

THE ECOLOGY AND CULTIVATION OF TERRESTRIAL ORCHIDS OF ARGENTINA

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ABSTRACT

A study of the ecology and culture feasibility of 9 species of native orchids from Argentina: 2 belonging to the genus *Sacoila*, 1 species of *Skeprostachys*, 1 species of *Pelexia*; 3 species of the genus *Habenaria* and 2 of the genus *Chloraea* were performed. The individuals were cultivated in the City of Buenos Aires from propagules or adult plants in pots with soil from the collection sites. The production of aerial and reproductive stems, as well as storage organs, was observed. The watering was managed according to the climatic conditions of the collection place. After at least one period of growth the adaptation to culture was evaluated. The species under study live in different ecosystems from forests to grasslands. Most of the species responded positively to their cultivation in containers. We discuss the possible use of these species for gardening, the suitable conditions for their cultivation and the importance of the data obtained in the ex-situ conservation of these terrestrial orchids.

INTRODUCTION

The Orchidaceae are terrestrial, epiphytic, or saprophytic herbs comprising one of the two largest families of flowering plants with about 1,000 genera and 15-20,000 species. In Argentina ca. 200 species of orchids, distributed in 41 genera, can be found in subtropical and temperate areas in different kind of environments (Dressler, 1993; Johnston, 2001).

Most of these species are perennial, emerging each season, reproducing, and then entering dormancy at the end of the season. These plants have evolved specialized requirements in their habitats. Each orchid species will germinate and grow only when these requirements are optimal. Orchids are also unique in their methods of fertilization, seed production, germination, and pollination strategies. Due to the symbiotic relationship between orchid and fungus (mycorrhizae), many orchids can remain underground for many years, building food reserves and energy to commence flowering and reproduction. After this large expenditure of energy, the plant will return

underground for several more years. During this underground phase, the orchid survives using food and energy provided from its mycorrhizal symbiont. The orchid will re-emerge when nutrient reserves are sufficient for another attempt at reproduction. This underground phase explains why many orchid species are not found in the same place from year to year. Because the evolutionary path of orchids is long, each species has had the time to adapt to a specific niche in the environment. Each species is typically associated with a specific set of habitat conditions such as nutrient availability, sunlight, and water. The low plasticity of orchids may be the result of the specific conditions needed to form the mycorrhizal association mentioned above. Because some orchids are considered mid-successional species and compete poorly with other vegetation, some species actually respond positively to certain disturbances, such as fire (Gleason and Cronquist, 1991).

The introduction of potential new ornamental crops includes the study of their biology, developing crop production, propagation techniques, and breeding improved cultivars. There is very little information about terrestrial orchids cultivation, so the main goal of this research is to obtain the specific cultural requirements such as temperature, water, and other needs of terrestrial orchids from Argentina.

MATERIALS AND METHODS

From 1996 to 2002, adult individuals or propagules of terrestrial orchids from different locations in Argentina were collected and identified, if possible, to species using available references (Williams, 1939; Correa, 1950; Johnson, 2001). Plants were cultivated in pots containing soil from the collection place and sterilized substrate. Repotting was performed in the same way with special care to keep part of the original substrate. The plants were grown under controlled conditions in a greenhouse in the Faculty of Agronomy, University of Buenos Aires. The watering was restricted completely during the underground period, according to the climate conditions in the area of origin. The species from Patagonia (*Chloraea magellanica*) remained in a refrigerated area of the greenhouse (with temperatures near 7° C day and night) for 60 days. No additional lighting was provided. Vegetative, reproductive, and storage organ development were observed. A hardiness zone map for South America based on that of the USDA (Cathey, 1990) can be found in <http://www.plantideas.com/zone/sazone.html>. We used this zone map and created a hardiness index according to how difficult it is to cultivate them in our local conditions. Index values range from I = difficult to V = easy.

RESULTS

In Table 1 (page 54) can be found the origin, the habitat and the kind of soils where the plants were found. Most of the species live in open areas like grasslands or wetlands in north and central Argentina. *Sacoila lanceolata* and *Habenaria gourleana* have the broadest distributions in Argentina, and have been cited in 17 and 16 provinces of Argentina respectively. *S. lanceolata* is very common but *H. gourleana* can only be found in wet sandy soils in small populations.

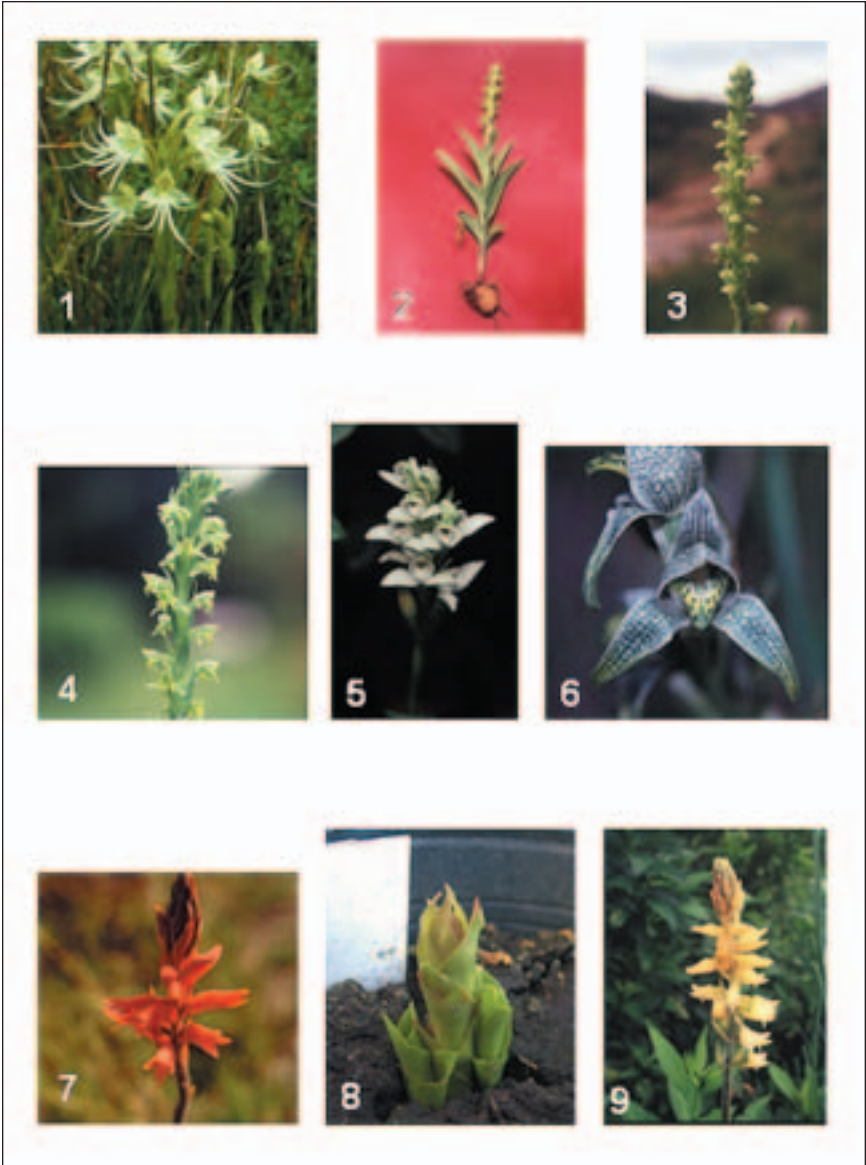
SPECIES STUDIED

Habenaria gourleana. Perennial herb from 50 to 80 cm tall, growing from fleshy tubers; the roots are long and fleshy. The flowers are white, grouped in a raceme, fragrant especially during the evening, with a 13 cm long spur protected by the bracts. This species occurs in wet sandy soils in north and central Argentina. Flowers are visited by nocturnal moths (Galletto et al., 1997). Under culture the stems sprout in October, produce flowers during January and dry down in March. Watering must be completely suppressed from April to September. Zone 9A, 9B; Index I. (Fig. 1).

Habenaria hyeronimii. Perennial herb from 20 to 30 cm tall, growing from fleshy tubers. The flowers are green with a short spur and are grouped in a raceme. This species occurs in sandy soils in central Argentina. Under culture the stems sprout in October, produce flowers during January and February, and dry down in March. Watering must be completely suppressed from April to September. Zone 9A, 9B; Index I. (Figs. 2, 3)

Habenaria parviflora. Perennial herb from 30 to 40 cm tall, growing from fleshy tubers. The flowers are small and green with a short spur and grouped in a raceme. This species occurs in wet soils in northern Argentina. Under culture the stems sprout in September, produce flowers during December to January, and dry down in March. During the rest period watering should not be suppressed. Zone 10 A; Index III (Fig. 4).

Chloraea membranacea. Perennial herb from 40 to 50 cm tall, with fleshy roots. The flowers are white, grouped in spikes, and visited by halictid bees. The species can be found in forests in the north and east of Argentina. Under culture the stems sprout in June, produce flowers during October and dry down in January. During the rest period watering should not be suppressed. Watering during August and September is crucial for the development of flowers. In dry winters many of the plants do not bloom at all. Zone 9 A; Index V (Fig. 5)



Figs 1-16: ARGENTINE TERRESTRIAL ORCHIDS 1. *Habenaria gourleana* 2-3. *Habenaria hyeronimi* 4. *Habenaria parviflora* 5. *Chloraea membranacea* 6. *Chloraea magellanica* 7-8. *Sacoila lanceolata* (reddish flowers) 9-10. *Sacoila lanceolata* (yellowish flowers) 11-12. *Sacoila* sp. 13-14. *Skepsrostachys paraguayensis* 15-16. *Pelexia* sp.



Chloraea magellanica. Perennial herb from 30 to 60 cm tall, with fleshy roots with large, white and green veined, fragrant flowers, grouped in spikes. The species can be found in open areas, shrublands and grasslands near forests in the southwest of Argentina. Under culture the stems sprout in August, produce flowers during January and dry down in March. During the rest period watering should not be suppressed, but temperatures below 8°C for at least 60 days are required. Zone 7; Index I (Fig. 6).

Sacoila lanceolata (reddish flowers). Perennial herb from 50 to 80 cm tall, with fleshy roots. Flowers are reddish with a white labellum, grouped in spikes. Flowers are visited by hummingbirds (Galetto et al, 1997). The species can be found in dry shrublands and grasslands in central Argentina. Under culture the stems sprout in August, produce the flowers from September to November, and dry down in April. During the rest period (May to August) watering must be completely suppressed. Zone 9A, 9B; Index III (Figs. 7, 8).

Sacoila lanceolata (yellowish flowers). Plant is similar to the former but the flowers are yellowish with a white labellum, or the outer tepals are light yellow and the inner tepals are white. The populations that we found with this flower color came from the northeast of Argentina, growing in shrublands or forests. Under culture the leaves remain throughout the year or the rest period is short (1 month) during September. Flowers are produced from November to December. Watering must not be withheld at any time. Zone 9B, 10A; Index IV. (Figs. 9, 10)

Sacoila sp. Perennial herb from 70 to 100 cm tall, with fleshy roots. Flowers are reddish with a yellow labellum, grouped in condensed spikes. The species can be found in stony places in northwest Argentina. Under culture the stems sprout in October, produce flowers in February, and dry down in April. During the rest period (May to September) watering must be completely withheld. Zone 9 B; Index I (Figs. 11, 12).

Skeptrostachys paraguayensis. Perennial herb from 25 to 40 cm tall, with fleshy roots. Flowers are white, grouped in condensed spikes. The species can be found in grasslands or savannas in northeast Argentina. Under culture, the leaves remain throughout the year. Flowers are produced from January to March. Water need not be withheld. Zone 9B; Index V. (Figs. 13, 14).

Pellexia sp. Perennial herb from 30 to 50 cm tall, with fleshy roots. Flowers are white, grouped in condensed spikes. The species can be found in stony grasslands in central Argentina. Under culture the stems sprout in October, produce flowers during February and March, and dry down in April. During the rest period (May to September) water must be completely withheld. Zone 9B; Index III (Figs. 15, 16).

CONCLUSIONS

The species studied come from different kind of climates and soils, most of them growing in wet to dry grasslands. Under culture they bloom normally and, if hand pollinated, produce seeds. Our observations suggest that the success in cultivating the species with hardiness index I to III lies in making sure that no water is received during the rest period.

Recently some species of terrestrial orchids has been introduced as new ornamental crops, e. g. *Chloraea* in Chile (INDAP, 2001). Some of the species studied have potential as ornamental crops. *Chloraea membranacea* and *Skeptrostachys paraguayensis*, for example, can be easily cultivated in Buenos Aires, grown in shaded humid places in the garden.

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Table 1. Geographical distribution, location, habitat and soil features of the studied species.

Species	Geographical Distr. in Argentina	Location of the cultivated individuals	Habitat	Soil
<i>Habenaria gourleana</i>	North and Central	Buenos Aires Province, vecinities of Mar del Tuyú	Wet areas between dunes	Sandy wet soils
<i>Habenaria hyeronimi</i>	Central	Cordoba, El Zapato	Rocky hills	Sandy soils between rocks
<i>Habenaria parviflora</i>	North east	Corrientes, Garruchos	Grasslands	Humid soils
<i>Sacoila lanceolata</i> (red flowers)	Central	San Luis, Papagayos Cordoba, El Zapato	Dry grasslands	Sandy soils
<i>Sacoila lanceolata</i> (yellow flowers)	North east	Corrientes, Santiago del Estero	Grasslands	Sandy soils
<i>Sacoila</i> sp	North west	Salta, Escoipe	Rocky Slopes	Sandy soils between rocks
<i>Chloraea membranacea</i>	Central	Buenos Aires, Magdalena	Dry forest	Calcareous soils
<i>Chloraea magellanica</i>	South	Rio Negro, Bariloche		Sandy soils between rocks
<i>Skeptrostachys paraguayensis</i>	Central	Entre Rios, Colon	Grasslands and savannahs	Sandy soils
<i>Pelexia</i> sp.	Central	Cordoba, El Zapato	Rocky hills	Sandy soils between rocks