

THE VARIETIES OF CYCAS REVOLUTA*

by

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Cycas revoluta is one of about 20 species in the genus Cycas. It is native to the Nansei I lands of Japan which are located south-west of the Japanese archipelago between Kagoshima and Okinawa prefectures. This chain of islands is made up of the Satsunan Islands and Ryukus Islands. (see Fig. Map).

The main areas of distribution are Tokuno Shima (129 E., 27.7 N.) and Amami O Shima (130 E., 38.8 N.). Variants of Cycas revoluta are predominantly found in both Okino Euabu Shima (128.8 E., 27.3 N.) and Yoron Shima (128.5 E., 26.9 N.).

Cycas revoluta grows naturally in the subtropics, where the minimum temperature is near 7°C (45°F). On the main island of Japan, it can bear fruit outdoors if the minimum temperature is above -5°C (23°F). In its natural habitat the coning period is May. The chances of seed production are high, because plants of both sexes are in cone at the same time. During the typhoon season, from August to October, the plants often suffer severe damage from storms.

On Yaku Shima the average annual precipitation recorded for 30 years between 1930 and 1960 is 3,800 mm (150 in.), and is the maximum rainfall among these islands. In the Satsunan Islands the average rainfall for the same period is 2,800 mm., 2,250 mm (90 in.) in Ryukyu Islands, and 2,525 mm (100 in.) in the Nansei Islands as a whole.

In Cycas, the bracts, a type of scaly leaf, are strongly spined at the apex and make up acanthobracts which protect young leaves from damage. Leaf production occurs at intervals with a very long resting period. When producing leaves many simultaneously emerge and extend rapidly in a rosette. Before leaves are produced, foliar buds are densely covered with wooly hairs and are surrounded by the many acanthobracts which protect the buds from damage. The resting period continues for up to a few years in some cases. Generally, emerging leaves of Cycas are densely lanate occasionally glabrous.

1. Cycas revoluta Thunberg

Sotetsu (Japanese)

Tieh shu (Chinese)

Japanese Sago Palm (English)

Cycas revolute (French)

Zuruchgerollter Sago-palme (German)

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Cycas revoluta ranges in size from small to large. In medium size plants of Cycas, trunks are 2 m high 10-11 cm in diameter and pinnae are 15-20 cm long, 0.4 cm wide, 30-40 (on each side) in number. When Cycas is grown under unfavorable conditions such as soil, lighting, etc., it becomes the medium size. In some instances, pinnae are bifid, or do not expand beyond the involute condition, or remain half opened. Frequently all or 2 out of 3 in the latter two cases of bifid pinnae, normal pinnae are present. The bifid pinnae, however, differ from those of the "Matsuba sotetsu" (Cycas revoluta var. diplofoliolum) which is described later. Cycas revoluta var. diplofoliolum generally belongs to the larger size group. A dwarf Cycas of very small size is known in C. revoluta. Little occurrence of this kind in other species of Cycas. This small-sized Cycas is a kind of bonsai and known as mini-cycas (Fig. 1). For cultivation of the mini-cycas, soil consisting of sand, excluding any organic matter, and a small amount of clay is suitable. It should be grown in a pot without fertilization. The size of the leaves should be kept less than 8 cm. long with controlled watering during the leafing period. If leaves are allowed to grow over 8 cm. long, the plant will be vigorous and the diameter of the trunk will become too large. Roots should be cut every one or two years to control the vigor of the plant.

When growing this type of Cycas it is desirable to obtain a plant with a small trunk diameter. If a plant develops branches and then becomes double or triple branched, its aesthetic value will increase greatly. The smaller trunk is of course much treasured. Trunks of 1.5 cm in diameter are known, but plants with trunks less than 2.5 cm in diameter are scarce and valuable. Those having a diameter below 4.0 cm are classified as mini-cycas. The longest trunk known with a diameter of 2.5 is 120 cm. in length. If the height is not more than four times the diameter it will be of no bonsai value. A Cycas with a diameter of 5.0 - 6.0 cm is simply a young plant. As in the mini-cycas, the height MUST be more than four times the diameter of the trunk.

This kind of small Cycas arises in two ways. In the first, the subterranean part of a large Cycas branches and elongates under given environmental conditions. In the second, the seed germinates under sandy soil, and the plant is repeatedly covered with sand just after elongation. With repeated elongation and burial, the trunk becomes long and narrow. In the former case, because the growth continues underground with out leaves the surface of the trunk is only covered with scales or bract-bases. In either case, the stem elongation is slow, 0.3 - 0.5 cm each year, therefore it may take 60 to 100 years for a plant to reach 30 cm long.

While Shuster (1932) has recorded C. revoluta var. nana, it is not clear whether the plant in question was a medium sized specimen, young plant or a minicycas. In any case, it appears that the plant is not a variety but rather a modification of C. revoluta. There is no report of coning in the medium nor minicycas. Little possibility of coning then should be expected.

The following varieties and forms of C. revoluta have been recorded.

Cycas revoluta binervis

C. revoluta f. planifolia

C. revoluta var. robusta

C. revoluta f. nana

Since the descriptions are obscure, it is not clear what plant a name corresponds to. According to my observations, C. revoluta has about ten cultivars.

1. Cycas revoluta cv. "Tosaka" (English meaning: Cockcomb)

Synonym: Cycas revoluta var. cristata Satake, Shin Kaki 90:91 1974
(not validly published)

(The synonyms published in Shin Kaki as Latin-named varieties were accompanied by descriptions in Japanese, not Latin as required by the International Code of Botanical Nomenclature, -Ed. and so used are not validly published.)

This is a fasciculate mutant with the top of the trunk spreading laterally and becoming fan-shaped, like a cockscomb (Fig 2). Leaves first develop in several bundles, then these bundles gradually grow together in a straight line over a long period of time, finally forming the typical semicircular row of leaves. The trunk is 80 - 100 cm high, and is 4 - 55 cm wide and 2 - 20 thick in the typical fan-shaped form. Plants having a small trunk, especially one below 6 cm in width, are extremely rare. In some cases, new trunks develop as a lateral line like belt. The typical fan-shaped trunk rarely extends laterally bisymmetrically. Most of the trunks are scaly or sinuate. The length of leaves depends on the size of the trunk and the vigor of the plant. Leaves are 2 - 3 cm long when the trunk is less than 6 cm wide. In young or very vigorous plants of this mutation, the leaves, bracts and acanthobracts are very rough. Old plants often have leaves long, and 0.4 cm wide; petioles 5 cm long and 1 cm wide. Pinnae are lustrous, deep green above; half-lustrous, light brownish-green and covered with thin hairs beneath. Both petioles and petiole bases are covered with light brownish hair. These features resemble those of the normal Cycas revoluta. As the bundles on the surface of the trunk change from sparse to dense, leaf size becomes gradually reduced, so that the aesthetic value increases.

Production of female sporophylls is rare, however, male sporophylls are not unheard of. Seeds have not been observed. In the male, the axis of the sporophylls develops vertically along the top of the trunk and the sporophylls overlap on both sides, in a fan-shaped sort of arrangement (Fig. 3). In plants having a trunk with the appearance of a mountain range, the male cone also appeared this way. While it is not clear how C. revoluta cv. cristata has arisen, it is possible that abnormal arrangement of cells at a meristematic region is induced by a trauma such as objects falling on the plant. This mutant grows naturally in places which are frequently devastated by typhoons.

2. Cycas revoluta var. diplofoliolum Satake var. nov.

(Japanese) Matsuba-sotetsu

Trunk generally small, rarely up to about 170 cm high, 25 cm in diam. in larger sized; leaves 50 - 100 cm long 0.5 cm wide with 100 leaflets (on each side), lustrous and deep green above and half-lustrous and light green beneath like regular C. revoluta; petioles and petiole bases covered with hair.

A character unique to this variety is that pinnae are bifid, (scissorlike), (Fig. 4), with all pinnae being bifid in some plants. Generally bifid pinnae are more common at or near the petiole and become few toward the tip of the rachis. Although in some cases leaves of the new growth are normal, the plant may eventually produce leaves with bifid pinnae again. Desirable plants are those in which the leaves never revert to normal. One of two subtypes is as mentioned above. The other mutation, is more emphasized in apical pinnae and produces pinnae two or three times longer than the normal ones. In some cases the rachis is branched. The branched rachis is also found in the first type as well as the second type (Fig. 5). This second type is that of C. revoluta var. involuta which will be described next. Fronds of this variety contain some bifid pinnae with the normal ones. There is a third variety which is apparently induced by unfavorable soil conditions or other factors. Such plants are often small and unhealthy.

In any case it appears that the degree of bifurcation is dependant upon the proportion of cells having the bifid arrangement, which perhaps occurs in meristematic tissue during early development. In plants having strongly bifid pinnae, the numerous branches that are produced on the trunk also have the bifid arrangement. These branches are typical Matsuba-sotetsu in which the bifurcation is genetically determined. Propagation of such desirable forms by seed is possible. The bifid-pinnae of the diplofoliolum type, first of the three types mentioned above is easily recognizable and genetically determined, while the other two types vary and often will revert to the normal C. revoluta type.

3. Cycas revoluta var. corrugata Satake var. nov.

(Japanese) Chirimen-sotetsu

Trunk simple or fasciculate, 150 - 200 cm high, 25 cm in diam. covered with bullate scales with many vertical stripes of both petiole and bract bases. These features distinguish it from the ordinary Cycas. Trunk bottle shaped at the lower part below 100 cm. high, cylindric and 20 - 22 cm in diam. at the upper part above 100 cm high. Leaves 90 cm long, 25 - 30 in number, revolute, more so at apex; pinnae 100 on each side, 9.5 - 10 cm long, 0.4 cm wide, strongly revolute, lustrous, deep green, crispate, variegated light green, half lustrous and light brownish green beneath like ordinary C. revoluta.

This variety is also very rare. Female sporophylls have been found only once to date, the cone is ovoid, 30 cm diam., 20 cm high, like the ordinary Cycas revoluta. The sporophyll stalk, 17 cm long, 1.2 cm wide. This variety has been grown from seed, even though examples of such are rare because there are few large fruiting specimens. Most of them have arisen by bud mutation.

4. Cycas revoluta var. variegata, Satake var, nov.

(Japanese) Fuiiri-sotetsu

This variety is very graceful with distinctly variegated pinnae. Since the variegation has arisen by seed mutation it is far more vivid than that of C. revoluta var. corrugata. They are very rare. (Fig. 6)

5. Cycas revoluta var. alba Satake var. nov.

(Japanese) Shiroba-sotetsu

This variety is not distinct from the ordinary C. revoluta, except that the entire crown of leaves are creamy in color. In most cases, green leaves are grown on other parts of the same trunk. In some cases green pinnae are found with creamy colored pinnae. Reproductive structures in this variety are known. (Fig. 7)

6. Cycas revoluta var. aurea Satake var. nov.

(Japanese) Kogane-sotetsu

The distinctive characteristic of this variety is a golden color at the tips of the pinnae. While it appears frostbitten, the color is stable in older specimens. In young plants the color may be due to a lack of proper fertilization. (Fig. 8)

7. Cycas revoluta var. hystrix Satake var. nov.

(Japanese) Hari-sotetsu

Bracteal prickles of this variety are extremely long and persist for a long period of time, where as those of the ordinary C. revoluta are short and do not persist. This variety has arisen by bud mutation from the normal C. revoluta. Leaves are somewhat delicate and weaker than usual. Sporophylls have not been observed. (Fig. 9)

8. Cycas revoluta var. involuta Satake var. nov.

(Japanese) Tako-sotetsu

This variety has also arisen by the bud mutation and looks somewhat morbid. Petioles are like those of the normal Cycas, rachises are very short, pinnae which remain involute are entirely covered with brownish hairs; rachises are slightly greenish. In vigorous plants the involution is less pronounced at the apex of the pinnae. Characters of this variety are short, thick rachises and petioles, ~~thin~~, bifid pinnae which may vary in some fronds where the involution of pinnae is slightly less pronounced. (Fig. 10)

9. Cycas revoluta var. glabra Satake var. nov.

(Japanese) Aoe-sotetsu

The back of the leaf, petiole, and petiole base is entirely glabrous and greenish. The entire plant is therefore completely smooth. This variety is extremely rare and sporophylls have not been observed.

References:

Schuster, J., Cycadaceae, In "Das Pflanzenreich", IV (i): 1-168., A.
Engler, Englemann, Leipzig.

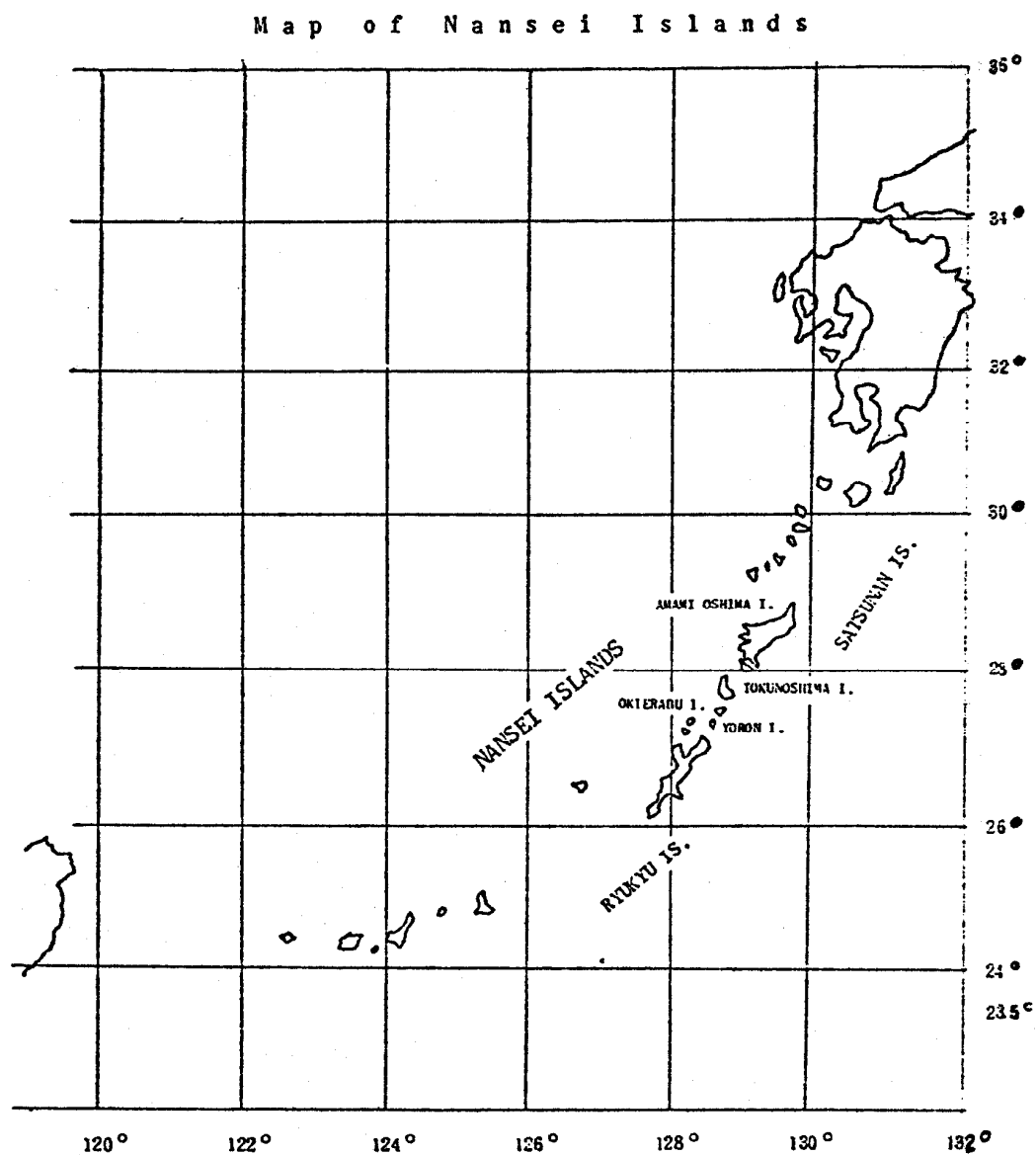




Fig. 1. *Cycas revoluta* var. *nana* (mini-cycas)



Fig. 2. *C. revoluta* var. *cristata*

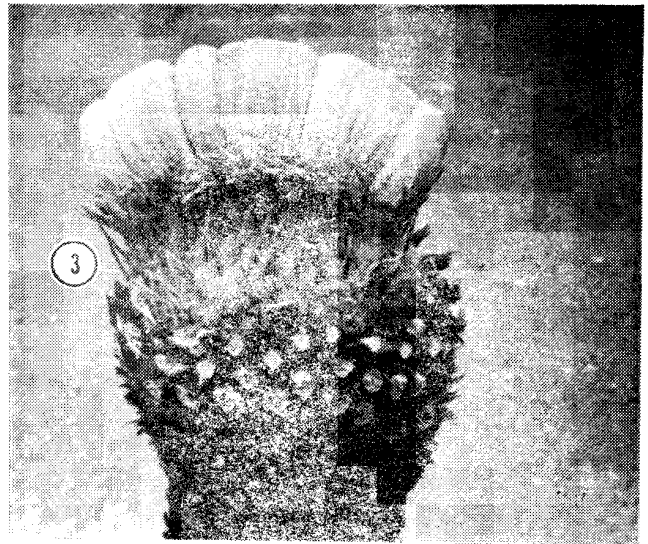


Fig. 3. *C. revoluta* var. *cristata* (male sporophylls)

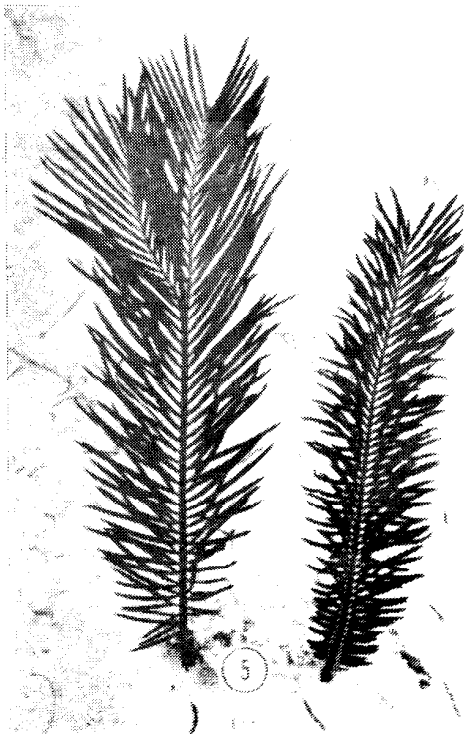


Fig. 5. *C. revoluta* var. *diplofoliolum* (detached fronds)

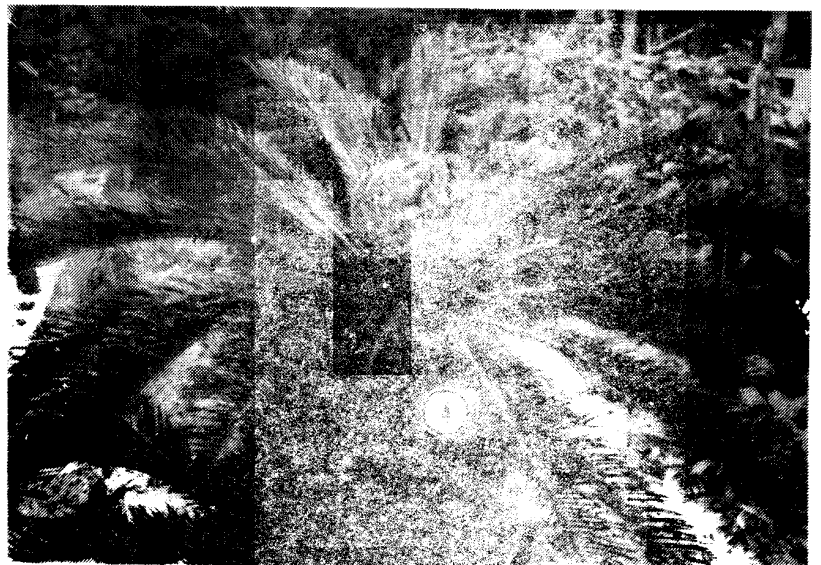


Fig. 4. *C. revoluta* var. *diplofoliolum*



Fig. 6. *C. revoluta* var. *variegata*



Fig. 7. *C. revoluta* var. *alba*



Fig. 8. *C. revoluta* var. *aurea*



Fig. 10.
C. revoluta
var.
involuta



Fig. 9. *C. revoluta* var. *hystrix*