

CONSERVATION OF THE EXTINCT
TOROMIRO TREE

SOPHORA TOROMIRO

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Summary. One of the extinct flowering plants of Easter Island (Rapa Nui) is the TOROMIRO TREE, *Sophora toromiro* Skotts. (Leguminosae) which is, however, maintained in cultivation in several botanic gardens. An outline of the history of the flora of the island, and of the TOROMIRO in particular, are given. The efforts of the Toromiro Management Group to secure its future, and its successful re-introduction to the island, are described.

Easter Island (Rapa Nui), has been described as the most remote piece of inhabited land on the planet, being located about 2250 km from Pitcairn, the nearest other populated island. This tiny land mass, an area of 166 square km or 64 square miles, shares with St Helena (South Atlantic Ocean) and Rodrigues (Indian Ocean) the

fate of having suffered the complete transformation of its terrestrial ecology, so that virtually no natural habitat survives. Such islands are characterized by high levels of environmental degradation and species extinction. With the main phase of environmental destruction on Easter Island (Rapa Nui) having passed, the opportunity now exists to restore degraded habitats and re-introduce lost components of the biota.

One lost element of Easter Island's flora is the TOROMIRO TREE, *Sophora toromiro* Skottsb., now only surviving in cultivation. The conservation of this threatened legume is being co-ordinated by the Toromiro Management Group a collaborative consortium of botanic gardens, geneticists, foresters and archaeologists.

The causes of the loss of original shrub and forest can be traced to ecological and social change following colonization by Polynesians around 400 AD, and later colonial settlement of the island. An endemic palm *Paschalococos dispersa* is extinct and the TOROMIRO only survives in cultivation. There are three surviving endemic flowering plant species, all Gramineae, *Axonopus paschalis*, *Danthonia paschalis* and *Paspalum forsterianum*, and 25 indigenous species, a number of which survive at very low population numbers, for example *Triumfetta semitriloba* (Tiliaceae) and *Caesalpinia major* (Leguminosae). The fern flora has been researched by Professor R. Rodriguez of Concepcion and will be reviewed in a forthcoming volume of the *Flora of Chile*.

The first European visitors commented on the island's treeless state; Roggeveen noted in 1722 that the island was 'destitute of large trees' and Gonzalez in 1770 stated that 'not a single tree is to be found capable of furnishing a plank so much as six inches in width'. Palynological data suggests that the island was covered by a low scrub and woodland with palm thicket. The grassland areas have expanded as a result of forest clearance, cultivation and associated soil erosion. By the seventeenth century the island had become a man-made landscape of agricultural plots with only small patches of the original scrub surviving. This process of degradation was completed in 1866 with the introduction of rabbits, sheep, pigs, horses and cattle.

The first scientific collection of *Sophora toromiro* was made in 1774 by J. R. and G. Forster during the second of Cook's voyages; this specimen is still held in the Herbarium of the Natural History Museum (BM). Notes at the time suggest that the species survived

as scattered thickets; Forster wrote that Hanga Roa 'was covered with a shrubbery of *Mimosa* (= *Sophora toromiro*), which grew here to a height of 8 or 9 feet.' In the late 1880s Thomson recorded 'small clumps of the *Edwardsia* (= *Sophora toromiro*), *Broussonetia* and *Hibiscus* but all were dead, having been stripped of their bark by the flocks of sheep.' The last surviving wild specimen was photographed by the 1934–35 Mertraux–Lavachery Mission and this small tree was growing on the inner slopes of Rano Kau crater. Protected by rock scree, from predation by introduced livestock, this specimen survived until 1960 when it was chopped down for firewood. A collection from this tree provided the type specimen for the botanical description when it was named by Carl Skottsberg in 1922 and was the source of the seeds collected by Thor Heyerdahl during the 1955–56 archaeological expedition to Easter Island (Rapa Nui). This collection was presented to the Nuturhistoriska Riksmuseet in Stockholm. In the autumn of 1958 seeds were transferred to the Göteborg Botanical Garden and six or seven were sown.

The species was listed as 'probably extinct' in the IUCN Red Data Book for Plants in 1978. The first records of cultivation date back to the early years of the twentieth century. The Royal Botanic Gardens, Kew, distributed plants raised from seed collected by Routledge in 1917. Stock was also cultivated at the Göteborg Botanic Garden in 1919–1920 derived from seed collected by Skottsberg. Neither of these introductions have apparently persisted in cultivation. The TOROMIRO was subsequently rediscovered in cultivation in European botanic gardens, and stocks currently in cultivation are descended from four seedlings germinated at the Göteborg Botanic Garden in 1959 from the Heyerdahl collection made in 1955–56. This initial stock was derived from one tree and was likely to have arisen as a result of self pollination. During the period from the late 1970s Göteborg distributed plants to a number of botanic gardens.

Sophora toromiro is also cultivated at the National Botanic Garden, Viña del Mar, Chile; this is thought to derive from seed collected on Easter Island by Efrain Volosky who donated the seed to Patricio Montaldo, Director of the garden from 1952 to 1959. Although there is no documentation on the collection, a herbarium specimen of *Sophora toromiro* exists in the Santiago Herbarium (SGO) collected by Volosky in 1953. In addition to the plants growing at Viña del Mar, there are a number of trees growing in private gardens and nurseries but none of these has any documented origin. At one site, one of the

trees was killed by an irate neighbour, frustrated by the level of trespassing from visitors to the trees. In 1994 seeds were sent from one of the Santiago trees to Missouri Botanical Garden, with the seedlings being established subsequently at the Waimea Arboretum and Botanical Garden, Hawai'i. In 1996 a new cultivated population was discovered in the Royal Botanic Gardens, Melbourne, Australia but the origin of this stock is not recorded.

The Toromiro Management Group (TMG) comprises a number of collaborating agencies committed to the conservation of *Sophora toromiro* and its recovery, together with that of associated island habitats within the ecology and culture of Easter Island (Rapa Nui). The primary objective for the TMG is to secure the TOROMIRO from extinction, firstly by establishing it in cultivation, then by re-introducing a genetically and demographically viable population to Easter Island (Rapa Nui). The TMG has undertaken a global search and located all available TOROMIRO trees in cultivation, and a directory of trees is held at RBG, Kew with associated data from genetic fingerprinting. It is evident that very little genetic diversity exists within the surviving population. Using this data a propagation programme is being designed to establish plantations of trees in Europe, Chile and Easter Island. The TMG is working with the Corporación Nacional Forestal (CONAF) on the repatriation of toromiros to Easter Island (Rapa Nui). In 1995 an experimental re-introduction, utilizing 150 plants from the Bonn and Göteborg botanic gardens, was undertaken.

The future of the TOROMIRO lies in promoting and maintaining collaboration between the botanic gardens holding stock and the conservation authorities in both mainland Chile and Easter Island (Rapa Nui). A single species conservation project will only succeed if integrated within the broader issues of protected area planning and habitat restoration. This in turn needs to be put into the context of the island's prevailing social and economic requirements. The TOROMIRO is not only an endangered species but is also an important part of the Rapa Nui cultural heritage. The planned re-introduction and restoration programme will work within the following constraints: Easter Island's ecology has been permanently altered as a result of human occupation, this is manifest through changes in landscape processes and species associations (habitats) as well as by species extinction; the island has a population of c. 2,800 people, so any planned re-introduction and restoration programme must take

into account the views and opinions of the islanders; currently the island has an insufficiently developed infrastructure for conservation planning and management, i.e. facilities are required on the island for the propagation of threatened plants (including indigenous crop cultivars); and the nature of habitat degradation has been so profound that restoration (*sensu stricto*) is no longer feasible, thus efforts will focus initially on establishing cultivated field gene banks for the TOROMIRO and assessing the ability of the island habitats to support reintroduced populations.

The TOROMIRO has moved from presumed extinction to being a conservation novelty on the nursery benches of botanic gardens. At least two leguminous species have been lost in cultivation: the last individuals of the NORFOLK ISLAND GLORY PEA, *Strebloorrhiza speciosa*, and *Vicia dennesiana* from the Açores appear to have died in botanic garden collections. With this in mind the TOROMIRO is the focus of an international project that is attempting to re-establish the species on Easter Island. This is not just a theoretical exercise in population genetics but an experiment in bridge building between European botanic gardens and the people of a remote Pacific island. The successful reintroduction of the TOROMIRO will reinstate lost components of the biological and cultural heritage of one of the planet's most famous World Heritage sites.

The Royal Botanic Gardens, Kew, is working with partners around the world to conserve threatened plant species, amongst which are survey and conservation projects for threatened legumes in East Africa, Madagascar and the Mascarenes. Few of these species are as threatened as the TOROMIRO; for many species and associated habitats the opportunity still exists to establish viable protected areas. However this will be increasingly dependent upon a sound knowledge of taxonomy, distribution and conservation status.

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