

Study Programme: Agronomy/Forestry
Course Unit Title: Molecular genetics of forest species
Course Unit Code: 19.AGR044
Name of Lecturer(s): Vladislava O. Galović
Type and Level of Studies: Doctoral studies
Course Status (compulsory/elective): elective
Semester (winter/summer): winter
Language of instruction: Serbian/English
Mode of course unit delivery (face-to-face/distance learning): face-to-face
Number of ECTS Allocated: 7
Prerequisites: Seminar paper and Exam
<p>Course Aims:</p> <p>The course is designed so that students are introduced to basic and modern principles and platforms in molecular genetics in the field of forestry, as well as continuous monitoring and introduction of the latest world achievements and methodological principles in this field. New molecular-based platforms currently used in the application of molecular methods will be applied to plant organisms, fungi and insects in forestry. Introducing the program of molecular methods in the study of plants, fungi and insects, their taxonomic affiliation and phylogenetic relationships as well as their ecological aspect, students would have the opportunity to become familiar with the use of various types of biomolecules (DNA, RNA) and molecular platforms (genomics, transcriptomics, functional genomics) that would bring significant insight and improvements of up-to-date research.</p>
<p>Learning Outcomes:</p> <p>Training students to master molecular techniques, isolation of different types of biomolecules; use of molecular platforms depending on research needs; independent mastering of molecular procedures in the laboratory. Students would be able to learn to use bioinformatics search engines and be able to independently interpret the processed results of molecular analyses, as well as to independently form and use gene data banks that are available on different websites and search engines.</p>
<p>Syllabus:</p> <p><i>Theory</i></p> <p>Through lectures, students in this course will learn about modern trends in the field of molecular taxonomy, phylogeny, population genetics, genomic editing within plant, fungal and insect genomes. Emphasis will be placed on different methods of sampling, which is the most important prerequisite for a good final result of molecular analyses, then on different methods of isolation of different biomolecules from different genomes. The participants will be familiar with the standard methods of the PCR technique and its principles, then the methods that would relate to PCR-based techniques (methods that include codominant and dominant molecular techniques) as well as other identification techniques (enzymatic reactions using endogenous nucleases, sequencing principles, DNA barcode techniques). In the case of sequence analysis within molecular taxonomy as well as phylogeny in species identification, they would become familiar with the principles and use of various search software (BLAST, Phytozome, UNITE, FinchTV, MEGA 6.6, ClustalW,</p>

MAFFT, RaxML).

Practice

Demonstration exercises: different methods of collecting samples, settings of experiments, ways of preserving them, introduction to different types of isolation of biomolecules from different tissues. Mastering PCR techniques, gel-electrophoretic identification of amplified target fragments, spectrophotometry and purification of fragments as part of preparation for sequencing parts of the genome of target organisms, familiarization with the latest identification technologies. The processing of the results would be directed towards the analysis of cladograms and phylogenetic trees as well as the reading of the sequences after the amplification of the target genes and the interpretation of their expression.

Required Reading:

1. Eriksson, G. & Ekberg, I., 2001. An introduction to Forest Genetics. Upsala, Sweden Eds.
2. Dozet, B., Mezei, S., Gološin, B., Galović V., Šesek, S., vasiljević, Lj., Vasić, D., Ognjanov, V., Macet, K. 1995. Kultura tkiva u poljoprivredi. Feljton, Novi Sad.
3. Berg, P. & Singer, M., 2008. Dealing with genes: The language of heredity (1st Eds.). Oxford University press
4. Application of PCR in Mycology. Eds. P. D. Bridge. CAB International, 1998

Weekly Contact Hours:

Lectures:4

Practical work:0

Teaching Methods:

Lectures combined with interactive teaching, seminars, consultations and mentoring work with students.

Knowledge Assessment (maximum of 100 points):

Pre-exam obligations	points	Final exam	points
Active class participation		written exam	
Practical work		oral exam	60
Preliminary exam(s)		
Seminar(s)			40

The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.