

Trachycarpus takil Becc. in Kumaon

More than 15 years have passed since senior author's reinvestigation into the occurrence of *Trachycarpus takil* Becc. in Kumaon¹. Yet the controversy regarding both its identity and its rarity or otherwise in the wild, has not abated. It is claimed on the verge of extinction^{2,3}. Yet this is repudiated by Husain and Garg⁴, who claim the existence of 'four naturally occurring, multiplying, big populations' of this palm, suggesting all is well. The reality is far from this for reasons we shall explain.

A solitary palm is about 30–40 ft height; trunk robust, oblique or ascending at the base, erect upward, distinctly conical at the apex when young, covered by permanent leaf bases and leaf sheath fibres; leaf bases triangular; leaf sheath tough, decomposes on ageing and leaving central erect ligular appendage which is chestnut at centre, brown outwards, leaf sheath fibres tightly clasping on the stem, obliquely matted and forming a close network of rhomboidal meshes; leaves forming a crown at the apex, permanent, young and fresh leaves erect and spreading at the top, old and marcescent dried leaves reflexed below the young leaves and giving a skirt-like appearance to the plant; petioles 40–90 cm long, half terete with lower angle rounded and upper flat, margins irregularly dentate, densely covered by woolly tomentum at margins when young, tomentum golden, dense at base, scarious above, blade as long as the petiole, orbicular, upper surface shining green, undersurface whitish glaucous, equally lobed, lobes nearly half way to the blade; segments 50–65 in mature trees, apex bifid or bidentate; at the junction of petiole and blade a small triangular ligule arises toward the flat surface of the petiole, ligule with crenate irregular margins; plants polygamo-monoecious; 1–4 flowering spadices arise between the new leaves and previous year's leaves, each spadix is 2–4 ft long, fleshy, green, 3–5 times branched into ultimate panicles and covered by thick spathe at each node, basal spathe largest and upper gradually reduced to a bract, densely covered by thick ferruginous tomentum on the outer side, inner side smooth, lower spathe completely encircles the node, flowers small, more or less regular, cyclic, arise on small expanded base, in ultimate branches of panicles, in groups of 2–4 or

solitary, trimerous, shortly stalked or subsessile, perianth in two whorls, both whorls dissimilar with distinct three sepals, three petals, six stamens and three carpels. The flowers show functional dimorphism, male flowers have functional six stamens and three rudimentary carpels (pistillodes) and female flowers have three ovaries with expanded functional ovules and six rudimentary stamens (staminodes).

First, there is the question of its identity. What are the differences between this palm and *T. fortunei* (Hook.) H. Wendl., which it closely resembles? Beccari⁵, who first described this palm in the early years of the last century, is, for a scientist, rather vague: he states 'the trunk is somewhat taller', 'male spadices very similar'; 'female spadices very similar'; 'flowers are a trifle larger', etc. If we strip these away we are left with the following, about which he is less equivocal: the tendency for the young plants to grow obliquely and by the young trunks being distinctly conical; the leaves more spreading; the fibres more tightly clasping and less 'ruffled' than in *T. fortunei* and finally – in our opinion, the most reliable feature – he refers to the ligula of the leaf sheath (i.e. the tip of the leaf sheath) and describes it as 'short, triangular, erect' (Figure 1b). Those of *T. fortunei* are quite different, being several inches long, tapering and acuminate, later disintegrating into individual strands (Figure 1a).

The difference in the ligula is significant, enabling anyone to differentiate between the two species at a glance. With *T. takil*, the top of the trunk is 'tidy' where the leaves appear, and they spring up from a flattish surface formed of the short ends of the leaf sheath fibres, which are all that is visible. *T. fortunei* is quite different: the top of the trunk where the leaves appear is a messy and untidy mass of extended leaf sheaths, ligulae and fibres. These split in time and go on to form the 'ruffled' fibrous trunk of *T. fortunei*. The lack of ligulae explains the 'tightly clasping' fibres on the trunk of *T. takil*. Once this is pointed out, there can be no doubt as to the correct identification of the two species.

There are other significant differences between them in that the leaves are much more evenly divided in *T. takil* (*T. for-*

tunei leaves are irregularly split), the leaves are also stiffer, and the crown of *T. takil* is much more open. This is a good guide and is useful in identifying trees at a distance.

Once we were sure of the differences between the two species, we were more confident in assessing the various reported populations. Based on our findings we realized that all the *Trachycarpus* palms in Nainital town (Figure 1c; outside the Boat Club, bank, along the main street and various prominent buildings) which were assumed to be *T. takil*, are in fact *T. fortunei*, undoubtedly planted by, or descended from trees planted by, the British, probably in the 1930s or 1940s. They look clearly different from the wild and cultivated palms of *T. takil* that we have seen.

This presents serious implications, as seed from these cultivated trees has apparently been collected and cultivated, and the resultant seedlings transplanted back into the forest to boost wild populations of *T. takil*.

Beccari⁶ writes that, '...plants cultivated in the Chaubattia Garden [were] brought there in 1877 from Badkot, 20 miles north of Chaubattia, where this palm was growing in a cool, moist valley, in a heavy jungle of oak...'. The *Trachycarpus* populations growing in the Chaubattia Garden today, however, were without exception identified as *T. fortunei*. As a consequence, it cannot be ruled out that the female inflorescence and flowers sent from there to Beccari in Florence, Italy, by Messrs. Osmaston and Smythies, and on which he based his original description a hundred years ago, were of the same species and not of *T. takil*. It remains to be seen, after a closer examination of Beccari's original vouchers and a comparison with the newly collected material of true *T. takil*, which species provided the original voucher. Taking into account the apparent similarity of the two species, this might prove quite difficult. If *T. takil* was ever cultivated in the Chaubattia Garden, it certainly has vanished in the meantime.

That is all bad news, but what about the good news? Three small, wild populations of this palm still exist in the temperate oak forest of Pithoragarh and Almora districts, Kumaon Himalaya between 29°29'–30°5'N and 79°26'–

80°15'E, and 2000–2400 m altitude. The first locality, Mt. Thalkedar (Mt. Thakil) South of Pithoragarh town (29°29'–29°32'N; 80°11'–80°15'E), the *locus classicus* and the type locality, though nobody claims to have seen a single wild adult tree for many years. The 'hundreds of specimens of all sizes, up to 10–12 m high', about which Beccari wrote have long since disappeared. Most now are small seedlings, and even these are cut down ruthlessly as soon as they reach about 18 in height, for the few pitiful fibres for making ropes. The leaves of the plants are also cut for making brooms. This is happening today, despite the area being a 'Reserved Forest'. If this population is to be preserved for posterity, then serious protection measures must be put in place immediately.

Also, there is a second small population at Gini–Kalamuni (30°2'–30°5'N; 80°11'–80°13'E) between Girigaon and Munsiyari (Figure 1d). Singh *et al.*⁷ describe this as a 'virtual treasure house', but at the same time admit that only one tree was in flower. We counted perhaps five mature trees with heights ranging from 1.5 to 4 m along with a reasonable number of juveniles, though seemingly no seedlings. While not exactly a treasure house, it seems self-sustaining to some degree, though surely under severe threat due to the low number of mature individuals.

The third locality is Badkot Forest of Pandukholi (29°50'–29°55'N; 79°28'–79°33'E) near Dwarahat. In 1995, we were also taken to these forests to assess the reality. Our local guide promised to show us a population of mature palms, but was only able to come up with 3–4 juvenile plants, plus one dead plant, and blamed a recent forest fire for the demise. This 'population' is also mentioned by Kulkarni and Pawar³.

Others localities mentioned in the literature^{5,6,8} such as the 'Dhiu (Dhuj) Mountain, northeast of Pithoragarh', seem to have long since disappeared, despite a thorough search. Those reported to be growing in the Sarju Valley near Bagesar (now Bageswar) by Blatter (in Beccari⁶) seem to be nothing more than *Phoenix loureiroi* var. *humilis*; thus victims of mistaken identity, the name 'Thakil' seemingly having been applied to any palm tree in the Kumaon.

The 'four big populations' mentioned by Husein and Garg⁴ are Thalkedar, Badkot Forest, Girigaon and Kalamuni (the

last two surely relating to a single population). As we have shown, the Thalkedar population has only seedlings, the Girigaon/Kalamuni population has only ± 5 adults plus some juveniles, and the population at Badkot has been reduced to almost nothing. While some of these number quite a few individuals, the seriously low number of mature trees in the wild is a cause for grave concern. Although it is always possible that other populations exist in similar habitats in the Kumaon and perhaps in neighbouring Nepal, their condition is unlikely to be much better than those already mentioned.

Regarding cultivated trees and those perhaps persisting after forest clearance, we know only of the following examples, all on farmland. One is at Barabe, half way up Mt. Thalkedar. This is a mature female tree about 10 m tall. Its fertility indicates a mature male somewhere in the vicinity. There are 4–5 mature trees on a nearby hill, at the edge of cultivated land on the premises of Mohan Singh Rana at Lamgarah, probably conserved after the forest was cleared, and not seen in flower. Another female tree was observed in cultivation at Munsiyari town. Finally, we are aware of one tree, about 4 m tall, gender unknown, at a farm near



Figure 1. a, Strap-like ligulae of cultivated *Trachycarpus fortunei* in the Chaubattia Garden. b, Short, triangular ligulas on *Trachycarpus takil* at Kalamuni. c, *T. fortunei* cultivated in Nainital, exhibiting a dense crown. d, Some of the taller *T. takil* remaining at Kalamuni. Note the open crown on the larger mature plant.

Bajnath on the Bageshwar–Kaushani road. Its fibres had been scorched by fire when we saw it in 1995. The palm was originally described on the basis of cultivated tree in Beccari's garden at Florence^{5,6,9}, where the senior authors have seen few plants growing well. However, a thorough search in the other gardens of Europe is necessary because there are reports on the distribution of the seeds and plants to London by its discoverer Major Madden, from where they were distributed around the United Kingdom and to Ireland¹⁰.

As can be seen from the above account, *T. takil* should be considered severely threatened. The causes of depletion of the species are mainly socio-economic. The plants are cut for fibre used to make ropes and local curd churners. The leaves are also cut for making brooms. However, forest fire may also cause mass killing of plants due to the marcescent dried leaves and permanent leaf-sheath fibres which are prone to fire. The situation is made worse by the fact that cultivated trees in Nainital and Chaubattia, which were thought to be *T. takil* and would thus have provided a buffer, have now clearly been identified as *T. fortunei*, the floristic equivalent of the cuckoo. In all, there may not be more than a dozen mature trees surviving in this area, with about 2–300 juveniles. We would therefore assess its status as critically endangered¹¹. It is es-

sentential that immediate and serious conservation measures be put into place.

In our opinion these should include the following:

- Education of local villagers about this palm, in particular about the dangers of continued cutting, the need to conserve them for their own support, and the possibility of fibre harvest without destruction. Also, the provision of free rope to take the pressure off the wild populations for a while.
- Removal of introduced seedlings of *T. fortunei* from the wild and clear labelling of other seedlings in cultivation from the same source as *T. fortunei*.
- Controlled collection of seeds from a wild population, perhaps at Kalamuni, for the production of seedlings to establish an *ex situ* population at a suitable location in the hills and perhaps for later reintroduction into the wild.

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Occurrence of house sparrow, *Passer domesticus indicus* in and around Bangalore

Birds are often common denizens of the ecosystem and have been considered as an indicator species of inhabited areas¹. Studies showed that depressed abundance of various bird species in most parts of the world today, especially in urban areas, is of particular concern as many cities are growing rapidly both in area and population^{2,3}. Among the various species of birds, the house sparrow *Passer domesticus indicus* (Passeriformes: Ploceidae) is one of the familiar species that has followed man everywhere and is inseparable from human habitations. The non-migratory sparrows are widely distributed in the Indian subcontinent and occur worldwide. Ali⁴ has described in detail the morphology and biology of the house

sparrow. Aggressive flocks of sparrows discourage other species of birds from foraging in the same area. The sparrow is omnivorous and feeds on grains, cereals, fruits, fruit buds, flower nectar, kitchen scrap, insects and insect larvae^{4–8}. House sparrows are monogamous and long-term pair bond is maintained throughout and between breeding seasons. The species breed in small colonies or in loose groups⁹.

House sparrows were abundant in the Bangalore region in the past. Of late, their population has been declining alarmingly in the region (pers. commun.). As no valid data are available, a study was conducted to know incidence of sparrows in different locations in and around the city.

The Bangalore region lies between latitudinal parallels 12°39'–13°18'N and longitudinal parallels 77°22'–77°52'E at an elevation range 839–962 m asl¹⁰. Over 6.52 million people inhabit about 2191 sq. km of the metropolitan area¹¹. Study areas were chosen based on the various types of habitats from four cardinal directions of Bangalore. Outward development continues exponentially in all directions of the city. The Kempegowda Bus Station (KBS) was identified as the central location of the city. We selected study areas to include four busy areas (KBS, K. R. Market, Shivajinagara and Yeshwanthapura) with high vehicular traffic and densely populated central city regions within a radius of 0–5 km from