

Note

Conditions for oak selection in Poland

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Summary — Details of the occurrence and quality of native oaks (*Quercus petraea* and *Q robur*) and a program for their selection in Poland are presented. Most investigations are being carried out at the Forestry Faculty of the Academy of Agriculture in Kraków. They include an analysis of the reasons for oak wilt and investigations into the possibilities of selection on the basis of so-called biologically mature stands once genetic variability has been determined.

***Quercus robur* / *Quercus petraea* / selection / quality / oak decline**

Résumé — **Conditions de sélection du chêne en Pologne.** Cette contribution rassemble les données relatives à la distribution et à la qualité des peuplements des chênes indigènes de Pologne (*Quercus petraea* et *Quercus robur*) et présente un programme d'amélioration des 2 espèces. La plupart de ces recherches sont menées par la faculté forestière de l'Académie d'agriculture de Cracovie. Elles concernent l'analyse des causes du flétrissement des chênes (oak wilt), les perspectives de sélection des chênes dans des peuplements «matures au plan biologique» dès lors que l'amplitude de la variabilité génétique a été appréciée.

***Quercus robur* / *Quercus petraea* / sélection / qualité / dépérissement du chêne**

OCCURRENCE

The genus *Quercus* is represented in Poland by 3 natives species: sessile oak (*Q petraea* (Mattuschka) Liebl), pedunculate oak (*Q robur* L) and pubescent oak (*Q pubescens* Willd). Among exotic species, the American eastern red oak (*Q rubra* L) is the most important. Only sessile and pedunculate oaks occur in mixed stands. Both these species are absent from mountains; *Q robur* reaches a maximum of 600–700 m above sea level, and *Q petraea* 700–800 m in the Carpathian foothills. Sessile oak extends over all of Poland, except the northern east (see fig 1).

Pubescent oak is found in a small enclave at Bielinek on the Oder river in western Poland; in practice, it has no importance for selection or breeding (Bialobok, 1955; Rózanski, 1990).

The important centers of occurrence of oaks (fig 1) are: Krotoszynska province of the Great Poland–Pomeranian region (where it makes up 40% of the forest area), the East-Lubelska upland province of the Mazowsze–Podlasie region (31%), the sudety foothill foreland province of the Silesian region (25%), and the West-Lubelska upland province of the central Polish uplands region (28%) (Zasady, 1980).

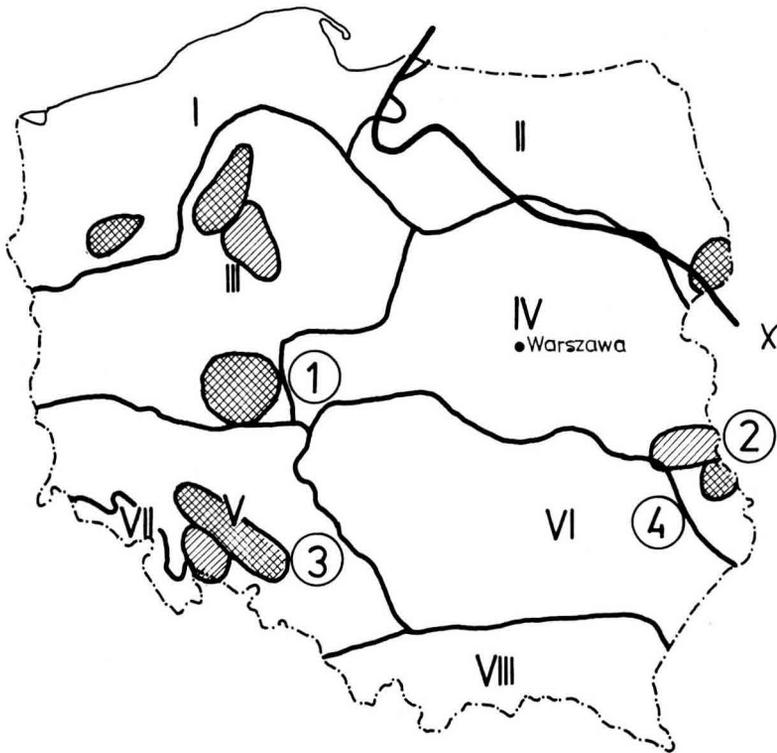


Fig 1. Regions with forest stands of high quality (/ / /) and the highest quality (X X X). X : limit of *Q. petraea* Liebl. Locations of stands I–VIII: natural forest regions: I: Baltic region; II: Masuria; III: Great Poland–Pomerania; IV: Mazowsze–Podlasie; V: Silesia; VI: Central Poland uplands; VII: Sudeten Mts; VIII: Carpathian Mt; stands and primeval forests 1–4: 1: Knyszynska Primeval Forest, 2: West-Lubelska upland province, 3: Sudety foothill of Silesian region, 4: East-Lubelska upland of Mazowsze-Podlasie region (Zasady, 1980; Polish provenances).

QUALITY AND OAK WILT

The stands of highest quality are found in Bialowieza Primeval Forest in the NE part of Poland; surrounding Barlinek in the Baltic region; in Knyszynska Primeval Forest in the Great Poland–Pomeranian region and in the southwest between Wrocław and Opole. In estimating the quality of oak stands, different opinions exist as to the importance of the so-called 'oak wilt' phenomenon which has been recorded many times. In 1942–1943, there was some evidence of decline of over-mature

stands in Krotoszynska Primeval Forest. Signs of oak wilt appeared in 1980 in both pure and mixed stands of ages ranging from 20 to 100 years throughout Poland.

A survey of damage to stands conducted by the Forestry Research Institute, indicated 3 zones of susceptibility. Oak woods in the southern and southwestern regions were most damaged but little damage was recorded among those in the north and north east.

The occurrence of an oak damage gradient in Poland is associated with a disease complex in which drought, low tem-

peratures, poor soil conditions, air pollution, fungal infections and insect attack all play a part (Rykowski *et al*, 1990). There has been no genetic interpretation of the phenomenon.

SELECTION PROGRAM

Oaks are selected according to principles which are generally accepted and practiced with other species. It is based on the choice of seed stands, taking native character of origin, age, quality and productivity into account. Seed orchards and plantations have been established from seed and by vegetative propagation. In 1991 there were 1776 ha of pedunculate oak seed stands (13.3% of all seed stands in Poland), 91 ha of sessile oak and 9 ha of red oak seed stands. The breeding value of the progeny of the selected trees is being tested in 609 ha of trials.

This seed resource has been poorly used so far. Between 1988 and 1990, the total quantity of acorns harvested amounted to 3263 tonnes of which only 104 tonnes (3.2%) came from selected stands. Individual tree selection has been developed to a small extent (Kociecki, 1988; Fonder, 1992).

CURRENT INVESTIGATIONS

Current studies at the Faculty of Forestry in Kraków, in collaboration with the Forestry Research Institute of Warsaw, aim mainly at explaining, analyzing and understanding oak wilt in different regions. The investigations primarily consider pedological, entomological and phytopathological aspects of the problem (Rykowski *et al*, 1990). Wilt occurs on different soil types but common features of affected sites are an inadequate supply of soil water and air pollution. Investigations have demonstrat-

ed the substantial role of herbivorous insects from species in the Geometridae and cambio-xylophagous families.

In phytopathological studies of sick and declining stands, 220 species of fungi have been isolated and 75 identified, among them 2 new species. No significant connection between the genus *Ceratocystis* and oak wilt has been found.

Dendrochronological analyses have confirmed the relationship between ring width and climatic conditions in influencing the health of oaks (Bednarz, 1987), and botanical studies (Róžański, 1991), describing oak habitat requirements on the basis of different methods of phytosociological analyses of photographs, have proven to be a useful supplement.

Biologically mature stands, as well as selected seed stands, are believed to be the natural basis for population selection (Balut *et al*, 1985). Biologically mature stands are those which have achieved maturity and yield seed (at 40–50 years) and in which oaks make up no less than 60% of the species in the stand, ensuring suitable conditions for pollination. On the basis of these features and the analysis of their quality class and habitat type, a broad base for the subsequent stages of the selection process has been achieved. In the case of oaks, preliminary analyses have shown that, by selecting biologically mature stands, it is possible to obtain a genetic gain. A large variability of quality classes occurs among stands in homogenous habitats (fig 2). Oaks are plastic species in all natural forest regions. For example, in the Silesian region habitat, variability is described by 9 habitat types (ranging from fresh mixed coniferous forest to mixed upland forest).

The present level of selection is at an early stage. However, we hope to make progress through cooperation with other research institutes, including foreign ones.

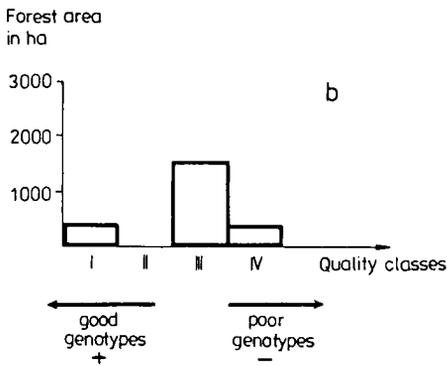
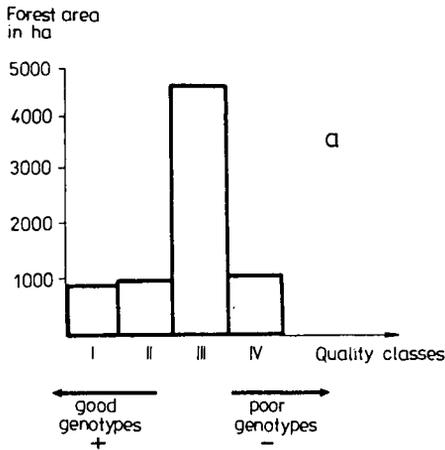


Fig 2. Variability of quality classes of biologically mature oak stands in habitats of mixed forest (a) and mixed coniferous forest (b) in Silesian region V.

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