

# Native Flora of Colombia – Restoration and Botanical Displays



Figure 1 Mature *Ficus citrifolia* Mill. at Cartagena Botanic Garden

**Caleb Job**

Royal Botanic Gardens Kew

Course 58 Diploma

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## Declaration

I declare that this report has been written myself and that all photographs used are my own.

## Contents

Declaration.....	2
Table of figures.....	2
Introduction / auto biography of author.....	4
Project Overview.....	4
Aims and objectives.....	5
Itinerary and works programme.....	6
Locations visited.....	28
Summary / conclusions.....	29
Future plans.....	29
Budget break down.....	30
Acknowledgements.....	30
References / Bibliography.....	30

## Table of figures

Figure 1 Mature <i>Ficus citrifolia</i> Mill. at Cartagena Botanic Garden.....	1
Figure 2 Grey and wet climate.....	6
Figure 3 A sea of <i>Espeletia grandiflora</i> .....	7
Figure 4 <i>Espeletia argentea</i> .....	7
Figure 5 <i>Espeletia grandiflora</i> .....	7
Figure 6 <i>Puya</i> sp.....	8
Figure 7 Seedlings grown in different soil mediums.....	8
Figure 8 Seeds collected from Chingaza Paramo.....	8
Figure 9 <i>Bidens andicola</i> Kunth.....	9
Figure 10 <i>Puya santosii</i> Cuatrec.....	9
Figure 11 <i>Hypochaeris sessiliflora</i> Kunth.....	9
Figure 12 <i>Plantago rigida</i> Kunth.....	9
Figure 13 <i>Elaphoglossum</i> Schott ex J.Sm.....	9
Figure 14 <i>Orthrosanthus chimboracensis</i> (Kunth) Baker.....	9
Figure 15 <i>Puya santosii</i> Cuatrec.....	9
Figure 16 <i>Lysipomia laciniata</i> A.DC.....	9
Figure 17 Potting on <i>Monochaetum meridense</i> Nuadin seedlings.....	10
Figure 18 Tropicarium at Bogota Botanic Garden.....	10
Figure 19 <i>Gossypium hirsutum</i> L.....	11

Figure 20	<i>Luffa actutangula</i> (L.) Roxb.....	11
Figure 21	<i>Puya goudotiana</i> .....	11
Figure 22	Palm collection outside of Tropicarium.....	12
Figure 23	Delivering presentation to staff at Bogota Botanic Gardens.....	12
Figure 24	Central church in San Francisco town .....	13
Figure 25	Gustavo Morales planting <i>Magnolia caricifragrans</i> in the town centre with local MP .....	13
Figure 26	Mauricio Bernal nursing the young trees on a bumpy drive.....	14
Figure 27	Supplying landowner Jaime Salazar with <i>Magnolia</i> saplings. ....	14
Figure 28	Jaime and his colleague planting a tree. ....	15
Figure 29	Carrying <i>Magnolia caricifragrans</i> looking for appropriate spot to plant.....	15
Figure 30	Mauricio collecting a sample .....	16
Figure 31	<i>Magnolia caricifragrans</i> flower.....	17
Figure 32	The team .....	17
Figure 33	<i>Passiflora tarminiana</i> .....	18
Figure 34	<i>Theobroma grandiflorum</i> (left) and <i>T. cacao</i> (right).....	18
Figure 35	Fleshy seeds from <i>Monstera deliciosa</i> spadix .....	19
Figure 36	<i>Garcinia madruno</i> .....	19
Figure 37	<i>Annona squamosa</i> .....	19
Figure 38	<i>Inga edulis</i> .....	19
Figure 39	In the field with Oscar .....	20
Figure 40	Orchid voucher specimens.....	20
Figure 41	Trekking through the Andes .....	21
Figure 42	Catching my breath after marching for hours. ....	21
Figure 43	Forest vegetation .....	22
Figure 44	Crossing scary rivers.....	22
Figure 45	Mangrove habitat.....	23
Figure 46	Counting stock in ex-situ collection of Mangrove species. ....	24
Figure 47	Viviparous seedlings.....	25
Figure 48	<i>Rhizophora mangle</i> .....	25
Figure 49	<i>Pelliciera benthamii</i> in flower .....	25
Figure 50	Glands on <i>Laguncularia racemose</i> .....	26
Figure 51	Variations of <i>Stachytarpheta</i> in the Butterfly Garden.....	26
Figure 52	Giving a lecture to biology undergraduates.....	27
Figure 53	Propagation workshop with biology undergrads .....	27
Figure 54	Goodbye selfie with biology students and Santiago .....	28



## Introduction / auto biography of author

My name is Caleb, I am 24 and I have been studying horticulture for the past 5 years. I am from South London and have been fortunate enough to always have a garden along with relatives who hold a keen interest in gardening. Once I completed my A-levels, I flew to Nepal where I travelled independently for 3 months. I spent my first 5 weeks volunteering on a farm that was entirely self-sufficient with principles of permaculture at the forefront of all the growing of edible produce. It was here where I really discovered that I had a great desire to learn about plants.

Not long after returning to the UK, I was working for a private garden maintenance firm in Chelsea and Kensington whilst attending Capel Manor to obtain my Level 2 certificate in Horticulture. Fast forward 5 years and I am soon to graduate from the Royal Botanic Gardens, Kew Diploma.

My interest in visiting Colombia grew whilst writing my dissertation on a Passionflower super-section called Tacsonia which only grows amongst the Andes. This is a group of 66 Passionflowers of which 33 are native to Colombia with 22 species being endemic. Whilst researching the distribution of the Andes through Colombia my interest grew broader from only being interested in passionflowers to the flora of Colombia in general. From researching the diverse habitats that exist within Colombia such as dry coastal deserts, cloud forests and wet Paramos, I concluded that I wanted to explore as much of Colombia as possible so that I could visit a range of landscapes and compare the flora that exist within them. How various Botanical Gardens display their collections was also of great interest to me.

I subsequently planned my travel scholarship to explore central Colombia with a cooler and wetter climate, south Colombia that is both wet and humid and finally north Colombia which is comparatively dryer has a climate more comparable to the Caribbean.

## Project Overview

From my travel scholarship to Colombia, I was successfully able to explore many unique habitats around the country. My trip began in Bogota, the capital city of Colombia. I visited Chingaza National Park which is one of the largest Paramo ecosystems in the Andes where I then got to work with the Paramo collection at Bogota Botanic Gardens. It was fascinating to directly compare in-situ and ex-situ collections of Colombian Paramo species. I then worked with a project that was focussing on the reintroduction of a Magnolia species native to Colombia with a very small wild population. This involved working with local farmers who held a keen interest in helping with this initiative.

Flying south to Florencia I then worked with a professor of agro-ecological engineering who showed me around the department of Caquetá. I visited tropical montane cloud forests, agroforests near the border of Ecuador and an eastern range of the Andes all 3 of which had distinctly different compositions of Flora.

The final chapter of my time in Colombia was spent in Cartagena at the Botanic Garden. Here I worked with the collections, helped teach biology undergrads visiting from Bogota and visited wild mangroves. I was rather unwell during my time here, so I was unable to participate in all of the expeditions I had arranged.

## Aims and objectives.

### In general

- Develop a broader understanding of Colombian flora, Key genera, and plant families and how this varies between environments with different altitudes, temperatures, humidity and plant/pollinator interactions.
- See a *Passiflora* species belonging to Tacsonia in the wild

### Bogota

- Work at Bogota botanic garden to learn about the relationship between the garden and how native flora is displayed to engage the public.
- Take part in any propagation from collecting and sowing seeds to taking cuttings.
- Visit any current in-situ or ex-site conservation projects either with Bogota Botanic Garden or with an independent horticulturist. The same applies for any habitat restoration projects.
- Visit a Paramo ecosystem to see population of *Espeletia grandiflora* Bonpl. in the wild

### Florencia

- Conduct fieldwork in the Andean-Amazonian foothills to help collect and research medicinal and useful plants that can be incorporated into agroforestry systems.
- Learn and try as many new edible plant species as possible.

### Cartagena

- Visit an in-situ collection of endangered mangroves and compare to the collection within Cartagena Botanic Garden.

## Itinerary and works programme.

### Bogota

My first weekend in Colombia was spent northeast of Bogota in Chingaza National Park where I went to visit an example of a Paramo ecosystem. Paramos are high altitude high Andean moorlands which can be found throughout the Andes in Ecuador, Peru, Venezuela, and Colombia. Paramo ecosystems are especially unique in that they are located within the South American tropical biome but with much colder environmental conditions because of the high altitude. Chingaza national park is 77,00 hectares with altitudes ranging from 800 to 4050m and annual mean temperatures ranging between 2 to 10°C. The national park is predominantly grey and wet with occasional breaks of sunlight in January during the dry season.



Figure 2 Grey and wet climate

More than 2000 species of plants have been recorded in Chingaza national park. My aim was to see *Espeltia grandiflora* in the wild and I was fortunate enough to see both this species and *E. argentic* Bonpl. along with naturally occurring hybrids of the two species which was fascinating.





Figure 5 *Espeletia grandiflora*



Figure 4 *Espeletia argentea*

In some instances, *Espeletia grandiflora* was the predominant species, forming carpets for as far as the eye could see.



Figure 3 A sea of *Espeletia grandiflora*



I, Mauricio, and his wife Eliza spent the night in a research centre in the middle of the national park. In the morning we visited a small nursery focussing on the propagation of important species considered pioneers within the Paramo ecosystem in Chingaza national park. Species of *Lupinus*, *Puya*, *Espeletia* and *Erica* amongst others are being grown here as they provide a fundamental ecological service to the wildlife in the national park offering valuable sources of food and habitat for nesting birds. Most of the specimens were grown from collected seed. The nursery men/women shared that they were experimenting with different soil mixes and recording data such as the success of germination.



Figure 7 Seedlings grown in different soil mediums.



Figure 6 *Puya* sp.



Figure 8 Seeds collected from Chingaza Paramo



Other examples of flora found in Chingaza National Park



Figure 10 *Puya santosii*  
Cuatrec.



Figure 9 *Bidens andicola* Kunth



Figure 12 *Plantago rigida* Kunth



Figure 14 *Orthrosanthus chimboracensis* (Kunth)  
Baker



Figure 13 *Elaphoglossum* Schott ex J.Sm.



Figure 11 *Hypochaeris sessiliflora*  
Kunth



Figure 15 *Puya santosii* Cuatrec.



Figure 16 *Lysipomia laciniata* A.DC.



After my first weekend spent with Mauricio Bernal who showed me around the Paramo, he then took me to Bogota Botanic Garden where he works as a horticultural technician. I spent three days working at the garden. During my time there I helped pot on many seedlings belonging to Melastomataceae and Onagraceae as this was a project led by Mauricio to help increase the quantity of pollinator friendly flora within the gardens. I also helped propagate species of Heliconia.



Figure 17 Potting on *Monochaetum meridense* Nuadin seedlings.

On my second day in the gardens, I was given a tour of the recently built Tropicarium which was made up of five various themed sections all of which containing special collections for conservation.



Figure 18 Tropicarium at Bogota Botanic Garden



This included endangered Andean Plants including Super paramo species, species from wet tropical forests and desert forests. One glasshouse was solely dedicated to useful plants as an attempt to inform visitors about where everyday products used such as cotton and chocolate come from.



Figure 20 *Luffa actutangula* (L.) Roxb.



Figure 19 *Gossypium hirsutum* L.

In the afternoon I was shown the ex-situ collections of flora from the Paramo region that I had visited on the weekend. Many of the species that I had seen in the field were part of the collection. A member of staff explained that some species in particular such as *Espeletia* were more difficult to

establish due to the difference in altitude of up to 1500m. However other species such as *Puya goudotiana* Mez were doing well.



Figure 21 *Puya goudotiana*

It was interesting to see how this collection was displayed due to the unique nature of a paramo habitat.



On my final day at Bogota Botanic Garden, Mauricio showed me around the site, told me about the history of the collections and discussed with me some ideas he had regarding the garden going forward.

The garden has an amazing collection of Palms including *Parajubaea coccooides* Burret, *Ceroxylon alpinum* Bonpl. ex DC. and *C. quindiuense* (H.Karst.) H.Wendl.



Figure 22 Palm collection outside of Tropicarium

To finish, I gave a lengthy presentation to both the horticultural and scientific staff at the Gardens. My PowerPoint included the following topics:

- An outline of the Royal Botanic Gardens, Kew – its collections and current projects
- My horticulture is important – Both on a personal level and a broader perspective.
- Observations of Bogota Botanic Garden with constructive criticisms
- Opportunities for staff at Bogota Botanic Gardens at Kew

Separating *Oxalis corniculata* L. from the general green waste is an example of the type of advice I suggested.



Figure 23 Delivering presentation to staff at Bogota Botanic Gardens

This was my first-time public speaking, so it was a bit nerve-racking, but I received positive feedback which was really a confidence booster.



My final two days in central Colombia were spent in San Francisco in the department of Cundinamarca working on a personal project of Mauricio's along with his colleagues Gustavo Morales and Pedro Alvarez.



Figure 24 Central church in San Francisco town

The goal of the project was to increase the number of *Magnolia caricifragrans* (Lozano) Govaerts in the wild. This is an endangered Colombian endemic that few locals know of which is something that Mauricio and his colleagues want to try and change.



Figure 25 Gustavo Morales planting *Magnolia caricifragrans* in the town centre with local MP



The tree saplings were grown onsite at Bogota Botanic Gardens the young specimens were packed into an incredibly retro range rover and off we went.



Figure 26 Mauricio Bernal nursing the young trees on a bumpy drive.

We visited five independent landowners over the course of the two days, provided them with Magnolia trees and *Passiflora emarginata* Bonpl. specimens along the way.



Figure 27 Supplying landowner Jaime Salazar with Magnolia saplings.



Jaime Salazar has a lot of land, so we provided him with several trees and then spent some time looking for the right locations to plant them.



Figure 29 Carrying *Magnolia caricifragrans* looking for appropriate spot to plant.



Figure 28 Jaime and his colleague planting a tree.



Whilst on Jaime Salazar's land, he showed us a mature *Magnolia caricifragrans* tree and so Mauricio took the opportunity to collect a sample of a flower for the record.



Figure 30 Mauricio collecting a sample

To achieve this, Mauricio used his own brand of Pole pruners called Conselva which are very convenient for taking samples of out of reach specimens whilst out in the field.





The flowers from this species of Magnolia are pollinated by a tribe of scarab beetles called cyclocephalini.

Figure 31 *Magnolia caricifragrans* flower

Another duo we worked with was Hernando Garcia (green) and German Andrade (yellow) who work at the Humboldt Biological Research Centre named after Alexander von Humboldt who a keen explorer and plant enthusiast around Latin America. Both Hernando and German play a big role with projects regarding habitat restoration in Colombia.



Figure 32 The team



My time spent with Mauricio and the team that we worked with over the duration of the 2 days was by far the most enjoyable and interesting part of my travel scholarship to Bogota. The guys were very knowledgeable and enthusiastic about their environmental / horticultural efforts. Being able to participate in this venture was incredibly rewarding for me.



Figure 33 *Passiflora tarminiana*

Before leaving Bogota I was over the moon to see *Passiflora tarminiana* Coppens & V.E.Barney growing on a roadside hanging from a tree. This is a species from the Tacsonia super-section and so I was thrilled to see this in the wild.

## Florencia

After my time in and around Bogota, I flew south to Florencia in the department of Caquetá. My contact here was Professor Oscar Perdomo who is an expert of orchids with an interest in agro-ecological engineering.

During my time here I visited the Universidad de la Amazonia where I was shown around by PHD Students conducting their own independent research into agroforestry with many focussing on species of *Theobroma* L. such as *T. cacao* Bonpl. and *T. grandiflorum* (Willd. Ex Spreng.) K.Schum.

I purchased some fresh *Theobroma grandiflorum* pulp which is locally known as Copoazu and I made fresh juice with this in the mornings.



Figure 34 *Theobroma grandiflorum* (left) and *T. cacao* (right)



Figure 35 Fleshy seeds from *Monstera deliciosa* spadix

I expressed a great interest in learning and trying as many new fruits as possible and Oscar made sure I did.

Some were very unpleasant such as the fruit from *Monstera deliciosa* Liebm which left my mouth feeling hot and numb.

Whilst some were so tasty and unlike any fruit I had tried before.

My favourite was *Garcinia madruno* (Kunth) Hammel, a species belonging to Clusiaceae which Oscar explained that we were very lucky to find a tree full of ripe fruit before the local monkeys.



Figure 36 *Garcinia madruno*



Figure 38 *Inga edulis*



Figure 37 *Annona squamosa*

Two other personal favourites were *Inga edulis* Mart. From Fabaceae and *Annona squamosa* L. from Annonaceae.



With Oscar I went to Portico located in the eastern range of the Colombian Andes at 2300m. We explored a large hilltop that Oscar had previously identified over 70 species of orchid as well as describing 3 himself.



Figure 39 In the field with Oscar

I wore wellies, waterproof trousers and a waterproof jacket and I still managed to get absolutely soaked from head to toe.

It was by far the wettest environment I have been in, especially for an extended period of time botanising.

I helped collect voucher specimens of orchids for some of Oscar's students whilst on the hilltop.



Figure 40 Orchid voucher specimens



Whilst in Florencia, I also embarked on a two-day trek into a tropical montane cloud forest above 1000m elevation called El Carano. Here Oscar collected voucher specimens for several species of orchids, and he showed me the native palms of the area along the way. We spent a long day walking to our overnight accommodation.



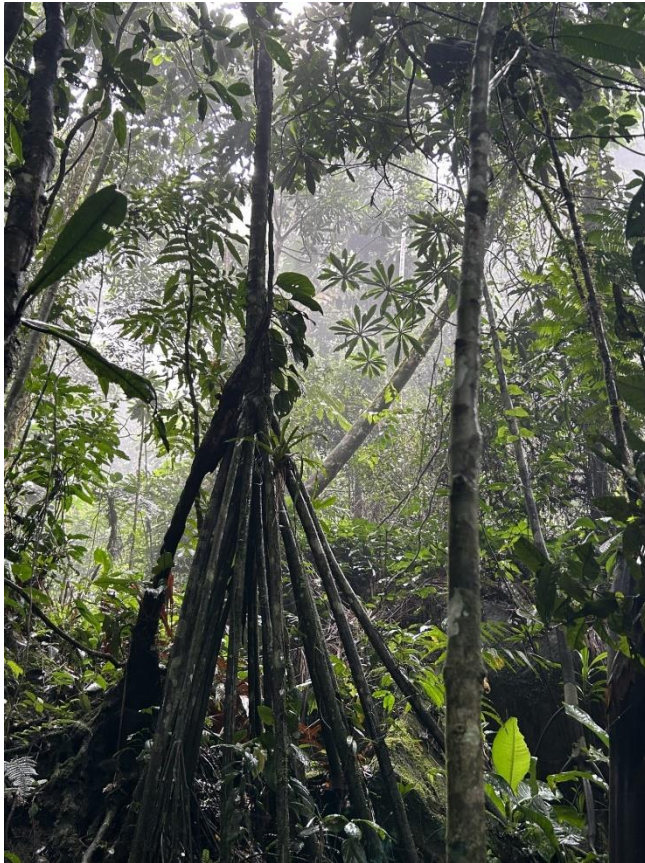
*Figure 41* Trekking through the Andes

The walk included stunning panoramic view of the Andes.



*Figure 42* Catching my breath after marching for hours.





While in the midst of the tropical montane forest, I got to see many palms, orchids and epiphytes.

It was incredibly humid and every bit of vegetation I made contact with tended to have a stream of ants or ambiguous insects on them which I tried to avoid.

*Figure 43 Forest vegetation*

Whilst staying in a cabin in the woods overnight, it rained...a lot! The river that we had planned to cross on the return trip was subsequently a lot deeper than planned but it was the only logical route back to the road with the time constraints that we had. We all linked arms and slowly crossed the river which at times was at chest height. This was scary but once we had passed the deepest point with the strongest current, it was exhilarating.



*Figure 44 Crossing scary rivers.*



## Cartagena

The final chapter of my travel scholarship in Colombia was spent at Cartagena Botanic Garden where I met my contact Maria-Paula who is head of horticulture at the Botanic Garden. This garden is in the far north of the country in the department Bolívar which was by far the hottest and driest part of Colombia that I travelled to.

During my time here I visited a local in situ collection of Mangroves along the coast in Baru.



Figure 45 Mangrove habitat



We then visited a small nursery close by which was growing several mangrove species by seed. I and a member of staff called Camilla from the Botanic Garden spent the day, counting stock, removing dead specimens, and repairing the protective netting that enclose the young plants.



Figure 46 Counting stock in ex-situ collection of Mangrove species.



Many of the same species have recently been brought into the collection at Cartagena Botanic Garden which now has a fantastic display of a mangrove habitat. Camilla taught me some common names of Mangrove species and then gave me the Latin names.

- Black: *Avicennia germinans* (L.) L.
- White: *Laguncularia racemosa* (L.) C.F.Gaertn.
- Red: *Rhizophora mangle* L.
- Tea: *Pelliciera benthamii* (Planch. & Triana) Cornejo
- Buttonwood: *Conocarpus erectus* L.

I learnt that the red mangrove was viviparous meaning that the seeds germinate whilst still attached to the parent plant.



Figure 48 *Rhizophora mangle*



Figure 47 Viviparous seedlings

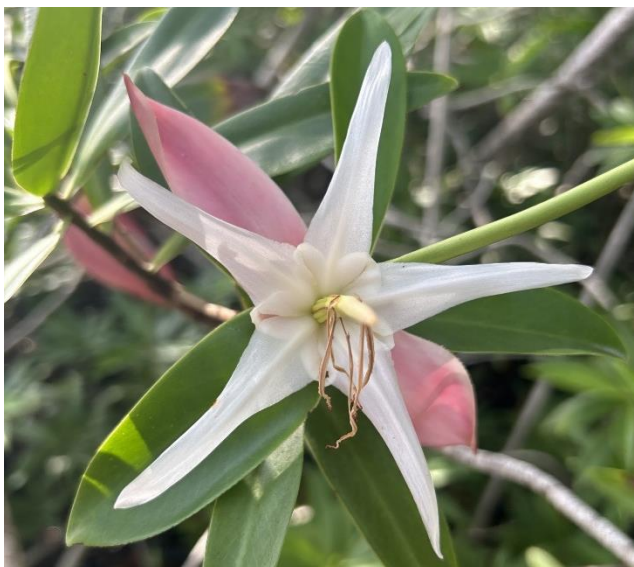


Figure 49 *Pelliciera benthamii* in flower

The tea mangrove had beautiful pink bracteoles to help attract hummingbirds and butterflies which pollinate this species.

I learnt that lenticels are only found on red, black and white types of mangroves and that Tea mangroves are an associate species to white and red mangroves.





Some species of mangroves such as *Laguncularia racemosa* have many glands on the abaxial leaf surface. The primary function of the glands is to excrete excess salt.

At the in-situ collection, there were some signs of damage. Camilla explained that the local crabs were the main cause of mortality among the mangrove species here.

Figure 50 Glands on *Laguncularia racemosa*

At Cartagena Botanic Garden, Maria-Paula has been developing a butterfly garden which was a collection of 3 species of *Stachytarpheta* Vahl. along with hybrids. The three species were *Stachytarpheta microphylla* Walp. *Stachytarpheta* (L.) Vahl and *Stachytarpheta cayennensis* (Rich.) Vahl.



Figure 51 Variations of *Stachytarpheta* in the Butterfly Garden

The garden was full of colour and thriving with Butterflies. On my final day at the Gardens, I was asked by the director of the Gardens, Santiago Madrinan to supervise a group of biology undergraduates from Bogota. He asked me to prepare some activities to teach any aspects of horticulture I thought would be beneficial.



I started the day by giving the students a lecture on...

- An outline of the collections at Royal Botanic Gardens, Kew
- The importance of Horticulture
- The basics of pruning
- How to propagate from softwood cuttings



Figure 52 Giving a lecture to biology undergraduates.



Figure 53 Propagation workshop with biology undergrads

After my lecture, I took the students to the butterfly garden where we cut back the *Stachytarpheta* shrubs.

For some, this was their first-time using secateurs.

With the vegetative material produced from the pruning, I showed the group how to then prepare and pot on the cuttings.



This was the end of my week at Cartagena Botanic Garden and the end of my travel scholarship overall.



Figure 54 Goodbye selfie with biology students and Santiago

## Locations visited.

Chingaza National Park, Cundinamarca

Bogota Botanic Gardens, Cundinamarca

San Francisco de Sales, Cundinamarca

Florencia, Caquetá

Bodoquero, Caquetá - Universidad de la Amazonia

Portico, Caquetá – Andes

El Carano, Caquetá Tropical Montane Cloud Forest

San Antonio de Atenas, Caquetá

Cartagena Botanic Garden, Bolívar



## Summary / conclusions

My travel scholarship went very much to plan. I was lucky enough to make concrete plans with reliable contacts who went above and beyond to make me feel welcome, interested in the work I was doing and most of all, safe. I have returned from my trip with a greater sense of my interests. I can now say that working with Orchids does not excite or inspire me anywhere near as much as working with conservationists working to restore habitats. Colombia is a beautiful country, made up with departments all of which that have their own unique identities. I hope to return to Bogota and work with Mauricio Bernal to help him with more of his own personal projects. Working with locals who are enthusiastic about celebrating their threatened native flora was very rewarding. I have also returned feeling more than capable of getting in front of an audience and talking, given I am talking about a subject I feel I know.

A big take home lesson for me from my travel scholarship to Colombia was the opportunity to recognise my privilege. I recognise how lucky I am to live in the UK where horticulture is an established sector with opportunities for great training and options for career progression. Though I still consider myself to be at the start of my career in horticulture, I felt like I had valuable knowledge and information to pass on to the contacts made and peers I worked with whilst traveling around the country. If the chance to work again in Colombia does come to fruition, I would consider working with gardens and perhaps offering pop-up workshops for their staff in interested.

Regarding the aims and objectives for my travel scholarship... I believe that I managed to accomplish all but one of them. Whilst I did learn about edible flora in Florencia and the popular species used in agroforestry systems, I did not learn about the medicinal properties of the cultivated species in Florencia.

## Future plans

By mid-September, I will have graduated from the Royal Botanic Gardens, Kew Diploma with an Honours of which I am over the moon about. Immediately after graduation, I will be staying in Andalusia in southern Spain for several weeks where I will be looking after an orchard. This will be a new experience for me.

I have just been accepted on to the KLC part time garden design diploma at Cheslea harbour which is facilitated through West Dean College. This is a one-year course, and I am seeing it as an opportunity to build on the basic design skills I have learnt whilst on the Kew Diploma. I will learn how to use digital design software such as Sketch-Up and AutoCAD so that I can communicate beautiful garden designs. My aim is to focus on designing resilient, future proof gardens that can maximise ecological benefits. This course will start in January so my plan for the rest of 2023 is to travel to India to visit gardens, great architectural building and ultimately gain as much inspiration as possible for myself and designs. During the KLC Diploma, I will work a part time job for a garden designer so that I can get as much out of the year as possible. I will hold onto my botanical training and interests and slowly build on these interests of mine in my own time. At the end of 2024, when I have completed the course, I will see what opportunities come my way with a strong preference to working abroad either back in a botanical garden or with a garden design firm. If I can find a job that allows me to pursue my interests in ecology and conservation, then this will be a favourable option.



## Budget break down

- £2500 Grant received from Royal Horticultural Society
- £1500 Grant received from Colegrave Seabrook Foundation / John Gibson Scholarship
- £500 Grant received from Hardy Plants Society
- £500 Grant received from Bentham Moxon Trust

**Total Grants received £4000.00**

Table 1 Table of expenses

Expense type	Estimated amount to be spent £	Actual amount spent £
Airfare	1485.00	1690.00
Train / Bus	20.00	60.00
Care Hire / Petrol	0.00	180.00
Accommodation	810.00	930.00
Food	900.00	760.00
Vaccinations	348.00	348.00
Tour guides	0.00	145.00
Contingency – 10%	350.00	-----
<b>Total</b>	<b>3913.00</b>	<b>4113.00</b>

## Acknowledgements

I would like to express the highest gratitude to the funding bodies that helped fund my trip. I could not have travelled to Colombia without you all and for that I am extremely grateful. I have learnt more than I could have wished for, and I have returned to the UK with a refined sense of my horticultural interests. Special thanks to the Royal Horticultural Society, Colegrave Seabrook Foundation, Hardy Plants Society and Bentham Moxon Trust.

I would also like to thank the primary contacts that helped bring my proposed trip to Colombia to life. Thank you Mauricio Bernal, Oscar Perdomo and Maria-Paula.

## References / Bibliography

*Kew science* (no date) *Plants of the World Online*. Available at:  
<https://powo.science.kew.org/> (Accessed: 03 September 2023).

All stats / information used in this report are from my personal notes from personal communications throughout my travel scholarship.