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Biodiversity Monitoring of SRC plantations – results after two seasons

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About the project

Dendromass4Europe (2017 – 2022) aims at establishing sustainable, Short Rotation Coppice (SRC)-based, regional cropping systems for woody biomass (dendromass) production on marginal agricultural land. The dendromass produced in SRC (ligneous biomass, bark and wood) is supplied to dedicated bio-based value chains that create additional income and job opportunities in rural areas. The supply chains will be tailored for optimum efficiency of supply logistics and for reducing CO_2 emissions. Innovative bio-based materials will help to replace fossil-based materials.

SRC locality T7b Bucany South (established in 2017) in July 2018

Introduction

Fast-growing trees are more competitive over native plants and therefore they have led to increasing concerns regarding their adverse effects on biodiversity. The real assessment of impacts on biodiversity needs to be elaborated. The data from biodiversity may provide baseline for this assessment.
Also the availability of specific information about the effect of D4EU's SRC plantations on biodiversity is essential for communication strategies, because in most cases the new, visible activities in the landscapes, that are yet unknown to local residents, are commonly rejected by the public.

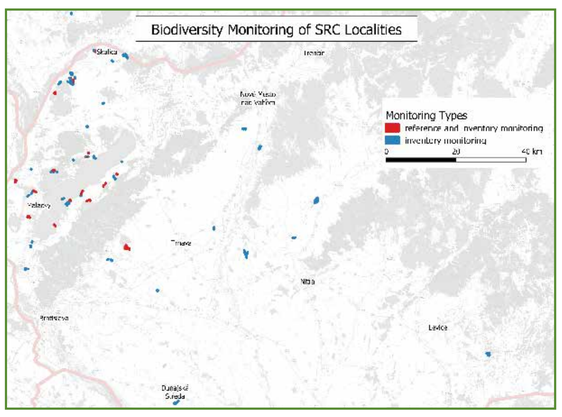
Filago vulgaris, an endangered and nationally protected species recorded in SRC locality R5.

Task and challenges

The status of the biodiversity is the key factor needed for understanding the impact on the nature. It can be evaluated on landscape or species level. In the scope of the project, the species level is used because it offers detailed information needed for such dynamic ecosystem like fast-growing tree species' plantations.
As it is not possible to cover all aspects of biodiversity, the representative species groups – plants, birds, amphibians, butterflies and beetles – were chosen as main objectives of research. Additional research objectives were specimens that can be easily determined in the field like mammals, reptiles or insects. They were minimally classified at the taxonomic order level. To gather and evaluate data is the main task for appropriate environmental impact assessment.

SRC locality T7b Bucany South (established in 2017) in July 2018

SRC locality T7b Bucany South in September 2020



Methodology

Two types of monitoring are carried out annually:

1. All 85 localities are surveyed by **Inventory monitoring**, covering vascular plants and selected, easily determined specimens of different animal species groups. Monitoring uses the method of repeating biotope mapping. For each plant species, the abundance is also recorded. On the same transect the recordings of presence of specimens of additional species groups; mainly mammals, reptiles, insects and molluscs are collected.
2. Reference monitoring for birds, amphibians, beetles and butterflies is done on 23 selected representative localities with reference control samples outside SRC localities. The main purpose of **reference monitoring** is to find out the differences between SRC localities and their surrounding reference biotopes. For each selected SRC locality at least one transect within the area of SRC and at least one transect per neighbouring biotope were defined as reference or control samples. Localities are visited minimally 3 times per year.

All data are kept in the information system developed specifically for this task and partly available on http://daphne.sk/d4eu/

Rana dalmatina under Poplar tree from SRC locality R1

Results after two seasons

Inventory Monitoring

Table1: Inventory monitoring data overview

inventory mapping data overerview	localities		visits		transects km		species records		species	
	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019
plant species records	74	84	76	87	114	126	2492	3141	310	341
animal species records	74	81	76	87	101	0*	715	280	102	42

* mapped together with plants mapping

Plants: The total number of 406 plant species were identified in all SRC localities. All species were divided into 6 groups according to their affinity to natural, semi-natural and artificial biotopes.

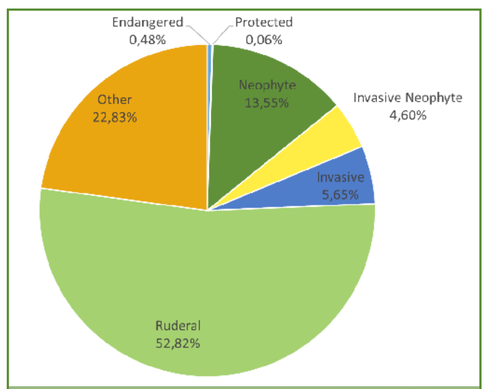


Fig. 1: The percentage of he abundance of different plant species groups

Animals: In the last two seasons in all SRC localities 2175 individuals of different species groups were observed.

Lacerta agilis on Poplar tree in SRC locality R3

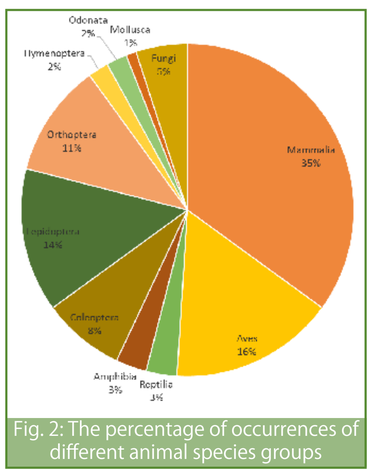


Fig. 2: The percentage of occurrences of different animal species groups

Reference Monitoring

Table2: Reference monitoring data overview

reference monitoring data overview	localities		visits		transects km		species records		species	
	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019
birds	14	15	26	32	99	145	966	1010	100	95
amphibians	8	9	34	111	86	148	157	284	9	8
beetles	8	9	32	36	27	30	978	1326	202	228
butterflies	8	9	54	62	28	31	380	431	37	41

Amphibians: In SRC localities, their reference biotopes and in the periphery, all 8 amphibian species were recorded which can potentially occur in this region. 6 of these species were observed directly in SRC localities: *Bufo bufo*, ***Bufo viridis, Hyla arborea, Pelobates fuscus***, *Pelophylax esculentus*, ***Rana dalmatina***. All of them are species of national importance, and 4 (in bold) are of European importance.

Butterflies: In total 41 butterfly species were recorded in SRC localities and in their reference control biotopes. 39 of them were observed also in SRC localities and 3 species only in SRC localities. Most of the butterflies adopt the SRC localities as a habitat for their entire life cycle.

Birds: In total 109 different bird species were recorded in the period of two seasons. 40 of them were from SRC localities, 70 from control transect biotopes and 103 species were found in surrounding biotopes. Probable and proved nesting activities were observed for 7 bird species (*Alauda arvensis, Carduelis cannabina, Lanius collurio, Lullula arborea, Motacilla flava, Passer montanus and Phasianus colchicus*).

Beetles: In total 228 beetle species were recorded in SRC localities and in their reference control biotopes. 207 of them were observed in SRC and reference localities and 21 species only in SRC localities. Two of these species, *Meloe violaceus* and *Meloe proscarabaeus* are species of national importance. But they were recorded only in reference control grassland biotopes.

Preliminary assessment of impact on biodiversity

According these preliminary results after two monitoring seasons and their evaluation we can assess impact of SRC localities on biodiversity.

Positive Impact on biodiversity:

- SRC localities established on arable fields become an important refuge for different species groups and can increase the biodiversity value of the area.
- Micro-localities of SRC tree rows, which are not disked, can offer suitable shelters for plant and animal species within the SRC locality.
- SRC localities with one or two years old trees are good for most of the animal species group. For bird species the "memory of the site" is used.
- Disking disturbances can be supportive for psamophytic and annual species. Some of them are rare – *Aphanes arvensis, Ranunculus arvensis, Spergula morisonii, Teesdalia nudicaulis*.
- If some micro-localities of natural biotopes, like tree solitaires or water ponds, are present in a SRC locality, its biodiversity value is higher.

Negative Impact on biodiversity:

- SRC localities established on the place of grasslands, wetlands or other non-forest biotopes decrease original biodiversity value.
- SRC localities of 4-year-old trees with dense canopy closure are sterile for almost all taxonomic groups but for beetles and for some bird species.
- Open soil areas, after disking, offer pre-conditions for spreading of invasive species
- Disking of the SRC areas destroys reproduction micro-localities of amphibian species and very often kills adult species from Reptilia and Amphibia species groups. Also disking very often destroys plants which are source of feeding for many butterfly species.

Near threatened species *Ranunculus arvensis* from SRC locality R8a

Invasive neophyte Solidago gigantea in SRC locality M10

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Horizon 2020 European Union Funding for Research & Innovation

D4EU has received funding from the Bio Based Industries Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement 745874.