



Fig. 1 The little town of El Calvario, in Cundinamarca, with Andean cloud forest beyond.

The genus *Passiflora* contains around 575 species of mostly climbing vines, woody lianas and a handful of perennial herbs. Most species climb by the means of tendrils, a morphological adaptation derived from a lateral shoot, though a few do not display this growth habit and are regarded as scandent shrubs or even freestanding trees.

The majority of passion flowers are distributed in the New World with the centre of diversity in South America, but 24 species are native to Asia and Australasia. Although passion flowers are most famous for their passion fruits, the edible fruits of some, they also sparked the early interest of horticulturists. The exotic, very large and colourful blooms are usually radially symmetric, or actinomorphic. Typical of this genus is the apparently rather bizarre structure, the corona, which rises from around the opening of the

floral tube, and in many species it attracts potential pollinators.

Since the start of my horticultural career I have been fascinated by this genus. Currently I am in the fortunate position of looking after some of these amazing plants as part of my job in the Tropical Nursery at the Royal Botanic Gardens, Kew. Here we grow, in addition to many exotic and often threatened plants, a great diversity of *Passiflora* species ranging from tropical lowland plants to those regarded as hardy within the UK.

Pursuing passion flowers

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Figs 2a & b *P. cumbalensis* in the cloud forest of the Cordillera Oriental



Fig. 3 *P. creuci-caetanoae* in Cundinamarca



Fig. 4 *P. mixta*, the most common species in the eastern Andes



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Figs 5a, b & c *P. lanata* and its strongly pubescent flower bracts in the Cordillera Oriental

In Britain the most commonly grown and hardiest species is the blue passion flower, *Passiflora caerulea*, but a few others – *P. tucumanensis*, *P. incarnata*, *P. lutea*, and *P. tetrandra* – are also suitable for outdoor cultivation. Unfortunately, most others will need either a warm or cool greenhouse.

In August 2017, I went on a three-week travel scholarship to Colombia to explore the country's passion-flower diversity. Despite being only five times bigger than the UK, Colombia is considered the second most biodiverse country in the world. Its floral diversity is enormous, and around a quarter of all known *Passiflora* species are natives. While I visited various habitats ranging from the tropical lowlands to the high Andean cloud forest, I was particularly keen to explore the higher elevations to study species that, given the

right conditions, would be suitable for outdoor cultivation in the UK.

The Andean mountains are a global biodiversity hotspot. Within Colombia, the Andes are divided into three major mountain ranges or cordilleras, known as Cordillera Oriental (Eastern), Cordillera Central (Central) and Cordillera Occidental (Western), which are home to a particular group of high-

altitude passion flowers, the *tacsonias*.

There are around 65 members of supersection *Tacsonia*, which are among the most magnificent and large-flowered species. They differ from most other passion flower climbers in that their pendulous blooms have rather long floral tubes and a corona reduced to tubercles or very short filaments.



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Fig. 6a *P. tarminiana* is in cultivation in local villages



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Fig. 6b Tacso, the ripe fruit of *P. tarminiana*



Figs 7a, b & c *Espeletia grandiflora*, with its very hairy leaf rosettes and yellow flowers, dominates the grass páramo.

This distinct flower morphology and their often pink, violet or scarlet-red colouration make them attractive to hummingbirds, one of the successful pollinators in the Andean cloud forests.

Some Colombian *tacsonias* occur on multiple cordilleras, whereas others are restricted to a single mountain range. They are found in cloud-forest habitats at elevations between 1,700 and 3,100m. This habitat is characterised by a seemingly unlimited supply of water with an average annual rainfall of 2000–3000mm. In the cloud forests, temperatures can easily drop as low as 0°C and for short periods even below freezing point, but maximum temperatures only rarely exceed 20°C.

I was able to study

tacsonias native to the Central and Oriental Cordilleras. The eastern ranges were by far the most species rich. There, in the Departments of Cundinamarca and Meta, I found five different taxa: *Passiflora cumbalensis* (figs 2a & b), *P. creuicaetanoae* (fig. 3), *P. cuatrecasasii*, *P. mixta* (fig. 4) and *P. lanata* (figs 5a, b & c).

The species with the greatest potential for cultivation in UK gardens is *P. lanata*: not only did it have the greatest altitude range but also, morphologically speaking, it was the species that seemed particularly well adapted to cold conditions. The epithet *lanata*, meaning woolly, describes this species well with the thickest pubescence of all *tacsonias*; the new shoots, peduncles

and flower bracts are coated with a solid layer of brownish hairs which protect them from low temperatures. The mainly solitary flowers are equally striking, with vivid pink corollas.

I also explored Antioquia, in Cordillera Central, a well-known hotspot for members of supersection *Tacsonia* though I was able to record only a few.

Economically speaking *P. tarminiana* (fig. 6a) is of great importance as the indigenous people of the Andes have cultivated it for centuries for the delicious edible fruits (fig. 6b). Local common names for these fruits are ‘taco’ or ‘curuba’, whereas in English they are often called ‘banana passionfruit’.

The passion flower I came across at the

highest elevation was, to my surprise, not part of supersection *Tacsonia*. *P. trinervia*, which is endemic to Colombia, is part of subgenus *Decaloba*. It was in an area known as páramo, a unique neotropical high mountain ecosystem found only in the Venezuelan, Ecuadorian and Colombian Andes, generally located well above 3,000m, between the continuous forest line and the permanent snowline. There are three distinct types: subpáramo, grass páramo and superpáramo, each defined by a slightly different type of vegetation. *P. trinervia* is found in the subpáramo, the lowest and most diverse, where shrubs and other low woody vegetation still dominate the landscape.

By far the most unusual habitat I was able to visit was the grass páramo, in altitude around 3,500 – 4,100m. Grass páramo vegetation is mainly grasses, cushion plants, herbs and rosette plants – and no passion flowers! I was especially excited to see the members of the genus *Espeletia*, commonly known as frailejón (figs 7a, b & c). These giant, rosette-forming herbs of the sunflower family (*Asteraceae* or *Compositae*) are found nowhere else in the world. Many of the around 60 species have



Fig. 7c

thick, tall trunks covered by marcescent leaves, and the growing tip is made up of large, succulent, hairy leaves that form a dense spiral; these features protect the plant in the harsh environment of very low temperatures and high UV intensity. Their yellow, daisy-like flowers are in comparison rather inconspicuous. Sadly, many frailejón species are considered endangered as a result of vast habitat destruction.

My trip included attending the annual meeting of the *Passiflora* Society International, which took place near the little town of Anapoima, Cundinamarca. Together we explored the local area looking for wild passion flower species, visited passion-fruit plantations and fruit markets, and gained some understanding of Colombia's biggest passion-

fruit export company and their packaging facilities.

In conclusion, my travel scholarship was a great success. I was able to study a great number of *Passiflora* species in their natural habitat, enabling me to gain a better understanding of the growing conditions they may need in cultivation. Exploring the higher altitude ranges of the Andes gave me an opportunity to see species that have great potential to be hardy in the UK, though few of them have made their way into cultivation yet, despite displaying great horticultural merit. Finally, I made excellent contacts with *Passiflora* growers, and with enthusiasts and experts from Colombia and across the globe.

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