THE IMPORTANCE OF MAINTAINING BROMELIAD IMPORTS

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ABSTRACT

Exotic bromeliads are important to horticulture in Florida. Several hundred bromeliad species from eight common and over 40 obscure genera have been imported into Florida to fuel an industry of horticulture and scientific enquiry. Recent moves aimed at restricting the importation of exotic fauna and flora, including bromeliads, could be detrimental to an important industry. This information is presented to argue for the economic importance of bromeliads, their low incidence of pest infestation and lack of any threat to native species through intentional or unintentional release of imported species to the wild. Additional benefits are gained from the cultivation and ultimate preservation of endangered taxa.

Key Words: Bromeliaceae, insects, introductions, exotic species, Florida

RESUMEN

Las bromelias exóticas son parte importante de la horticultura en la Florida. Varios cientos de especies de bromelias correspondientes a 8 géneros comunes y más de 40 no comunes han sido importadas a la Florida con el propósito de incrementar la industria de la horticultura y de satisfacer las necesidades de la investigación científica. Las recientes medidas de restricción a la importación de flora y fauna exóticas, incluyendo bromelias, podrían actuar en detrimento de tal actividad. La presente información sustenta el interés económico de las bromelias, su baja incidencia de infestación, y la ausencia de peligro alguno para las especies nativas, motivado por la liberación intencional o accidental de especies importadas. Beneficios adicionales podrían obtenerse mediante el cultivo y la preservación de los grupos en peligro de extinción.

The first exotic bromeliads to be introduced to horticulture in Florida were imported from Europe at the beginning of the last century. Although the USA became the leader in bromeliad sciences, Europe never relinquished its hold on the U.S. market. Today, millions of seedlings and tens of thousands of finished plants are imported annually into the USA from Belgium and Holland alone. In Florida, over a dozen large nurseries and many smaller ones devote themselves to bromeliad production. Ornamental bromeliads have become a commercial crop worth an estimated $20 million per year to Florida horticulture. Several meristem laboratories in Florida have begun production of patented and non-patented bromeliad varieties, but most bromeliad nurseries in Florida and, indeed, the entire USA depend partly or wholly on imported meristems, seedlings or cuttings for their growing-on stock.

BROMELIADS AND THEIR CULTIVATION

Bromeliaceae are tropical and subtropical herbs, native, with a single exception, to the New World. Over 2,000 species belong to three subfamilies (Pitcairnioideae, Tillandsioideae and Bromelioideae) with approximately 50 genera. In general, brome-

liads form rosette-shaped whorls of parallel-veined leaves and produce perfect, 3-petaled flowers. Leaves are covered with trichomes or peltate scales which enable these plants to adapt to various harsh growing condition. Bromeliads may be terrestrials, facultative epiphytes, or obligate epiphytes, and exhibit great diversity among family members: compare *Ananas comosus* (L.) (pineapple) with *Tillandsia usneoides* (L.) (Spanish moss).

A Brief History

Exotic bromeliads have been a factor in the horticultural world since the 1500s. On his second voyage in 1493, Columbus was introduced to *Ananas comosus* by the Carib Indians on Guadeloupe. This plant had been a part of pre-Columbian culture for untold years. By the end of the 1700s, the subfamilies of bromeliads had been described. Early plant explorers prized bromeliads for their unusual form and beauty. By the late 1700s and early 1800s, the search was on in earnest for new species, introducing hundreds of species to cultivation in Europe by the turn of the twentieth century.

Although Florida has 17 native species of bromeliads, representing three genera in the subfamily Tillandsioideae, these were never horticulturally important. The first exotic bromeliads to be introduced to Florida horticulture were imported from Europe at the beginning of the last century. Florida's pineapple industry, begun in the 19th century, peaked in the 1930s, and it is now very small. Changing weather conditions eventually made it unprofitable.

Importance to Agriculture and Horticulture

Historically, bromeliads have had limited agricultural use. Several bromeliad species produce commercially important fibers. Bromelain, an enzyme produced by *Ananas comosus* fruits in defense against insect larvae (Benzing 1980), is becoming important in the chemical and pharmaceutical industries. A second enzyme, hemisphericin, produced by *Bromelia*, may become important (Gutierrez et al. 1993). As a food source, bromeliads provide a few species with edible stems, flowers, roots and fruits, the most notable of which is *Ananas comosus*. Now, more than ever before, bromeliads hold the promise of a bright future in the horticultural industry.

Florida's Commercial Production of Ornamental Bromeliads

Commercial bromeliad production in Florida is now centered on the production of ornamental varieties. Large and modern facilities produce millions of finished bromeliads from domestic and imported seed, meristems, cuttings and pre-finished material. Most revenues are generated in the market for bromeliad hybrids for interiorscape and flowering potted-plants, with only 8 genera and a few dozen species dominating production.

A much smaller but still important part of the bromeliad market lies in the production of bromeliads for use as novelties. This includes various species grown especially for use in dish gardens, for mounting on decorative wood and as 'tourist novelties', such as small *Tillandsia* plants on magnets and sea shells.

A growing sector of the industry is producing bromeliads as landscape plants. South and central Florida, and the warmer parts of the sun belt are well suited to exploit this potential in bromeliads. Several Florida nurseries now specialize in landscape bromeliad production.

Many people across the country and the world have collections of bromeliads. To satisfy their needs, several smaller Florida nurseries specialize in the production of a wide array of species, hybrids and cultivars.

International Trade in Bromeliads

Although the production of bromeliads in the USA (with the exception of pineapples) is centered in Florida, our state by no means has a lock on the industry. California is second to Florida in bromeliad production, and Hawaii is now entering the market place.

Just as Florida's pineapple production was nearly eliminated by cold temperatures, so is Hawaii's moving east due to increasing production costs. Pineapple production for the U.S. market is now much greater in Central America than it ever was in Hawaii. Despite the fact that Hawaii is still a major pineapple producer, many Hawaiian nurserymen are now entering the exotic bromeliad market, with some major facilities producing foliage and decorative flowering species of bromeliads.

Which Bromeliads Are Imported?

Of 50 genera and over 2,000 species of bromeliads, only a relative few are commonly imported. Of these, much the majority are from cultivated stock. Plants of wild origin are imported to a much more limited degree. These few are used primarily as propagation stock, hybrid parent stock, limited sales to collectors, and as herbarium material. Many, if not most of the bromeliads imported, are artificially propagated hybrids, patented varieties not otherwise available in this country.

Economics

Bromeliad cuttings can be grown faster and cheaper in nurseries abroad than in the USA. Many such facilities exist in Puerto Rico, Guatemala, Costa Rica, Colombia and, to a lesser extent, in several other Latin American countries. The largest bromeliad nursery in the world is in Holland, and it funnels millions of seedlings and finished plants annually into the U.S. market. Plants of the genus *Tillandsia* are grown in large overseas operations where a combination of selected climatic conditions and lower production costs make production there more lucrative. These plants, often incorporated into novelty uses, cannot be sent to the USA as finished products for direct sale. Nurseries here must, at the very least, house them for a time, pending sales. However, these plants are usually brought in as cuttings or pre-finished, and grown out for an extended period to produce a superior, unblemished, finished product.

The Need to Import Bromeliads

Commercial Competition

The bromeliad market is extremely competitive and the biggest companies vie for market share with a steady stream of beautiful new patented varieties. Hybridizers are working constantly to produce ever more spectacular and hardy varieties for the marketplace. This work is fueled by one thing: new stock. The competition for finding and being the first to use new superior clones and new species of bromeliads, especially in the genera *Guzmania*, *Vriesia*, and *Aechmea*, is stiff. At stake may be the very

survival of the U.S. bromeliad industry. Many superior hybrids have been produced in the USA and are now grown under licensing agreements here and abroad. A single patented variety could be worth millions to the patent holder.

Research

Florida is the center of bromeliad research. The Marie Selby Botanical Garden and the Mulford B. Foster Bromeliad Identification Center employ full-time research staff investigating the taxonomy and physiology of bromeliads. Researchers and scientists from all over the world come to Florida to involve themselves with these studies. Importation of fresh research material is essential to the survival of these institutions. In no less a manner, the results of their research are essential to the survival of the bromeliad industry.

Conservation

Great concern has been expressed in recent years about the possible imminent demise of many tropical organisms, including bromeliads. Recently, seven species of bromeliads were added to the CITES list of endangered species. Rampant habitat destruction is the major cause of their decline in nature and can be attributed to many factors. Land-clearing for cattle production and other agricultural use leads the list of habitat-destroying activities. New, full-sun varieties of coffee and cacao are causing great tracts of montane forest to be cleared where once some canopy, often bearing epiphytic bromeliads, was left for shading the crops. Traditional crops such as bananas and now pineapples have caused the decimation of much lowland forest for their production. Logging, mining and human encroachment have eliminated much critical habitat.

Importing bromeliads for the purpose of saving rarer species and conserving the biological diversity of others is now a reality. Already some species exist in cultivation that are known or thought to be extinct in their natural habitats. These and other species of bromeliads, still found in their natural habitats, but declining from various factors, are being cultivated with an eye toward reintroduction. All this is made possible by bromeliad importation.

The Argument Against Importing Bromeliads

Human Health Risks

Misinformation has been responsible for some minor hysteria about the "problem" of mosquitoes in bromeliads. Both of the two species of mosquito known to develop habitually as larvae in bromeliad tanks in Florida, are native to Florida, and neither is known to be a vector of diseases of humans. It appears that they are no more than a nuisance (Frank 1994). Even though some neotropical mosquitoes have larvae specialized to existence in bromeliad tanks and have adults that vector diseases to humans, none of these has become established in Florida. Larvae of a few other mosquito species sometimes inhabit water in bromeliad tanks in Florida, but bromeliad tanks are just a small part of their habitat, and they would occur whether or not bromeliad tanks were available to them. It is fairly easy to control bromeliad-inhabiting mosquitoes, of native or foreign origin, in nurseries and well-maintained landscapes. Much

of the misinformation is spread by the pest-control industry which profits from the public's fear of disease.

A similar misinformation campaign has been mounted against a native bromeliad, *Tillandsia usneoides* (Spanish moss). Much profit has been made by pest-control companies by spraying copper to eliminate the 'moss' after convincing people that it kills their trees, a premise long ago proved false.

Risks to Agriculture and Horticulture

Bromeliads have been imported into the USA for more than a hundred years. So far, no pest of foreign origin, whose presence in Florida is attributed to bromeliad imports, has been shown to affect plants other than bromeliads.

Bromeliads collected in the field in the tropics may house all sorts of insects and other invertebrate animals, which are often difficult to detect because of the plants' structure. USDA inspectors at airports annually discover large numbers of insects, molluscs, and plant pathogens in imported bromeliads, as a result of carelessness on the part of the shippers. If plants have to be collected in the field, they should be cleaned carefully and then dipped in a suitable chemical pesticide.

Bromeliads shipped from nurseries abroad are likely to be much cleaner of insects in general than are plants collected in the field. However, those pests that do hitchhike in such plants are more likely to be specific pests of bromeliads. Most such pests have so far been species of scale insects specific to bromeliads. Again, the best solution is to dip all plants in a suitable chemical pesticide. The onus is on the importer to make sure that only pest-free plants are imported, because USDA inspectors are too short-staffed to inspect more than a small fraction of plants. A pest of concern which **has** become established in southern Florida due to its hitchhiking in imported bromeliads is *Metamasius callizona* (Chevrolat) (Frank & Thomas 1994). Other pests as important as *M. callizona* could arrive in imported bromeliads if importers are not extremely careful. Vigilance is now required to detect and control this weevil pest in nurseries and collections in Florida.

Risks to the Native Flora

No exotic species of bromeliad has become established in nature in Florida, even on a limited scale, even though some species could certainly survive. In biological terms, bromeliads of foreign origin do not seem to be "invasive" in Florida even when they originate from places of similar climate. Reasons for their lack of invasiveness have not been investigated.

Presence of *Metamasius callizona* in nature in four counties in Florida is of more concern. Its continued spread is believed to be in part due to transport of infested plants and in part to flight by adults. What effect this weevil will ultimately have on the bromeliad flora of southern Florida is unknown. A hope is that insect biological control agents will be discovered in its native range, will be introduced successfully into Florida, and will succeed in controlling this pest in nature.

Conclusion

Bromeliad importation appears to be fairly benign. Lacking strong evidence to the contrary, bromeliads should continue to be imported as an important part of Florida's horticultural industry and as fuel for its research facilities. Hundreds of jobs directly related to the bromeliad industry, and thousands indirectly related, may be at stake.

The bromeliad industry helps make Florida the top state in the nation in horticultural production. Our subtropical climate lends itself well to landscaping with bromeliads, and bromeliads now add beauty to countless homes, business, parks, public works, tourist attractions and public buildings. This same climate allows the cultivation of a wide and ever-increasing variety of threatened and endangered bromeliad species. Coupling this with a fairly low incidence of pest infestation leaves little grounds for the restriction of bromeliad imports.

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