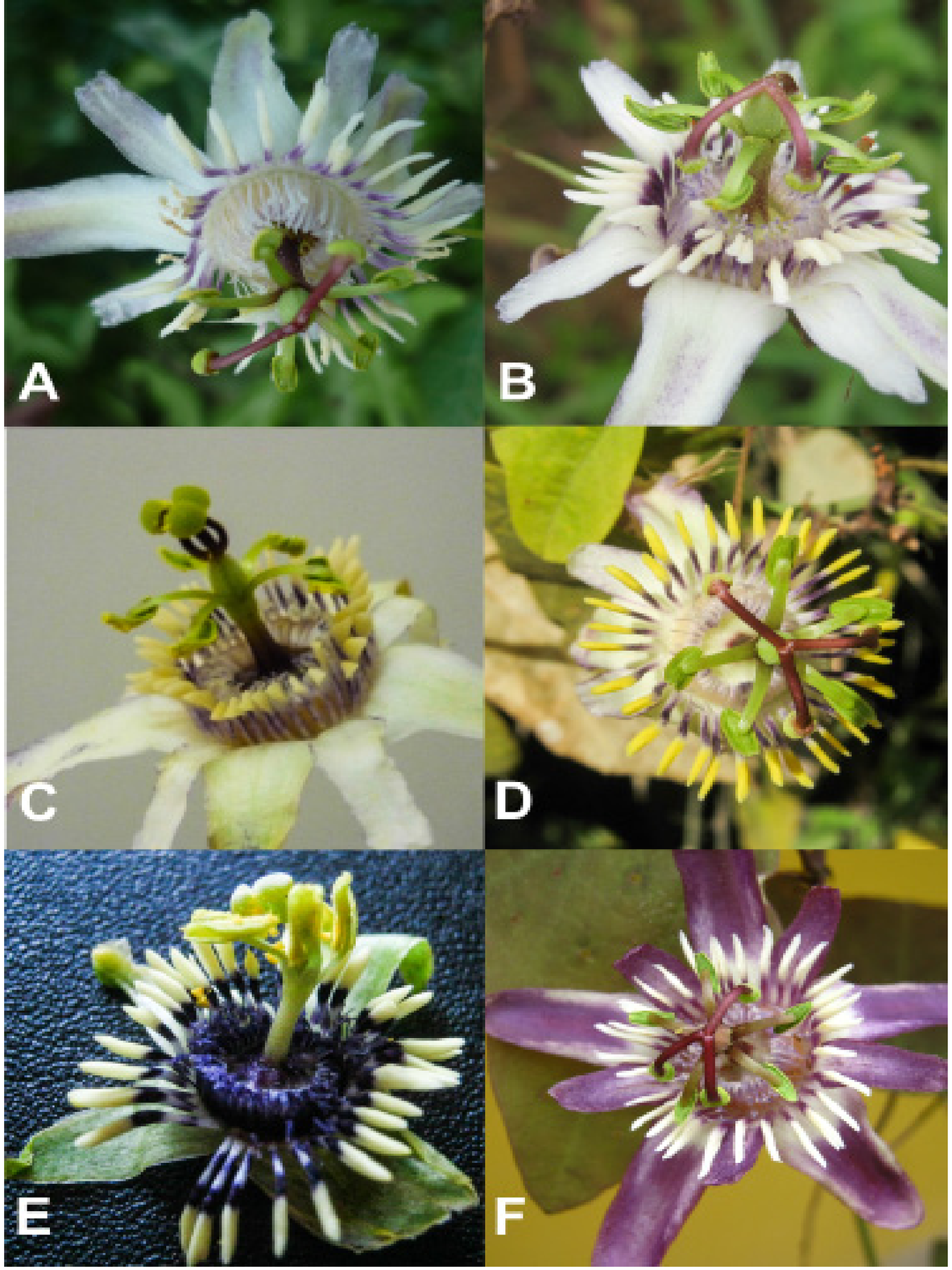

Fig 5. Intensity variation in the color of flowers of P. punctata in Northern Peru: Coastal area (A-B), Andean region (C-D), Amazonian highlands (E), Cultivated (F)

Tacsonia Gallery

With particular thanks to John Ocampo

P. antioquiensis © John Ocampo

P. antioquiensis © Joana Costa

P. antioquiensis © Joana Costa

P. flexipes © John Ocampo

P. mathewsii © John Ocampo

P. tenerifensis © John Ocampo

P. pinnatistipula alba © Bridget Campbell

P. parritae© John Ocampo

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P. pinnatistipula © Bridget Campbell

P. mixta © John Ocampo

P. mixta © Neil Gale

P. tarminiana alba © Joana Costa

P. tarminiana alba © Joana Costa

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P. cumbalensis © Sebastián Rendón G

P. cumbalensis © Sebastián Rendón G

P. x exoniensis (centre) & P. 'Grandioso' © *Frank Rene Stausholm*

P. x exoniensis © Frank Rene Stausholm

P. 'Grandioso' © *Frank Rene Stausholm*

P. 'Grandioso' © *Frank Rene Stausholm*

P. 'Grandioso' © *Frank Rene Stausholm*

P. peduncularis © Boris Esquerre Ibáñez

P. 'Wilgen K. Verhoeff' © *Frank Rene Stausholm*

Passionflowers from Argentina: domestication of native species and strategies to obtain new varieties.*

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[2]: Institute of Floriculture, National Institute of Agronomic Technology (INTA), Argentina.

P. caerulea

South American germoplasm has been useful for the development of some international ornamental plant varieties. However, in Argentina, native genetic resources have been poorly exploited for its ornamental value.

The Instituto de Floricultura (IF) - INTA (Institute of Floriculture, National Institute of Agronomic Technology, Argentina) has been carrying out breeding programs to develop new varieties from native genetic resources.

Activities of characterization, domestication and breeding are being carried out in the genera *Tabebuia, Nierembergia, Jacaranda, Calibrachoa, Glandularia, Gloxinia* and *Passiflora* (Facciuto et al., 2008).

The genus *Passiflora* (*Passifloraceae*) comprises more than 500 species and it is considered an important genetic resource (Ulmer & MacDougal, 2004; Delis Pérez et al, 2009). Its commercial uses are diverse: as edible fruit, for medicinal purposes, ornamental, and as an enthomologic-botanical resource (Yockteng & Nadot, 2003).

The American species are found in the central and southern part of the continent and 19 of them are native from the north and center of Argentina. (**Fig. 1**) (Killip, 1938; Deginani, 2001).

The *Passiflora* breeding activities in the IF-Argentina have been oriented to obtain, through sexual crossings between different species (interspecific hybridization), varieties with colourful flowers combined with low temperature tolerance, common in winter in the suburbs of Buenos Aires city (34º 36' south latitude, 58º 40' west longitude). Interspecific hybridization is one of the most important sources of genetic variation in breeding ornamental crops. This technique allows the combination of characteristics from different species (van Tuyl & De Jeu, 1997).

An important step to obtain new varieties is the characterization of the species which will be the parents of the hybrids. This activity includes descriptive and comprehensive studies that could determine the potentiality for cultivation and crossability with other native species in the IF genebank. Pictures of some of the native species of this collection are presented in **Fig. 2.**

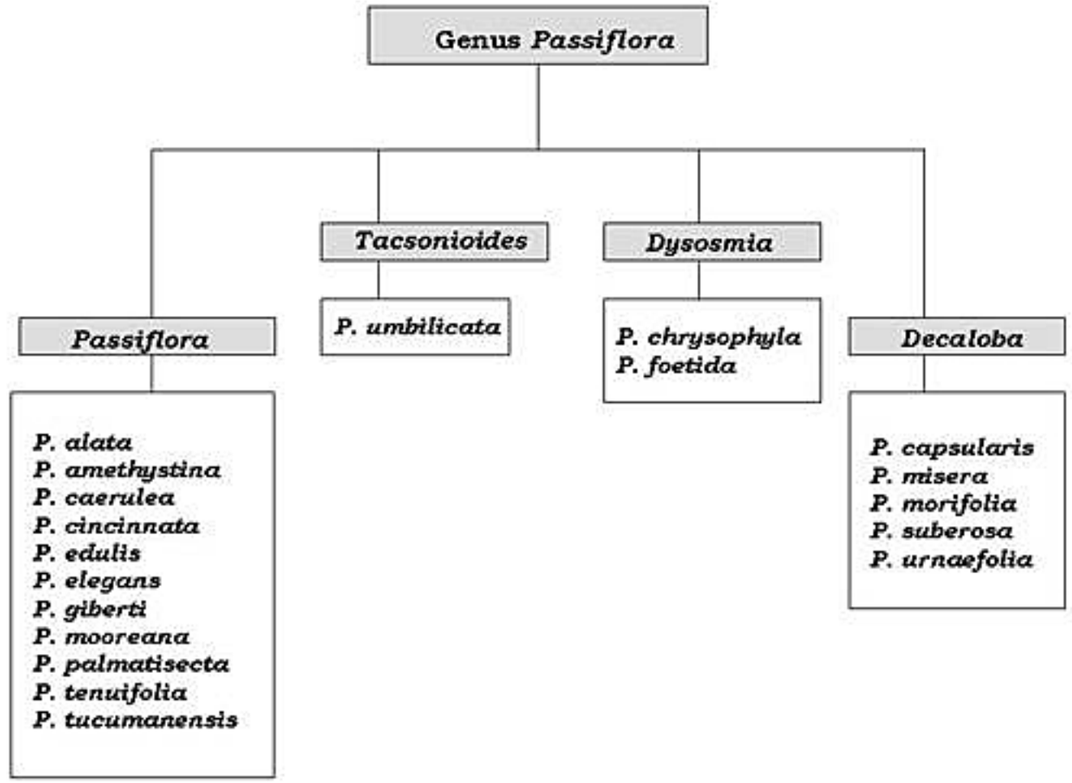

Fig. 1. Subgenus of Argentine native species from the *Passiflora* genus (Deginani, 2001).

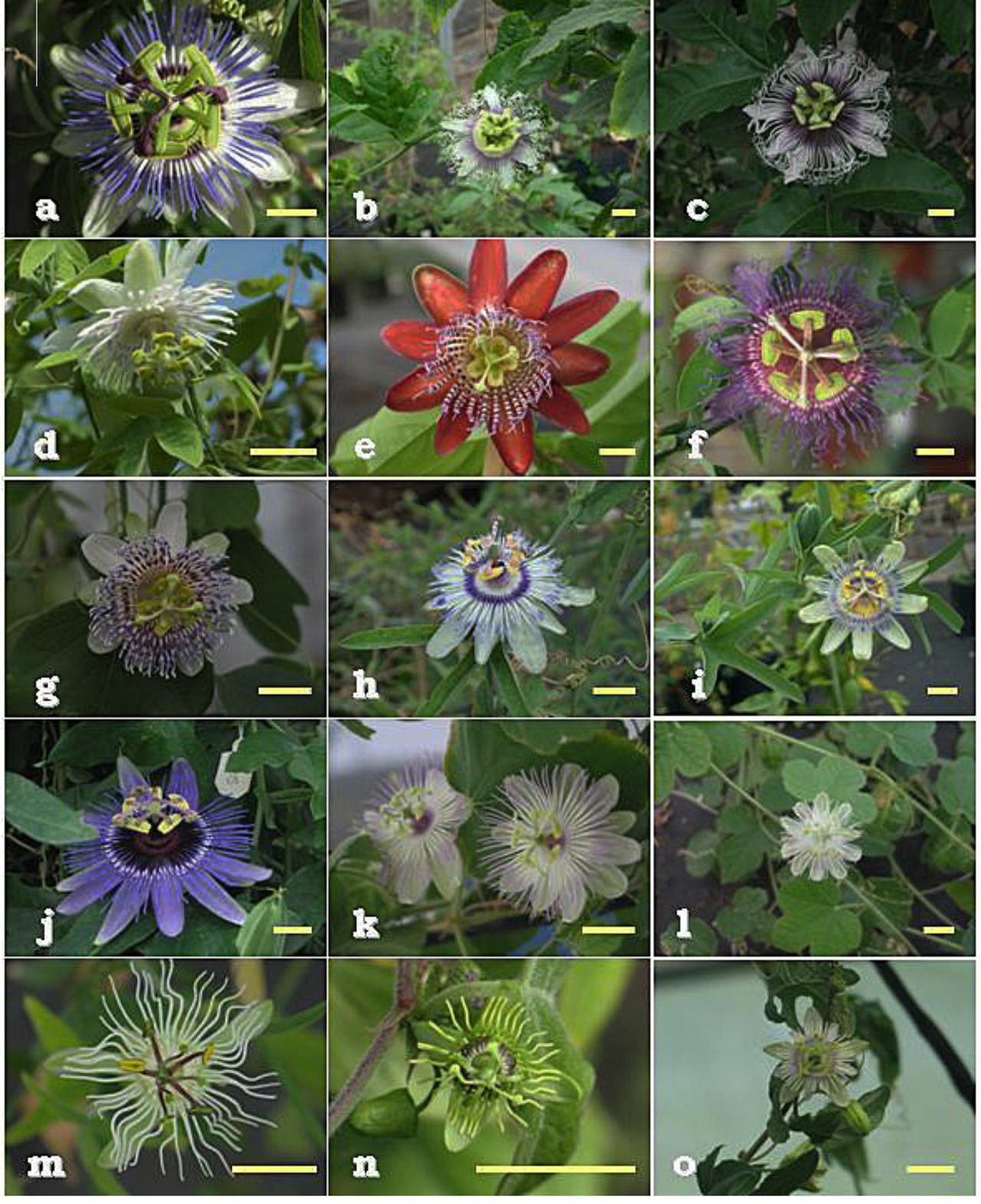

Fig. 2: *Passiflora* species native to Argentina in the *in vivo* collection of the Instituto de Floricultura.
From subgenus *Passiflora*: a: *P. caerulea*; b: *P. edulis f. edulis*; c: *P. edulis f. flavicarpa*; d: *P. tucumanensis*; e: *P. alata*; f: *P. cincinnata*; g: *P. elegans*; h: *P. mooreana* (diploid); i: *P. mooreana* (tetraploid); j: *P. amethystina*. From subgenus *Dysosmia*: k: *P. foetida* (pink crown); l: *P. foetida* (white crown). From subgenus *Decaloba*: m: *P. misera*; n: *P. suberosa*; o: *P. morifolia*. Bar: 1cm throughout all figures.

Among the Argentinian native species, *P. caerulea* (**Fig. 2-a**), tolerates temperatures below -15º and, for this reason, it is the more widely distributed species. It is alsoquite important for the breeding program (Deginani, 2001; Ulmer & MacDougal, 2004). Another cold tolerant species is *P. edulis f. edulis* (**Fig. 2-b**) but, in its other form, *P. edulis f. flavicarpa* (**Fig. 2-c**) is more sensitive to low temperatures. These two forms of *P. edulis* are two of the most cultivated and bred for their edible fruits (Ulmer & MacDougal, 2004).

P. tucumanensis (**Fig. 2-d**), named after its natural distribution in the Argentinian province of Tucumán, has pendulous white flowers with a light pink crown and it resists the cold temperatures of the mountains. *P. alata* (**Fig. 2-e**) is the only red flower of the native species but it dies in the cold weather of Buenos Aires. The deep purple of *P. cincinnata*'s flowers (**Fig. 2-f**) contrasts with the green colour of the foliage but neither resists winter temperatures.

P. elegans (**Fig. 2-g**) has three-lobed leaves and a colourful crown in the pendulous white flowers. *P. mooreana*, found in nature either diploid level (with two sets of chromosomes, one from each parent) (**Fig. 2-h**) or tetraploid level (four sets of chromosomes, two from each parent)(**Fig. 2-i**), has shorter internodes than other species, greenish grey foliage and fragrant flowers (Ulmer & MacDougal, 2004).

P. amethystina (**Fig. 2-j**) has scented flowers with blue petals and, as other *Passiflora*, three-lobed leaves, but dies in the cold winter.

The smallest passionflowers of the collection are *P. foetida*, *P. misera*, *P. suberosa* and *P. morifolia* (**Figs. 2-k, l, m, n, o**).

Through hybridization techniques many hybrids were obtained, each showing interesting combinations of the different characteristics of their parents.

Fig. 3 shows some of the hybrids of the crossing of *P. alata* and *P. caerulea*. (the *P. x belotii* cross.) As a mixture of their parents, the hybrids have an intermediate colour in different degrees of pink colour.

The same situation with petal colour is repeated in the crosses of *P. amethystina* and *P. caerulea* **(Fig. 4)**, the commercial hybrid *P.* 'Amethyst' with *P. edulis f. edulis* (**Fig. 5**), with *P. caerulea* (**Fig. 6**) and with *P. alata* (**Fig. 7**), in the crossings of *P. alata* with *P. cincinnata* (**Fig. 8**) and *P. cincinnata* with *P. mooreana* (**Fig. 9**).

Among the hybrids from the cross between *P.* 'Amethyst' and *P. caerulea,* a white flower stands out among light fuchsia ones (**Fig. 6**). This is because one of the parents is *P.* 'Amethyst', a hybrid of fuchsia *P. kermesina* and white *P. caerulea.* Thus it may contribute genes for fuschia or white petals to its offspring.

When a hybrid is achieved, sometimes it is possible to cross it with a third species to form a three-way-hybrid. An example of three-way-hybrid is presented in **Fig.10**. The hybrid obtained from *P.* 'Amethyst' x *P. caerulea* crossing was crossed with *P. alata* and, the descendant is the three-way-hybrid [(*P.* 'Amethyst' × *P. caerulea*) × *P. alata*]. This may actually even be considered a four-way-hybrid as *P.* 'Amethyst' is a hybrid itself.

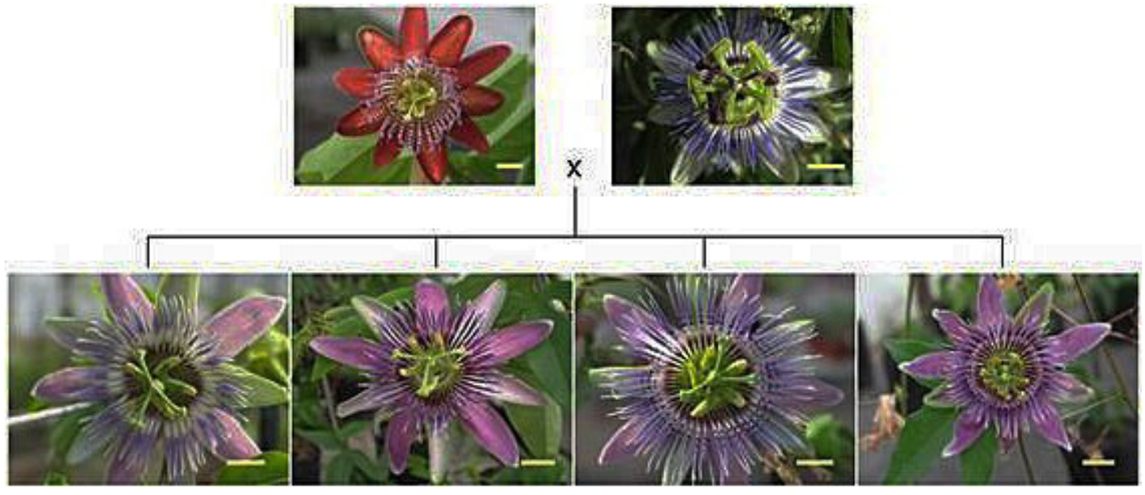

Fig. 3: *Passiflora* interspecific hybrids obtained from the crossing of *P. alata* and *P. caerulea*. Parents (above); hybrids (below).

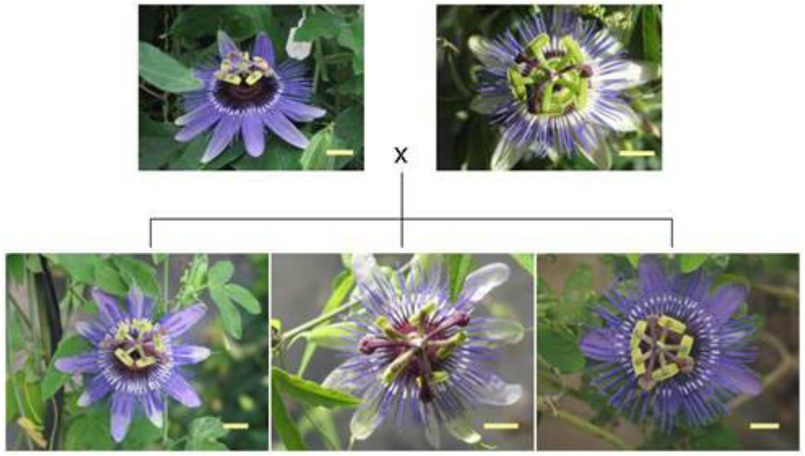

Fig. 4: *Passiflora* interspecific hybrids obtained from the crossing of *P. amethystina* and *P. caerulea.* Parents (above); hybrids (below).

Fig. 5: *Passiflora* interspecific hybrids obtained from the crossing of *P.* 'Amethyst' and *P. edulis f. edulis*. Parents (above); hybrid (below).

Fig. 6: *Passiflora* interspecific hybrids obtained from the crossing of *P.* 'Amethyst' and *P. caerulea.* Parents (above);hybrids (below).

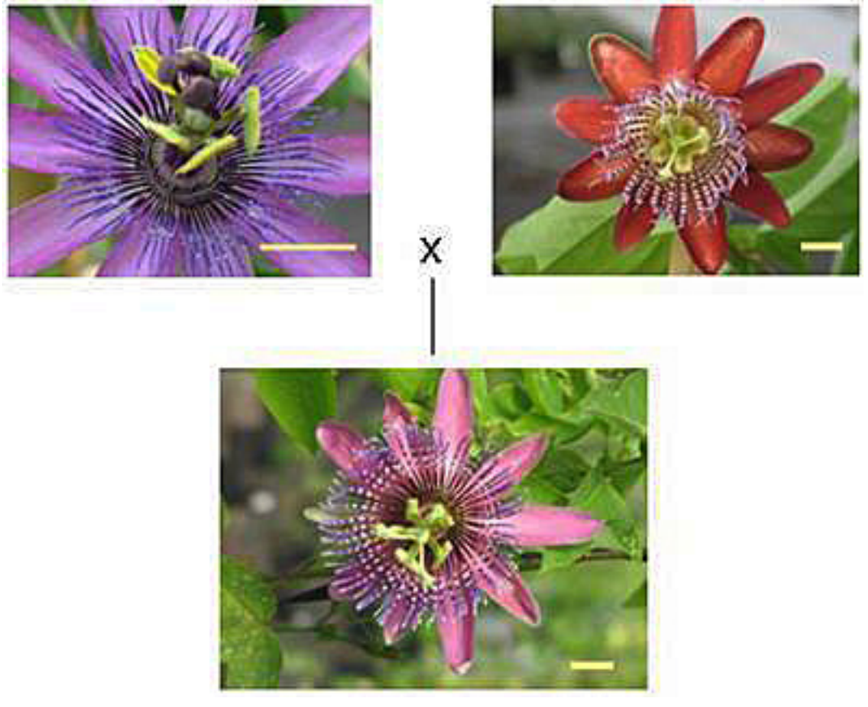

Fig. 7: *Passiflora* interspecific hybrids obtained from the crossing of *P.* 'Amethyst' *and P. alata.* Parents (above); hybrid (below).

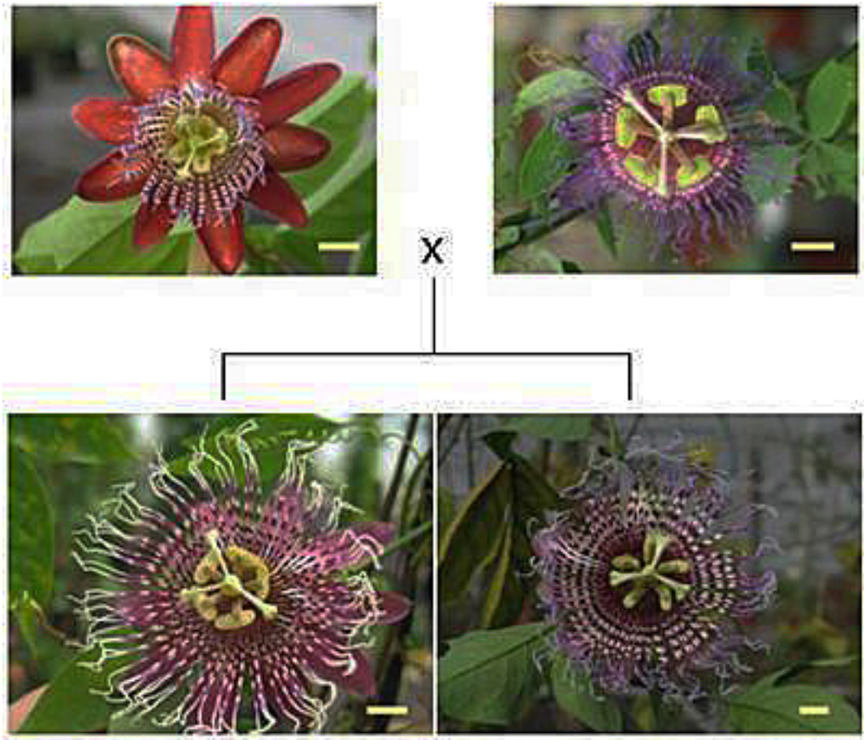

Fig. 8: Passiflora interspecific hybrids obtained from the crossing of P. alata and P. cincinnata. Parents (above); hybrids (below).

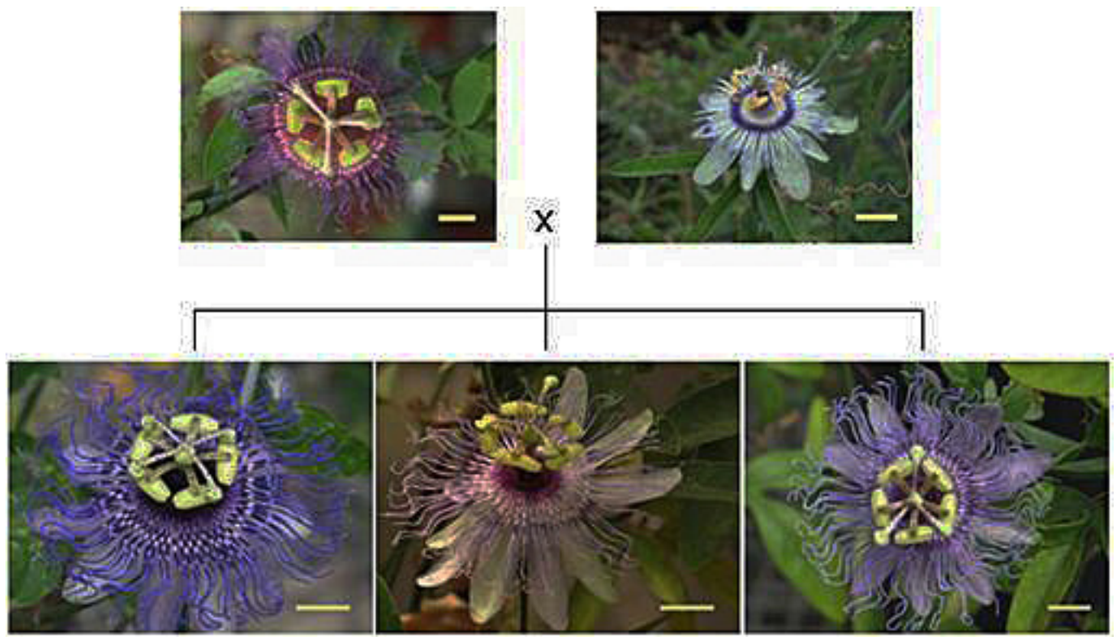

Fig. 9: *Passiflora* interspecific hybrids obtained from the crossing of *P. cincinnata* and P. *mooreana* (diploid). Parents (above); hybrids (below).

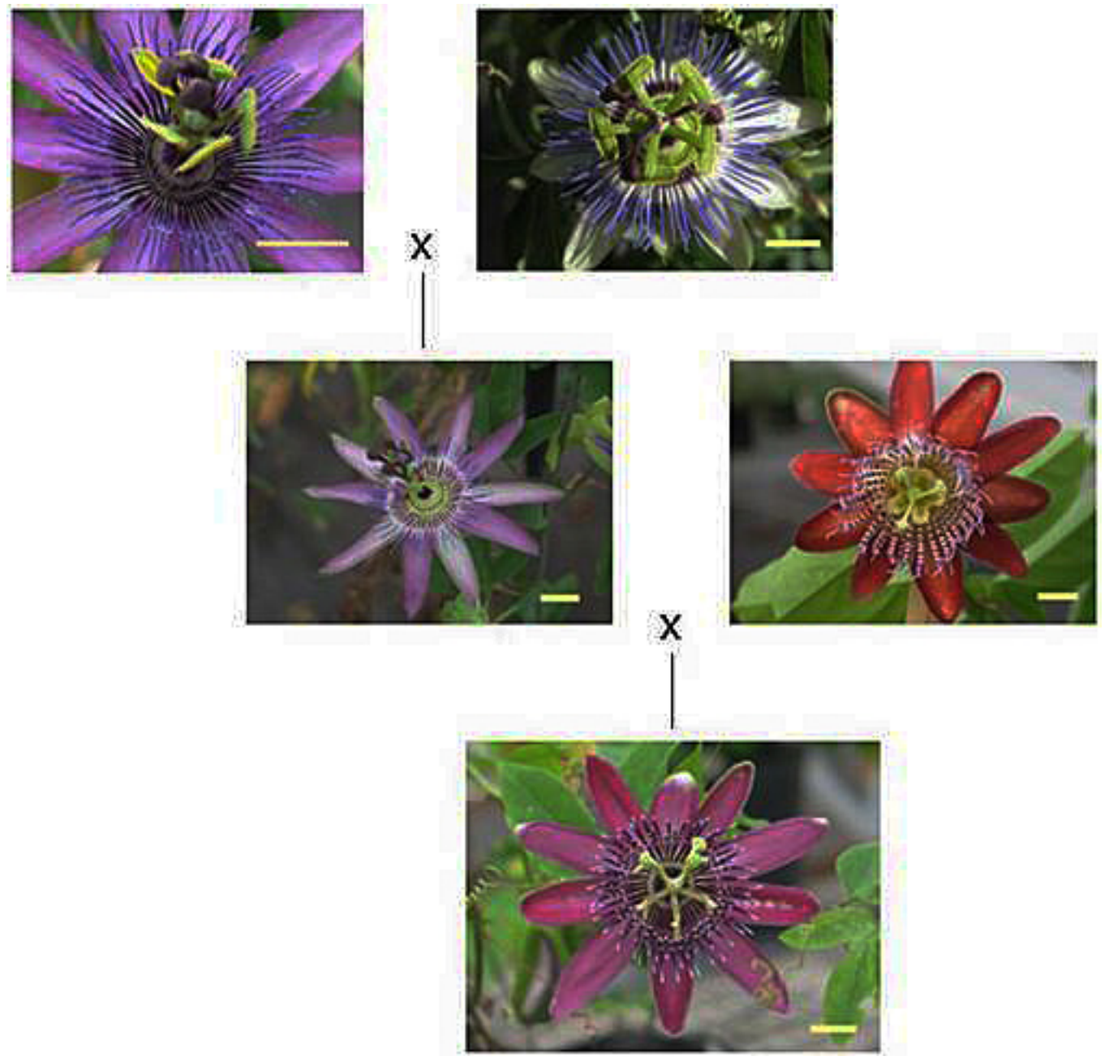

Fig. 10: *Passiflora* interspecific hybrid obtained from the crossing of *P.* 'Amethyst' and *P. caerulea* and three-way-hybrid obtained crossing the hybrid with *P. alata*. Parents of the hybrid (above); hybrid and *P. alata* (middle); three-way-hybrid (below).

Despite the considerable number of interspecific hybrids achieved, only a few of them tolerant to winter temperatures have been obtained - from the crosses between *P. amethystina* and the commercial variety *P.* 'Amethyst' both with *P. caerulea* (cold resistant) as male parent (**Fig. 4 and 6**). On the other hand, relevant information about reproductive success of several other native couples was achieved.

When a parental genotype showed a desirable characteristic, but no fruits were able to be obtained through artificial crosses, the progeny of free pollinations were cultivated. If seeds were abnormal, embryos were rescued from the seeds and cultivated in vitro. In this way, one can get a hybrid knowing the female parent, but not the male parent.

Some of the hybrids from free pollination are showed in **Fig. 11**.

Polyploidy, or having more than two sets of chromosomes, occurs naturally through various mechanisms, but it is rare in wild *Passiflora*. Polyploid species (or individuals) are morphologically similar to their diploid relatives, but often have larger flowers and bigger stronger leaves and growth habit to match. They may also show differences in

Fig. 11: *Passiflora* hybrids obtained by free pollination. a-b-c-d-e: *P.* 'Amethyst' free pollination hybrids; f: *P. alata* free pollination hybrid; g-h-i: Progeny of *P.* 'Amethyst' × *P. edulis* hybrid obtained by in vitro cultivation of embryos.

quantitative genetic characters such as flower colour and cold-tolerance. Also, rarely, the sterility of some hybrids may be overcome in the duplication of the chromosome number. For this reason, we are working on induced polyploidization of selected species and hybrids with some positive results emerging. Two of the obtained polyploids obtained are shown in **Fig. 12**. One of the aims of our breeding program is cold-tolerance testing. For testing hybrids, polyploids and parental species for cold-tolerance in suburban Buenos Aires (34º 36' south latitude, 58º 40' west longitude), plants were placed randomly on tables in field conditions during winter.

Plants were evaluated weekly by visual rank and by the damage of the leaves. By the time of this publication, three cold tolerant hybrids were identified using *P. caerulea* as parental (Bugallo et al., 2011). **Fig. 13** shows some of the plants before, during and after winter period and the disposition at the experiment.

The future of *Passiflora* breeding program in the Institute of Floriculture will continue with hybridization among the native, commercial and the obtained hybrids. Also, we are planning to apply techniques to overcome the barriers to hybridization among some of the species, and to continue with polyploidization and cold-tolerance experiments. In addition, inclusion of variability from other species not considered at the moment could be interesting.

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Fig. 12: *Passiflora*: obtained polyploids. a: *P. cincinnata* free pollination hybrid (left) and its obtained polyploid (right); b: *P. mooreana* natural diploid (left), natural tetraploid (center) and obtained octoploid (right).

Fig. 13: Cold tolerance behavior of parental species and hybrids of *Passiflora* in Buenos Aires. Plant disposition at the beginning of the experiment (a), during the experiment (b) and at the end of winter period (c).

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