***Bromelia pinguin* L.** maya
BROMELIACEAE

Synonyms: none

General Description.—Maya is a pineapple-like plant with large, sword-shaped, dark-green leaves that have alternate curved spines about 5 mm long on their edges. The name used is Spanish meaning "net" which derives from its use as a barrier or possibly because its fibers may have been used for making nets. Other common names are karatas, pingouin, bayonette, and pinguin (Howard 1979). Although it is mostly fleshy, maya is classed as a shrub because it is perennial, of shrub size, and has a woody core at its base and fibrous leaves. The plants are formed of a large basal rosette and rarely develop a discernible stem. The roots are shallow, relatively fine, all of a similar size, and radiate in all directions. At the start of a plant's last year, it grows a stout scape inflorescence with many wooly red-orange flowers. The new leaves surrounding the inflorescence are also intensely red-orange. A few months later, 3.5-cm-long elliptical yellow berries ripen. After the fruits have withered, about 1 year after the start of fruiting, the plant dies.

Range.—The native range of maya extends from Mexico through tropical South America and the Caribbean islands (Howard 1979). In Puerto Rico nearly all the stands are on or near abandoned farmland, which may indicate a relatively recent introduction. It has been planted and naturalized in Hawaii (Neal 1965) and many other tropical areas.

Ecology.—Maya is intermediate in shade tolerance. Although it sometimes grows in open areas, the most vigorous stands are found under forest stands with moderate basal areas. In Puerto Rico, natural stands occur in areas with from 850 to 2000 mm of rainfall and from near sea level to 600 m of elevation. All types of soils except very poorly drained and saline soils are colonized. Maya is sensitive to fire. Although many plants in a colony will recover from a burn, they do so slowly. Usually flowering is synchronized, although an occasional plant flowers out of phase, especially in moist habitat.

Reproduction.—Maya reproduces vegetatively and by seeds. The fruits, whose fresh weight averaged 12.26 $\pm$ 0.35 g in a Puerto Rican collection, contain 0 to over 100 seeds, depending on their size. The fruits have a tough, fibrous rind. In Puerto Rico, most of the fruits are eaten by fine-toothed animals (probably rats, mice, or fruit bats) and it is assumed that the seeds are dispersed by these small mammals. The black, teardrop-shaped seeds averaged 0.245 $\pm$ 0.006 g (air dry). Seventy-five percent of these seeds germinated between 133 and 175 days after sowing. The plants are very fragilely rooted at first and develop at a moderate rate. After maya plants have reached their full size and before flowering, most healthy individuals produce one or sometimes two stiff horizontal stolons about 0.5 m long. A new plant forms at the terminus. The new plants grow rapidly and reach roughly half the parent plant's height and diameter and become independent in about a year. Consequently, (with the exception of those planted by humans) new colonies are started as seedlings from dispersed seeds and most plants within colonies arise vegetatively. Maya has been propagated with apical bud explants with a high degree of success (Mesa and Lajonchere 1996)

Growth and Management.—Maya plants grow to full size (1 to 2 m in height and 2 to 3 m in diameter) in 2 or 3 years. Mature stands can be dense with interlacing crowns and little clear space. Five stands inventoried in Puerto Rico ranged from 723 to 1,948 plants/ha. Four whole plants averaged 81.6 percent water and ranged from 0.3 kg to 1.6 kg dry weight. The maya portion of total stand dry biomass would run from about 500 to 2,000 kg/ha. For the most part, maya is undesirable in forests and pastures because it

takes up valuable space, restricts access, inhibits grazing, and provides nesting habitat and cover for rats (Vélez and van Overbeek 1950). Maya stands may be controlled by uprooting and piling the plants. If management objectives so dictate, maya can be established by transplanting top-trimmed wildlings.

Benefits.—Historically, and to some extent today, maya was used as a hedge or living fence to inhibit entry into fields and homesteads (Crane 1945). These hedges were never more than marginally effective—cattle and many species of animals pass relatively easily and people can ignore the spines or cut a path with a machete. The fruit, which has a white flesh, is bitingly acid, and tastes like pineapple, is eaten occasionally out of hand and used to make a refreshing drink (Neal 1965). The long, parallel leaf fibers were found to be of good quality and proposed for commercial production (Guzman 1975). Maya offers food and cover for wildlife, such as small mammals and birds.

References

Crane, J.C. 1945. Living fence posts in Cuba. Agriculture in America 5(2): 34-35, 38.

Guzman, D.J. 1975. Especies útiles de la flora Salvadoreña. Ministerio de Educación, Dirección de Publicaciones. San Salvador, El Salvador. 703 p.

Howard, R.A. 1979. Flora of the Lesser Antilles, Leeward and Windward Islands. Vol. 3. Arnold Arboretum, Harvard University, Jamaica Plain, MA. 586 p.

Mesa, A.R. and G. Lajonchere. 1996. Micropropagation of *Bromelia pinguin* Lindl. Pastos y Forrajes 19(3): 217-223.

Neal, M.C. 1965. In gardens of Hawaii. Special Publication 50. Bernice P. Bishop Museum Press, Honolulu, HI. 924 p.

Vélez, I. and J. van Overbeek. 1950. Plantas indeseables en los cultivos tropicales. Editorial Universitario, Río Piedras, PR. 497 p.

John K. Francis, Research Forester, U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, Jardín Botánico Sur, 1201 Calle Ceiba, San Juan PR 00926-1119, in cooperation with the University of Puerto Rico, Río Piedras, PR 00936-4984