Acta Botanica Malacitana 27: 237-294 Málaga, 2002

FRAGMENTOS TAXONÓMICOS, COROLÓGICOS, NOMENCLATURALES Y FITOCENOLÓGICOS (108-121)

108. CUPULE AND ACORN BASIC MORPHOLOGICAL DIFFERENCES BETWEEN *QUERCUS ITHABURENSIS* DECNE. SUBSP. *ITHABURENSIS* AND *QUERCUS ITHABURENSIS* SUBSP. *MACROLEPIS* (KOTSCHY) HEDGE & YALT.

Jean-Marc DUFOUR-DROR & Aytekin ERTAS

Estructura del glande y de la cúpula de Quercus ithaburensis Decne. subsp. ithaburensis y de Quercus ithaburensis subsp. macrolepis (Kotschy) Hedge & Yalt.: Diferencias esenciales.

Key words. *Quercus ithaburensis*, taxonomy, morphology, acorn, cupule, Israel, Turkey.

Palabras clave. *Quercus ithaburensis*, taxonomía, morfología, glande, cúpula, Israel, Turquía.

The Tabor oak, *Quercus ithaburensis* Decne., is an Eastern Mediterranean oak (Subgen. *Euquercus*, Section *Cerris*) (Camus, 1938). The Tabor oak is generally considered as a deciduous tree (Zohary, 1973; Davis, 1982), yet Ne'eman (1993) regards this oak rather as semi-deciduous since some populations are characterized by a very short duration of leaflessness. The Tabor oak includes two subspecies, *Quercus ithaburensis* subsp. *macrolepis* (Kotschy) Hedge & Yalt. and *Quercus ithaburensis* Decne. subsp. *ithaburensis* (Govaerts & Frodin, 1998). The subspecies *macrolepis* (fig. 1) grow in Italy in the Salentina peninsula (Pignatti, 1982; Zangheri, 1976), in Southern Greece (Strid & Tan, 1997), in Crete (Chilton & Turland, 1997), and in several Aegean Islands (Economidou, 1981; Davis, 1982), in Western and Southwestern Anatolya, (Turkey) (Inal, 1955, 1959; Akman *et al.*, 1978, 1979; Davis, 1982). The second subspecies of the Tabor Oak, *Quercus ithaburensis* subsp. *ithaburensis* (fig. 1) is found mainly in Israel: It extents in the Sharon plain, north of Tel-Aviv, then northwards through the Ramot-Menashe area,

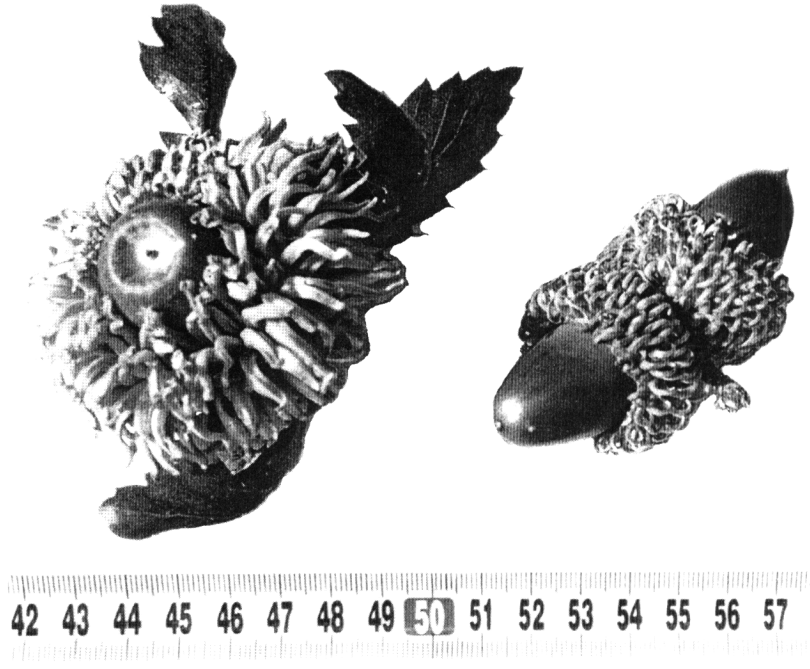

Figure 1. Acorns in their cupules collected in early September. *Quercus ithaburensis* subsp. *macrolepis* (left), *Quercus ithaburensis* subsp. *ithaburensis* (right).

the Lower Galilee, the Dan Valley (north of the Tiberias lake), and up to the southern part of the Golan Heights (Zohary, 1962; Ne'eman, 1993). The subsepcies *ithaburensis* is also found in the northwestern part of the Gilead region in the Mediterranean part of Jordan (Zohary, 1962, 1973; Quézel & Barbéro, 1985). The presence of Tabor Oak in Lebanon and in Syria is very unlikely as the different works carried out on the vegetation of these countries made no mention of either of these subspecies (Chouchani *et al.*, 1975; Abi-Saleh *et al.*, 1976; Barbéro *et al.*, 1976; Chalabi, 1982; Nahal, 1982, 1983, 1984). The presence of isolated individuals identified as Tabor Oak by Post (1933) and later by Mouterde (1966) in the coastal area of Syria remains unclear and these specimen may have been introduced for agriculture purposes as in other Mediterranean regions (Turland *et al.*, 1993). As a consequence, the extent of the subspecies *ithaburensis* seems to be restricted mainly to Israel and to specific locations in eastern adjacent regions.

Surprinsingly, the basic morphological differences between the two subspecies are not well established. Zohary (1973) mentions that the two subspecies are «very similar in their ecology» but this author did not develop any further comparative description of the two subspecies. Davis (1982) notes briefly that «*Quercus ithaburensis* subsp. *ithaburensis* only differs from the more northern subspecies [subsp. *macrolepis*] in the less deeply incised leaf margins». Moreover, Zohary (1973) and Davis (1982) both insisted that Tabor Oak subspecies show a great variability in leaf shape. As a consequence, one might conclude that both subspecies are very similar. Actually, *Quercus ithaburensis* subsp. *macrolepis* and *Quercus ithaburensis* subsp. *ithaburensis* appear to be very different when the basic

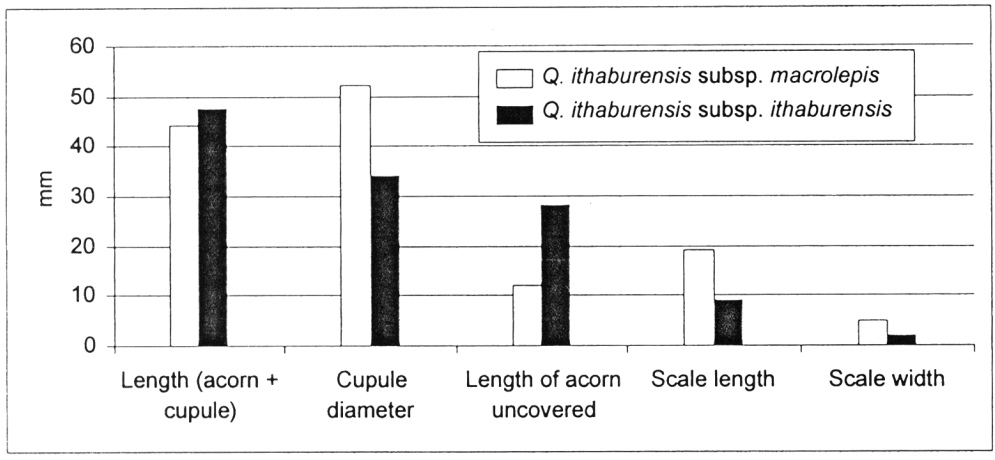

Figure 2. Morphological differences between the two subspecies of the Tabor Oak.

morphological external characteristics of their cupule and acorn are considered. The purpose of this paper is to display and quantify these differences.

A total of 120 samples of Tabor Oak acorns inserted into their cupule were collected in late September from various areas in Western Anatolya and in the Ramot-Menashe region southeast to the Carmel area. The samples were collected from the trees simultaneously in Turkey and in Israel, with the most mature acorns being selected. Since Zohary distinguished five varieties in the subspecies *ithaburensis* (Zohary, 1966) it should be stressed that all the samples collected in Israel have been taken from specimens belonging to the variety *ithaburensis* which is the most widespread according to Zohary's nomenclature (1966).

In order to compare the major morphological divergences between the two subspecies five parameters were chosen: (1) The length of the structure composed by the acorn inserted in the cup-shape cupule; (2) the diameter of the cupule; (3) the length of the acorn which is *not* enclosed by the cupule; (4) the length and (5) the width of the scales which are covering the outside surface of the cupule. The first three measurements were carried out with a digital calippers.

The total length of the structure composed by the acorn inserted into the cupule was found to be slightly longer for the subspecies *ithaburensis* (48 mm, Sd: 6.5 mm) than for the subspecies *macrolepis* (44 mm, Sd: 6.3 mm) (fig. 2). As shown in Table 1, these results are consistent with those mentioned by Camus (1938); the main nuance is in the length of the acorn of the subspecies *macrolepis* which has been reported by Camus (1938) as quite smaller. However, the values of the standard deviation (Sd) suggest that the difference in the acorn length of the two subspecies is not prominent enough to be considered a reliable criterion for differentiating between the two subspecies.

In contrast, the cupule diameter shows very significant morphological differences between the two subspecies of the Tabor Oak (fig. 2). The subspecies *macrolepis* develops cupules whose average diameter reaches 52 mm (Sd: 7.3 mm) whereas the average cupule diameter of the subspecies *ithaburensis* does not exceed 34 mm (Sd: 5 mm). These values are very similar to these reported by Camus

	Dufour-Dror & Ertas	Camus (1938)
Q. ithab.* ssp. *ithaburensis		
Acorn length	48	50
Cupule diameter	34	35
Scales length	9	14 - 18
Scales width	2	2 - 6
Q. ithab.* ssp. *macrolepis		
Acorn length	44	25 - 40
Cupule diameter	52	45 - 60
Scales length	19	-
Scales width	5	-

Table 1. Table displaying our results and the measurements reported by Camus (1938). The values given by Camus are referring to *Quercus aegilops* subsp. *macroplepis* —now named *Quercus ithaburensis* subsp. *macrolepis* (Govaerts & Frodin, 1998)— and to *Quercus aegilops* subsp. *ithaburensis* —presently named *Quercus ithaburensis* subsp. *ithaburensis* (Govaerts & Frodin, 1998). Values are given in millimeter.

(1938) (tab. 1). Consequently, the value of the ratio of the length of the structure formed by the acorn and the cupule (previously measured) and the cupule diameter, reveals a great difference between both subspecies: This ratio reaches only 0.8 for the subspecies *macrolepis* whereas it reaches up to 1.4 for the subspecies *ithaburensis*. These values actually reflect the general aspect of the structure formed by the association of the cupule and the acorn. In the *ithaburensis* subspecies this structure is oblong, whereas the *macrolepis* subspecies develop a rather globose structure.

Similarly, the length of the acorn which is not enclosed by the cupule constitutes a second reliable criterion for the differentitation between the two Tabor Oak subspecies (figs. 1 and 2). The length of the acorn section uncovered is almost two and half times longer in *ithaburensis* subspecies (28 mm, Sd: 4.8 mm) than in *macrolepis* subspecies (12 mm, Sd: 1.9 mm). One should mention that Zohary (1966) distinguished a variety *subinclusa* of *Quercus ithaburensis* subsp. *ithaburensis*, characterized, as «an acorn enclosed in the cupule by 2/3 or more of its length». However, this variety is represented by a very small population whose extent is restricted to the Dan valley, north of the Tiberias lake.

Finally, the length and the width of the scales which are covering the external surface of the cupule, can be considered as the third significant morphological criterion according to which both subspecies may be easily distinguished (fig. 2). The scales of *Quercus ithaburensis* subsp. *macrolepis* have been found to be 19 mm long and 5 mm wide whereas those of *Quercus ithaburensis* subsp. *ithaburensis* are significantly smaller as they do not exceed 9 mm in length and only 2 mm in width. Surprinsingly, the values reported by Camus (1938) concerning the length and the width of the scales of the subspecies *ithaburensis* are significantly higher than those found in this study (tab. 1). This difference may suggest that the size of the scales might not be as reliable as the two previous morphological criteria in order to differentiate the Tabor oak subspecies.

A comparison of the most basic morphological characteristics of the acorn and the cupule of both Tabor Oak subspecies highlights the existence of three major morphological differences:

1. The cupule diameter of the subspecies *macrolepis* is 1.5 times larger than that of the subspecies *ithaburensis*. As a consequence, the general aspect of the structure formed by the acorn and the cupule is globose in *macrolepis* subspecies while it is distinctly oblong in *ithaburensis* subspecies.

2. The part of the acorn which is not covered by the cupule is 2.3 times longer in *ithaburensis* subspecies than in *macrolepis* subspecies.

3. Scales are 2.1 times longer and 2.5

times wider on *Quercus ithaburensis* subsp. *macrolepis* specimens than they are on *Quercus ithaburensis* subsp. *ithaburensis*.

These results suggest that acorn and cupule basic morphological traits constitute simple and reliable distinction criteria that enable to differentiate accurately between both subspecies of the Tabor Oak. As a consequence, it is preferable to distinguish between the two subspecies according to the morphology of the acorn and the cupule rather than according to the highly variable shape of the leaf.

AKNOWLEDGMENTS. The authors are very grateful to the General Directory of Turkish Forests for its assistance in fieldwork. The data published in this short communication have been collected as part of a research project on the characteristics and the biogeography of Tabor oak subspecies, partly financed by the Tel-Aviv University.

REFERENCES

ABI-SALEH, B., BABÉRO, M., NAHAL, I. & P. QUÉZEL -1976- Les séries forestières de végétation au Liban, essai d'interprétation schématique. *Bulletin de la Société Botanique de France* 123:541-560.

AKMAN, Y., M. BABÉRO & P. QUÉZEL -1978- Contribution à l'étude de la végétation forestière d'Anatolie méditerranéenne (I). *Phytocoenologia* 5 (1):1-79.

AKMAN, Y., M. BABÉRO & P. QUÉZEL -1979- Contribution à l'étude de la végétation forestière d'Anatolie méditerranéenne (II). *Phytocoenologia* 5 (2):189-276.

BARBÉRO, M., M.N. CHALABI, I. NAHAL & P. QUÉZEL -1976- Les formations à conifères méditerranéens en Syrie littorale. *Ecologia Mediterranea* 2:87-99.

CAMUS, A. -1938-1954- Les Chênes. Monographie du genre Quercus. Paris, Paul Lechevalier. **1**. Genre Quercus sous-genre Cyclobalanopsis, sous-genre Euquercus (Sections Cerris et Mesobalanus) : X, 686 pp., 35 fig (1938) ; **2**. Genre Quercus sous-genre Euquercus (Sections Lepidobalanus et Macrobalanus). 830 pp., 59 fig. (1939) ; **3** (1) : 664 pp., 28 fig. (1952) ; **3** (2): 665-1314, 28 fig. (1954).

CHALABI, M.N. -1982- Sols et climax forestiers en Syrie littorale. *Ecologica Mediterranea* 8:137-141.

CHILTON, L. & N.J. TURLAND -1997- *Flora of Crete – A supplement*. Marengo Publications: p.125.

CHOUCHANI, B., M. KHOUZAMI & P. QUÉZEL -1975- A propos de quelques groupements forestiers au Liban. *Ecologia Mediterranea* 1:63-77.

DAVIS, P.H. -1982- *Flora of Turkey and the east Aegean Islands*. Vol. 7. Edinburgh University Press. Edinburgh. p.947.

ECONOMIDOU, E. -1981- Le milieu terrestre de l'île de Limnos et ses reliques de forêts. *Biologie-Ecologie Méditerranéenne* 8:129-138.

GOVAERTS, R. & D.G. FRODIN -1998- *World checklist and bibliography of Fagales*. Royal Botanical Garden, Kew. p.407.

INAL, S. -1955- *Türkiyenin Palamut Mesesi Varligi*. Istanbul Üniversitesi Yayinlarindan No 648. Orman Fakültesi No34. Istanbul. p 103,

INAL, S. -1959- Palamut Mesesi Ormanlari ,Cografi Yayilislari, Ekonomik Önemi, ve Amenajman Esaslari. *Orman Umumu Mudurlugu Yayinlari Sira* 280 (14):1-307.

MOUTERDE, P. -1966- *Nouvelle flore du Liban et de la Syrie*. Tome premier. Editions de l'Imprimerie Catholique. Beyrouth. p.563.

NAHAL, I. -1982- Rôle des facteurs édaphiques dans l'organisation de la végétation méditerranée-orientale. *Ecologia Mediterranea* 8:135-136.

NAHAL, I. -1983- Le pin brutia, première partie. *Forêt méditerranéenne* 5 (2):165-172.

NAHAL, I. -1984- Le pin brutia, deuxièpe partie. *Forêt méditerranéenne* 6 (1):5-17.

NE'EMAN, G. -1993- Variation in leaf phenology and habit in Quercus ithaburensis, a Mediterranean deciduous tree. *Journal of Ecology* 81:627-634.

PIGNATTI, S. -1982- *Flora d'Italia*. Vol. 1. Ed. Edragricole. p.790.

POST, G. -1933- *Flora of Syria, Palestine and Sinai*. Vol 2. American Press, Beirut. p.928.

QUÉZEL, P. & M. BARBÉRO -1985- *Carte de la végétation potentielle de la région*

méditerranéenne, feuille 1: Mediterranée orientale. Editions du CNRS. Paris. 69p.

STRID, A. & K. TAN -1997- *Flora Hellenica*. Koeltz Scientific Books, Konigstein.

TURLAND, N.J., L. CHILTON & J.R. PRESS -1993- *The flora of the Cretan area: annotated checklist & Atlas*. The Natural History Museum and HMSO, London.

ZANGHERI, P. -1976- *Flora italica*. Vol.1. Cedam-Padova. p 1157.

ZOHARY, M. -1962- *Plant life of Palesine*. Ed. Ronald Press. p.262.

ZOHARY, M. -1966- *Flora palaestina*. Vol. 1. The Israel academy of sciences and humanities, Goldberg's Press. p.364.

ZOHARY, M. -1973- *The geobotanical foundations of the Middle East*. Ed. Gustav Fisher. Stuttgart. p.738.

Aceptado para su publicación en septiembre de 2002

Dirección de los autores. J.M. Dufour-Dror: Geography department, Tel-Aviv University. P.O.B. 39040, Ramat-Aviv, Tel-Aviv 69978, Israel; Centre Biogéographie-Ecologie, Institut Européen pour le Développement Durable, 45 rue de France, 77300 Fontainebleau, France; A. Ertas: Department of Sylviculture, Faculty of Forestry, Istanbul University, 80895 Bahçekoy-Istanbul, Turkey.

109. NUEVAS LOCALIDADES Y UNA NUEVA VARIEDAD DE *CENTAUREA ULTREIAE* SILVA PANDO (COMPOSITAE).

Jaime Bernardo BLANCO-DIOS

New localities and a new variety of Centaurea ultreiae Silva Pando (Compositae).

Palabras clave. *Centaurea*, Compositae, corología, A Coruña, España.

Key Words. *Centaurea*, Compositae, corology, A Coruña, Spain.

Centaurea ultreiae Silva Pando, especie encuadrada en la categoría En Peligro (EN) (UICN, 2001), es conocida hasta el momento solamente de la localidad de donde fue descrita (A Coruña, Coristanco, Pena Cabaleira) situada en el macizo gábrico de los Montes do Castelo (Silva Pando,1987). La realización de trabajos forestales en esta zona durante estos cinco últimos años nos ha permitido ampliar el área de distribución de la especie con el hallazgo de diez nuevas poblaciones de este taxón en otros tres términos municipales, confirmar la estabilidad y relativa frecuencia de una variedad que describimos en esta nota y, por último, conocer el efecto sobre la localidad clásica de las obras de instalación de un parque eólico en la zona.

Material estudiado

Centaurea ultreiae Silva Pando in *Anales Jard. Bot. Madrid* 44: 422 (1987)