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## Formation of Professional Competencies in the Prospective Agronomy Research Workers

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### Abstract

The article specifies the content and structure of the professional training of masters-agronomists in selective breeding and genetics, and sets out the main functional groups of professional competencies in their preparation.

**Keywords:** professional competencies, masters-agronomists in selective breeding and genetics, professional training

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Integration of Ukraine into the European educational area, and the growth of competition for the employment of higher educational institutions graduates in the domestic and world labor markets form the new requirements for the training quality of the prospective specialists in agronomy, selective breeding and genetics of agricultural crops. Those requirements are now based on the principles of a competent approach. Therefore, there are some changes which exist in directions, standards and plans to be implemented. According to the standard of higher education branch in Ukraine in 2006 (Branch Standard..., 2006), the professional training of masters-agronomists in selective breeding and genetics was based on the formation of technological functions, which now has to be replaced by competencies. This determines the need to identify and substantiate the main groups of competencies in selective breeding and genetics of agricultural crops during the preparation of prospective agronomy-research workers.

In the previous scientific works the authors considered the role of scientific schools on selective breeding and genetics of agricultural crops in the establishment and development of educational programs (Antipova, Ridei, Antipov, 2014; Antipova, 2014), the formation of a conceptual and categorical apparatus of a competent approach to professional training (Antipova, Ridei, Antipov, 2014). A comparative analysis of industry standards of higher education of the

bachelor-agronomist was carried out on the basis of the competent approach (Antipova, Antipov, 2015) as well as the diagnostics of the motivation of students-agronomists training in the higher agricultural educational institutions was conducted (Antipova, 2015).

The main document that defines the scope and list of normative and selective disciplines, their sequence of study, forms of conducting the lessons is the curriculum, which is developed on the basis of the educational professional program and educational qualification characteristics by the scientific and methodological commission of agronomy.

According to the curriculum of the Master's Degree, 6.090101 "Agronomy", specialty 8.09010105 "Selective breeding and genetics of agricultural crops" [5], the cycle of disciplines of professional-oriented, humanitarian and socio-economic training is 144 hours. (4% of the total number of hours), natural sciences, professional and practical training - 1260 (39), independent choices of Higher educational institute (HEI) - 612 (19), independent student choice - 576 hours (18%). Theoretical and practical training in the cycle of disciplines of professional-oriented, humanitarian and socio-economic training is respectively 27 and 34 hours. (44% and 56%) in the structure of the curriculum; natural sciences, professional and practical training - 238 and 255 hours (48% and 52%); independent choices of HEI - 84 and 84 hours (50 % and 50%); students' independent choices - 40 and 30 hours (57% and 55%). Theoretical training in all cycles of disciplines is 389 hours (49%), and practical - 403 hours (51%). The curriculum allocates 468 hours for scientific and production practice. For preparation and defense of master's work - 180 hours. Masters' training is carried out according to the production specialty (master's programs "Methods of genetic control in crop and environmental use", "State scientific and technical examination of plant varieties and their legal protection") as well as research one (master's program "Implementation of biological diversity as sources of economic and valuable features and creation new donors for selection of modern varieties and hybrids").

The main functional groups of professional competencies for prospective agronomy-research workers in selective breeding and genetics of agricultural crops were selected based on the analysis of the structure and curriculum content:

*Humanitarian, socio-economic, and agrarian political professional competency* is a theoretical and methodical basis for the formation of the constituent groups of professional competence in masters-agronomists of selective breeding and genetics, and combine communicative (foreign languages, international, professional mobility, adaptability, self-determination), methodological (methodical, technical-regulating - on standardization, certification, licensing, selection-genetic-research, project-search, forecast-modeling, constructive), and philosophical (scientific-ideological, civilian) competencies.

*Communicative competencies* combine foreign language and international competence that allow scientists to support international scientific ties, share the results of scientific research with the help of foreign language communicative mobility.

*Foreign language competence* is a philological and linguistic competences that provide foreign-language communicative mobility of genetics-breeder with using of foreign-language theoretical and methodological sources for research. They provide a free access to foreign-language information data of international genetic banks, leading scientific and diagnostic centers and laboratories for testing genetic products (constructions). Also they promote for testing of their own research results in the world's assemblies and forums.

*International competence* the ability to create and maintain international contacts concerning the exchange of results in scientifically-research and scientific-design works, or their joint providing by the countries with the subsequent separate or joint use of the results; joint development and use of scientific and technical regulations, standards and requirements; exchange of general scientific-research, scientific and technical (with its further accumulation in data banks for sharing), and marketing information.

*Professional mobility* is a person's ability to self-improvement, self-organization, self-determination, flexibility, risk, constant search; ability to perform new tasks quickly and successfully, acquire new knowledge and skills, master new technics and technology.

*Adaptability* is an ability and readiness of the individual to adapt to the conditions of the professional environment, assimilation of professional experience; skills and abilities to implement actively the acquired professional knowledge.

*Self-determination* is the ability of the individual to self-determination, self-development, self-respect, self-acceptance, self-esteem, self-realization, self-affirmation through the presentation of his own social professional abilities, readiness for a new level of self-development; ability to realize his own interests.

*Methodological competencies* combine methodological, technical-regulatory (on standardization, certification, licensing), breeding-genetic-research, design-search, forecast-modeling, and constructive.

*Methodical competencies* are knowledge of a set of techniques, methods, skills and abilities to apply them in professional activities.

*Technical-regulatory competencies (on standardization, certification, licensing)* are extensive knowledge of regulatory and technical regulation of standardization, certification, licensing in the field of selective breeding and genetics of agricultural crops.

*Breeding-genetic-research competencies* are modern knowledge on methodology and methods which are currently used in modern genetics and breeding in the world.

*Design-searchcompetencies* are the latest knowledge on the specifics of designing research parks, DNA designing; ability and responsibility in applying of modern breeding-genetics and biotechnological methods in DNA-designing; design skills and abilities.

*Forecast-modelingcompetencies* are deep knowledge about the system-analytical approach in selective breeding and genetics of agricultural crops.

*Constructivecompetencies* are creative knowledge of constructive tools for resolving conflict situations, ways of regulating conflicts.

*Philosophical competencies* are competencies of philosophical and scientific approaches to the study of science and innovation.

*Scientific-ideological competencies* - the ability to acquire modern scientific knowledge, views, beliefs; the ability to analyze, synthesize, compare, synthesize, argue their thoughts and defend their own scientific and world-view positions.

*Civilian competencies* - knowledge of national and world history, European history, modern goals and directions of development of society, the importance of socio-political concepts of equality and justice, international declarations and civil rights.

*Fundamental (natural sciences) and professional-practical competencies of agrarian area constancy, or the competencies in agrarian area ecology* are modern knowledge on the eco-safety of food and food raw materials, the ability to apply eco-biotechnology in the agrarian sector, ecological protection of agrarian eco-systems, the ability to move from classical agriculture to alternative approaches in agrarian production; skills in evaluating the agrarian territory for the selection of certain raw material areas in order to obtain raw materials and products for diet and infant nutrition;competencies in environmental control of agricultural area as the ability to use balanced rural areas, monitoring quality, protection, sustainable land use, management, environmental assessment of agrarian bio-geo-cenoses; also management, audit, standardization, certification, inspection, and ecological-economic substantiation of agricultural solutions. They include special genetic, adaptive breeding, genetic engineering, biotechnological (agro, ecological, industrial, pharmaceutical, molecular), genetic-resource-immunological, purposely selective-seed (grain, leguminous, forage, technical, oil, vegetable, fruit, medicinal spice-aromatic, ornamental plants).

*Special geneticcompetencies* are wide knowledge of genomic and karyological analysis, genetics and phylogenetics of signs, mutagenesis, polyploidy, inbreeding and heterosis, genetics of populations;the way to inherit the basic quantitative and qualitative features.

*Adaptive breedingcompetencies* are fundamental knowledge about plant protective mechanisms; physiological and biochemical mechanisms that provide the morphological resistance of plants to stress and pathogens; the ability to imple-

ment methods of estimation and creation of source materials, adapted to extreme environmental conditions, improve them and create new ones.

*Genetic engineering competencies* are modern knowledge of genetic engineering, skills and abilities to implement methods of work with plants in vitro, basic methods and techniques of genetic engineering in the selective breeding and genetics of agricultural plants.

*Biotechnological* (agro-, ecological, industrial, pharmacy, molecular).

*Genetic-resource-immunological competencies* are knowledge and ability to use the world experience of conservation genetic resources and the main genetic banks of plants, microorganisms, fungi.

*Purposely selective-seed competencies* are modern scientific knowledge on breeding technology of individual agricultural crops (grain, leguminous, forage, technical, oil, vegetable, fruit, medicinal aromatic, ornamental), taking into account their biological and genetic features and the existing gene pool; ability to perform selective breeding by different methods (polyploidy, induced mutagenesis, heterosis on the basis of cytogenetic and nuclear male sterility, methods of biotechnology and genetic engineering).

*Special professional-practical competencies of agro-constancy* are system of professionally-oriented and special knowledge, skills, and abilities in the fields of next sciences: information technologies in breeding, legal protection of plant varieties, examination of varieties on patentability, examination of plant varieties on applicability for spreading in Ukraine, modern methods of cultivars identification; professional-practical training of specialists for systematic analysis of environmental objects and plant production, as well as responsibility and authority for the use of transgenic technologies and DNA technologies in crop production. They include information-selective-technological, variety-law-defensive, expert-variety-diagnostic, patentability, strategic-managerial, market research, accreditation and licensing.

*Information-selective-technological competencies* are deep knowledge of modern information technology, information systems.

*Variety-law-defensive competencies* are modern scientific knowledge on structure organization of the state system for the protection of plant variety rights in Ukraine and in the world.

*Expert-variety-diagnostic competencies* are wide knowledge of modern types of scientific and technical expertise.

*Patentability competencies* are the latest knowledge of the biological and legal criteria of the protection capacity of plant varieties, microorganisms, and fungi; knowledge on varieties features and on their qualifications.

*Strategic-managerial competencies* are detailed knowledge about the laws and strategic directions of agricultural production development in the field of genetics, breeding, seed production of agricultural crops, biotechnology in modern market conditions.

*Market research competencies* are creative knowledge and skills in the system of production and sale organization of agricultural crops' seed in the predicted market.

*Accreditation and licensing competencies* are modern knowledge on specifics and regulatory legal regulation of seed accreditation and licensing, selective genetic, molecular genetics, and biotechnological laboratories.

As a result of the research specifics, structure and content of the professional training of masters-agronomists in the selective breeding and genetics have been clarified; three functional groups of professional competencies in training of masters-agronomists in selective breeding and genetics have been separated i.e., humanitarian, socio-economic, agro-political professional competencies, fundamental (natural sciences) as well as professionally-practical competencies of agricultural area constancy, special professional-practical competencies of agrarian constancy.

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