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THE PROSTRATE FORM OF THE PHOENICIAN JUNIPER: *JUNIPERUS PHOENICEA* L. F. *PROSTRATA*, F. NOV.

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A prostrate, creeping, freely rooting form of the Phoenician juniper, a species known for its rather limited variability, was found in SW Portugal. The form has a restricted distribution, and differs from the more common wind shaped forms (individuals) of the species by its more prostrate habit and its capability of freely sending adventitious roots to further establish itself in this summer-dry region. It may be valuable in soil-conservation projects and its ornamental merit may also be explored.

Key words: new form, conifers, Cupressaceae, *Juniperus*, prostrate forms, Portugal, Mediterranean region

JUNIPERUS PHOENICEA L. F. *PROSTRATA*, F. NOV.

A tipo differt: frutex humilis, repens, altitudine 0,2–0,4(–0,8) m surculis illis, typi similibus, tenuibus squamulis parvis (1 mm), galbulis 8 mm diametro, globosis, rufo-brunneis.

Typus: SW Portugal, near Praja Grande (*ca* 15 km W of Sintra), near ocean cliffs, about 40 m above sea level. Oct. 13, 1995. D.A.P. collections #46163, collectors: Zs. Debreczy, Gy. Bíró, I. Rácz and J. Németh (BP and the International Dendrological Research Institute, Wellesley, Massachusetts), with Chris and Stephanie Tebbutt (Boonville, California). Holotypus: BP, Isotypi: LISC, LISI, COI.

The prostrate form differs from the species by its low creeping growth (with a height of 0.2–0.4 or up to 0.8 m), its prostrate leaders, and its capability of sending secondary (adventitious) roots (Fig. 4) from branches contacting the soil, and further supporting the creeping character of the plant. The branches are often twisted, curved with various sized knots that have clusters of branchlets. The one year old branchlets (annotini) are typically very thin (0.7 to 1 mm), less often up to 2 mm across. Although the scale-leaves are usually small (1 mm) in this form, this as well as other characteristics are well within the range of the regular variability of the species. The creeping form seems to be rare, and so far has only been observed in the type locality (Fig. 1).

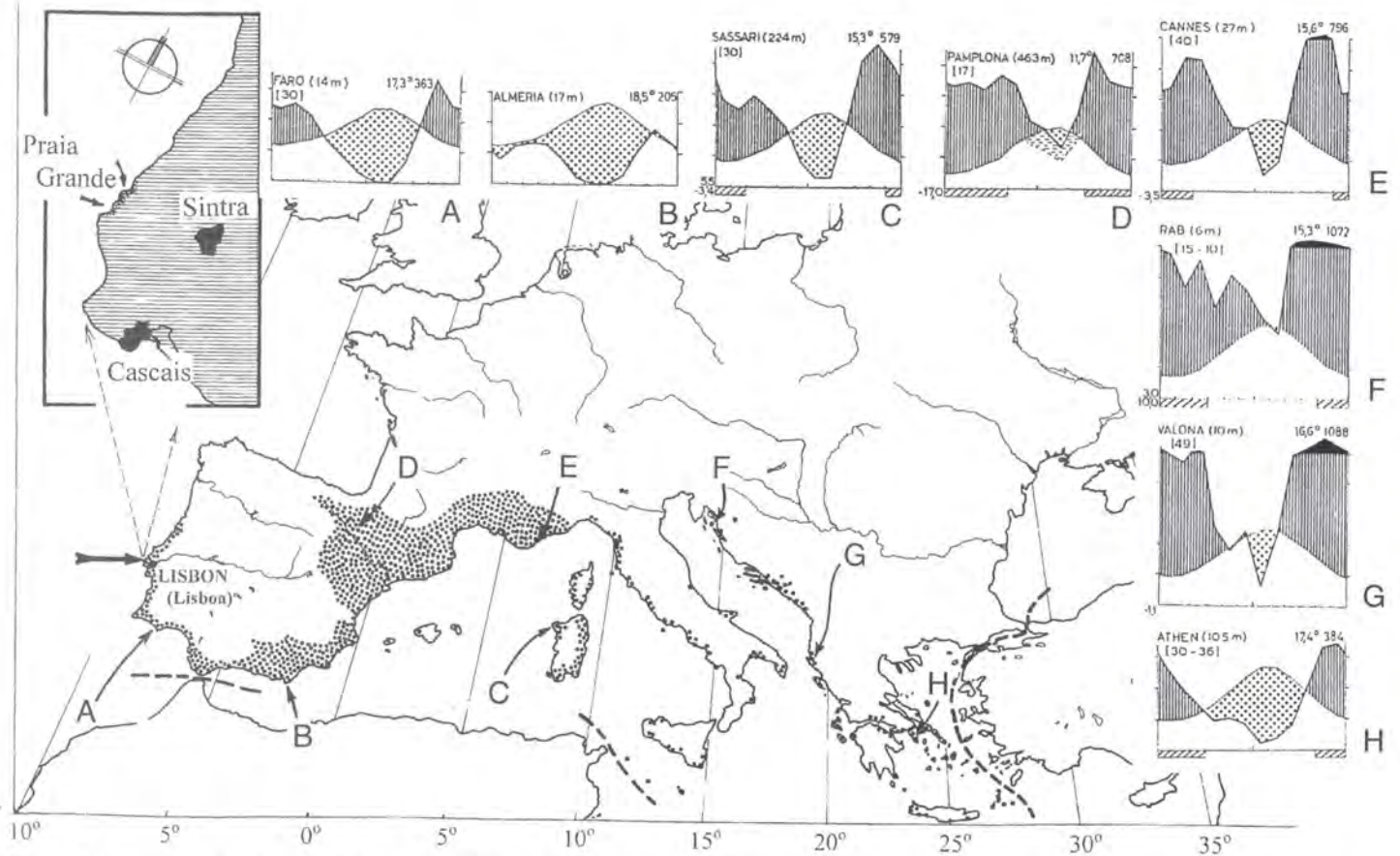


Fig. 1. The European distribution of *J. phoenicea* (after JALAS and SUOMINEN 1973) with arrow pointing to the type location of f. *prostrata*. The climate diagrams were taken from WALTER and LIETH (1960–67).

DISCUSSION

The Phoenician juniper is native to the Mediterranean Basin and adjacent Atlantic coast (Portugal), Asia Minor, Near East and the Arabian Peninsula; also known from the nearby islands of Madeira and the Canary Islands (CARRIERE 1867, FRANCO 1986, KERFOOT and LAVRANOS 1984, LORET and BARRANDON 1876, PARLATORE 1867, 1868, TUTIN *et al.* 1964, VEITCH and SONS 1900 etc.). It usually occurs on (summer-)dry hills in the often degraded habitats near the coast line, but scattered stands or individuals may be found over 150 kilometres from the sea (JALAS and SUOMINEN l.c., KERFOOT and LAVRANOS l.c.). In its southern distribution it locally ascends the mountains up to 2200 m (BALL 1878, KERFOOT and LAVRANOS l.c., VIDAKOVIC 1982). The climate in most of its range is classical Mediterranean, however, it is also found in some dry submediterranean climate zones, such as parts of Iberia, the southern Balkans, the Near East and North Africa (IV(VII) and IV(III) or III(IV) in WALTER and LIETH 1960–1967). In other locations, its distribution coincides with the cooler, more humid ("too wet") type of submediterranean climate (IV(VI) in WALTER l.c.) such as that found in the southern foothills of the Pyrenees (Fig. 1).

The Phoenician Juniper is known to grow up to 6–8 m in height, however, it most frequently is a multi-stemmed, broad conical, upright shrub. Grazing animals often shape it to a low bush so that it almost appears to be a creeping shrub or an upright one with an extended broad base. It has bright red, dark red or reddish-brown cones that vary in shape from globose to ovate. The latter is usually treated as a distinct subspecific taxon of this species: *J. ph.* var. *turbinata* (Guss.) Parl. or subsp. *turbinata* (Guss.) Nyman. It is a low shrub with rather large (up to 14 mm long), ovate cone-berries (strobili).

Another form, originally appearing in the Sénéclauze nursery catalogue in 1854 as "*J. Myosurus*" was re-named by CARRIERE (1867) as "*J. ph. filicaulis*". This form is now usually listed among man-made forms with the cultivar name "*Myosurus*" (KRÜSSMANN 1955, 1991, MESTERHÁZY 1995, VIDAKOVIC 1982, WELCH and HADDOW 1993).

HENKEL and HOCHSTETTER (1865) list "*J. phoenicea Lycia* Lois.", with the synonym "*J. ph. malacocarpa*", as a more shrubby plant with lighter or grayish green scale leaves and smaller and "bluish" (bloomy) cone-berries. They also mention "*J. phoenicea filicaulis*", with "*J. Myosurus*" added as a synonym, and refer to its elongated scale leaves.

An important early discussion of the forms of this juniper was published by CARRIERE (1867) in which four variants were distinguished: 1) *J. Lycia*, Linn., *J. Ph. Lycia*, Loud., with among other names listed *J. Ph. Malacocarpa*, Endl., *J. Ph. foemina*, Gord. and *J. Ph. sclerocarpa*, Endl.; 2) *J. Ph. expansa*; 3) *J. Ph. py-*

ramidalis; 4) *J. Ph. filicaulis*, Carr., with the synonym of *J. Myosurus*, Hort. Sénécl. Catal. 1854, p. 35.

PARLATORE (1868) mentions the form with seeds exceeding the cone scales as f. *monstruosa* from Sierra de Segura, S. France nr. Telonem from Webb's herbarium.

In BALL (1878) "*var. galbulis mollibus*" (syn. *J. lycia* L.) appears as a native of Ait Mesan, Morocco, from 1500 m, and having characteristic soft hairy cone-berries.

Under *J. phoenicea*, VEITCH (1900) discusses var. *filicaulis*, var. *turbinata* and var. *Langoldiana*, the latter characterized with a more open habit, more distantly set branchlets, and with young ("herbaceous") shoots having a brighter green colour with a "slight glaucous tint".

The Flora Europaea (TUTIN *et al.* 1964) recognized *J. phoenicea* without distinguishing any form, variety or subspecies.

In Flora Iberica, FRANCO (1986) discusses six *Juniperus* species from the region – the Phoenician juniper is separated into two subspecies, the type and subsp. *turbinata*.

A true prostrate, creeping form that spreads by rooting branchlets is worthy of a botanical note on the variability of the species.

HABITAT OBSERVATIONS

J. phoenicea f. *prostrata* grows in SW Portugal on the seashore cliffs near Praja Grande, 15 km west of the town of Sintra which is famous, among others, for its rich living collection of trees in the Pena Park. The climate here is humid Atlantic-Mediterranean with a rainfall of about 1000–1200 mm (to somewhat north of the type locality: Coimbra, 140 m, 14.9 °C, 984 mm; Oporto, 100 m, 14.8 °C, 1189 mm). In the low scrub where this new juniper forms patches, the most frequent associative species include *Asparagus acutifolius*, *Crithmum maritimum*, *Daphne gnidium*, *Dorycnium herbaceum*, *Rhamnus alaternus*, *Rubia tinctoria*, *Smilax aspera* etc. After finding the first clump or population we looked for others in several other locations along the ocean cliffs and among windswept sea-front vegetation, but without success. The form seems to be rare and restricted to the Sintra region. It is, however, possible, that further thorough search will prove its wider distribution.

To speculate on the origin of this form, we contend that it appears to have developed from an accidental seedling of procumbent and rooting character, which survived and became dominant on the cliffs where the upright (normal) form is restricted by the strong, frequent Atlantic winds.



Fig. 2. The habitat of the prostrate form of the Phoenician juniper.



Fig. 3. Close-up of a male specimen of the prostrate Phoenician juniper.

Another approach is that the strong winds caused the establishment of the prostrate habit and initiated the rooting habit as a secondary characteristic in the development of this form. This argument cannot be supported because of the observation that other low stands of the Phoenician juniper appear to be dwarfed, but they do **not** have low adventitious rooting bodies. Long observation of the Phoenician juniper indicates that the species typically has little capacity to develop adventitious roots and it does not root easily in artificial circumstances.

If the first statement is true, the genetic prints of this likely phenotypic character must be present in the creeping genotype, making it quite likely that viable prostrate seedlings will appear in a large and subsequently repeated selection in seedbeds from seeds collected from prostrate plant(s).



Fig. 4. Detail of one of the type sheets of the prostrate Phoenician juniper with arrows pointing to the rooted side branches (scale bar: 10 cm).

FURTHER NOTES ON THE HABITAT AND MORPHOLOGY OF THE SPECIES

Within most of its distribution *J. phoenicea* grows under a minimum frost conditions (olive-zone) and is usually regarded as a tender plant in areas of cold winters (KRÜSSMANN 1955, 1991, REHDER 1951, SILVA TAROUCA 1913). However, its frost resistance in cultivation proved to be much higher than would be expected from its present distribution. Specimens cultivated in Central Europe (Budapest and Lake Balaton, Hungary, 10.5 °C, 580–600 mm, with minimums – 18–23 °C; 47° N) survived several severe frosts when experimentally grown in (summer-) warm, sun-exposed but not too dry locations. These experiments have demonstrated the species's Arcto-Tertiary origin.

In relation to its northern cultivation, it is worth mentioning, that in mild but cool regions the typical reddish colour of the cone-berries (strobili) of the species does not seem to appear. Instead, the cone-berries ripen to green or greenish yellow – some earlier references to the colour of the cone-berries (yellow or yellowish – SILVA TAROUCA 1913, KRÜSSMANN 1955, 1991) may have been based on similar observations. In specimens cultivated in the Bedgebury Pinetum in Kent, S England, in the winter of 1975 and 1977, the mature strobili, although fully developed, were found to remain greenish yellow and finely, minutely black-dotted. Also strobili of specimens distributed under the name of *J. phoenicea* var. *turbinata* by the Hillier and Sons Nursery nr. Winchester, England in the 70s, and grown in Central Europe (between 1970 and 1995 nr. Siófok, Hungary) ripened to a pale greenish yellow and were minutely black dotted, almost identical to those of the Bedgebury specimens. This and the fact that the authors have never observed reddish cone-berries in the species in its northern limit in cultivation seem to indicate that the colour of the cone-berries is closely connected to the climate, probably the amount of heat, which influences the accumulation of colour pigments in the cone-berry.

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