

## The Indian species *Trachycarpus takil* in the garden of Villa Beccari, Florence, Italy

In February 2006, an inventory of the Arecaceae in Odoardo Beccari's garden in Florence, Italy, was carried out, described in detail by Lorek<sup>1</sup>. The inventory has revealed some interesting facts about the Indian species *Trachycarpus takil* Becc. described by Beccari<sup>2</sup> and recently proved to occur in few localities<sup>3</sup> in Uttarakhand, India. Inside the garden one still can find some *Trachycarpi* from Beccari's own plantings. Other palms that originated from that time encompass *Chamaerops humilis* L., *Jubaea chilensis* (Molina) Baill. and *Nannorrhops ritchiana* (Griff.) Aitch., possibly also *Trachycarpus caespitosus* Becc. (vide *T. fortunei* Hook.) H. Wendl.

Though Florence has a sub-Mediterranean climate, it should be mentioned that during the cold winter of 1984–85, several palms died inside the garden, including *Phoenix sylvestris* (L.) Roxb., *Butia capitata* (Mart.) Becc., *Washingtonia robusta* H. Wendl. and *Brahea armata* S. Watson. That winter was exceptionally cold with a lot of snow<sup>4</sup>, with temperatures down to  $-23^{\circ}\text{C}$ . Interestingly, some *Trachycarpus fortunei* died, whereas *T. takil* survived. The same observation was made in the urban area of Florence, where the author could identify only one specimen of *T. fortunei* that exceeds an age of 20 years. Beccari reported that *T. fortunei* was planted as early as 1870 at several spots in Florence. This leads to the conclusion that *T. takil* is as tolerant to winter frosts as *T. fortunei* under sub-Mediterranean climate conditions<sup>1</sup>.

This observation is supported by the fact that inside the garden all *T. fortunei* most probably are not older than 20 years and have been planted after the winter of 1984–85, to replace the died palms. In the front yard and the southern garden are two specimens of *T. fortunei* (L4 + 6, # as on the inventory list by Lorek<sup>1</sup>) that were planted after 1984–85 by Beccari's family. In the eastern garden (L 12), one can find few *T. fortunei* too. They have a maximum height of 7 m and encompass two clusters of *T. caespitosus* and three specimens of typical *T. fortunei*. Considering the overall height of these plants, they are most likely not from Beccari's planting. Though *T. caespitosus* is regarded as a synonym of *T. fortunei*, it is

not evidentially proved if *T. caespitosus* is in fact suckering or not. If so, the two clusters may be an original planting from Beccari, as there is the possibility that they recovered after being frozen back in 1984–85. If this *Trachycarpus* does not sucker, all *T. fortunei* have to be regarded as dead in 1984–85. Finally, these questions could not be answered sufficiently as the eastern part of the garden was inspected only from outside due to non-accessibility.

Regarding *T. takil*, Beccari most probably had planted five specimens at the end of the 19th century<sup>2</sup>. Four of these are still alive, whereas one specimen died around 1995 (Brigida Beccari, pers. commun.) due to its age<sup>1</sup>. Another specimen of *T. takil* was erroneously reported to have died during the winter of 1984–85. An old photograph of his specimen from 1914 to 21, copied in Moggi<sup>4</sup> and Lorek<sup>1</sup>, and erroneously labelled as *T. takil* clearly displays *Washingtonia* species not *T. takil* (see Lorek 2006b: 28)<sup>5</sup>. Additionally it should be mentioned that *T. takil* was described by several authors<sup>4,6</sup> as being extinct in Florence, which is not the case.

In front of the villa two large *Trachycarpus* specimens (L1 + L2) enfilade the entrance. The left specimen (L1) is male, attains a height of ca. 15 m and has a curved trunk of ca.  $7^{\circ}$ – $10^{\circ}$ . It displays the following characters of *T. takil* as mentioned by Beccari: three-fourths orbicular lamina with segments divided irregularly down to about the middle (cheirifole lamina<sup>1</sup>), the larger diameter of trunk compared to *T. fortunei* and the overall height that succeeds the height of *T. fortunei*<sup>2,7</sup>. The fibres of these specimens could not be used as a diagnostic character because they have been removed artificially around 1980 (Brigida Beccari, pers. commun.).

The right specimen (L2) is female, attains a height of ca. 12 m and has a straight, upright trunk. This specimen could not be clearly identified as *T. takil* or *T. fortunei*, because it has several characters that are not evident in either species. The lamina with deeply divided segments fits *T. fortunei*, whereas trunk-diameter, overall height, leaf scars and the creeping basal trunk-portion<sup>7</sup> are described as characters of *T. takil*. Fibres could not be

used for identification, as they have been artificially removed, similar to L1. The embryo position in the endocarp of seeds of this specimen is in 3/10 lateral and 7/10 medial.

Both specimens can be seen from photographs taken ca. 1900 (Moggi<sup>4</sup>: 42), ca. 1985 (Moggi<sup>4</sup>: 87) and on an engraving from 1918–19 (Pichi Sermolli<sup>8</sup>: 27). All these pictures fit the prospective planting date of *T. takil* at the end of the 19th century. *T. fortunei* was planted much earlier<sup>2</sup>, around 1880. This leads to the conclusion that both specimens have to be treated as *T. takil*. Additionally, the overall height with 12–15 m of L1 + 2 succeeds the height of *T. fortunei*. Beccari<sup>2,7</sup> mentioned that *T. takil* reaches 10–12 m and *T. fortunei* 8–10 m. Old photographs from the Alinari archive (exact dating was not ascertainable) display the specimens with a typical petticoat of old leaves down to the ground, as it could be observed in other specimens of *T. takil*.

In the southern part of the garden is found growing one female specimen of *T. takil* (L7) with a height of ca. 13–15 m. The lamina is more or less divided down to about the middle (cherifole character), some (not all) segments are divided down to the central lamina. The fibre texture is a tightly clasping network and the trunk is curved at ca.  $8^{\circ}$ – $12^{\circ}$ . Most segments of the lamina are drooping, but this may be due to the wind-exposed conditions in which this plant grows. This specimen is treated as *T. takil* because of the curved trunk, overall height and fibre texture, though the lamina is not divided in all segments down to about the middle. Unfortunately, the embryo position in the endocarp was not ascertainable as the seeds have been mixed up with other *Trachycarpi* by soil movement.

In the backyard are two more *T. takil* (L8a + b) specimens. The larger one (L8a) attains a height of 13–15 m and has a straight, upright trunk. The smaller one (L8b) is ca. 7 m high and has a curved trunk. In both specimens one can notice a lamina that is *T. martinaus*-like: A cheirifole silhouette with stiff segments divided down to about the middle; only few drooping segments are found in the lat-

eral parts of the lamina. This performs a crown that in its overall appearance is rather more like *T. martianus* than *T. fortunei*. L8a is the specimen Beccari has taken the type material from, as evidentially explained in Lorek<sup>1</sup>. Photographs from 1994 (Moggi<sup>4</sup>: 91f) confirm the trunk characters (straight or curved, respectively) of both specimen. A close inspection of L8a + b was not possible as this part of the garden was not accessible. Thus it should be mentioned that L8b could also be *T. wagnerianus*, considering the shape of the crown. On the other hand, the locality is more or less shady, which could lead to a *wagnerianus*-like crown.

Contrary to these Beccari-planted specimens, there is an abundance of spontaneously growing *Trachycarpi* species everywhere in the garden. Most of them are small seedlings, some juvenile plants and few mature plants. Botanical characters are not developed in the juvenile specimens, and so it is not possible to identify most of the individual plants. However, the mature plants in locality L10 clearly display the characters of *T. takil*, as described by Beccari: Conical trunk, the inflorescence placed just above the previous years petiole, the tightly clasping network of fibres, not ruffled as in *T. fortunei*, leaves semi-orbicular to three-fourth orbicular with segments divided down to about the middle. The position of the embryo is in 10/10 of the examined seeds lateral. According to Brigida Beccari, at this locality a *T. takil* was found which died around 1995 (see above).

A close inspection of specimen L10 revealed that the fibre texture differs from *T. fortunei* in being more of a undulate structure. If the apical appendices of the trunk are torn between fingers, they split in a textured manner: this means that the fibre texture is still persistent; otherwise in *T. fortunei* the fibres are split into solely fibres. This character is constant in all specimens examined in Beccari's garden, juvenile or mature plants. So the fibre texture can be used as a diagnostic character to distinguish *T. takil* from *T. fortunei*. Additionally, the appendices of the fibres, especially in the younger parts of the trunk, are broader than in *T. fortunei*. The same observation was made by the author on natural stands in Badkot-forest, the metapopulation around Kalamuni and on Mount Thalkedar.

*T. takil* from Beccari's own plantings are still alive in his garden in Florence. *T. takil* is cold-tolerant and has to be regarded as equally hardy as *T. fortunei*.

*T. takil*, as an indigenous Indian species, is freely propagating in the garden and can be regarded as actually not threatened in culture. Nevertheless, it is a vulnerable population, and the family of Beccari is still interested in preserving the 'famous' plants inside their garden.

The question whether *T. takil* and *T. fortunei* are able to hybridize or not, could not be answered as the recruiting population was still too small to investigate a significant amount of mature plants with validly developed characters.

Some characters in the *T. takil* population do not fit the description of Beccari's protologue<sup>2</sup>: The overall height of the mature specimens with 12–15 m exceeds the height of 10–12 m as mentioned by Beccari<sup>2,7</sup>. This discrepancy may be due to the fact that Beccari has not examined plants with final height.

Additionally, three plants of *T. takil* do not grow straight and erect, but more or less curved at all parts of the trunk. This character obviously is not due to shade or other light factors because comparable situations of L1 vs L2 and L8a vs L8b lead to different growth habits. The same character could be observed in the specimen of *T. takil* in a botanical garden at Rome, which also grows curved. Thus, the habit of trunk more likely is an inconstant character. Regarding natural stands around Kalamuni, the curved trunk could also be observed, but this character mainly depends on the steep slopes on which the plants grow.

According to Beccari in young plants the 'trunk is creeping', but in mature plants it is 'erect, straight and stout'<sup>7</sup>. Regarding the juvenile population in Beccari's garden, one can find different characters, as there are creeping and erect trunks in young plants as well. The young population could neither be referred to as *T. takil* nor *T. fortunei*. Hence it is not clear whether the 'creeping trunk' is a constant character or not. Regarding young plants in the populations of Badkot, Kalamuni and Thalkedar, the creeping trunk was not observed as a constant character.

In mature plants of *T. takil* (L1, L2 and L7), the basal trunk portion is somehow curved. This could be a residual character of creeping trunks in a young state of growth. It is not evident if creeping young trunks are a distinguishing

character in general, because this feature could be observed, more or less, in all other *Trachycarpus* species as well. Observations in cultivated stands in Europe and northern India (Lorek, pers. obs.) showed the juvenile creeping habit to occur abundantly in *T. fortunei*, *T. nanus* Becc., *T. takil*, *T. ukhrulensis* Lorek & Pradhan and *T. wagnerianus* Becc. These observations are supported by DNA analysis of plants from Nainital, India. Plants from this locality, erroneously collected as *T. takil*, showed a juvenile creeping habit but turned out to be *T. fortunei*<sup>9</sup>.

Considering the results of DNA analysis, it is interesting that plants from Nainital were diagnosed as *T. fortunei* and not *T. takil*, though this locality has been generally regarded as *T. takil* in all available literature. Most likely some of the specimens of *T. takil* in Beccari's garden could derive from this locality, because Beccari got *T. takil* seeds from Duthie in 1887, which were collected on Mount Takil and additionally he got seeds from Brandis in 1883 ('provenivano de Kumaon')<sup>2</sup> and possibly from a third locality, Chaubattia botanical garden, in 1915 ('... samples from plants cultivated in the Chaubattia garden ...')<sup>7</sup>. Regarding the cultivated plants in Chaubattia, it is not evidentially clear whether they are *T. takil* or *T. fortunei*, as was found by my own observations. Though, all literature treat this plants as *T. takil*. From actual inventory it is impossible to match the specimens of *T. takil* in Beccari's garden with his collection locality. But, the consequence could be that Beccari had cultivated and diagnosed *T. fortunei* which he, in respect of DNA analysis, erroneously misidentified. Also, this means that some of the plants, regarded here as *T. takil*, could in fact be *T. fortunei*. Finally, this question can be answered definitely only by comparing DNA analysis of cultivated and natural stands.

Examination of the position of the embryo inside the endosperm of all accessible female *T. takil* showed in L2 3/10 embryos in lateral position and in L10 10/10 lateral embryos. Samples from L7 could not be used due to actual soil movements for garden restyling. Through soil movement seeds from *T. takil* got mixed up with other *Trachycarpi* species. Lateral embryos are most likely a distinguishing character if found in a high percentage of examined seeds.

Other than in Beccari's protologue ('limbo 3/4 orbiculari in laciniis numero-

sis (45–50) ensiformibus breviter bifidis vel bidentatis profunde et irregulariter partito', 1905), the lamina in most *T. takil* is semi-orbicular. In some specimens the lamina showed more or less a V-shape, whereas in other specimens a three-fourth orbicular lamina was found. This discrepancy may be due to the fact that Beccari got seeds from different localities. The orbicularity should be regarded as an inconstant character as long as it is not known if the specimens in Beccari's garden are *T. takil* or hybrids of it or if some are from the mentioned Nainital *T. fortunei*.

A useful character for identification are the fibres in the younger parts of the trunk. In juvenile and adult plants, the appendices of the fibres are rather more broad than in *T. fortunei*. If the appendices are torn between fingers they split in a textured manner, and not solely into fibres as in *T. fortunei*. This was observed in all specimens, in Beccari's garden, as well as on plants in natural stands.

The position of the flowering spadices is a uniform character as well. In *T. takil*, flower stalks are placed just above the

previous year's petioles. On bare trunks the spadices release a prominent scar just above the leaf-sheath scars, more or less directly above the middle position of the scars. In *T. fortunei* supra-petiolarous inflorescences can also be observed, but not that regularly. In *T. fortunei*, the spadices do not show such a prominent scar.

The question occurs, as to whether *T. takil* should still be treated as a species of its own, as it has been suggested by Jones<sup>10</sup>. Taxonomically, the characters of the cultivated stands in Florence are more or less overlapping with *T. fortunei* and other species of the reniform group. One should discuss the possibility if *T. takil* has to be re-classified, similar to the ovaliform group<sup>11</sup>, or if the characters of *T. takil* must be re-described. This will be a part of future work on comparing the cultivated stands in Europe and the natural populations in India.

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## MEETINGS/SYMPOSIA/SEMINARS

### Workshop on Biostatistics and its Applications in Research

Date: 23–24 November 2007

Place: Thane

Topics include: Measures of central tendency and dispersion; Normal distribution and Z test; *t* Test; ANOVA; Chi square test; Use of computers to solve biostatistical problems; Correlation and regression analysis.

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### Workshop on Physics and Technology of All-optical Communication Components and Devices

Date: 11–16 October 2007

Place: Kharagpur

Topics include: Basic nonlinear optics, optical amplifiers: fiber amplifiers, Raman amplifiers and semiconductor optical amplifiers, optical wavelength conversion, all-optical switches, optical diode, optical transistors, optical logic gates, optical computing and optical networking.

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