Azərbaycan Respublikası Elm və Təhsil Nazirliyi
Lənkəran Dövlət Universiteti

“BİOLOJİ MÜXTƏLİFLİYİN QORUNMASI VƏ EKOLOJİ CƏHƏTDƏN DAYANIQLI SOSİAL-İQTİSADİ İNKİŞAFA DOĞRU” MÖVZUSUNDA BEYNƏLXALQ ELMİ KONFRANSIN

MATERİALLARI

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Modern achievements of biotechnology and agrotechnical measures in the fight against weeds

Weeds are one of the biggest problems in agriculture as they compete with cultivated plants for water, nutrients, and sunlight. This leads to a decrease in crop yield and quality, as well as an increase in costs to combat weeds. Due to the widespread military aggression by Russia against Ukraine in areas of active combat, a significant portion of arable land has been removed from agricultural activity. This leads to significant contamination by harmful weed vegetation in these areas, which can only be returned to the agricultural sector through the widespread use of total herbicides – the most common method of weed control.

Total herbicides are chemical compounds designed to destroy all types of plants, including both weeds and cultivated crops. Modern herbicides act quickly and effectively, but they also have some drawbacks. Firstly, if used improperly, they can be harmful to the environment and human health. Secondly, they can cause the development of resistance in weeds, which complicates further weed control.

A more effective approach to weed control is the use of genetically modified plants. These genetically modified plants are resistant to certain groups of herbicides and can provide a high economic benefit in conditions of active weed control, which will be very important in the post-war period of Ukraine's reconstruction. The use of genetically modified crops is an effective and environmentally friendly method of weed control.

One of the latest and most promising methods of weed control is the use of CRISPR/Cas9 technology. This is a genetic editing method that allows for precise changes to DNA in organisms. This makes it possible to create plants that are resistant to certain groups of herbicides or even capable of destroying weeds on their own.

One example of successful use of CRISPR/Cas9 for weed control is the creation of genetically modified corn and soybeans that are resistant to glyphosate herbicides. This has already reduced the use of herbicides and increased the yield of these crops. CRISPR/Cas9 is a powerful genome editing tool based on a bacterial defense system that has been adapted for making changes to the DNA of plants, animals, and humans.

Bacteria constantly repel attacks from their natural enemies – viruses – using specially developed enzymes. Each time the bacteria successfully kill a virus, it cuts up the remains of its genetic material and stores it inside CRISPR sequences. Later, the bacteria use this information in case of a new viral attack. During an attack, the bacteria produce Cas9 proteins that carry a fragment of the virus's genetic material. If this fragment matches the DNA of the attacking virus, Cas9 cuts up its genetic material and neutralizes the threat. This technology makes it possible to enhance the resistance of cultivated agricultural crops to adverse environmental factors, including weeds, and significantly improve the quality of plant products.

Modern achievements in biotechnology should be combined with agronomic methods of weed control, in particular through justified soil cultivation and inter-row cultivation. This

agro measure is somewhat less effective under conditions of sufficient moisture, when the root system of weeds can easily regrow.

Another important and effective agronomic method is mulching, which involves covering the soil surface with organic material, including straw, agro-fiber, or mulching film. This reduces the intensity of soil illumination and hinders the growth and development of weeds. In addition, mulching preserves moisture in the soil and prevents erosion.

A very important issue in modern agriculture in Ukraine is the observance of crop rotation, as different crops require different conditions for growth and development and are differently affected by weedy vegetation. To combat specific types of weeds, it is possible to practice growing certain types of crops. For example, against the perennial herbaceous bindweed (*Convolvulus arvensis*), mustard can be sown, and against the perennial rhizomatous couch grass (*Elytrigia repens L.*), wheat or oats can be grown.

Simultaneously with the use of modern achievements in genetic engineering of plants, it is very important to adhere to justified technologies of growing crops, as healthy and strong plants will compete with weeds and prevent their spread.

Thus, summarizing, it should be noted that weed control in agriculture, especially in the post-war period in Ukraine, is a complex task that requires a comprehensive approach. The use of biotechnology and agronomic methods will reduce the spread of weeds and ensure effective and environmentally friendly agricultural production.

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Ecogeographical problems of using natural resources

Forests cover 1.25 million ha of the Republic of Azerbaijan, which has an area of 8.66 million ha. However, under the influence of natural and more anthropogenic (human) factors, open areas were formed within the forest, and as a result of the change of the lower and upper border of the forest in many places, the areas covered with forest decreased significantly. Only 989.33 thousand ha of the 1.21 million ha of forest area in the fund of the Ministry of Ecology and Natural Resources of Azerbaijan are forest-covered lands. The Greater Caucasus region ranks first in terms of the size of the forested areas. There are 494.88 thousand ha of forest here. Of this, 352.69 thousand ha belong to the southern slope of the Greater Caucasus, and 142.19 thousand ha to the northeastern slope. It should also be noted that the main part of the forest fund in Azerbaijan is made up of mountain forests. Although the total area of forests is 14% of the country's territory, the areas covered by forests do not exceed 11%. Forest area per person is approximately 0.12 ha, which is 4 times less than the corresponding global average (0.48 ha).

As for Ismailli district, forestry has been operating here since 1929. It operated under the name of Ismailli Forest Production Farm on the basis of forest massifs of Ismailli, Shamakhi and Aghsu regions. In 1956, Shamakhi and Aghsu regions were separated. Ismailli Forestry covers part of the forest areas in the administrative territory of the district. Now the