

Molecular biological methods of plant physiological process investigation

1. Lecturer: Samoilov Andrii Myhaylovych, senior lecturer of the department of plant and microorganism physiology and biochemistry.
2. Status: optional for masters.
3. Course, semester: 1th academic year, 1th semester.
4. Number of credits – 4, general academic hours – 120, labs – 54; self-study – 66.
5. Preliminary requirements: basics of Biochemistry, Microbiology, Genetics, Biotechnology, Molecular Biology, Plant Physiology and Biochemistry
6. Description of the course: the main purpose of the special lab practice is to form practical skills and ability to work in molecular laboratories, the ability to extract proteins and nucleic acids and to work with them. Within the lab practice there are provided the theoretical basis of common molecular biological methods for the study of biological objects and the practice to extract plant nucleic acids (DNA and RNA) and proteins, methods of treatment, one-dimensional or two-dimensional separation electrophoresis, PCR, gene expression analysis algorithm in eukaryotes, especially in plants, etc.

Sections: 1) Methods of plant DNA and RNA analysis; 2) Methods of plant proteins and protein markers analysis.

Knowledge and skills:

- Principles of molecular biological methods such as PCR, blotting, hybridization, etc;
 - Work with devices used in molecular biology (thermocyclers, spectrophotometers, boxes, sequencers etc.);
 - Theoretical foundations of the use of molecular methods in biology;
 - Methods used to study DNA and RNA;
 - Methods used to study proteins;
 - Methods used in genetic engineering and biotechnology research;
 - Methods of gene expression analysis in plants;
 - To carry out DNA and RNA isolation from plant material, to determine their concentration and quality;
 - To carry out RT-PCR and other types of PCR;
 - To carry out fractional extraction of proteins from plant materials and separation them by electrophoresis and other biochemical methods.
7. Course organization: lab practice. Forms of control: tests, lab protocols.
 8. Language: Ukrainian.
 9. Educational and methodological support: program, schedule of classes, educational and multimedia presentations, methodical complex, guidelines for practice.

Studentbooks:

1. [Cota-Sanchez J.H. et al. Ready-to-use DNA-extracted with a CTAB method adapted for herbarium specimens and mucilaginous plant tissues // Plant Mol Biol Reporter, 2006. – Vol. 24. – P.161–167](#)
2. [Ivanova N.V. et al. An inexpensive, automation-friendly protocol for recovering high-quality DNA // Molecular Ecology Notes, 2006. – Vol. 6. – P.998–1002.](#)
3. [Song H., Liu Y. et al. An improved method for total RNA isolation from recalcitrant loquat \(*Eriobotrya japonica* Lindl.\) buds // Pak. J. Bot., 2011. – Vol. 43, N 2. – P.1163–1171](#)
4. [Testing gene expression by reverse transcriptase PCR \(rt-PCR\). Overview](#)
5. [Žilić S., Barać M. et al. Characterization of proteins from grain of different bread and durum wheat genotypes // Int. J. Mol. Sci., 2011. – Vol. 12. – P.5878–5894: doi:10.3390/ijms12095878](#)
6. [Đukić N., Matić G. et al. Biochemical analysis of gliadins of wheat *Triticum durum* // Kragujevac J. Sci., 2005. – Vol. 27. – P.131–138](#)