

Propagation and management of ornamental and commercial cacti– a review

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ABSTRACT

Cacti are one of the most diverse and widespread plants globally. They are useful in numerous ways, including food, medicine, and ornamental plants. This review aimed to synthesise current and potential uses of cacti, methods of propagation, threats by invasive cacti, control and management of invasiveness, and socio-economic synthesis of the cacti industry. Because of the attractive unique morphology of the plant, it's used as ornamental plant globally. For commercial scale cacti production, both molecular and classical breeding methods are employed. Advantages of micropropagation of cacti for mass-scale production, compared to sexual propagation were identified. The potential for the application of molecular techniques in the cacti industry is high. Regardless of slow growth, cacti trade is a highly profitable market. However, due to slow growth, the cost of cultivation and maintenance should be considered. Sometimes, wild cacti are used for commercialisation in the international and illegal market. The species selection for commercialisation is vital for farmers. However, introduction of high quantities of ornamental cacti to other countries increases the risk of cacti being invasive in the future. In this review, while managing invasive cacti, the international trade in rare expensive cacti is addressed.

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Introduction

Cactaceae is a family of some of the succulent plants that include cacti. With almost 1,600 species, cacti are one of the plant kingdom's most morphologically diverse plant families (Gibson & Nobel, 1986). Their leaves have modified into spines, while their stems have flattened and widened into elongated green succulent structures carrying chlorophyll that is essential for photosynthesis which helps their life and growth (Pérez-Molphe-Balch et al., 2015). Due to its broad array of spectacular morphological variations, the Cactaceae is one of the most interesting families in the plant kingdom. These peculiar adaptations allow for overcoming water scarcity and sun irradiation. Cacti first appeared recently (30 million years ago), during the mid-Tertiary period in the fast-evolving deserts of North, Central, and South America (Hershkovitz & Zimmer, 1997). However, Mauseth (1990) reported that Cactaceae are thought to have their origins in Southern Brazil and Bolivia. Since *Rhipsalis* is the only genus of epiphytic cacti native to regions (Madagascar, tropical Africa, across Sri Lanka, and Southern India) other than the New World it stands out among cacti species. However, rather than emerging independently of existing cacti, dispersion to these locations was probably caused by frugivorous birds (Barthlott, 1993). Since cacti are now available worldwide, they are being used for human use as well.

Importance of cacti

General uses of cacti

Cacti have been utilised as raw materials, food, medicine, and livestock feed (Shetty et al., 2012). They exhibit a wide range of pharmaceutical effects, including diuretic properties, cardiotoxic activity, analgesic (pain relief) activity, astringent, laxative, and antiparasitic properties. Additionally, they are a great source of colour pigments (Santos-Díaz et al., 2010). For millennia, cacti have been grown as decorative plants all around the world due to their human attractive morphology. Due to their ability to fix CO₂ in the night (Crassulacean acid metabolism, CAM), cacti are tolerant to drought and well adapted to dry environments. It can be used as a living fence to defend agricultural fields as well as a substitute for food and fodder (Shetty et al., 2012). *Stenocereus griseus* (Pitaya) is a cactus fruit that has been consumed as a dietary supplement in Southern Mexico since ancient times. About 30 different varieties of *Stenocereus griseus*, including Amarilla, Jarra, Melon, Crema, and Olla, have been recognised in this area. The fresh and processed market's top quality performers were Olla and Jarra varieties (Yáñez-López et al., 2005). Therefore cacti are closely associated with human culture and society for medicine, nutrition, and decoration as well.