

INTEGRATED APPROACHES TO ORCHID CONSERVATION IN GUATEMALA: PAST, PRESENT AND FUTURE, OPPORTUNITIES AND CHALLENGES

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RESUMEN. Se discuten los retos enfrentados para lograr la conservación de orquídeas en Guatemala, los factores que contribuyen a la pérdida de poblaciones, y los esfuerzos realizados para preservar las especies. Se presentan ejemplos de estrategias que combinan técnicas *in situ* y *ex situ* e incluyen aspectos educativos, mitigación de impactos ambientales, rescate y participación comunitaria.

KEY WORDS: orchid conservation, Guatemala, rescue, community participation

Introduction

In 2001, Dix *et al* described the state of orchid conservation in Guatemala, factors responsible for orchid disappearance, legal aspects that favored or hindered conservation efforts and the relative success of different approaches. We present an update on the Guatemalan scene and discuss some indications that give hope for the future.

Factors that contribute to orchid loss in Guatemala in order of importance are: land use change that includes deforestation for agriculture, timber production, conversion of mixed forests to conifer plantations, and losses from forest fires; cloud cover reduction as a result of climatic change; disappearance of pollinators, especially bees; collectors and street vendors; and herbicide use that affects both pollinators and terrestrial orchid populations. The latter are particularly vulnerable, represent 30% of the Guatemalan orchid flora (Dix & Dix 2006) and many have disappeared from habitats in and around Guatemala City where they were once abundant. In rural areas, terrestrials are threatened by leaf litter and humus removal for horticulture, as well as destruction of the litter layer by exotic worms (Dunne, 2004). Closely related to these factors is the extreme poverty of many communities in regions where orchids are, or were, abundant.

Approaches to Orchid Conservation

These include *in situ* habitat preservation, either in national or private reserves; rescue operations with either *in situ* or *ex situ* orchid care; restoration and

management; seed bank development and seedling propagation; and education. Many of these tactics can be combined to form an integrated strategy.

RESCUE OPERATIONS. Given that prevention of habitat loss is often not feasible, rescue operations are potentially very important. Tree cutting, for lumber or slash and burn agriculture, results in a large amount of orchid material which could be rescued, incorporated into tourist attractions or used to establish propagation sites that could generate income for small farmers, especially those living in the multiple use zones of protected areas. In addition, because of destruction by fire, Guatemala annually loses hundreds of millions of orchid plants, representing millions of dollars.

In the past, rescue activities were hindered by government policies that required not only constant inventories but also prohibited vegetative reproduction of rescued plants for commercial purposes. This situation may have changed. It seems that the authorities in CONAP (National Council for Protected Areas) charged with managing and protecting biodiversity in Guatemala, have realized that without at least an opportunity to cover costs, there is little incentive for raising and caring for rescued or confiscated plants. Now, CONAP allows rescue operations by registered nurseries and collections and permission can be given to collect in areas scheduled for urban development, use conversion (*e.g.* conversion of citric orchards to sugar cane plantations) and forestry operations; provided one has the owner's permission. Moreover, these plants can be used for vegetative propagation and divisions sold. In the past, one was required to wait for the third generation.

COMMUNITY INVOLVEMENT. Because there was usually no local community involvement in rescue operations, no economic benefits were perceived and projects perished from lack of funding. At the Universidad del Valle, we are currently developing a program with community involvement that we hope will eventually contribute to sustainable orchid use. This project, financed by the U. S. Food for Peace program, is being carried out in collaboration with Texas A & M University (TAMU) and the funds received from selling surplus soy flour in Guatemala are used to promote income generating, horticulture projects in local communities. Our project involves developing central nurseries for orchid and bromeliad propagation in the university's two rural campuses, located in the highlands above Lake Atitlan at 2,300m and on the Pacific coastal plain at 300m, and developing a cooperative that will work with satellite nurseries in five surrounding communities in each region. The central nurseries will be the plant source for community nurseries. Stock plants will be obtained both from rescue operations and from local and foreign purchases. Initially, only a few selected species, suitable for the different climatic regimes will be commercialized in these operations; later, plants grown from seed will be incorporated into the system. Genera with species that we hope to conserve in this way include *Guarianthe*, *Rossioglossum* and *Lycaste*. Once this is established, we hope to be able to repopulate community forests.

At the same time, plans are underway to develop a seed bank at the central campus. The university also has an established field station of over 1,000 hectares with at least 120 orchid species on Volcán Atitlán and a reforested ravine on the central campus with many terrestrial species.

MINES AND RESCUE OPERATIONS. In Guatemala, at present, mining development, as a government policy, has generated public opposition. Nevertheless, at least two of the mining operations have proposed establishing nurseries for cultivating epiphytes that they rescue from felled trees as part their management and impact mitigation plans and intend to transfer plants to reserve areas within the mining operation. One of these has set up the nurseries but, as yet, does not know what to do with the plants they are raising. The other, which has not yet begun operations, plans to rely more on trans-

ferring orchids and bromeliads to refuge areas that have been set aside within the mining operation.

PROTECTED AREAS. Thirty one percent of Guatemala's territory is included in the national protected area system (SIGAP), but these reserves are not always managed adequately because financial resources are insufficient (CONAP 2006). During the past few years, a series of private reserves, many of them located in cloud forest remnants, has gained momentum and could potentially result in better orchid protection, income from tourists and educational programs. A recent undertaking that gives fiscal incentives to communities and landowners for maintaining existing forest cover is a positive development. Yet, the areas where most orchid diversity is found are also those with most deforestation.

EDUCATION. Education can inform as to what orchids are, why they are important, how they are threatened and what could be done to help preserve them. This can have both positive and negative consequences. In Guatemala, because of rural poverty, any potential income source is exploited without thought to its sustainability. Some orchid education programs have resulted in increased depredation, even though the importance of conserving disappearing species was stressed and the participants agreed that orchids were threatened. Another approach that gave talks to street vendors, resulted in attempts to cultivate rather than just sell wild collected plants. However, large numbers are still being collected from nearby forests and these are not rescue operations.

Another Guatemalan has been energetically educating orchid growers, not only in Guatemala but also in El Salvador. His courses have included members of orchid societies, and agriculture and biology students, as well as the sons of one of the largest vendors of wild collected plants. As a result, there is more appreciation of the plight of orchids, and an interest in cultivation and propagation. We hope this will result in a genuine interest in conservation.

A local secondary school, guided by Raquel de Pinto, has worked unceasingly since 1994 (Colegio Ciudad Vieja 2006) to protect and reforest the Colonia Maestra ravine in Guatemala City and has a program where rescued orchids are planted in trees within the Universidad Francisco Marroquin campus. These efforts stimulated the Universidad Francisco Marroquin to develop a uni-

versity arboretum and a website with photographs and species descriptions. Several schools in Guatemala City and two more universities are now carrying out similar projects in nearby barrancos and at least 60 species native to Guatemala City, including 25 terrestrials, are being preserved.

Local orchid societies give occasional talks on orchids and their orchid shows help educate the public, but so far they do not have any established programs for orchid conservation, other than in greenhouses and private collections.

SEED PROPAGATION. This is, as yet, limited in scope. Very few orchidists hybridize or sow seeds of native species. Intensive programs to propagate large numbers of *Lycaste skinneri alba* were abandoned because the institution could not devote personnel to maintaining the flasks. Another program that hoped to sell small seedlings in flasks failed because of insufficient expertise. A long-term commitment and an appropriate financial base is required.

The proposed orchid seed bank may help to establish more *in vitro* orchid propagation. Only a few genetic studies to determine variation and hybrid relationships have been carried out (Maldonado *et al.* 2001).

Concluding remarks

Orchid conservation is a long-term proposition that requires continued effort; local community involvement and perceived benefits are essential. In Guatemala, at least, the people who live closest to the orchid populations cannot afford to be altruistic and, in the long run, projects related to orchid conservation have to be self-sufficient. There is a need for more collaboration and joint efforts involving

hobbyists, academics and commercial producers

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