

Top Ten Botanic Gifts from the Andes

Newton Fund Workshop on Plant Dynamics and Climate Change in the Andes, Mendoza 2018

1#*Solanum* From the Andes to you frenchfries!

The genus *Solanum* is among the top ten most species-rich genera in the tropical Andes. This genus includes cultivated species of **the world's principal food crops such as potato and tomato**. The Andes is the origin centre and the premier centre of *Solanum* diversity. Also, three of the four cultivated potato species only grown in the Andes, what represents a great genetic diversity linked to these amazing mountain ecosystems. Text by: P. Gonzales. Pics: P. Gonzales



Figure 1. *Solanum cantense*, one of the 107 of wild crop relatives of potato (*Solanum* section *Petota*), endemic of the central Andes region in Peru



Figure 2. *Solanum candolleianum*, a member of the wild crop relatives of potato growing in the high Andean Puna, above 4000 m.



Figure 3. *Solanum corneliomulleri*, a member of the wild crop relatives of tomato (*Solanum* section *Lycopersicon*), distributed in the western slopes of the Andes

2#*Espeletia*

Espeletia (frailejones): a daisy with a difference! Endangered by habitat destruction in high Andes, their furry leaves collect water vapor and release it to irrigate land below. Text by: A. Davey. Pics: @RBGE_Science @RBGE_Education MSc FieldCourse



Figure 4. *Espeletia* sp. (Compositae) plants in high tropical Andes

3#*Polylepis*

-The remarkable evergreen trees *Polylepis* sp. which belongs to the rose family, forms the **highest altitudinal forests in the world** with species growing up to 5000 metres. Most species only survive in small relict populations and as the Andes lose their ice sheets, as a result of climate change, the seeds will be a vital resource for reforestation and restoration. Text by: M. Gardner

-*Polylepis* forests are distributed along the Andes Mountains from Venezuela with *Polylepis sericea* to Argentina with *Polylepis australis*. They are also distributed in different environments such as *Polylepis tarapacana* over 5000 m.a.s.l. in semi-arid environments up to 2500 m.a.s.l. as *Polylepis pauta*. Text by: J. Requena-Rojas.

-The genus *Polylepis* consist of 28 shrubs or trees species with usually twisted trunks, which can reach a height of 27 m and a diameter of 2 m. They dominate occasional vegetation where the Andes hold the world's highest elevation woodlands between 4000 and 5200 m.a.s.l., providing numerous ecological services, such as biodiversity conservation, soil erosion reduction, carbon capture, clean water provision, and wood and medicinal plants for local communities. Text by: D. Alarcón



Figure 5. *Polylepis tarapacana*. Photo credit J. Requena-Rojas and H. Quispe

4#Orchids

Orchids are a prominent component of the Andean flora for they virtually occur across the whole elevational range of the cordillera below the snow-line. They also account for ca 20% of total plant Andean species diversity and often they are counted amongst the most speciose lineages in key ecosystems of the mountain such as dry and cloud forests. More importantly, **the Andes is the premier centre of orchid diversity and evolutionary hotspot worldwide** because it promoted and hosted multiple rapid diversifications during the Miocene that gave rise to the two largest orchid clades in the tropics: the miniature babyboot (Pleurothallidinae, ~5000 species) and the boat orchids.(Cymbidieae, ~3000 species).Text by: O. Perez-Escobar. Pics: O. Perez-Escobar



Figure 6. *Scaphosepalum gibberosum*, one of the 5,000 species of babyboot orchids (Pleurothallidinae), endemic to the Northern Andes region in Colombia.



Figure 7. *Kefersteinia parvilabris*, a member of the boat orchid clade (Cymbidieae), distributed in the cloud forests of the Northern Andes.

5#*Nothofagus pumilio* Lenga

Nothofagus pumilio (Poepp. & Endl.) Krasser, (Lenga) is one of the most widespread tree species of the temperate forests of South America. With a latitudinal distribution range spanning 34° and often forming the upper altitudinal treeline, it is the common denominator of the many forest types that cover the flanks of the Southern Andes. It thrives in some of the harshest conditions present in the Andean Forests, where it has irreplaceable ecological roles. It produces fine wood which is used for furniture, flooring and outdoor structures. With its wind-twisted flag trunks and its leaves turning red in autumn it creates truly emblematic views of Patagonia. Text by: C. Pissolito. Pics: M. Chiuffo.



Figure 8. Near the upper treeline Lenga trees change colour during autumn and prepare for several months under the snow, at 42° S, the midpoint of their latitudinal distribution this takes place at ca 1500 m.a.s.l.

6#Fitzroya

Fitzroya cupressoides or Alerce is the only species of this genus, the longest-lived tree of the Southern Hemisphere reaching more than 3600 years, and one of the most compelling tree species of southern South America. *Fitzroya* is a slow growing tree that inhabits rainy and poor soil sites in southern Chile and adjacent areas of Argentina. It can reach large sizes, up to 50 m height and 4 m diameter, so large amounts of carbon can be stored for several centuries in pristine forests. Due to its past over exploitation and forest fires it is currently endangered and illegal cuttings still threat its conservation. Text by: R. Urrutia-Jalabert. Pics: Y. Malhi, A. Lara, A. Farías



Figure 9. Alerces from the Alerce Costero National Park. Photo credit Aldo Farías.



Figure 10. Alerces from the Alerce Andino National Park. Photo credit Y. Malhi



Figure 11. Photo credit A. Lara

7#Cactaceae

The family *Cactaceae* comprises around 200 genera and 2000 species **native to America**, with most of species aggregated at the Tropics. Cacti are **typical but not exclusive of arid lands**. Plants are **succulent** and perennial. They are distinguished from other succulent plants by the presence of **areoles**, they are modified branches from which flowers, branches or leaves may grow. In most plants the leaves are reduced, absent or modified as spines, minimizing the area from which water can be lost, and the stems are photosynthetic. Flowers are often large, colourful and very attractive and can be pollinated by wind, birds, insects or bats. **Cacti flowers are astonishing!** Habitat destruction and illegal collection for international trade are the mayor conservation threat to cacti and the hole group is covered by **CITES** (Convention on the

International Trade of Endangered Species of Wild Fauna and Flora). Text by: V. Aschero. Pics: M. Ferreyra and D. Alarcón



Figure 12. *Maihuenia patagonica* forming a pink lovely spot in the harsh open habitats in the Patagonian steppe. Photo credit M. Ferreyra.



Figure 13. *Eryosice chilensis* endemic cactus from Chile with a very restricted distribution (~56 km²). Photo credit D. Alarcón.

8#Bromeliaceae (*Puya* genus)

The terrestrial bromeliad genus *Puya* (Bromeliaceae) comprises more than 200 shrub species and occurs from sea level to about 5000 m a.s.l. mainly confined to the Andes. They have **successfully colonized different kind of habitats** in semixeric to xeric Andean habitats, but also more humid habitat at lower elevations. They are an example of a rapid radiation during the last 3.5 million of years, with a wide spectrum of variation in morphology and physiology. Their more than 4 m **tall inflorescences** have flowers with impressive colours from yellow to metallic blue and purple, and they are a **source of nectar for an important number of insects and hummingbirds** through their whole distribution across the Andes. Some

of their species are threatened by conversion for crops and cattle uses, human produced fires and the collection of their edible young leaves. Text by: D. Alarcón. Pics:D. Alarcón



Figure 14. Inflorescence close view of *Puya alpestris subsp. alpestris*. Photo credit D. Alarcón



Figure 15. *Puya raimondii* occurs in the high Andes of Peru and Bolivia. It is famous for having the largest inflorescence in the world. Plants grow to 15m tall. They are threatened because as these image show they are burnt by local people. Text: Martin Gardner. Photo credit C. Magdalena

9#*Azorella* genus

The genus *Azorella* (*Yareta*, *llareta*; *Apiaceae*) comprises around 36 species distributed from high tropical Andes to subantarctic islands. Some species of this genus are cushion forms looking like “green clouds over the ground” in the Andean vegetation. It is known that *Azorella compacta* grows very slowly (~0.4 cm per year). Therefore, **many individuals could be as old as 3000 years** given their diameter. Yaretas have being **appreciated along the Andes** as fuel because they are like “subterranean trees” but mostly because the resin exuded by plants is traditionally collected to treat illnesses, inflammation and pain. *Azorella* plants are incredible, they are extremely resistant to abiotic stress and they are **one of the plant species reaching highest elevation in the world** (5300 m.a.s.l.). At these high altitudes *Azorella* cushion plants moderate their closest environment acting as **nurse plants** that favour the persistence of other non-chushion species. Text by: V. Aschero, K. Speziale and M. Ferreyra. Pics: D. Alarcón, M. Ferreyra



Figure 16. *Azorella monantha* forming a cushion green balcony with yellow flowers at Valle Hermoso, Mendoza, Argentina. Photo credit M. Ferreyra



Figure 17. *Azorella compacta* in Northern Chile forming green cushions along the landscape. Photo credit D. Alarcón

10#*Araucaria araucana* (Molina) K.Koch

Araucaria araucana or Monkey Puzzle tree is an **Endangered conifer considered a living fossil**, being the only species of the genus living in the Andes. It occupies only 392.51 in both sides of the ranges. It has developed adaptations to survive the effect of volcanoes, fire, landslides, snow avalanches and wind as thick bark and epicormic buds. This predominantly dioecious species produce relatively heavy seeds that turn into important food supplies for native species and humans. Currently it is **threatened by human activities as seed overexploitation, biological invasions and land use change.**

Text by: K. Espeziale

Pics: F. Hiraldo



Figure 18. Mixed *Araucaria - Nothofagus* forest in autumn



Figure 19. Pure *Araucaria araucana* forest.