Protection of forests against pest insects and diseases

European Oak Decline Study Case

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with contribution of Dmitri Voitka – PROFOREST Post-Doc WP. 3.2

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1. Preface

This review of papers is a result of work performed during a post – doc of Dr. Dmitri Voitka from the Plant Protection Department of the Byelorussian University within an activity of the Work Package 3.2 of the PROFOREST project.

PROFOREST Centre of Excellence

On 17th July 2002 the European Commission officially approved a three year-long project focused on development of a ERA in the area of protection of forest resources in Central Europe **(QLK1-CT-2002-30315/ PROFOREST)** within the Framework V Programme: Quality of Life and Management of Living Resources.

The PROFOREST Centre of Excellence (CoE) at the FRIW brings together a team of scientific personnel from selected Departments of the Institute to develop a network of international cooperation, integrative activity and education, to foster the development of forest science related to protection of forest resources in Europe, dividing the project into 9 Workpackages, with 38 project actions.

The main aim of the PROFOREST CoE is to pursue and stimulate the process of integration of forest scientists working on the protection of forest resources in Central Europe. The location of PROFOREST at the FRIW is testimony to the Institute's 75-year history and experience, and the knowledge of its researchers in the protection of forests and forest resources against insects, pathogens, fires, air pollution, game animals; protection of water catchments and soil, conservation of biodiversity and genetic resources, and nature conservation in general. The PROFOREST CoE serves to strengthen personal contacts and encourage closer Europe-wide cooperation and integration of researchers in formulating joint grant proposals. It also fosters the development of forest sciences in the countries of Central and Eastern Europe, towards the better management of forests for future generations.

The PROFOREST CoE is located in the middle of European forests and deals with many pure science and applied research problems in forest science; therefore it facilitates contacts between researchers throughout Europe, east to west and north to south. The network formed will enable the pooling of knowledge and the exchange of detailed of methodologies and research techniques and to host

meetings, workshops and seminars devoted to protection of forests and forest resources. The resulting contacts between distinguished scientists and young researchers and students will facilitate rapid development of the subject area.

Numerous conferences, workshops, seminars, scientific fellowships and training sessions are organised with the participation of the Institute and PROFOREST CoE, in cooperation with the State Forests Holding and the National Park Offices. Researchers, practitioners, and students from local and European areas have gathered in Poland to discuss and gain understanding of the problems of protection and silviculture in multifunctional forests, to collect materials for research and comparative assessments and to foster the development of new research networks.

The book deals with one of the most important problems of the contemporary forest protection which is the complex disease involving many abiotic and biotic factors. Interaction between different agents is demonstrated in the case study of the European Oak Decline phenomenon. Deteriorating of the health status of oaks in Europe has affected every country in Europe over the last 100 years. The analysis of predisposing, inciting and contributing factors in chosen incidents of the oak decline in different parts of Europe is given and relevant hypotheses are discussed.

The first chapter shows the history, course and consequences of the oak decline in Europe whereas the following chapters concentrate on the specificity of the phenomenon in zones with similar climatic conditions. The interdisciplinary problem solving approach tries to look at the problem from different perspectives: silviculture, phytopathology, enthomology, plant physiology and genetics.

2. Introduction

Many computer simulations showed that global warming and all predicted changes of the climate in Europe will strongly affect its forests. The growth condition for conifer tree species will be steadily worsening, therefore finally a big increase in the broad-leaved tree species in forest share is expected. One of the most important forest tree species which will probably be much more intensively planted within the next years is oak. Unfortunately for last decade a mass oak decline phenomenon has been observed in the whole Europe. Therefore one of the purposes of this work is a review of past incidences of decline and agents identified at the time as causing decline. Presentation and discussion on the European case studies of recent decline and recoveries as well as probable cause and remedial action is the second goal of this work. Better understanding of the phenomenon itself should lead to the further elaboration of successful methods of overcoming decline and maintain the health of European oak stands. Knowledge about current state of health of oak stands and its evolution help to predict the future situation in forest economy as well as the common threads in the cause of decline and recovery.

Why is it important to study oak decline

The following arguments support the necessity for engaging in further oak research:

- Oaks are ecologically and economically an indispensable tree species. Many forest sites on pseudogleyic soils would be easily destabilised without the stocking of oaks. Oaks are essential for a wide range of forest products and are a valuable asset for forest enterprises.
- Oak trees contribute significantly to the richness of Europe's forest ecosystems as well as to the economic production functioning of forests. More than 20 oak species exist in Europe representing about 9% of the total growing stock and 27% of broad-leaved forests respectively (Inter- and intra-specific variation … 1996).
- The health of oaks in Europe has steadily declined throughout the last decade in contrast to the recovery of other tree species (e.g. fir, spruce). Oak may be a tree of minor importance on a national scale, but on a local or provincial scale it is quite important.
- Oak and mixed oak hardwood stands ameliorate the effect of climate and hydrology on forests in areas where the "agricultural steppe" is dominant. The

forests in these areas provide valuable habitats for many plant and animal species. A change in tree species would endanger many of them.

- With global warming the potential range of oak silviculture will be expanded. At the same time, the steadily deteriorating conditions for coniferous species make oak forests more attractive or even indispensable in some European regions.

Oak decline has already been occurring in Europe from time to time in different regions. In the last decade the intensification of decline process was noticed in the whole European continent. Such a wide spread of disease does not indicate the presence of only one cause factor. The purpose of this paper is to review the literature dealing with oak decline phenomenon in Europe.

3. European oak decline in brief - facts

- Severe oak decline has been occurring in many European countries since the beginning of the eighties. The spread of oak decline caused a great concern in many parts of Europe (Delatour, 1983, Ragazzi *et al*., 1995). It extents enormously, from England in the West to the Ukraine in the East, and from Sweden in the North to Italy in the South, and affects a high percentage of natural oak stands (Tomiczek, 1993, Austria)

- There is a long list of descriptive names given to instances of sudden oak decline: cohort senescence, "T" disease, bark canker, epidemic wilt, Eichensterben, new-type damage, damage of various types, oak mortality, vascular disease, spiral disease, lethal yellowing and oak wilting are the most common (Ragazzi *et al.* 1995).

- A review of oak decline literature shows its chronological and geographical progression in Europe. Oak decline was already occurring in Europe in the past. The first report originated more than 250 years ago and other cases have been reported regularly since the 18th century. However, in the last 15 years the incidence of oak decline has shown a dramatic increase all over Europe, and by 1989 was even reported in almost every European country.

- The survey of oak health made on European scale since 1988 showed a permanent increase in oak forests severely defoliated (Forest Conditions in Europe…1997) During the last 9 years the share of undamaged trees dropped from 60 % to about 20%.