Program Final examination of Discipline “Methods of molecular biotechnology”

**6D05105 Biotechnology**

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| Describe feature and functions Genetic Engineering.  |
| Show the methods of recombinant DNA technology |
|  What is the GMO process? |
|  Analyze the techniques to create recombinant DNA (Genetic modification)  |
| Give characterization creating a GMO is a multi-step process. |
| What is molecular cloning  |
| How to use plasmids c as cloning vectors to carry genes. |
| Show the examples of the DNA sequences that are difficult to clone are inverted repeats (перевернутые повторы),  |
| Cloning a Eukaryotic Gene in a Bacterial Plasmid |
| Choice of host organism and cloning vector |
| Gene cloning using plasmids |
| Gene cloning using Bacteriophage |
| Describe the steps of molecular cloning |
| Modification of nuclear acids  |
| Describe Different types of endonucleases and their use in molecular biotechnology |
| Describe the main principles of electrophoresis for analysis of nucleic acids **and** Separation Techniques for different types of DNA  |
| Show methods of nucleic Acid Detection DNA  |
| Characterize the use of SDS-PAGE for analysis of nucleic acids |
| Present characterization of DNA cloning techniques  |
| Describe sequencing techniques of nucleic acids  |
| Analyze multiple cloning site (MCS)characterization and use in molecular biotechnology. Subclone characterization and use. |

Analyze cosmid as vector DNA

How to analyze a PCR product

Health risks of GMOs associated with the transfer of genes, gene expression products.

Human genetic engineering. Main directions

Fundamentals of the safety of genetic engineering.

Risk assessment methodology (stages of risk assessment):

 The nature of risks to human health and the environment associated with genetically modified organisms

Intentional effect of insertion of foreign DNA into GMOs (manifestation of targeted traits of genetic modification).

Unintended effects of genetic modification (GEM)

Directions of genetic engineering for the creation of various physiologically active and pharmaceutical substances), the spectrum of non-target organisms.

Potential adverse effects of GM plants on human health, methods of their assessment and methods of prevention.

Analysis and examples of the impact on human health of food additives (dyes, emulsifiers, preservatives, etc.)

Methods for assessing the quality and safety of traditional food products Reducing biological diversity as a result of changes in natural biocenoses when growing transgenic plants.

Analysis of possible adverse effects on human health of food contaminants (pesticide residues, veterinary medicinal products, hormonal drugs, mycotoxins, etc.).

Application of the concept of substantial equivalence to assess the safety of GMOs and GM foods.

 Evaluation criteria for a new GMO product (plant variety).

Evaluation of the potential toxicity of transgenic products new to the host organism.

 Proteins are the main transgenic products of commercially used GMOs. Procedure for assessing the allergenic potential of the transgenic source (potential allergenicity of the donor organism).

 Assessment of the risk due to the possibility of horizontal transfer of marker genes of antibiotic resistance to microorganisms of the digestive tract

Mechanisms of horizontal gene transfer (LHT), providing the manifestation of new traits in the recipient organism.

Risks of possible use of herbicides.

Risk of plant resistance to pests and pathogens.

Mythical risks.

The risk associated with the GM plant as such.