AMENDMENTS TO APPENDICES I AND II OF THE CONVENTION

Other Proposals

A. PROPOSAL

Inclusion of Tillandsia spp. in Appendix II of the Convention.

B. PROPONENT

Austria.

C. SUPPORTING STATEMENT

1. Taxonomy

11. Class: Liliatae

12. Order: Bromeliales

13. Family: Bromeliaceae
Subfamily: Tillansioidae

14. Genus: Tillandsia

15. Common Names:

English:	tillandsias, air plants
French:	tillandes, ananas sauvages, ananas bois
Spanish:	Tillandsias, Clavel del Aire
German:	Tillandien, Luftnelken

2. Biological Data

21. Distribution: Tillandsias were and still are distributed over all of South and Central America as well as in the south of North America. They grow in tropical and subtropical regions, in cool mountains forests, in arid regions, and in rainforests. Tillandsias have the largest distribution of all Bromeliads. Destruction of the woods goes parallel to the increasing shrinking of the Tillandsias' natural habitat. The areas of distribution are also being decreased by the unchecked wild-collecting of Tillandsias.

22. Distinctive marks: The most important distinctive marks in the identification of Tillandsias are: leaves are never dentate or spiny, but always entire, often with a thick covering of scales, therefore silvery gray or white in appearance; petals are not fused, but always separate, with no scales on their bases (as opposed to the closely related genus Vrisea whose petals have scales at the base); ovaries are superior; fruit is in capsule-form; seeds have a plumose appendage on the seed-base; hairs in the capsule straight not bent. It should be pointed out that most species of Tillandsia can only be explicitly classified with difficulty or even not at all. T. meridionalis can for example easily be confused with T. disticha. (More that a hundred examples of this kind could be given). As well as this, many species are very variable in their growth. One example of

many for this is T. xiphioides. Furthermore, many species are so variable in their growth-form that you often think you are looking at different species. A prominent example for many such cases is the much sought-after T. ionantha. It is fairly easy to recognize Tillandsias as such, but a differentiation of species is very difficult, at the non-flowering stage almost impossible (e.g. when identifying for customs). Because of this problem of identification, it would make sense to have the entire genus listed instead of just individual species.

23. Population: The genus Tillandsia, named after the Swedish botanist Tillands (1640 - 1693), was established in 1753 by Linnaeus and is with more than 400 species the largest genus and has the largest number of species in the family. New species are still being discovered and classified. The endemism in many countries is very pronounced, too. Some species only grow on specific peaks, others only in one specific valley. Some have adapted to special environmental conditions and climatic influences. The population densities vary immensely. For example, in a valley of the Andes in northern Argentina masses of Tillandsias can be found in up to 10 species, but in an annexing valley at the same sea level there are only a few specimens of three species to be found. This can most likely be put down to minor climatic differences. Tillandsias can be found growing at heights of 4000m and more in Peru. The majority of Tillandsias, especially those that trade is most interested in, grow as epiphytes on trees and cactuses. Some species grow lithophytically or terrestrially. Thus, conditions for cultivation are hard to simulate for most species; Tillandsias in general are absolutely not suitable for "window-sill cultivation". A standardized statement for entire populations can thus not be made. It is however a fact that traders have exact knowledge of local populations, harvesting one mass-occurrence after another. Prof. Rauh, one of the best experts on Tillandsias, has himself witnessed collectors and traders driving big trucks into the areas of distribution, for example of T. ionantha, clearing them so thoroughly, that there was not one plant left to be found. Because of the smallness of these plants, several hundred thousand are most likely necessary to fill big trucks like these. Prof. Rauh recorded similar cases in Guatemala with the magnificent white T. xerographica with its spiral-form rolled leaves. On a visit by Prof. Rauh in 1976, the treetops were covered in white: just 3 years later only a few specimens could be found after thorough searching. The situation since then has become dramatically worse, the population density is decreasing all the time because of the unchecked, continuing wild-collecting.

3. Trade Data

31. Utilization: These plants are offered for sale en masse at dumping prices as ornamental plants. These specimens are not just to be bought in florist shops, but also in food stores, chain stores and DIY-shops. More often than not these specimens are glued onto roots and stones often using silicone adhesive or hot glue. Wholesalers offer the stones and roots along with the specimens. Often, the plants are spayed with bright colours, red, blue or green, to make them more attractive. At Christmas Tillandsias sprayed silver or gold are offered too. It is not at all unusual for dead specimens, sometimes brightned up with colour, to be sold to unknowing customers. The customer often receives a brief information leaflet along with the Tillandsia. In one of these distributed in Austria it

says: "Tillandsia ... live on air and love! These bizarre plants are called 'air plants' and grow in Central and South America. With the aid of a few roots they grip onto bare rock, dead trees and spiny cactuses, even telegraph poles and still blossom. The Mayas utilise the Tillandsia as a healing plant and as decoration for their temples. As it seldom rains in their habitat, the air plants feed on mere dew and humidity that they absorb through their scaly leaves. Simple to care for with (moist) air and (sunny) love: short spray daily (the dew), once a month add some liquid fertilizer. Tillandsias love sunny spot by the window, or if the temperature is more than 10°C, in the open. In your specialist shop there are many species on various materials to collect. Have fun!" It is quite certain that 99.9% of all plants held in such "cultural conditions" will not survive even the first year of culture. Tillandsias are being degraded to "throw-away" plants. And trade makes sure of supplies by continuosly wild collecting.

32. Legal International Trade: In some CITES member countries (Costa Rica, Chile, Ecuador, Guatemala, Panama, Venezuela) trade with Tillandsias is controlled. In most other countries in which these plants are taken from the wild there are no controls whatsoever. The international commercialisation is increasing in leaps and bounds when you compare the trade data from TRAFFIC USA over the last few years. In German-speaking cactus and orchid specialist journals for plant lovers, Tillandsias are offered for sale each month in large advertisements. As an example, a big Brasilian exporter offers 10,000 specimens in 8 species for $ 3000. A Guatemalan trader states himself that his annual sale capacity goes up to 30 million specimens. The same trader also writes that seeds and in vitro are still at an experimental stage. So wild-collection is the rule, albeit with vegetative propagation decreasing this somewhat. A Venezuelan wholesaler, who has been proved to breed orchids en masse in vitro, has as yet not been successful in establishing mass production of Tillandsias from seed. It is a fact, research of WWF Germany confirms this, that at least 95% of all plants offered for sale and sold come from wild collecting. Only around 5% come from vegetative propagation. Seed-propagation or other propagation is at present insignificant.

33. Illegal Trade: There is little illegal trade as these plants can in most countries be traded at will and legally. Only in Costa Rica, Ecuador and Panama trade in wild plants is illegal. In these countries illegal trade occurs via the local airports. It should be stressed that many of these plants are wild collected in forest reserves, National Parks and biological reserves.

34. Potential Trade Threats: Over the past 5 years trade in Tillandsias has increased spectacularly. While trade in cacti and orchids chiefly appeals to specialised plant-lovers, in the case of Tillandsias it is almost exclusively the mass of flower and plant-lovers in general. Special Tillandsia-lovers who succeed in cultivating these plants are few. These few would present no significant threat to the species. As Tillandsias are however "mass-produced articles" sold to absolutely anyone, the threat to the species caused by trade is very great. What makes the bad situation of this genus all the worse is the fact that the consumer is only able to keep the plant alive for a short time (partly as a result of wrong information on cultivating them). The Tillandsia situation is thus worse than that of the cacti and orchids before their listing.

Investigations of WWF Germany in Guatemala have shown that in this country alone, 600 collectors are active and that they collect almost exclusively in the wild. Every month, around 10 tonnes of plants are exported from Guatemala alone, and it was discovered that every second plant dies on the way from wild-collection to consumer. Furthermore, WWF-Germany noted that every third species sold in Austria and Germany is to be classified as potentially threatened by trade. Research showed moreover that the collectors get between $ 0.30 and $ 0.60 from the buyers as a rule for each (wild-collected) Tillandsia. More informative is the result of the research concerning T. xerographica; it is in danger of becoming extinct. The collector gets $ 0.12 for each one, the exporter sells them for $ 1.6 to European customers. Because of the heigh cost of transport, $ 1.6 are added on, so the European wholesaler sells them for $ 6.4 to retailers. The consumer pays between $ 17 and $ 20 for a wild plant that brought the collector $ 0.12. Dr Mike Read of the "Fauna and Flora Preservation Society" writes in his highly commendable publication "Bromeliads threatened by trade" (Kew Magazine 2/1989, see enclosed), that if no protective measures are taken soon, "....the prospects for survival of wild populations of bromeliads, especially of Tillandsia, look very poor."

4. Protection Status

41. National: Wild plants and thus also Tillandsias are only protected in Costa Rica, Ecuador and Panama.

42. International: None.

43. Additional Protection Needs: Because of the enormous demand, especially in North America and Europe and the fact that this demand is met almost exclusively by wild plants, it can be seen that alongside habitat destruction, demand is to be blamed to a great extent for the threat to many species of Tillandsia. Thus, international protection for the entire genus is absolutely necessary.

5. Information on Similar Species

6. Comments from Countries of Origin

Questionnaires in English were sent to the CITES-enforcement authorities of all countries possessing Tillandsia habitats. Several countries did state species lists, but no comment concerning an Appendix II listing. Up to 20 September 1991 the following replies have been received from the countries below:

COSTA RICA (translated from Spanish): Costa Rica has itself entered a proposal to have the genus Tillandsia listed in Appendix II at the CITES Plants Committee in Malawi in April 1991. As no concensus was reached Costa Rica was asked to draw up a limited species list together with Venezuela. "Because of their beauty there is great demand for them on the part of collectors and plant lovers chiefly from Europe and North America. This pressuring of the natural population along with the changing of their habitat, means that several species are in danger of extinction, thus protection is necessary. It is a subfamily that must be protected by CITES to prevent it becoming extinct."

ECUADOR (translated from Spanish): A general comment on the present situation of the family Bromeliaceae in Ecuador could be made. These plants are in fact not threatened in our country, one could list some few species that might fall into this category in the next few years if they were not protected, which we take the proper measures to do. Concerning those species exposed to commercialisation, bearing in mind the increase in individuals and companies dedicated to the export of inflorescences and plants, an international limitation by listing the family Bromeliaceae in Appendix II would be recommendable. This would force those striving for commercialisation to set up suitable facilities for propagation and cultivation.

NICARAGUA (translation from Spanish): Looking at it from this point of view, it is my opinion specifically that the genus Tillandsia should be listed in Appendix II, with the aim of helping some member states to create suitable mechanisms to regulate and scientifically control sustainable minimal utilisation and at the same time realise an exact stock-taking of these.

ST. VINCENT & THE GRENADINES: In support of proposal.

TRINIDAD AND TOBAGO: Since it has been shown that these species have the potential to become traded in high volume (as has been demonstrated in the report submitted to the CITES Plants Committe in 1988, by TRAFFIC Germany), we feel that we might be willing to support an Appendix II listing of this species, povided that it can bew shown that this species meet the Berne criteria for such a listing.

7. Additional Remarks

71. Situation of Trade in Austria: Exact investigations were carried out by WWF-Austria (provincial group Styria) and D.C.S.P. in the Styrian capital, Graz. The investigations were carried out in 66 outlets for plants (florist shops, gardening shops, stores, DIY-shops, pet shops). In 31 no Tillandsias were found, although several stated that they didn't have any at present, but that they could get hold of some at short notice. In two shops it was stated clearly that they never wanted to spell plants of this kind again since they are wild-plundered. 35 shops, more than 50%, offered Tillandsias for sale. Of these 16 shops had less than 5 species, 9 up to ten species and in10 shops more that ten species were to be found. The following species were often seen: argentea, brachycaulis var. multiflora, bulbosa, butzii, caput-medusae, ionantha var. ionantha, ionantha var. scaposa, juncea, magnusiana, oaxacana and xerographica. Altogether 23 different species were found. 4 wholesalers from Austria and others from Belgium, Germany and the Netherlands supply the retailers in Graz. One of these wholesalers offers 185 species. The retail prices vary from $ 2.5 to $ 25, the Austrian wholesalers offer as an example (at least 100 units) of T. ionantha at $ 0.7 a plant. Most of the above listed species are not much more expensive. If you assume that Graz is a representative average in Austria, it can ba said that Tillandsias are sold in every second shop in Austria - these are the facts. Transferred to the population figure, Austria must be seen as one of the major consumer countries of Tillandsias.

72. Comparison to other Protected Genera: Cacti and orchids, all at least listed in Appendix II, were beforehand not in such a bad situation as Tillandsias are now. The chances of survival for cacti and orchids was always better

in the hands of plant-lovers as the majority of buyers had founded knowledge of cultivating. Bromeliad-lovers possessing knowledge of cultivating properly for the species are few and thus an extremely high rate of mortality results. And cacti and orchids are artificially propagated en masse too (from seed or in vitro) which is at present not the case for Tillandsias. These extremely low dumping prices that collectors get for wild-collected specimens, make sure that propagation is not worthwhile. In order to achieve retailable Tillandsias (that will flower) from seed, it takes 4 to 5 years for most species.

73. Possible Listing of Specific Species in Appendix I: An express warning must be given of merely listing species already directly threatened by trade in Appendix II as opposed to the entire genus. This is not just because of the great look-alike problem alone, but also because trade would get onto other species similar in growth-form straight away. Should individual species of Tillandsia be listed, then this must be in Appendix I. Extremely endangered are the species carminea, dexteri, fuchsii, reclinata, spengleriana, ionantha (all varieties), atroviridipetala, plumosa, mauryana, magnusiana, pruinosa, xerographica, argentea, caput-medusae, filifolia, butzii, streptophylla, tenuifollia, subulifera, monadelpha, bulbosa, matudae, velickiana, cacticola, ignesiae and tectorum.

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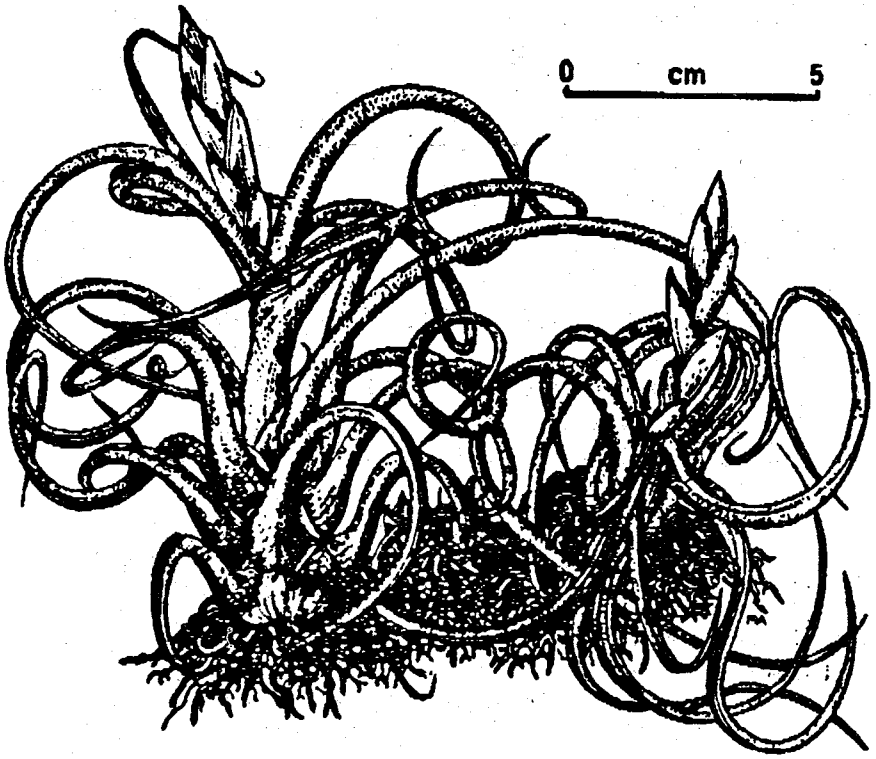
KEW MAGAZINE 2/1989

BROMELIADS THREATENED BY TRADE

Mike Read

The trade in wild-collected plants has been a contentious issue for many decades. Within recent years, however, the effect on wild populations of many species has become so severe that international legislation has been required to reduce the likelihood of further extinctions. Individual species, genera, or whole families have come under the control of the Convention on International Trade in Endangered Species of Flora and Fauna (CITES). However, horticultural tastes can change more quickly than the international legislatory processes. Consequently, as new groups of plants become fashionable, there is always a danger that commercial exploitation of wild populations will develop unchecked. Trade in species of the Bromeliaceae is expanding rapidly and investigations by the Fauna and Flora Preservation Society have shown that many of the plants on sale are of wild origin. This is of considerable concern, especially as a significant number of the species to be found in the trade have a very limited natural distribution.

The Bromeliaceae, or 'bromeliads', is a large and fascinating family comprising some 2,000 species, all but one from the New World. They are generally attractive, exotic-looking plants with firm sword-shaped leaves which are sometimes beautifully marked, and gaudily coloured flower-spikes. Typically the leaves are arranged in a rosette, with the leaves being channelled to the base, allowing water to collect towards the centre of the plant. Their natural range



Tillandsia caput-medusae, p. 28

extends from Virginia, USA in the north, down to southern Argentina, covering some 80 degrees of latitude (Rauh, 1979), and all manner of climatic conditions. Nevertheless, the members of the bromeliad family share some unusual features; most remarkable is their ability to obtain such water and nutrients as they require solely from rainfall and mists, with the roots used only for support. Many species are epiphytes and can grow on a whole range of surfaces from trees, to cacti or even telegraph wires.

One member of the family has become a familiar plant and furthermore is of great economic importance. The pineapple, *Ananas comosus* (L.) Merr. reached Europe in the seventeenth century, though it was first illustrated in a publication at least a 100 years before (Rauh, 1979). Also well-known is Spanish moss or Florida moss, *Tillandsia usneoides* (L.) L., an epiphytic species with long, hanging, rootless strands forming curtains up to eight metres long.

New species and subspecies of bromeliads are still being discovered and described with some regularity.

Bromeliads are further notable for their variation in size from the tiny, almost moss-like *Tillandsia bryoides* Griseb. ex Baker to the majestic *Puya raimondii* Harms. *Puya raimondii* is a species found in the Andes of Bolivia and Peru (Lineham, 1987) which, unlike other bromeliads, never reproduces vegetatively. It forms a rosette of three to four metres in diameter, over a period of perhaps 50 years, before producing a flower-spike which may reach as much as twelve metres. After shedding millions of seeds, the plant dies.

Most bromeliads are long-lived plants. Although individual rosettes perish after flowering, the stored nutrients are transferred to developing offshoots. The plant thus reproduces vegetatively and sexually in the one process. Usually two or more offshoots appear at the base of the dying plant, although they may also occur on the flower-spike (Rauh, 1979).

In the wild, flowers are often pollinated by humming-birds, but they may also be pollinated by butterflies or moths. Birds have been seen flocking around bromeliad inflorescences in mountain regions at altitudes as great as 4,000 m.

The Bromeliaceae is usually divided into three subfamilies:

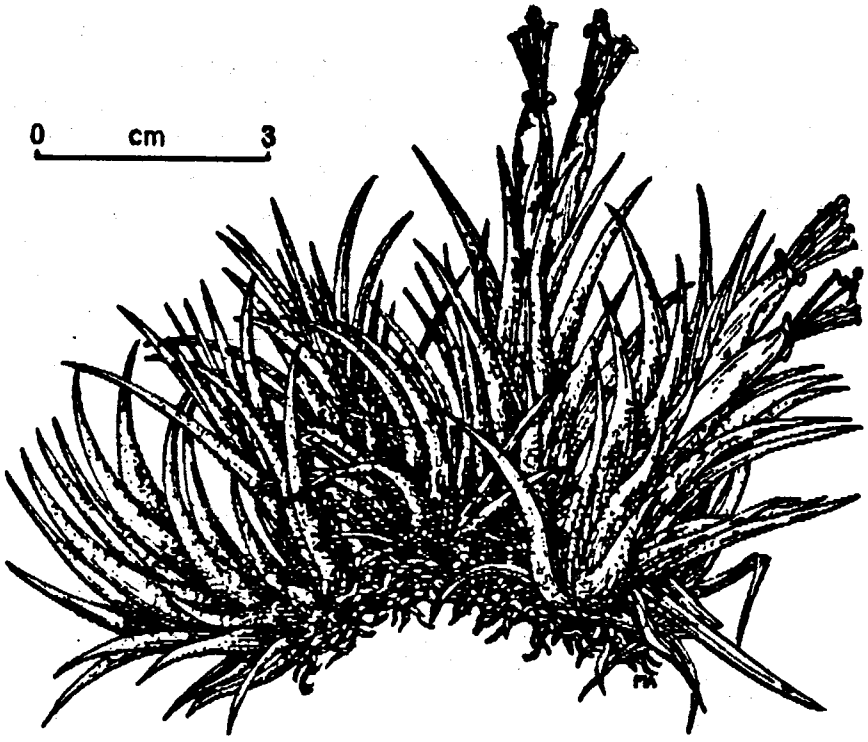
1. Pitcairnioideae comprises 12 genera including *Abromeitiella* Mez, *Dyckia* Schultes fil., *Pitcairnia* L'Herit. and *Puya* Molina, and is distinguished by having winged seeds.

2. Tillandsioideae includes the greatest number of those types now in cultivation, and comprises the six genera *Catopsis* Griseb., *Glomeropitcairnia* Mez, *Guzmania* Ruiz & Pavón, *Mezobromelia* L.B. Smith, *Tillandsia* L. and *Vriesia* Lindl., which all have plumose seeds.

3. Bromelioideae has seeds neither plumose nor winged, and comprises 26 genera including *Aechmea* Ruiz & Pavón, *Billbergia* Thunb., *Cryptanthus* Otto & Dietr. and *Neoregelia* L.B. Smith.

Over the years, several genera have become popular as house plants, in particular, varieties of the urn plant, *Aechmea fasciata* (Lindl.) Baker, *Tillandsia lindeni* Regel, *Billbergia nutans* H. Wendl. ex Regel, *Vriesia splendens* (Brongn.) Lem. and several species of earth stars, *Cryptanthus*, as well as variegated forms of the pineapple, *Ananas comosus*. Most recently there has been considerable interest in a wide variety of species of *Tillandsia*.

The genus *Tillandsia* alone contains well over 400 species, and is the largest single genus of bromeliads. The grey-leaved *Tillandsia*



Tillandsia ionantha, p. 28

species form the larger part of the genus, and it is these plants which are considered most at risk from the horticultural trade (Rauh, pers. comm.).

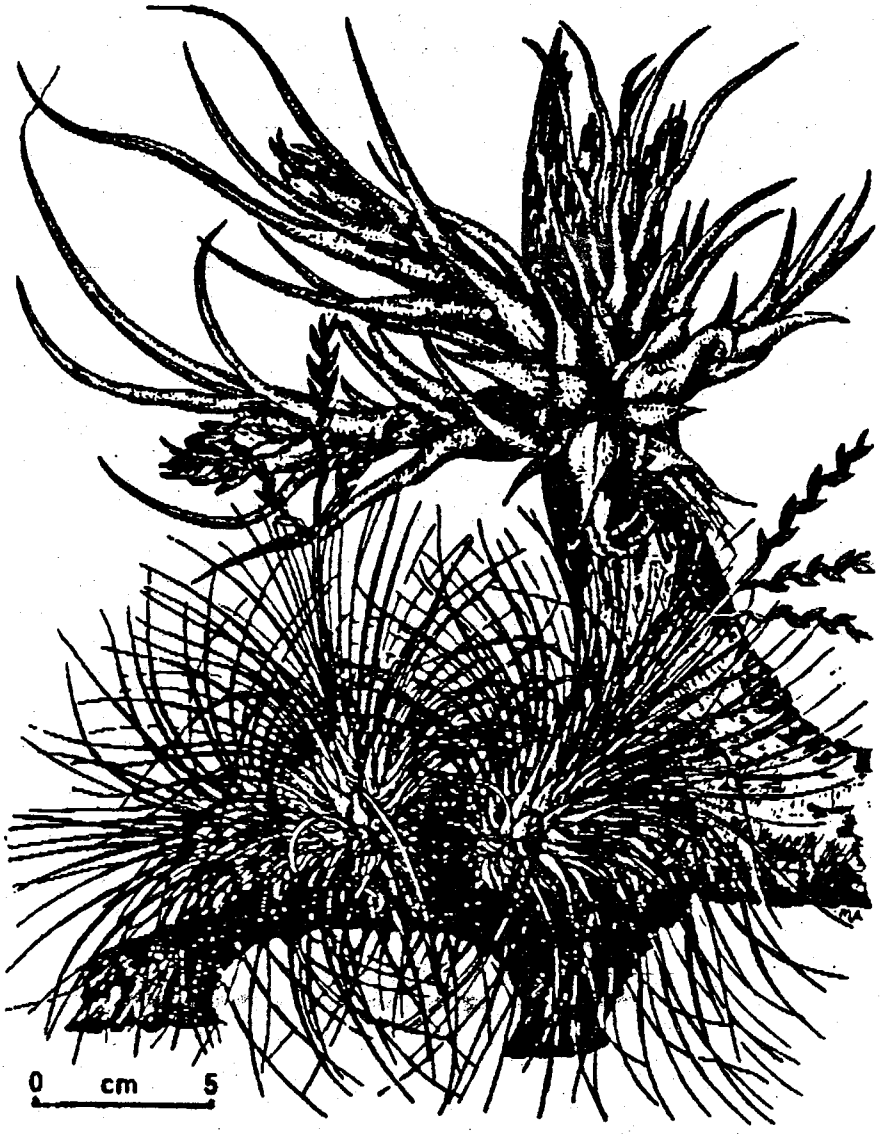
The grey types are those whose leaves are covered with fur-like scales (trichomes). These scales possess the dual function of absorbing moisture from the air and transferring it to the leaf tissue by capillary action, and also of protecting the plant from exposure to strong sunlight, thus slowing down dehydration when humidity is low. This significantly increases the plants' ability to survive periods of drought and leads to their vernacular name of air plants. It also appears that ants derive shelter within and between the swollen leaf-bases of a number of species of *Tillandsia*, and in return for shelter, help to protect the plants from pests.

Members of the genus *Tillandsia* are now being marketed as plants suitable for modern interior decor and requiring relatively little

cultural expertise. The market in the United Kingdom is largely restricted at present to half a dozen species, available at most garden centres and some high street shops. Specialist outlets are offering over 70 species of *Tillandsia*, as well as species of a number of other genera new to the horticultural trade. Furthermore, it appears that the trade in bromeliad species in the USA may well be considerably larger than in the United Kingdom. Advertisements in a specialist US journal offer around 200 species of *Tillandsia* and bulk lots of up to 10,000 *Tillandsia* plants at a time. The extent of trade in western Europe has still to be established, in particular from the Netherlands, Denmark and Germany, where dealers now list almost 200 species, varieties and forms. How many truly distinguishable species this represents, however, remains open to doubt. On the basis of previous experience, it is likely that the level of trade in these countries, and others such as Japan, will be as high or even higher than in the United Kingdom. *Tillandsia* species are relatively difficult to propagate, slow-growing, and take several years to flower from seed. Propagation by the offshoots, which form after flowering, is possible in only limited numbers. Unfortunately, this makes collection of mature specimens from the wild an economically attractive proposition to traders, thereby endangering the survival in the wild of a great many species.

In many places where bromeliads grow they densely clothe tree-trunks and branches. Here it appears quite possible that they play an important part in the ecosystem by trapping precipitation and moisture from mists, thus preventing its loss from the system. It may be suggested that collecting of such epiphytic species is only secondary to forest destruction. However, it is eminently possible that trees are being cut down with the express purpose of stripping them of their bromeliads. Elsewhere, for example near Peru's capital Lima, terrestrial bromeliads may play a significant part in soil stabilization and even dune formation. Removal of such plants could have considerable adverse effects in terms of erosion and the loss of nutrients and the water-holding capacity of the soil.

A great many garden centres and a number of high street outlets, including chain-stores, are offering for sale 'artistically' packaged specimens of *Tillandsia*. These are mostly plants some three or four years old, representing about half a dozen species. A smaller number of much larger and older plants are also for sale in the larger garden centres and 'prestige' high street outlets. Typical prices range from



Tillandsia prasinoa (above) and *T. fasciculata* (below), p. 28

£3 for a small single specimen, to over £50 for an arrangement of several larger specimens.

Whilst some nurseries claim that all stock is artificially propagated, the true level of artificial propagation in 'consumer' countries remains to be established. There is considerable evidence

that many plants offered for sale are collected from the wild in Central and South American countries.

Indications are that *Tillandsia* plants are being collected from the wild in at least Paraguay, Panama, Guatemala and Mexico. It is also believed that plants are exported from Honduras and it is to be expected that evidence will come to light of exploitation of wild populations in many other Central and South American countries. Nursery production of bromeliads in the countries of origin is not known to the author outside Argentina, Belize, Brazil and Guatemala. In these countries it probably occurs in tandem with wild collecting. Professor Werner Rauh of Heidelberg University (and author of the standard popular text on bromeliads) has recorded the collecting of *Tillandsia* from the wild on a huge scale in both Mexico and Guatemala (pers. comm.), lorry-loads of plants being transported to the USA. He considers a number of species to be thus endangered with imminent extinction. Among these are: *Tillandsia argentea* Griseb., *T. butzii* Mez, *T. cacticola* L.B. Smith, *T. caput-medusae* Morren, *T. filifolia* Schlecht. & Cham., *T. ignesia* Mez, *T. ionantha* Planchon, *T. magnusiana* Wittm., *T. mauryana* L.B. Smith, *T. plumosa* Baker (syn. *T. atroviridipetala* Matuda), *T. pruinosa* Sw., *T. streptophylla* Scheidw. ex Morren, *T. tectorum* Morren, and *T. xerographica* Rohw., and all the small species of the Organ Mountains of Brazil. Rauh further suggests that *Dyckia marnier-lapostollei* L.B. Smith and *Cryptanthus warasii* E. Pereira may be approaching extinction.

For many of those species in the trade, the status in the wild is still poorly known. However, the majority of *Tillandsia* species have a limited distribution, and can be considered extremely vulnerable to commercial exploitation. For this reason the Fauna and Flora Preservation Society is recommending that research into the nature, volume and pathways of trade should be undertaken as soon as possible, along with investigations into which species are most vulnerable, or already endangered. Furthermore, the trade should be monitored as far as possible while such research is under way. As ever, funds are required for such work. It is also suggested that a proposal for 'Appendix 2' listing for all Bromeliaceae (with the exception of *Ananas comosus*) together with 'Appendix 1' listing of all grey-leaved *Tillandsia* species should be submitted to the parties to the Convention on International Trade in Endangered Species at the earliest possible date.

The government of those countries from which bromeliads are exported should be encouraged to take steps on a national level to ensure that their natural heritage is not damaged by the bromeliad trade. Encouragement should also be given to nurseries in both exporting and importing countries to develop the propagation of bromeliads by seed or by offsets.

Without rapid action as described here the prospects for survival of wild populations of bromeliads, especially of *Tillandsia*, look very poor.

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