Scientific Report of the 1st Training School, Faculty of Forestry University of Sarajevo, Sarajevo, Bosnia and Herzegovina




COST ACTION FP 1301

COST Training School – Silviculture of coppice beech forests - from traditional forest management to conversion in high forest

Sarajevo, Bosnia and Herzegovina July 01st - July.06th, 2014

Objectives and Learning Outcomes:

- to provide knowledge about traditional forest management systems, history, current importance and future perspectives of coppice forests,
- demonstrate different silviculture systems for coppices and analyze benefits and disadvantages,
- train student in applying forest management concepts in order to improve coppice of European beech.

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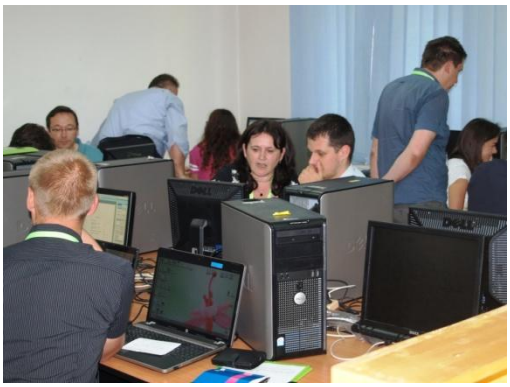
Silviculture of coppice beech forests - from traditional forest management to conversion in high forest

COST Training School

Sarajevo, Bosnia and Herzegovina July 01st - July.07th, 2014



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The 1st Training School with the topic "Silviculture of coppice beech forests - from traditional forest management to conversion in high forest“ was held in Sarajevo (Bosnia and Herzegovina) from July 1st to July 6th 2014. Local organizer of this school was the Faculty of Forestry, University of Sarajevo. Assistance with field work was provided by Forest Management Societies: „Forests of Sarajevo“ Ltd. based in Sarajevo and „Central Bosnian forests“ Ltd. based in Donji Vakuf. All activities during the Training school took place in the premises of the Faculty of Forestry in Sarajevo and in the coppice beech forest near Sarajevo that are managed by the listed Forest Management Societies.

Theme of the Training school was „Silviculture of coppice beech forests“. The main objective of training school was: to provide knowledge about traditional forest management systems, history, current importance and future perspectives of coppice forests, to demonstrate different silviculture systems for coppices and analyze benefits and disadvantages, make inventory in coppice beech forest, and last day to train student in applying forest management concepts in order to improve coppice of European beech.

Training School lasted five days and the program was structured as follows:

1. Lectures in classroom - presentations by trainers
2. Field work, demonstration plots and recording data on a field
3. Processing and analysis of data
4. Presentation of the results and concluding remarks.

The first day was organized for the arrival of the participants and their registration as well as introducing participants to the work plan for the coming days. On the second day lectures were held by the trainer where participants were familiar with the concepts, ecology, silviculture and utilization of coppice forests. The third and fourth day were scheduled for field work within the coppice beech forests and measurements of data necessary for making management plans. The fifth day was scheduled for delivery and processing of data and preparation of the plan for management of coppice forests. On the forth and fifth day students worked in groups (5 groups, each group - 4-5 students), and at the end each group, based on the recorded data, made and presented a plan for management of coppice forests.

The total number of participants was 23 and they came from 14 European countries, namely: Bosnia and Herzegovina (4), Latvia (3), Romania (2), Italy (2), Germany (2), Poland (2) Turkey (1), Serbia (1) Albania (1), Croatia (1), Lithuania (1), Belgium (1), Spain (1) and Portugal (1). Given that the participants came from a large number of European countries, the level of knowledge and understanding of the topics of the students was different, but all of them based on previously completed studies had a good basis for attending of the training school.

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For working with the students during the training school 6 trainers were provided, including:

1. Prof. Dr. Karl Staempfer, BOKU University of Vienna, Institute of Forest Engineering. Responsible for specific aspects of forestry techniques in the utilization of coppice forests.
2. Prof. Dr. Achim Dohrenbusch, Faculty of Forestry, Georg Aaugust University of Goettingen (Germany) Scientific area: Silviculture. Responsible for ecological – silviculture categorization of coppice beech forests and creation of management plans for management of coppice forests
3. Prof. Dr. Pietro Piussi, Faculty of Forestry, University of Florence (Italy). Scientific area: Silviculture. Responsible for the silvicultuture of coppice beech forests (coppice system and conversion).
4. Prof. Dr. Cemal Visnjić, Faculty of Forestry, University of Sarajevo, Scientific area: Silviculture. Responsible for ecological and silviculture categorization of coppice beech forests, coppice system, conversion of coppice beech forest in High forest, and creation of management plans for management of coppice forests.
5. Prof. Dr. Sead Vojniković, Faculty of Forestry, University of Sarajevo, Scientific area: Ecology of forests. In charge of ecological vegetation characteristics of coppice forests.
6. Prof. Dr. Besim Balic, Faculty of Forestry, University of Sarajevo, Scientific area: Forest inventory. Responsible for measurements inside of coppice beech forests.

Just before the start of the training school Prof. Dr. Pietro Piussi has canceled his participation. He stated in his letter that he was ill and that his doctor recommended rest for a month. After professor Piussi cancellation remaining local trainer, in mutual agreement, took extra duties, so there was no need for the engagement of a new trainer.

During the lectures in the classroom, which are aimed to introduce students to the basic concepts related to coppice beech forests, basic ecological, silviculture and vegetation characteristics of coppice beech forests in Bosnia and Herzegovina, and with methods and procedures harvesting of coppice beech forests, students have gained good basis for further work, especially for field measurements that were carried out in the next two days. During the presentations questions were asked during and after the end of each presentation, with the active participation of students and trainers. Following topics were presented:

1. Ecological and vegetation characteristics and diversity of coppice beech forest in Bosnia and Herzegovina.
2. Silvicultural, ecological and structural characteristic of coppice beech forest in Bosnia.
3. Harvesting of coppice forest.
4. Understand ecology, yield expectations and silviculture of coppice management systems.

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The third day of the training school touring of coppice beech forests is conducted at three locations. Students are acquainted with the ways of tending and conversion of these forests. At the third location, students were divided into two groups and on the demonstration plots size 20x 20 meters each group has conducted survey and marking of trees to be cut according to the principles of the two models of selective thinning.

At all locations the students were given the instruction about basic ecological and vegetation characteristics of that area and silviculture characteristics of coppice beech forest as well as activities which are conducted in tending and conversion of these forest in high forest. We visited the following sites:

Tarčin near Hadžići (30 km south - west from Sarajevo)- Conversion of coppice beech forest to high forest. On a private property near Tarčin has been made a conversion of coppice beech into high forests of economically valuable conifers (fir and Douglas fir). Beech habitats, where used to grow highly productive beech forests, have now become coppice after years and years of unplanned deforestation. This degraded forest is after all that made of shoots, it's a low quality forest with a very low rating of growth and has a poor quality of burgeons. In order to use maximum of manufacturing possibilities of this habitat it was done the conversion of coppice into regular high forest.

Dera near Kiseljak (30 km north-west from Sarajevo)- Traditional management of beech coppice forests Coppice beech forests located in the vicinity of Kiseljak, about 30 kilometers north-west of Sarajevo. It is located within the belt of forests of beech, fir and beech at an altitude of 500-700 meters, at the deep brown soils on silicates. In this area, in the past, grew high mixed forests of beech and fir. The Fir trees over the past century was used as a timber for construction and disappeared completely from these forests. High beech forest through unplanned use from the local population for firewood, charcoal and other thinner assortments, converted into coppice forest as it looks today.

Musići near Sarajevo (10 km west from Sarajevo)- Thinning in the function of tree quality improvement of coppice beech forests Within unmanaged coppice beech forests with good timber quality and composition of growth on deep soils, it was necessary to optimize the methods and procedures for conducting thinning cutting that lead to improving the quality structure of the remaining trees in the stand with minimal distortion of forest communities.

Object of work

Coppice beech forest, which is located on the site of Musići in the area Hadzic (Sarajevo). Within a larger complex of coppice beech forests, were placed two experimental plots measuring 20 x 20 meters. to be used to implement two types of thinning

Figure 1. Coppice beech forests , which is located on the site of Musići in the area Hadzici (Sarajevo)

Model 1: Thinning of coppice with selecting representatives.

Within coppice beech forests of medium quality, age 60 years was placed experimental plot measuring 20 x 20 meters. All the trees were marked at a height of 1.30 m.

Following measurements were conducted:

- Breast height diameter of trees.
- The height of the trees.
- Quality classification.
- Belonging offshoots of stump (number offshoots from the stump).

Determine the general condition of the surface, soil condition and categories of beech trees, which are present on the surface.

The trees were transferred by the principle of positive selection with selecting and marking future carrier Z-trees, then it was remove only those trees that interfere with the selected trees.

Model 2: Thinning of coppice beech forest with selecting one or two representatives pro stool

Following measurements were conducted at selected plots 20 x 20 m, of similar habitat conditions as the first:

- Breast height diameter.
- The height of the trees.
- Quality classification.
- Belonging offshoots of stump (number offshoots from the stump).

Trees are selected for transfer based on the principle of positive selection. Targeted groups are looking trees with the same stump where selects one or two trees and the rest are removed no matter what their looks. Individual trees were not subject of cating.

During the fourth day, the students were divided into five groups. Each group had 4-5 students and each of them was assigned with one trainer. Students were asked to collect field data (measurements) which could be used to create a plan for management of coppice forests.

Methodology for data collection is simplified due to different knowledge levels of students and the students instead of the 4 planned samples, recorded 2-3. On the field, within the coppice beech forests recording was carried out by the following methodology:

To collect data for estimation and measure of structural characteristics in coppice forests of beech we used a representative method or sampling method. In this purpose we used temporary sampling plots which are systematically deployed in quadratic grid. Centres of sampling plots are arranged according to simple systematic sampling design.

Individual sampling plots are design with one fixed concentric circle of 25 m diameter size for collecting general information and one fixed concentric circle of 9 m diameter size for information about trees. One circle plot of 9 m radius have surface of 254.5 square meters. Distance between centres of sample plots is 50 m.

a. Type of data which were collected from the students:

- Department number (we worked in department No. 3)
- Altitude (m) (H)
- Coordinates of plot centre
- Terrain exposure (flat-F, N, E, W, S, NE, NW, SE, SW)
- Slope - in degrees
- Stand canopy
- Soil depth: shallow - <30 cm; medium deep - 30-60 cm; deep - >60cm,
- The level of humus decomposition (0-good, 1-middle, 2-poor)
- Presence of natural second growth (0- no; 1-yes)
- Incidence of grass (in percentages %)
- Date of survey

All general information were collected on 25 m radius, on each sampling plot.

Also on each sampling plot, students collected following information for all trees above 5 cm of thickness at DBH that are in 9 m radius:

1. Ordinal number of trees
2. Number of stump
3. Tree species
4. Tree origin (generative –0; vegetative –1; pollard -2);
5. Diameter at breast height (cm);
6. Increment - Wide of 10 fully formed growth rings on increment core (mm)
7. Wood quality (1- High technical quality; 2- Medium technical quality; 3- Low technical quality)
8. Silvicultural (breeding) role of tree (S – selected tree; U - useful tree; D - damaging tree);
9. Tree height

Table 1. Part of form for fieldwork:

No.	Tree species	Origin (0-generative, 1-vegetative, 2-pollard)	No. of stump	DBH D1,3 (cm)			Increment (mm)			Wood quality	Silvicultural (breeding) role	Height (m)		Note:
1.	Beech	1	1	0	1	5	0	2	1	1	S	1	6	
2.	Beech	1	1	0	2	5	0	1	2	3	D	2	2	Infected
3.	Beech	1	2	0	3	2	0	1	5	2	U	2	8	
4.	Beech	0	2	0	1	3	0	1	4	3	D	1	3	
5.	Beech	0	2	0	0	4	0	1	1	3	D	0	5	Broken top

After an inventory conducted in the field, on the fifth day, students filled the recorded data into software applications and performed data processing with the aim of obtaining basic information about the number of trees per hectare, basal area and volume per hectare as well as basic information on habitat (climate, soil). Based on the results, each group of students created management plans for coppice beech forests on Musici locality (where recordings were performed) and presented them later in the classroom at Faculty of Forestry. Presentations lasted 20-30 minutes. And during the presentation each student from the group had to clarify its role in the development of the management plan and argue in favor of their stance. After the presentation, questions were asked to all team members in relation to reality and feasibility of adopted management plan.

Ultimately, concluding observations were brought and students are given certificates. Certificate form is in addition of this report.

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Overview from local organiser

Based on the conducted training school and the experience we gained during the course of the same, as the local organizer, we can make the following observations:

1. 23 participants from 14 countries attended the training school, which represents a very heterogeneous group with a variety of skills in the field covered by the training school. Therefore, the level of the entire course should be adjusted to a level of students' knowledge, due to this the individual activities during the school were simplified, especially the planned methodology for recording data in the field.
2. When we talk about different experiences of individual participants great diversity also represents wealth, which is one of the best features of this training school.
3. Communication and cooperation between trainers and students was at a high level with a lot of understanding and cooperation on both sides.
4. Nearness of facilities for field recording was of great importance for the efficiency of labor, there was no undue loss of time on long journeys.
5. Cooperation with forest management societies has enabled efficient performance of field activities without any added effort by local organizer.
6. At the end of the training school students have gathered a certain quantum of knowledge that can be transferred to the ECTS credits, and at the University of Sarajevo equivalent is 3 ECTS credits.

Anex I – Inventory data

Field form 1 – model 1

Management area:	IGMANSKO	Size of plot:	400 m²
Management unit:	ZUSEVINA	Average age of stand:	50
Department:	103	Exposure	240°
Section:	B	Slope	17°
Location:	MUSIĆI	Altitude	614 m

No.	Tree species	Number of outgrowths	DBH (cm)	Height (m)	Quality class	Selection			Note
						S	I	D	
1	BE	1	21,7	19,2	2	x			
2	BE	1	13,2	12,7	3		x		
3	BE	1	17,8	15,9	3			x	
4	BE	2	5,7	8,2	3		x		
5	BE	2	28,4	21,0	1	x			
6	BE	3	7,4	12,8	3		x		
7	BE	3	32,7	22,9	1	x			
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S – Selected; I – Indifferent; D – Damaged

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