Federal State Autonomous Educational Institution of Higher Education "Peoples' Friendship University of Russia"

Agrarian and Technological institute

Recommended by ISSC / ME

THE WORKING PROGRAM OF THE DISCIPLINE

Discipline name

PLANT BREEDING AND BIOTECHNOLOGY

Recommended for direction of training/specialties

06.06.01 "Biological Sciences"

(the code and name of the direction of training / specialty are indicated)

Focus of the program (profile)

03.02.07 Genetics

(name of the educational program in accordance with the direction (profile)

1. Goals and objectives of the discipline:

The goal of the discipline is to develop skills in the field of practical plant breeding among graduate students, accelerate the breeding process using the latest methods, and create varieties and hybrids of agricultural crops on their basis, as well as develop abilities focused on research work.

Discipline objectives:

- the study of breeding methods;
- study of the organization and technique of the breeding process;
- study of the assessment of breeding material.
- studying the application of biotechnological methods in the breeding process

2. Place of discipline in the structure of EP VO:

"Plant breeding and biotechnology", as a discipline, is included in the variable part of the OOP and the professional cycle of the direction 06.06.01 "Biological Sciences".Block 1 of the curriculum.

Table 1 shows the previous and subsequent disciplines aimed at the formation of discipline competencies in accordance with the competence matrix of EP HE.

Table No. 1

Prior and subsequent disciplines aimed at the formation of competencies

P / p No.	Code and name of competence	Preceding disciplines	Subsequent disciplines (groups of disciplines)
Universal competences			
1	Ability to critically analyze and evaluate modern scientific achievements, generate new ideas when solving research and practical problems, including in interdisciplinary fields (UC-1)	Plant genetics	Genetic bases of plant immunity. Molecular and biochemical markers.
General professional competencies			
1	the ability to independently carry out research activities in the relevant professional field using modern research methods and information and communication technologies (GPC-1);	Plant genetics	Genetic bases of plant immunity Molecular and biochemical markers
Professional competence			
1	PC-1: the ability to understand modern problems of biology and use fundamental biological concepts in the field of professional activity to formulate and solve new problems; PC-2: Ability to use basic theories, concepts and principles in the chosen field of activity, ability to think systems PC-3: readiness to independently analyze the available information, set the goal and objectives of the study and propose methods for their solution;	Plant genetics	Russian language in sphere professional communications Genetic bases of plant immunity Molecular and biochemical markers

3. Requirements for the results of mastering the discipline:

The process of studying the discipline is aimed at the formation of the following competencies:

Universal Competencies (UC):

- UC-1: the ability to critically analyze and evaluate modern scientific achievements, generate new ideas when solving research and practical problems, including in interdisciplinary fields

General professional competencies

- the ability to independently carry out research activities in the relevant professional field using modern research methods and information and communication technologies (GPC-1);

Professional competence

- PC-1: the ability to understand modern problems of biology and use fundamental biological concepts in the field of professional activity to formulate and solve new problems;
- PC-2: Ability to use basic theories, concepts and principles in the chosen field of activity, ability to think systems
- PC-3 :. the willingness to independently analyze the available information, set the goal and objectives of the study and propose methods for their solution;

4. Scope of discipline and types of educational work

The total workload of the discipline is 4 credit units.

Type of educational work	Total hours	Semesters			
		3	4		
Classroom lessons (total)	80	40	40		
Including:	-	-	-	-	-
Lectures	40	20	20		
Laboratory workshop	40	20	20		
Independent work (total)	46	23	23		
knowledge control	18	9	9		
Total labor intensity hour	144	72	72		
credits units	4				

5. Content of the discipline

5.1. Contents of discipline sections

Name of the discipline	**Plant breeding and biotechnology**
Discipline scope	4 Credits / 144 hours
Discipline summary	
The name of the sections (topics) of the discipline	**Summary of sections (topics) of the discipline**
Introduction to plant breeding.	Historical background and importance of plant breeding. The history and role of plant breeding in society.
The role and importance of plant germplasm resources.	Genetic plant variety Plant genetic resources for plant breeding.

Genetic analyzes in breeding.	Introduction to the concepts of population genetics. Introduction to Quantitative Genetics. Statistical methods used in plant breeding.
Methods and tools used in breeding.	Sexual selection and outbreeding in plant breeding. Mutagenesis. Polyploidy.
Biotechnology in plant breeding.	Application of biotechnology in crop production. Tissue culture and propagation of cloned plants
Genetic engineering in plant genetics.	Transgenic technologies (Agrobacterial transformation, Selective markers and reporter genes, selective bombardment) Application of transgenic technologies Obtaining plants that are resistant to biotic and abiotic stresses.

5.2. Sections of disciplines and types of classes

P / p No.	The name of the discipline section	Lecture.	Laboratory workshop	knowledge control	Ind. work	Total hour.
1.	Introduction to plant breeding.	8	8	3	9	
2.	The role and importance of plant germplasm resources.	8	8	3	9	
3.	Genetic analyzes in breeding.	8	8	4	9	
4.	Methods and tools used in breeding.	8	8	4	9	
5.	Biotechnology in plant breeding. Genetic engineering in plant genetics.	8	8	4	10	
Total		40	40	18	46	144

6. Laboratory workshop *(in the presence of)*

P / p No.	Laboratory workshop topics	Labor intensity (hour.)
1.	Introduction to plant breeding.	8
2.	The role and importance of plant germplasm resources.	8
3.	Genetic analyzes in breeding.	8
4.	Methods and tools used in breeding.	8
5	Biotechnology in plant breeding. Genetic engineering in plant genetics.	8
Total		40

7. Practical exercises (seminars) *(in the presence of)*

8. Material and technical support of the discipline:
Classroom with personal computer (laptop), multimedia projector, screen.
Demonstration material on slides on discipline topics.
Specialized equipment for general use

9. Information support of the discipline
a) software
Volume Licensing Program (Microsoft Subscription) Enrollment for Education Solutions (EES) No. 56278518 dated 04/23/2019 (renewed annually, the program is assigned a new number).
b) databases, reference and search systems
1. EBS of RUDN University and third-party EBS to which students have access on the basis of concluded agreements:
- Electronic library system RUDN - EBS RUDN http://lib.rudn.ru/MegaPro/Web
- EBS "University Library Online" http://www.biblioclub.ru
- EBS Yurayt http://www.biblio-online.ru
- EBS "Student Consultant" www.studentlibrary.ru
- EBS "Doe" http://e.lanbook.com/
- TUIS: http://esystem.pfur.ru/course/view.php?id=46
2. Database of biological publications:
- Bulletin of RUDN University:access mode from the territory of RUDN University and remotelyhttp://journals.rudn.ru/
- Scientific library Elibrary.ru:access by IP-addresses of RUDN University at the address: http://www.elibrary.ru/defaultx.asp
- ScienceDirect (ESD), "FreedomCollection", "Cell Press" ID "Elsevier". There is remote access to the database, access by IP-addresses of RUDN University (or remotely by individual login and password).
- Google Academy (eng. Google Scholar) - free search engine for full texts of scientific publications of all formats and disciplines. Indexes full texts of scientific publications. Access mode:https://scholar.google.ru/
- Scopus - scientometric database of publishing house "Elsevier". There is remote access to the database.
Access by IP-addresses of RUDN University and remotely by login and password (Grant of the Ministry of Education and Science). Access mode:http://www.scopus.com/
- Web of Science. There is remote access to the database. Access to the platform is carried out by IP-addresses of the RUDN University or remotely. Remote access to WOS is activated without administrator intervention after registering on the platform from RUDN Universityhttp://login.webofknowledge.com/

10. Educational and methodological support of the discipline:

a) Main literature:
1. Konovalov, Yu. B. General plant breeding. Yu.B. Konovalov, V.V. Pylnev, T.I. Khupatsaria, V.S. Scar. - SPb. : Lan, 2013 .-- 480 p. - ISBN 978-5-8114-1387-4.
2. Varieties of the main field crops in the Lower Volga region / textbook, ed. N.S. Orlova. Federal State Budgetary Educational Institution of Higher Professional Education "Saratov GAU named after N.I. Vavilov ". Publ .: Saratov source. - Saratov, 2012 .-- 245 p. ISBN 978-5-91879-171-4.
3. Workshop on selection and seed production of field crops: a tutorial / VV Pylnev, Yu. B. Konovalov, AN Berezkin. (Textbooks and tutorials for students)
b) Further reading:
1. Borodai, Yu. G. Model of an intensive variety of spring wheat and barley for the arid zone of the forest-steppe and steppe of the south of Western Siberia and the north of Kazakhstan (physiological-agronomic-breeding substantiation) / Yu.G. Borodai. - Barnaul. Zeya, 2006, - 393 p.

2. Orlova, NS Breeding of triticale in the Lower Volga region: history of creation, biological characteristics, use. N. S. Orlova, I. Yu. Kanevskaya. - Electron. text data. - Saratov: FGBOU VPO "Saratov GAU", 2011. - 180 p. - ISBN 978-5-7011-0734-0. fifteen

3. Orlova, NS General selection and varietal science. Methodical instructions. Part 1 / N. S. Orlova, V. I. Zhuzhukin. - Electron. text data. - Saratov: FGOU VPO "Saratov GAU", 2005. - 56 p.

4. General breeding and varietal science. Teaching aid / comp. N. S. Orlova, V. I. Zhuzhukin, Yu. G. Meshalkin. - Saratov: FGOU VPO "Saratov GAU", 2005. - 88 p.

5. General breeding and varietal science. Methodical instructions for independent work of students / comp. N. S. Orlova, V. I. Zhuzhukin. - Saratov: FGOU VPO "Saratov GAU", 2005. - 24 p.

6. Plant immunity and breeding for resistance to diseases and pests: textbook / L. Ya. Plotnikova; International Association "Agro-Education". - M.: KolosS, 2007 .-- 359 p. : ill. - (Textbooks and teaching aids for students of higher educational institutions). - ISBN 978-5-9532-0356-2.

7. Selection and seed production of field crops. Educational method. manual for the lab. classes and self. work / FGOU VPO SSAU, Faculty of Agronomy; comp. N. S. Orlova, E. V. Morozov, V. I. Zhuzhukin. - Saratov: FGOU VPO "Saratov GAU", 2010. - 84 p.

8. Guzhov, Yu.L. Selection and seed production of cultivated plants / Yu.L. Guzhov, A. Fuchs, P. Valichek. M .: Mir, 2003. - 537 p.

9. Law "On seed production" N 149-FZ. 1997.

10. Instructions for the approbation of varietal crops. Part 1 (cereals, cereals, legumes, oilseeds and spinning crops). Part 2 (sugar beets, potatoes, perennial and annual forage grasses). M. NIITEIagroprom, 1996.

11. Konovalov, Yu.B. Plant breeding for resistance to diseases and pests. M .: Kolos, 2002.- 136s.

12. Rubets, V.S. Atlas of plants taken into account when testing cereals, legumes and oilseeds / V.S. Rubets, V.V. Pylnev, O. A. Buko, et al. M .: Ed. Moscow Agricultural Academy, 2006.

13. Malko, A.M. Scientific and practical bases of quality control and certification of seeds in a market economy. M .: 2004.- 288s.

14. Konovalov, Yu. B. General plant breeding. Textbook / Yu. B. Konovalov, VV Pylnev, TI Khupatsaria, V.S. Scar. - SPb. : Lan, 2013 .-- 480 p. - ISBN 978-5-8114-1387-4. [Electronic resource]. Access mode:www.lanbook.com

15. Orlova, NS Selection of triticale in the Lower Volga region: history of creation, biological characteristics, use [Electronic resource] Access mode: monograph / NS Orlova, I. Yu. Kanevskaya. - Electron. text data. - Saratov: FGBOU VPO "Saratov GAU", 2011. - 180 p. - ISBN 978-5-7011-0734-0. [Electronic resource]. Access mode:http://library.sgau.ru

16. Orlova, NS General selection and varietal science [Electronic resource] Access mode: guidelines. ... Part 1 / N. S. Orlova, V. I. Zhuzhukin. - Electron. text data. - Saratov: FGOU VPO "Saratov GAU", 2005. - 56 p. [Electronic resource]. Access mode: http://library.sgau.ru

17. General breeding and varietal science [Electronic resource] Access mode: teaching aid / comp. N. S. Orlova, V. I. Zhuzhukin, Yu. G. Meshalkin. - Saratov: FGOU VPO "Saratov GAU", 2005. - 88p. [Electronic resource]. Access mode:http://library.sgau.ru

11. Methodical instructions for students on mastering the discipline (module)

Postgraduate students must observe discipline, come to classes on time, submit homework for testing, prepare for the test and control work provided for in the course, be active in the classroom.

An important place in the educational process is occupied by the independent work of graduate students. To organize independent work on the course, modern information technologies are used: online complexes of educational and teaching materials (program, list of recommended literature and information resources, tasks for self-control), free access to the Internet for working with databases. Working with educational and scientific literature is the main form of independent work and is necessary in preparation for the current control of knowledge or intermediate certification. It includes the study of lecture material, as well as the study of recommended sources and literature on the subject of lectures. When self-studying a theoretical topic, a graduate student, using the literary sources and electronic resources recommended in the RAP, must answer control questions or complete tasks proposed by the teacher.

For practical training, before being admitted to work in a molecular biological laboratory, it is necessary to undergo safety instructions from a responsible person. At the beginning of each session, laboratory equipment should be checked for visible damage. If damage is found, inform the teacher. At the end of each lesson, the teacher summarizes the implementation of the practical lesson and gives a topic for study for the next lesson. After each PZ, the postgraduate student performs cleaning of his workplace.

Features of the implementation of discipline for people with disabilities and people with disabilities.

Training in the discipline of disabled people and persons with disabilities (hereinafter HIA) is carried out by the teacher, taking into account the characteristics of psychophysical development, individual capabilities and health status of such students.

For students with musculoskeletal disorders and hearing disabilities, lectures will be accompanied by multimedia tools and handouts.

For students with visual disabilities, the use of technical means for enhancing residual vision is provided, and the possibility of developing audio materials is also provided.

In this discipline, training of disabled people and persons with disabilities can be carried out both in the classroom and remotely using the capabilities of the electronic educational environment (TUIS) and e-mail.

In the course of classroom training, various means of interactive learning are used, including group discussions, brainstorming, business games, project work in small groups, which makes it possible to include all participants in the educational process in active work on mastering the discipline. Such teaching methods are aimed at joint work, discussion, group decision-making, contribute to group cohesion and provide opportunities for communication not only with the teacher, but also with other students, cooperation in the process of cognitive activity.

Training of disabled people and persons with disabilities can be carried out according to an approved individual schedule, taking into account the characteristics of their psychophysical development and health status, which implies the individualization of the content, methods, pace of the student's learning activity, the ability to follow the specific actions of the student when solving specific problems, making the need, the required adjustments in the training process.

It provides for individual consultations (including counseling via e-mail), the provision of additional educational and methodological materials (depending on the diagnosis).

12. Fund of assessment tools for intermediate certification of students in the discipline (module)

Materials for assessing the level of mastering the educational material of the discipline (evaluation materials), including a list of competencies indicating the stages of their formation, a description of indicators and criteria for assessing competencies at various stages of their formation, a description of the assessment scales, typical control tasks or other materials necessary for the assessment of knowledge, abilities, skills and (or) experience of activity, characterizing the stages of the formation of competencies in the process of mastering the educational program, methodological materials that

determine the procedures for assessing knowledge, skills, skills and (or) experience of activities that characterize the stages of formation of competencies , developed in full and available for students on the discipline page at TUIS RUDN.

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