

# Guidelines for conducting genetic monitoring in the field: *Quercus robur* L. and *Quercus petraea* (Matt.) Liebl.

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## INTRODUCTION

The guidelines for conducting genetic monitoring of pedunculate and sessile oak in the field shortly describe both oak species, their reproduction, environment and threats. They provide guidance on establishing a genetic monitoring plot and on recording all field level verifiers. These two tree species, as well as other oaks, are very variable morphologically, and can naturally hybridize, generating individuals showing intermediate traits or the prevalence of one, so that it can be difficult to characterize them unequivocally by observations alone. Leaves and acorn characteristics are key tool to determine the species and to define a level of hybridization between sessile and pedunculate



FIGURE 1: Habitus and leaves with fruits - *Quercus robur* (left) and *Quercus petraea* (right)

## PLOT ESTABLISHMENT

Both oaks are a stand forming tree species and follows the “rules” for stand forming species plot establishment. After selecting an oak forest stand to be monitored, a random point within the stand is selected. In the field, the closest tree to this point becomes the center of the forest genetic monitoring plot. After selecting the central tree, 49 more trees are selected in concentric circles, always keeping the distance of 30 m between the trees. The size of the monitoring plot following this design is 4.5 ha.

The establishment of natural regeneration subplots is carried out during germination following a strong or massive fructification event.

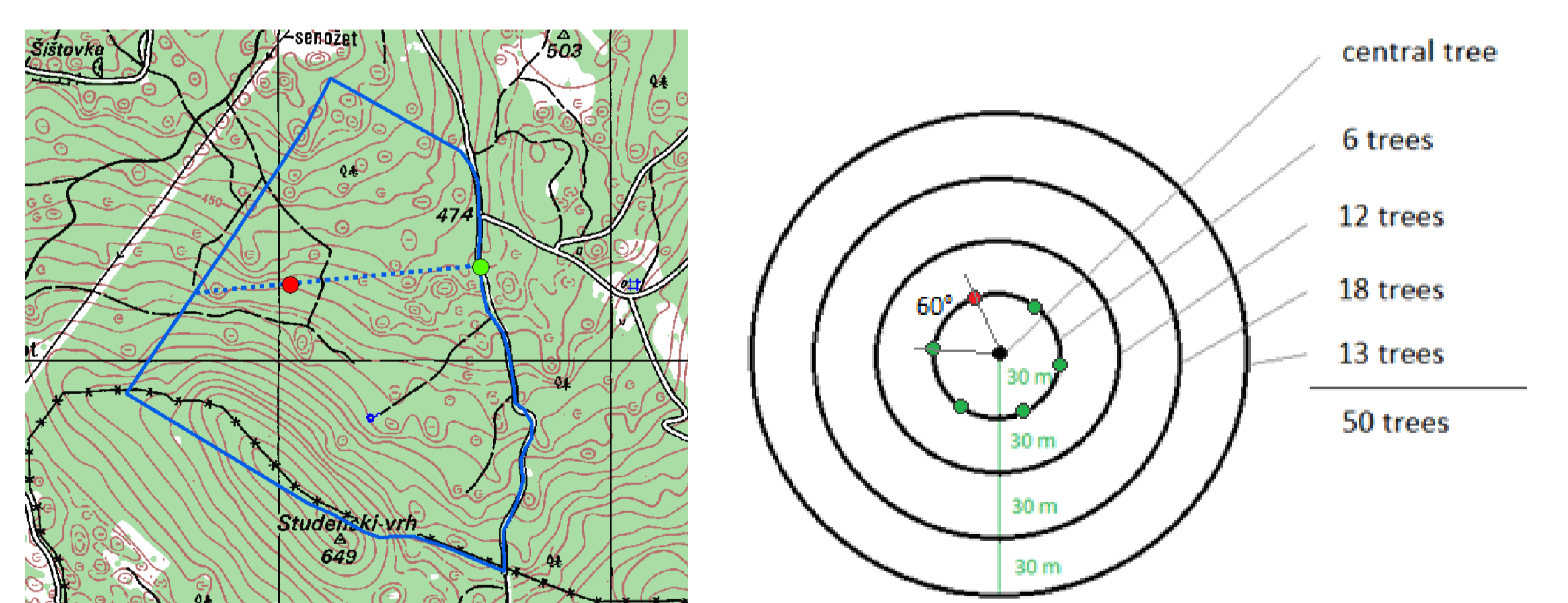


FIGURE 2: Selection of a random point on the map of a forest stand (left) and selection of trees to be monitored in concentric circles.



Photo: Boris Rantaša

## Acknowledgments

The work was carried out within the LIFEGENMON project.

## VERIFIERS

The verifiers recorded in the field belong to the indicator Selection. The average cost of monitoring this indicator per decade (without plot establishment, based on the estimates of three countries) at the basic level is approximately 2000 EUR and 280 man-hours, at the standard level 5000 EUR and 930 man-hours and at the advanced level 14500 EUR and 2420 man-hours.

	Name	Basic level	Standard level	Advanced level
Verifiers	<b>Mortality / survival</b>	Counting of remaining marked trees every 10 years and after every extreme events	Same as basic level	Same as basic level
	<b>Flowering</b>	Stand-level estimate, every year	Individual tree level observation, during two major flowering events per decade, ideally equally spaced	Individual tree level observation, during two major flowering events per decade, ideally equally spaced
	<b>Fructification</b>	Stand-level estimate, every year	Individual tree level observation, the same year as the assessment of the flowering at the standard level (regardless of the fructification intensity)	Counting of fruit, during the same years as the assessment of flowering at the advanced level, regardless of the fructification intensity Seeds are collected for laboratory analyses every assessed fructification event at the advanced level
Background information	<b>Natural regeneration abundance</b>	Stand-level estimate, every year	Counting of seedlings in defined time frame according to protocol (1 <sup>st</sup> and 6 <sup>th</sup> year after every assessed fructification event)	Counting of seedlings in defined time frame according to protocol (1 <sup>st</sup> , 6 <sup>th</sup> , 11 <sup>th</sup> , 16 <sup>th</sup> year after every assessed fructification event)
	<b>DBH class distribution</b>	/	Measurement every 10 years	Same as standard level
	<b>Height class distribution</b>	/	Measurement every 10 years	Same as standard level
	<b>Bud break</b>	/	Individual tree level observation, every 5 years	Individual tree level observation, every year
	<b>Senescence</b>	/	Individual tree level observation, every 5 years	Individual tree level observation, every year
	<b>Flowering synchronisation</b>	/	/	Individual tree level observation, during each assessed major flowering event

### advanced level Flowering – Advanced level

Code	Female flowering stage	Code	Male flowering stage
1	Female flower fully developed	1	Elongated peduncle – closed flowers (green)
2	Acorns fully formed, but not yet ripe	2	Anthers releasing pollen (yellow)
		3	Empty anthers (pollen released) (brown)

Code	Proportion of the crown flowering (%; male and female flowering together)
1	0 – 10%
2	> 10 – 30%
3	> 30 – 60%
4	> 60 – 90%
5	> 90%

FIGURE 3: Picture guide for description of female (left) and male flowering (right)

