

ASSESSMENT OF CHEMICAL CONTROL AGAINST DISEASES AND PESTS OF APPLE (*MALUS L.*) AND PEAR (*PYRUS L.*) PRODUCERS IN GUBA-KHACHMAZ ECONOMIC DISTRICT USING THE EMPIRICAL SOCIAL RESEARCH METHOD

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Abstract. As a result of the research conducted in different countries, it became known that the use of resistant varieties is the basis of the measures taken to reduce the use of pesticides in the fight against diseases and pests. However, it should also be noted that most of the fruit varieties currently produced according to market requirements are sensitive to various pests and diseases or are included in the group of unsustainable varieties. This research work was conducted in Guba, Khachmaz and Gusar regions in order to determine the application of pesticides against diseases and pests of apple and pear producers and their consequences in 2018-2019. An empiric social survey consisting of 10 questions was conducted among 100 randomly selected farmers and the obtained results were evaluated as a percentage. According to the results of the survey conducted with farmers, it was determined that they use excessive pesticides against diseases and pests of apple and pear plants. It was found that most of the farmers sprayed more medication of sprays predicted by the early warning system to scab disease (*Venturia inaequalis* Wint. and *Venturia pyrina* Aderh.). Manufacturers have doubts about the bioeffectiveness of the drugs they use and the biggest reason for these doubts is that diseases and pests show resistance to pesticides.

Keywords: *Malus M., Pyrus L., chemical control, pesticides, disease and pests.*

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1. Introduction

Fruit growing is an important component of the agrarian economy of the republic. The state's need for an effectively functioning agricultural sector is felt more prominently in the time of the world population is growing rapidly and global climate change is intensifying in the current era. An efficient agricultural sector is the economy can achieve higher production of agricultural products by using less resources. The low or high productivity in agriculture of different countries with the same natural and economic conditions shows those countries is effective the agricultural policy in international experience.

Apples and pears are among the seedly fruit plants that have a wide distribution in the world and are produced in different ecological conditions. The production of apples in the world (78 million tons) is about 3 times more than the production of pears (24

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million tons). China is the first with 52.1% of apple production, the EU is second with 16.2% and Turkey is 6.2%. is in the third place in the world. 59% and 39% of the 13308.9 hectares of apple orchards and 1439.9 hectares of pear orchards of the Guba-Khachmaz economic region, where the research was conducted, are produced in the Guba region, respectively (<https://www.fao.org>, <https://www.stat.gov.az/?lang=az>).

One of the most important problems of local farmers is the problems related to plant protection. According to the empiric social research carried out in the area, the most important problems in these orchards are scab and various viral diseases and pests are stemworm (*Synanthedon myopaeformis* C.) and mites (*Panonychus ulmi* C., *Tetranychus urticae* C., *Bryobia rubrioculus* C.). According to the information provided by the State Phytosanitary Control Service, in different apple and pear orchards cultivated in the Guba-Khachmaz economic district of the republic, the producers fought 5 times in one month against scab disease, 3.3 times against stem worm (*Synanthedon myopaeformis* C.) and 2 times against mites it was determined that the medication was carried out.

It is a well-known fact that over-medication can bring some risks. The most important of these risks is the disturbance of the natural balance and the effect of these chemicals on the disturbance of the natural balance is greater than any other factor. Because, they destroy useful entomophages and cause a decrease in food sources as a result of the weakening of the development of host plants. In addition, as a result of continuous and unconscious use of chemical compounds, target organisms become resistant to these compounds (Oncuer, 1997). In particular, modern pesticides with a single mechanism of action have a greater risk of developing resistance in organisms. Since resistance occurs as a result of a mutation, there is also a change in the genetic make-up of individuals who gain resistance.

As the pests gradually gain resistance, the effectiveness of the pesticide begins to decline. According to the information provided by the experts, the pesticide that was effective at first became ineffective over time, so they started to increase the dose to restore its previous effectiveness. As a result, increasing doses in parallel with increasing resistance lead to faster environmental pollution (Delen, 1999).

Some pesticides applied against diseases and pests have a harmful effect on living organisms even in very small amounts. They accumulate in fatty tissues and cause cancer, as well as have effects that damage the liver and impair kidney function. Although some of them do not accumulate in the body, by having a negative effect on the nervous system, they cause forgetfulness, retardation of thinking and disorder in nerve and muscle coordination. For this reason, after consciously using pesticides, it is necessary to investigate the amount of residues on products and in the environment (Ugurlu, 2000).

As in the world, in Azerbaijan, as well as in the world, researches conducted in order to detect resistance genes against the most dangerous disease of the apple plant (*Malus* Mill.) to the scab disease (*Venturia inaequalis* (Cke.) Wint.) once again prove that modern orchards the use of cultivars (local, selected and introduced) that differ in their reproduction due to their high genetic characteristics is an important method of combating the disease that does not have a negative impact on the environment (Khankishiyeva, 2020a; 2020b; 2021; 2022).

This study investigated the tendencies of Guba, Khachmaz and Gusar apple and pear producers to decide on chemical control against the most important diseases and pests, chemical control applications and expectations from chemical control have been defined and possible risks that chemical control may cause in the area.

2. Materials and Methods

This research work was conducted by interviewing 100 randomly selected farmers from the towns and villages where apple and pear are mostly produced. Questionnaires containing the following questions were prepared in advance to determine the sensitivity of farmers to make decisions about chemical control of apple and pear diseases and pests, its application, the results obtained and the negative effects of chemical control on the environment and human health. In the study, a survey form was used for each farmer and the answers to each question in the survey form were recorded one by one. For each question, responses from all manufacturers were evaluated separately.

It should be noted that for empiric social research, first of all, a problem should be selected, the appropriate source should be investigated, then hypotheses should be developed, research methods should be selected, analyzed and a report should be drawn up at the end (Neuloh, 2011).

The farmers were asked the following questions:

1. What elements do you think come to the fore when deciding on the implementation of disease and pest control?
2. What do you pay attention to when choosing the dosage of the drug?
3. What is the main reason for using the drug more than the recommended dose?
4. When do you administer the medication?
5. Can more pesticide application completely eradicate the disease and pest?
6. How often do you take vaccinations against scab and other diseases?
7. Have you noticed a decrease in the number of vaccinations you have carried out due to the early warning system compared to previous years (when the system was not installed)?
8. Which company's drugs do you prefer and what is the main reason?
9. Have you noticed that the effect of the medicines you used before has decreased?
10. What is the main reason that the effect of drugs disappears over time?

3. Results and Discussions

As a result of the conducted empiric social research, in question 1 of the survey, 60% of farmers stated that it is related to the spread of diseases and pests, 17% to drug prices and 23% to drug costs. According to the results of the survey, the reason why the majority of farmers do not pay much attention to the price of pesticides used in the chemical control of diseases and pests in apple and pear varieties and forms is the commercial method of production. Their main goal is that the market value of the product they produce does not decrease. Most of the farmers complain about scab disease, which causes economic losses in apple and pear crops. Let's note that in our republic as well as in the world, scab disease (*Venturia inaequalis* (Cke.) Wint. and *Venturia pyrina* Aderh.) is the most dangerous disease of apple (*Malus* L.) and pear (*Pyrus* L.). Scab disease caused by the pathogen (*Venturia inaequalis* and *Venturia pyrina*) is a fungal disease that causes changes in the size and shape of fruits, premature shedding of young leaves and increased sensitivity of the plant to winter frosts. Early infection increases production costs, as well as has a negative effect on human health and environment, as a lot of pesticides are applied, in addition to crop and economic losses (Suleymanova, 2018). The disease is widespread in all regions where apples and pears are grown in our country.

Golden Delishes, Fuji and Starkrimson, among the more widely cultivated apple varieties in Azerbaijan, are among the varieties included in the sensitive group by showing a low resistance reaction to the scab disease (Aliyev, 2015; Khankishiyeva, 2015). Among the most cultivated pear varieties in Azerbaijan, Bal pear, Jir pear, Uzunboghaz pear are among the unsustainable varieties against scab (Babayeva, 2024). As it is known, it is possible to achieve the desired result from only 1% of the pesticides used in the fight against various diseases of plants, while the remaining 99% falls into the environment and pollutes the soil and air, as well as poisoning the biota to an unimaginable extent, causing unexpected disasters (Mammadov, 2002). As it is known, only 1% of the pesticides used in the fight against various diseases of plants can achieve the desired results, and the remaining 99% fall into the environment, pollute the soil and air, as well as poison the biota to an unimaginable extent, causing unexpected disasters (Mammadov, 2002). In general, when fighting against various diseases of plants, chemical preparations should be applied when they are more important for plant protection and appropriate from the economic, social and ecological point of view (Gurbanov, 2013). In recent times, the increase in international trade in the production and sale of pesticides and the overuse of pesticides have led to the emergence of resistant forms of harmful organisms against chemical preparations, increasing the risk of them moving to new areas.

To question 2 of the survey, 80% of producers said that they fully comply with the recommended dose, 8% sometimes exceed the recommended dose and 12% say that they use a low dose. Every farmer should know that when applying pesticides against diseases and pests, they should use the dose recommended on the drug label.

In response to question 3 of the questionnaire, 54% of farmers said that they do not consider the recommended dose to be effective and 46% said that they use high doses due to disease and pest resistance to drugs.

If we look at question 4 of the empirical social survey, we can see that 55% of producers said that they decided on the timing of spraying by looking at the intensity of disease and pests, 12% by looking at the early warning system and 33% on the time of spraying by looking at other manufacturers.

In response to the 5th question of the survey, 73% of farmers said that there is no 100% sustainability in varieties and forms of apple and pear plants, 21% said that pesticides have a relative effect and 6% reported that the intensity of spread of pests and diseases is increasing.

In question 6, farmers mentioned the role of abiotic factors for the development of disease-causing and harmful organisms. Especially in Guba, Khachmaz and Gusar regions, rainy and humid weather conditions in March and April promote the development of various diseases and pests. As a result, in order to prevent the spread of the disease and the intensity of the pest, farmers are spraying 5 times in a month to fight against scab. However, in recent years, during the cool and humid spring months, in order to fight against scab disease, producers have been continuously spraying apple and pear orchards.

During the conducted research, 42% of farmers answered the question “have you observed a decrease in the number of spraying you carried out due to the early warning system compared to previous years (when the system was not installed)” that the number of spraying did not change, 19% said that the number of pesticides applied decreased and 39% said that it increased have expressed related opinions.

In response to the 8th question of the survey, 65% of farmers said that they bought pesticides to be used in the fight against diseases and pests from “EMA-Group”, 15%

from “AZCHEMCO” LLC and 20% from “Shans” group of companies. The main reason why farmers turn to the “EMA-Group” company is the quality of the pesticides they advise after carefully determining their requirements in the agricultural sector.

In response to the 9th question of the empiric social survey conducted among farmers, 83% of the producers reported that the effect of the high-impact pesticide decreased with the annual application and 17% reported that there was no change in the effect of the applied pesticide.

In response to the 10th question of the questionnaire, 25% of the farmers said that the active substance in the pesticide is weak, 45% said that because they apply the same drug every year, new races of disease-causing and pest organisms have undergone genetic recombination and showed resistance to that drug, 30% and mentioned that they could not get more effective pesticides due to their high price.

Based on the results of the conducted empiric social research, it can be noted that the answers of each farmer should be given importance. Indeed, it is necessary to use them consciously in order to benefit only from the beneficial aspects of the use of pesticides, which are a part of the agricultural system and to avoid its negative effects. They should be analyzed in laboratory conditions to avoid residue problems in agricultural products.

4. Conclusion

The use of pesticides is inevitable in order to obtain high and quality products. Economic losses can increase from 60% to 100% if farmers do not use pesticides during fruit production. For this purpose, the use of pesticides in the appropriate conditions and in the recommended amount will bring a high profit to the producer, as well as prolong the vegetation period and storage period of the plant. Also, thanks to the use of apple and pear varieties that are better adapted to the soil and climate conditions as donors in modern breeding programs, the creation and selection of new varieties will reduce the anthropogenic effects in nature and preserve useful entomophage try it and will make a great practical contribution to the prevention of environmental pollution.

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