

## **Project “Improving skills in laboratory practice for agro-food specialists in eastern Europe» (Ag-Lab)**

Program Erasmus +, project KA2 n° 586383-EPP-1-2017-1-SI-EPPKA2-CBHE-JP (2017-2978/001-001)

### **Programme of the training of master students in Agronomy**

#### **Objectives:**

- to complete the diploma in agronomy with the knowledge and skills necessary for the work at laboratory according to the elaborated references / professional competences;
- to provide the comprehension of laboratories organisation and activities;
- to provide the knowledge of actual laboratory methods and national and international norms related to the laboratory practice and to develop the capacity for the permanent up-grading of professional knowledge;
- to reinforce relations between universities and laboratories in agro-food sector and to create the conditions for the sustainable cooperation through the web-portal and other means.

#### **Methods:**

- the theoretical and practical classes in form of modules integrated into curricula (30% of the general curriculum);
- the practical trainings and study visits to laboratories of national and foreign institutions ;
- the on-line lectures;
- case-studies.

#### **Quality assurance:**

- the examination in the end of every course with the results reflected into the supplement to the diploma (modules, number of hours and notes);
- the tests of knowledge before the training study visit and after it;
- the evaluation of the provided training quality by students (clearness, completeness, practical usefulness etc.) with the further work for the improvement;
- the questioners for unit heads of the laboratories after receiving students for the practical training;
- the report of the common lectures and trainings with universities;
- further feedback of gradulators launching their professional activities at laboratories.

### **Modules for the specialization “laboratory practice in the agronomy”**

<b>Module / Subject</b>
<b>Module 1. General organization of the laboratory practice</b>
<b>Subject 1. Activity organization and metrological provision of laboratory</b>

<b>Topic 1.</b> Organization and functioning of laboratories (general requirements for laboratories): GPL – good laboratory practice, certification and accreditation of laboratories, metrological provision, international standards ISO 17025, ISO 9001, ISO 14001, ISO 45001, biosecurity levels in laboratory, European regulation related to the laboratory practice).
<b>Topic 2.</b> Procedures for confirmation of laboratory diagnostic efficiency (internal and cross audit, verification), quality assurance of laboratory researches (intra and inter-laboratory control). Validation of analytical methods.
<b>Topic 3.</b> Rules of the laboratory biosafety and use of plants, biological materials and samples. Organization of measures for recycling of laboratory wastes, used samples, materials and chemical agents.
<b>Topic 4.</b> Measures for laboratory researches quality assurance at pre-analytical, analytical and post-analytical stages. Procedures for calibration and verification of measurement equipment.
<b>Topic 5.</b> Documents management related to laboratory activity (necessary documents, software for documents management and registration, registers, experts' conclusions).
<b>Module 2. Diagnostic of crops mineral nutrition</b>
<b>Subject 1.</b> Diagnostic of crops mineral nutrition
<b>Topic 1.</b> Chemical content of actual varieties and hybrids of crops
<b>Topic 2.</b> Soil nutrition of plants
<b>Topic 3.</b> Diagnostic of plants crops mineral nutrition
<b>Subject 2.</b> Optimization of crops mineral nutrition
<b>Topic 4.</b> Physiological and biological bases for fertilizers use
<b>Topic 5.</b> Modern technologies of using fertilizers for optimization of mineral crops nutrition
Subject 3. Methods of operational diagnostic and optimization of mineral crops nutrition
<b>Topic 6.</b> Work with modern mobile laboratories
<b>Topic 7.</b> Detection of mineral nutrition elements content by express-methods
<b>Module 4. Methods of agronomic analyses</b>
<b>Topic 1.</b> Nature of radiation spectrum. Fields of the spectral method application. Theoretical bases, equipment and method. Spectral analyses: emission method. Study of emitted light structure. Direct and indirect methods. Extraction of main elements from samples and dirt. Quantitative analysis of mixtures.
<b>Topic 2.</b> Spectral analysis: absorption. Study of light structure absorbed by the analysed matter. Theoretical bases, equipment and method. Scheme of spectrometer. Quantitative analysis of mixtures.
<b>Topic 3.</b> Methods of biological analyses - centrifugation. Fields of method application. Method of purification and fractionation of biological materials. Study of structure and biological activity of biological materials.
<b>Topic 4.</b> Chromatography methods. Gas chromatography. Method. Separation and definition of chemical compounds.
<b>Topic 5.</b> Liquid chromatography. Method. Equipment. Obtaining and treatment of results.
<b>Topic 6.</b> Polymerase chain reaction (PCR). Principle of action (necessary components, primers, reaction running). Methods and use. Amplification and definition of ADN number.
<b>Topic 7.</b> ELIZA test. General principle and significance of the method. Application and stages of analysis.

## **Module 5. Quality management and certification of products of plant origin**

**Topic 1.** Quality notion for products of plant origin. Biological, hygienic qualities of plant products. Quality management of products.

**Topic 2.** Quality management of cereals. Physical, biochemical and technological indices of wheat quality. Baker's qualities of flour. Factors impacting wheat quality. Indices of rye and triticale quality. Factors impacting and regulating rye quality.

**Tema 3.** Quality management of corn. Indices of corn quality. Proteins species and their important for human and animal nutrition. Amino acids containing in proteins. Vitamins containing in corn. Fertilizers impact on corn productivity. Changing of chemical composition of grains during maturation.

**Topic 4.** Quality management of leguminous. General characteristic of leguminous crops. Biological composition of soy beans. Requirements of national standard DSTU 4964:2008 to soy beans. Conditions of nutrition for leguminous crops.

**Topic 5.** Quality management of oleaginous crops. Biological role of lipids. Acids classification. Indices of sunflower seeds quality. Impacting factors and regulation methods of sunflower seeds quality. Indices and management of lint and hemp seeds quality. Changing of chemical composition of seed during their storage.

**Topic 6.** Quality management of potatoes. Biological composition of potato. Composition of carbohydrates and their role in the potatoes quality definition. Nitrogen matters, organic acids, vitamin composition of bulbs. Compound forming taste and odour of potato. Changing of chemical composition of potatoes during their maturation. Impact of climate conditions and fertilizers on potato quality.

**Topic 7.** Certification of agricultural products. Certification authorities. Legislative regulation of the certification. Voluntary certification.

## **Module 6. International phytosanitary standards**

**Topic 1.** Phytosanitary principles of quarantine and plants protection, their application in the international trade (International standard of phytosanitary measures №1). Main principles: Suzerainty. Necessity. Risk management. Minimum impact. Transparency. Harmonization. Absence of discrimination. Technical justification. Cooperation. Equivalence of phytosanitary measures. Changes. Notification and dissemination of information related to regulation. Conflicts regulation.

**Topic 2. Phytosanitary system of import regulation** (International standard of phytosanitary measures №20).

Objective of the standard creation and its application. Definition of the standard. Requirements HO3P: structure, rights, duties, responsibility. International agreements, principles and standards. Regional cooperation. Main regulating provisions: material submitted to quarantine, phytosanitary measures related to this materials. Implementation of measures related to imported commodities. Procedure for obtaining permission for import. Interdiction of import. Transit commodities. Measure for the reaction on inconformity and urgent actions. Legal power of HOK3P. System of import regulation: management, development and revision of the regulations, surveillance, analysis of phytosanitary risk, creation of the list of hazardous organisms. Audits and control of import, export conformity: overview, sampling, laboratory analysis. Inconformity of commodities and urgent actions. Notification of inconformity and urgent actions. Cancellation or changing of regulation.

**Topic 3. Export certification system** (International standard of phytosanitary measures №7). Objective of the standard creation and its application. Definition of the standard. Legal powers. Administrative responsibility. Resources: staff. Information about phytosanitary requirements of importing countries. Technical information. Equipment. Documents: phytosanitary certificates,

re-export certificates. Data storage. Commodities traceability. Connection means: inside exporting country, outside exporting country. Revision of the system. Reaction on incidents.

**Topic 4. Transit commodities.** (International standard of phytosanitary measures №25). Objective of the standard creation and its application. Definition of the standard. Analysis of the phytosanitary risk at the territory of transit country. Evaluation of phytosanitary risk. Management of phytosanitary risk. Transit commodity not requiring phytosanitary measures. Transit commodity requiring phytosanitary measures. Other phytosanitary measures. Organization of transit system. Non-conformity and actions in urgent situations. Cooperation and communication between national authorities. Absence of discrimination. Revision. Documents.

**Topic 5. Surveillance guide.** (International standard of phytosanitary measures №6). Objective of the standard creation and its application. Definition of the standard. General surveillance. Sources. Collection, storage and search of information. Use of information. Target examinations: related to hazardous organisms. Examination of commodities and plants. Systemic and aleatory sampling.

**Topic 6. Examination guide.** (International standard of phytosanitary measures №23). Objective of the standard creation and its application. Definition of the standard. Task of examination. Requirement to examination. Requirements to inspectors. Responsibility for examination. Role of examination for analysis of phytosanitary risk. Specific requirements. Control of document accompanying commodity. Examination of commodity originality and integrity. Visual examination. Hazardous organisms. Conformity to phytosanitary requirements. Examination methods. Results of examination in controlled conditions.

**Topic 7. Phytosanitary treatment against regulated hazardous organisms.** (International standard of phytosanitary measures №28).

Objective of the standard creation and its application. Definition of the standard. Process of treatment. Requirements to phytosanitary treatment.

### **Module 7. Seeds control and inspection**

**Topic 1.** Seeds control: carrying out of seeds field inspection, control of seeds lots creation, packaging and labeling, sampling methods, laboratory analyses of seeds. System of laboratory control ISTA.

**Topic 2.** Plants varieties protection. Varieties and hybrids characteristics. National and international varieties registers. International systems of seeds control: OECD, EU. Participation of countries in the international seeds control systems, mutual recognition.