Cycas revoluta

Cycas revoluta (Sotetsu [Japanese ソテツ], sago palm, king sago, sago cycad, Japanese sago palm), is a species of gymnosperm in the family Cycadaceae, native to southern Japan including the Ryukyu Islands. It is one of several species used for the production of sago, as well as an ornamental plant.

Names

Cycads' only relation to the true palms (Arecaceae) is that both are seed plants. The Latin specific epithet *revoluta* means "curled back", in reference to the leaves. This is also called Kungi (comb) Palm in Punjabi speaking areas.

Description

This very symmetrical plant supports a crown of shiny, dark green leaves on a thick shaggy trunk that is typically about 20 cm (7.9 in) in diameter, sometimes wider. The trunk is very low to subterranean in young plants, but lengthens above ground with age. It can grow into very old specimens with 6–7 m (over 20 feet) of trunk; however, the plant is very slow-growing and requires about 50–100 years to achieve this height. Trunks can branch several times, thus producing multiple heads of leaves.

The leaves are a deep semiglossy green and about 50–150 cm (20–59 in) long when the plants are of a reproductive age. They grow out into a feather-like rosette to 1 m (3.3 ft) in diameter. The crowded, stiff, narrow leaflets are 8–18 cm (3.1–7.1 in) long and have strongly recurved or revolute edges. The basal leaflets become more like spines. The petiole or stems of the sago cycad are 6–10 cm (2.4–3.9 in) long and have small protective barbs.

Roots are called *coralloid* with an *Anabaena* symbiosis allowing nitrogen fixation. Tannins-rich cells are found on either side of the algal layer to resist the algal invasion.

As with other cycads, it is dioecious, with the males bearing pollen cones (strobilus) and the females bearing groups of megasporophylls. Pollination can be done naturally by insects or artificially.

Cultivation and uses

Propagation of *Cycas revoluta* is either by seed or clonally by removal of basal offsets. It is one of the most widely cultivated cycads, grown outdoors in warm temperate and subtropical regions, or under glass in colder areas. It grows best in sandy, well-drained soil, preferably with some organic matter. It needs good drainage or it will rot. It is fairly drought-tolerant and grows well in full sun or outdoor shade, but needs bright light when grown indoors. The leaves can bleach somewhat if moved from indoors to full sun outdoors.

Of all the cycads, *C. revoluta* is the most popular in cultivation. It is seen in almost all botanical gardens, in both temperate and tropical locations. In many areas of the world, it is heavily promoted commercially as a landscape plant. It is also quite popular as a bonsai plant. First described in the late 18th century, it is tolerant of mild to somewhat cold temperatures, provided the ground is dry. Frost damage can occur at temperatures below −10 °C (14 °F), and several healthy plants have been grown with little protection as far north as St. Louis, Missouri and New York, New York, both in USDA zone 7b. *C. revoluta* usually defoliates in this temperate climate, but will usually flush (or grow) several new leaves by spring.

Sago

The pith contains edible starch, and is used for making sago. Before use, the starch must be carefully washed to leach out toxins contained in the pith. Extracting edible starch from the sago cycad requires special care due to the poisonous nature of cycads. Cycad sago is used for many of the same purposes as palm sago. Sago is extracted from the sago cycad by cutting the pith from the stem, root and seeds of the cycads, grinding the pith to a coarse flour and then washing it carefully and repeatedly to leach out the natural toxins. The starchy residue is then dried and cooked, producing a starch similar to palm sago/sabudana. The cycad seed contains cycasin toxin and should not be eaten as it is possible for cycasin toxin to survive the most vigorous of repeated washings. Cycasin toxin can cause ALS, Parkinson's, prostate cancer and fibrolemellar hepatocellular carcinoma.

Chemistry

The hydro-alcoholic extract of leaves of *C. revoluta* shows the presence of alkaloids, steroids and tannins while the chloroform extract shows the presence of saponins, tannins and sugars. Leaflets also contain biflavonoids. Estragole is the primary volatile compound emitted from the male and female cones of *C. revoluta*.

Toxicity

Cycad sago is extremely poisonous to animals (including humans) if ingested. Pets are at particular risk, since they seem to find the plant very palatable. Clinical symptoms of ingestion will develop within 12 hours, and may include vomiting, diarrhea, weakness, seizures, and liver failure or hepatotoxicity characterized by icterus, cirrhosis, and ascites. The pet may appear bruised, have nose bleeds (epistaxis), melena (blood in the stool), hematochezia (bloody straining), and hemarthrosis (blood in the joints) The ASPCA Animal Poison Control Center estimates a fatality rate of 50 to 75% when ingestion of the sago palm is involved. If any quantity of the plant is ingested, a poison control center or doctor should be contacted immediately. Effects of ingestion can include permanent internal damage and death.

All parts of the plant are toxic; however, the seeds contain the highest level of the toxin cycasin. Cycasin causes gastrointestinal irritation, and in high enough doses, leads to liver failure. Other toxins include Beta-methylamino L-alanine, a neurotoxic amino acid, and an unidentified toxin which has been observed to cause hindlimb paralysis in cattle.

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Cycas revoluta è una pianta della famiglia *Cycadaceae*, originaria del Giappone.

Descrizione

L'aspetto ricorda la palma sia per il fusto, poco ramificato, che per la disposizione delle foglie, grandi e pennate poste a spirale alla sommità del fusto, come una corona. Il fusto raggiunge un diametro di circa 20 cm ed ha una crescita molto lenta: lungo pochi centimetri nelle piante giovani, negli esemplari molto anziani (oltre 50 anni) può raggiungere i 6–7 m di altezza.

Le foglie, di colore verde brillante e lunghe sino a 1,5 metri, sono pennate, leggermente arcuate, lucide ed appuntite. Le singole foglioline, rigide e sottili, sono lunghe 8–18 cm; quelle più vicine al fusto si modificano in forma di spine.

Le foglie giovani appaiono in primavera all'apice del fusto in gruppi numerosi; al momento dell'emergenza dal fusto sono raggomitolate e coperte da una densa peluria; nel giro di pochi giorni si dispiegano e raggiungono rapidamente l'aspetto delle foglie mature.

Riproduzione

La propagazione può avvenire per semina o per rimozione dei polloni basali.
Come la gran parte delle cicadi è una pianta dioica: i coni maschili e quelli femminili si trovano su esemplari differenti.
Studi recenti hanno dimostrato che nella *C. revoluta* l'impollinazione avviene anche tramite insetti (cosiddetta *impollinazione entomofila*)

Distribuzione e habitat

La pianta, scoperta alla fine del Settecento, è nativa del Giappone meridionale.
Fu messa per la prima volta a dimora in Europa nel 1793, presso l'Orto botanico di Palermo.

Cresce ottimamente in terreni sabbiosi, ben drenati, in aree con estati molto calde (temperature medie di 30-35 °C) ma tollera anche climi con temperature più basse. La occasionale esposizione a temperature al di sotto dello zero può causare danni alle foglie.

Usi

Il midollo del tronco è utilizzato per la preparazione del *sago*, una fecola di impiego alimentare. Per l'estrazione del sago si utilizzano le piante che non sono ancora giunte alla fioritura, tagliandone i tronchi in un certo numero di pezzi, e quindi spaccandoli nel senso della lunghezza, in modo da poterne separare il tessuto interno, dal quale si ottiene la fecola mediante lavaggio. Nei luoghi di produzione il sago rappresenta un prodotto di notevole importanza alimentare e viene anche esportato. La *Cycas revoluta*, anche in quantità limitate, se ingerite da cani o gatti può provocare danni respiratori ed epatici, e nei casi più gravi la morte. Causa gastroenterite emorragica, coagulopatie, danni epatici, insufficienza renale.

Tra tutte le cicadi la *Cycas revoluta* è una delle più utilizzate a scopo ornamentale: ogni anno nel mondo ne vengono commercializzati milioni di esemplari.