

The Many Uses of *Trachycarpus fortunei* (Arecaceae) in China¹

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One of the most useful and widely grown palms in China is the windmill palm, Trachycarpus fortunei. It provides food for man and beast, fiber, structural materials, medicinal drugs, and a high grade of wax. The windmill palm, one of the hardiest of all palms, can be grown widely in subtropical and warm-temperate regions. It thus has the potential for production of unique palm products in regions where other palms will not grow.

Undoubtedly the most commonly grown palm in China is *Trachycarpus fortunei* (Hook. f.) H. A. Wendl., known in English-speaking countries as the windmill palm or chusan palm (Fig. 1). This species, indigenous to the mountains of south-central China, is one of the hardiest palms known. The southern fringe of China is tropical, and there one will see many palms, including of course the coconut, but the windmill palm is the only palm hardy enough to be grown to any extent in the densely populated region of eastern China. In Beijing, one sees it in large tubs adorning such cultural attractions as the Forbidden City and the Great Wall (Fig. 2). In warmer areas such as the Yangtze River Valley, however, it is frequently encountered in the landscape (Fig. 3). It is in fact cultivated throughout the warm-temperate regions of China both as an ornamental and for a surprising array of uses.

A number of species of *Trachycarpus* have been described, but all except *T. fortunei* are rare in cultivation. Several species originally described from cultivation have never been collected in the wild, and even these are rare in cultivation. Kimnach (1977), in reviewing the species of *Trachycarpus*, said that *T. wagnerianus* Hort. ex Becc. and *T. caespitosus* Becc. "seem so closely allied to *T. fortunei* that they might better be reduced to varieties or cultivars of that species." *Trachycarpus martianus* H. A. Wendl., from India and Burma, appears to be a very distinctive species, as does *T. nanus* Becc., a trunkless palm from southern China. The genus is in need of a modern revision, one based ideally on the study of natural populations throughout its range.

USES

The Chinese Pharmacopeia (Chung yao ta tz'u tien 1977) lists a number of medicinal uses for various parts of the windmill palm, but under the name *T. wagnerianus*. Other references, however, correctly identify the widely cultivated and utilized species as *T. fortunei*. It appears that virtually every part of this palm has been used for one purpose or another by the Chinese and other peoples of the Orient.

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Fig. 1-3. Windmill palm, *Trachycarpus fortunei*. **Fig. 1.** Coauthor Dong stands in front of a mature palm, holding one of several large fruit masses. **Fig. 2.** Potted palms decorate the Forbidden City in Beijing. **Fig. 3.** Palms in a public park in Nanjing.



Fig. 4. The display at the Jiangsu Institute of Botany, Nanjing, describing some of the uses of the windmill palm, *Trachycarpus fortunei*. Samples of the haemostatic drug "hsuen an" and various wax products are on the table.

While traveling in China in 1985, the first author noted a display at the Jiangsu Institute of Botany in Nanjing (Fig. 4) that briefly described some of the current uses of the palm, here correctly identified as *T. fortunei*. The second author, whose research has analyzed and verified some of these uses (Dong et al. 1981), has provided information on some of the other reported uses, and these have been supplemented from the historical and Chinese pharmacological literature. Some of these uses, particularly medicinal ones, are reported rather briefly in Chinese folk medicine manuals and need to be investigated further.

As we said, virtually every part of the palm can be used for something. The fresh flowers, for example, are eaten, and the seeds are used as animal fodder. The trunks are used as house pillars.

Fiber from *Trachycarpus* has been of major importance in China and is mentioned in a number of historical accounts. Wilson (1913; p. 82) mentioned that leaf-base fiber of *Trachycarpus* was baled and exported down the Yangtze River from Sichuan Province "in quantity." He and others imply that the quality and utilization of the fiber are comparable to that of coconut coir. The fiber was used for making ropes, mats, mattresses, and brushes. In Taiwan, as well as on the mainland, rough raincoats were made of it (Fig. 5). These were in use in Taiwan as recently as 30 yr ago and still are in some remote areas of mainland China. Grisard and Vanden-Berghe (1889) and Beccari (1905) reported similar uses. Segments of the fibrous leaf blade have been used to plait fans, hats, chairs, and sofas and to thatch roofs.



Fig. 5. A traditional raincoat, made of *Trachycarpus* leaf-base fibers, on display at a museum in Kenting, Taiwan.

The exterior of the fruit contains a significant amount of wax, reportedly comparable in quality (but not in quantity) to that obtained from the carnauba palm in South America. The wax is extracted by first separating the pericarps (fruit wall) from the large, solitary seeds, and steeping the pericarps in a vat of ethanol. Evaporation of the alcohol leaves a dark yellow wax. About 4 g of wax are obtained

from 1 kg of fruits. In China, the wax is used primarily for making shoe polish, wax paper, stencils, floor polish, and carbon paper. Undoubtedly, it could be used for many other purposes.

From the seeds themselves another product is obtained: the haemostatic drug "hsuen an," used to control bleeding of the uterus, bowel, and respiratory tract by constriction of capillaries. Clinical trials have shown it to be up to 89.71% effective. The drug has also been shown to stimulate uterine contractions and to have beneficial effects with respect to hypertension and severe diarrhea. Secondary compounds isolated from the seeds, and which may be active agents in the drug, are fumaric acid, protocatechuric acid, d-catechin, epicatechin, and leucocyanidin (Dong et al. 1981).

The crude drug is obtained by powdering the seeds followed by extraction in vats of alcohol (Fig. 6, 7). Evaporation of the alcohol leaves a red-brown pasty residue containing the active drug. This is dried in a vacuum oven and the final powder is put into capsules. It takes about 3 d to produce the final product from raw seeds. The remaining seed endosperm can be used as an animal fodder. About 50 g of the crude drug are obtained from 1 kg of seeds.

Roots, leaves, and flowers apparently contain compounds similar to those of the seeds. The root are reported to be used for birth control by women, probably because of the effect on uterine contraction. The leaf stalk or petiole is said to contain an agent effective against hypertension. The carbonized petiole, on the other hand, is alleged to have styptic properties (can stop bleeding). Flowers have similar properties; for this reason they are not eaten by small children and pregnant women.

Because of these many uses, particularly the production of wax and the drug "hsuen an" today, the cultivation of *T. fortunei* is a significant industry in China. About 20,000 tons of palm fruit are produced each year, primarily in the provinces of Hubei, Hunan, Sichuan, and Gueizhou. Each tree produces about 25–50 kg of fruit per year. Multiple use is the key to successful exploitation of plants such as *Trachycarpus*, even in non-mechanized areas of China. Yields of the separate products alone are not sufficient to compensate for land devoted to the palm, but when fully exploited, *Trachycarpus* is an economical crop.

Because of their history, the Chinese have had to be self-reliant and resourceful. They have found ways to use a wide array of plant and animal resources that would be ignored in the developed western countries. Yet frequently, traditional Chinese folk medicines have given rise to modern drugs, and there has therefore been renewed interest in recent years in the vast store of Chinese medicinal folklore.

CONCLUSION

Does *T. fortunei* have something to offer the world of high technology and big business? Can its various products compete with similar natural or synthetic products already on the world market? Certainly, *Trachycarpus* flowers are not likely to turn up soon in fast-food salad-bars, but the haemostatic drug and the wax are certainly worth investigating. These products could have valuable properties not available in competing products.

It has been our intention, in this brief report, to bring the many uses of the

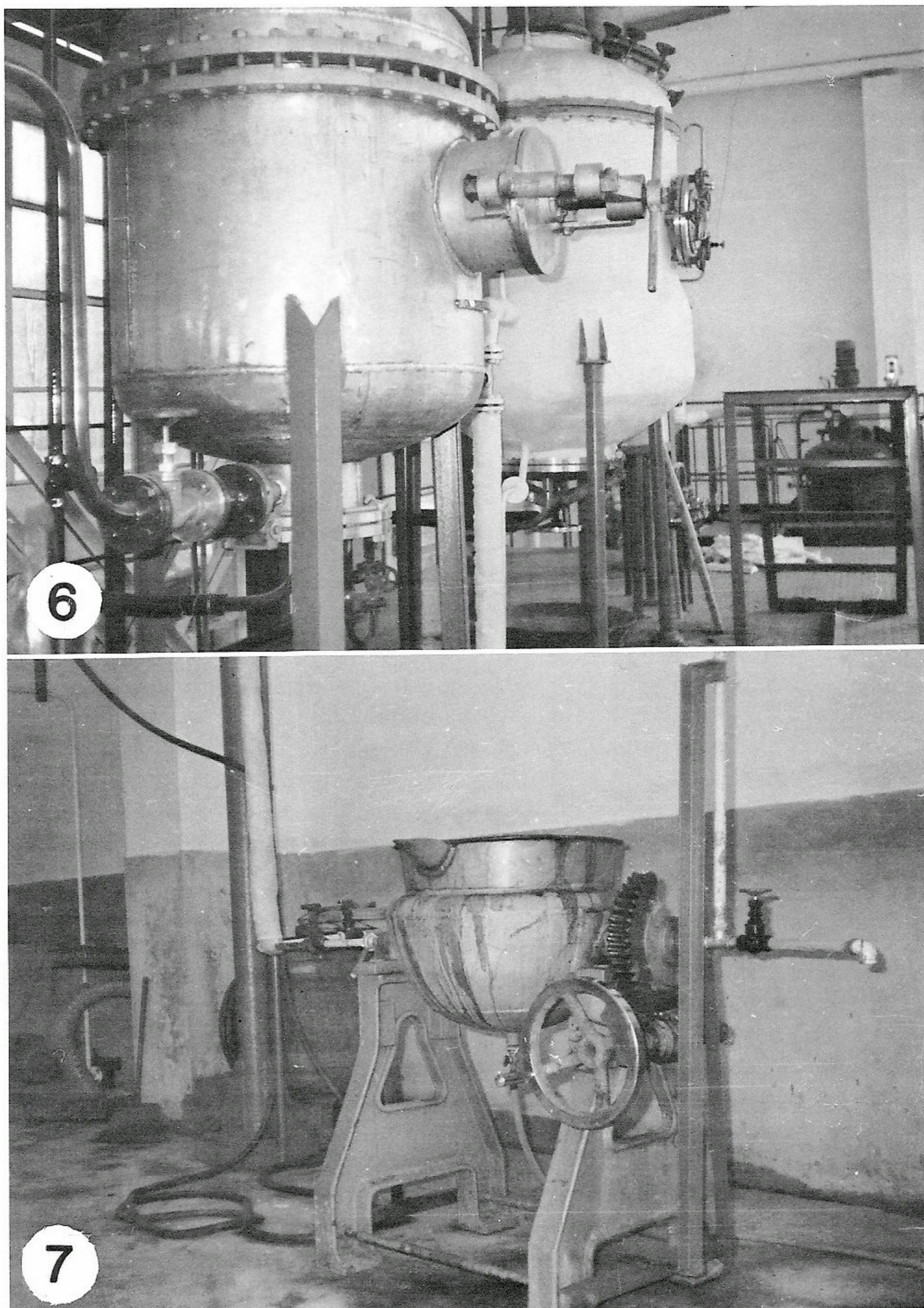


Fig. 6-7. Windmill palm, *Trachycarpus fortunei*. **Fig. 6.** Vats used for the alcoholic extraction of the haemostatic drug "hsuen an" from seeds of the palm. **Fig. 7.** Vats in which the concentration of "hsuen an" is completed.

familiar windmill palm to the attention of the western world for investigation and scrutiny. If none of the products seems economically attractive to the west at this time, several factors must be kept in mind. First, as petroleum and coal gradually dwindle away as sources of synthetic products, we will have to turn once again to renewable, natural products. The plant and animal sources of these products must be preserved, along with the information on their use that has accumulated over so many centuries.

Secondly, and more specifically, *T. fortunei* grows in large parts of the world where few other palms do; it could serve there as a local source of fiber, wax, etc. If, for example, it cannot compete with carnauba wax today, it could conceivably replace it should we somehow be cut off from that solely Brazilian supply. In the U.S. the windmill palm can be grown throughout the deep south as far north as Durham, NC, and in the Pacific coastal regions up to Vancouver, B.C. It is cultivated in southern Europe, Japan, and in other warm-temperate areas. It has withstood many hours of below freezing weather, and temperatures as low as -3°F (with defoliation) in places like Portland, OR (Bishop 1960). Temperatures in the mid 20s in Florida do not affect it at all.

On the other hand, the windmill palm does not seem to thrive in central and southern Florida. It may persist for years, but rarely flowers and fruits well, and individuals often die rather abruptly for no apparent reason. As noted by Bailey (1930), this may be more related to the sandy nature of the soil in peninsular Florida than to the climate. The Yangtze River Valley is at least as hot and humid as Florida in the summer, and the palm grows in Taiwan where winters are milder than those in Florida. In these places, and in the places where it does well in the U.S., the soil is of a heavier, clay type. Most likely, it is a combination of summer heat, porous soil, and possibly pests like nematodes thriving under such conditions, that form the southern limit to the cultivation of *Trachycarpus* in the U.S. Experiments with altered soil conditions in Florida may therefore improve the prospects for growing this palm.

Thus, *T. fortunei*, an important plant resource in China, may have something to offer, other than ornament, to the western world today. It is certainly a potential resource for the future that should be investigated thoroughly.

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