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The Effect Of Pesticides On Antioxidant Ferment Activity And Perecisyl Oxidation Of Lipids In Flourishing Periods

Nematova M.[1], Mirkhamidova P[2]., Tuychiyeva D.[3],
Jurakulov G.[4], Nomonjonov M.[5]

1- Teacher of Navoi State Pedagogical Institute;
2 - Professor of Tashkent State Pedagogical University,
Doctor of Biological Sciences;
3 - Associate Professor of Andijan State University,
Candidate of Biological Sciences;
4 - Associate Professor of Andijan State University,
Candidate of Biological Sciences;
5 - Andijan State University, 3rd year student.
harida mirhamidova @mail.ru
tds.bio@mail.ru

Annotation: The article examines the effect of pesticides Karate zeon and Karache super on the activity of antioxidant enzymes - catalase and peroxidase in the grass cell during the germination of wheat, as well as on the peroxide oxidation of lipids. The results showed that peroxidase enzyme activity increased under the influence of karache and karate pesticides during the germination period of the wheat plant studied during germination, and the amount and activity of catalase enzyme decreased during 7-10 days of growth. since then, this figure has been observed to increase. The studied pesticides Karache super and Karate zeon influenced the process of peroxidation of lipids in wheat germ cells, while the increased activity of the enzymes peroxidase and catalase showed a decrease in this process.

Key words: wheat, grass, pesticide, enzyme, catalase, peroxidase, lipid peroxidation, active form of oxygen (CAF).

Pesticides protect plants from pests and diseases and help increase productivity. However, in recent years, they have been covered in soil and landscapes, phytocenoses, biocenoses, and through them the growing negative impact on many wildlife and humans.

It is known that, like any xenobiotic, pesticides affect the lipid layer of cell and organoid membranes, altering their permeability. This is mainly due to the accelerated peroxidation of lipids and the increase of free radicals.

It is also important to study the effects of plant antioxidants (OAOs) to correct and prevent adverse events in the body when poisoned by various pesticides.

It is known that 50 species of pests (40 species of insects, 3 species of mites, 7 species of rodents) are found in grain. It is estimated that more than 34% of the world's agricultural output is lost to pests worldwide. Even during the storage of harvested grain products, the risk of pests is much higher, with an average loss of up to 20% of the finished product [1].

Pesticides are chemical or biological drugs that control pests and diseases of plants, parasites that damage wild plants and agricultural products.

Some pesticides have very high activity in plants when used as defoliants. At the same time, it is toxic to the extent that it leads to changes in the metabolism of humans and animals, and has the property of functional and material accumulation [2,3].

Pesticides not only kill pests, but also have a number of effects on the plants they protect. The processes that take place between pesticides and plants are more complex, different pesticides act on plants as different physiologically active substances, and their different resistance to pesticides also plays a big role in studying the relationship between pesticides and plants. plays. Typically, this resistance depends on the rate of application of the pesticide, its composition and dosage form, timing and method of application, growth phases, anatomical and morphological structure of plant tissues and organs [4,5]. Once the pesticides enter the plant's body, the relationship between them begins. Different pesticides enter plants differently. Some pesticides are easily distributed throughout the body of a plant through its capillary tubes and have a general effect. Some do not have the ability to affect the whole body of the plant, but only accumulate in a certain part of the plant, and they act locally.

Pesticides that enter a plant undergo a certain metabolism (change) in the plant organism. The rate of change can last from 7 to 20 days. This change occurs more rapidly in young plants, where the processes that take place have a higher physiological activity, so they react more quickly with pesticides and reduce their activity. The speed of the metabolic process determines the shelf life of pesticides in the plant, ie the time of protection. Prolonged storage of slow-metabolizing pesticides in plants increases the risk of their toxic residues being transferred to plant products [6, 7].

The processes that take place in a cell under the influence of a pesticide cause profound changes in it. The external environment plays an important role in the cell's response to pesticides. In particular, ambient humidity has a major impact, as moisture deficiency accelerates the reduction of cell protoplasmic viscosity under the influence of pesticides [3,8].

In general, pesticides disrupt physiological processes in the plant body (photosynthesis and respiratory rate, nitrogen and carbohydrate metabolism, etc.). For example, in the first stage of action of organochlorine and organophosphorus insecticides, many physiological and biochemical changes in the plant body are disrupted. The intensity of photosynthesis slows down as the amount of chlorophyll decreases. Changes in the activity of respiratory enzymes increase the energy of respiration. Treatment of plants with organophosphorus pesticides (methylmercaptophos) causes changes in the activity of many oxidative enzymes. [9].

Like insecticides, many fungicides and herbicides reduce chlorophyll production and inhibit photosynthesis. At the same time, the conversion of sugars to starch can be sharply reduced [11]. The plant is protected from the adverse effects of pesticides by its timely response. If the pesticide norm is not high, the temperature and humidity are at the optimal norm, and also the nutrients for the plant are sufficient, the plant will be able to eliminate the physiological and biochemical disorders caused by the pesticide in its body. works. As a result, physiological and biochemical processes can be activated, which accelerates the development of the plant and increases its useful components. During this time, the production of disaccharides, as well as protein nitrogen, improves the supply of tubers, roots, grain nitrogen and carbohydrates [10].

When pesticide consumption is increased, deeper changes in metabolism can last for a long time. After a certain amount, the plant will not be able to overcome the effects of the pesticide, and the physiological and biochemical changes in the plant body will be irreversible. As a result, the plant is adversely affected by the pesticide, the plant's growth and development are impaired, and its damage occurs.

The effects of pesticides on plants vary. When the effect of the pesticide on the seed (when treating the seed or applying the pesticide to the soil) is negative, its germination slows down and the growth energy is weakened [12].

The effect of a pesticide during spraying or pollination can be a pest or a phytocidal (burns the plant and kills its organs and tissues). In general, exposure to a pesticide slows down a plant's metabolism and slows its growth and development, and the pesticide can also weaken the plant's physiology. In this case, the appearance of the plant does not change, but its resistance to the external environment decreases (for example, the impact of fruit trees on low temperatures during the winter is reduced).

When sprayed with pesticides, pollinated, applied to the soil, or treated with seeds, they can have an accelerating effect on the plant. This speeds up seed germination, plant growth and development, and increases the surface area of the leaf blade. Such effects of pesticides are similar to those of growth accelerators, but they also have less positive effects on growth and development than accelerators. Increasing pesticide consumption slows down plant growth [12].

The first object that toxins can affect is the cell. The cell is covered with a clear thin membrane that can protect it from the uncomfortable external environment. The membrane surrounding the cell is a semiconductor (membrane) that allows some substances to pass through and others to trap. This membrane is composed of lipids, proteins, and other substances that separate cells from each other [13].

The solution of substances entering the cells is carried out by the process of diffusion through the cell membrane. Saturated and unsaturated chlorinated compounds of hydrocarbons, esters of thio- and dithiocarbamates and phosphoric acid, simple esters are polar compounds in the form of concentrated emulsions, so they are well soluble in membrane lipids and diffuse well into the cell [14].

Inorganic pesticides such as copper, iron, mercury, zinc, calcium enter cells without ionization and dissociation. The ability of substances with very high polarity to diffuse depends on their molecular size. As the molecular volume increases, the rate of diffusion decreases. This can be explained by the fact that the cell membrane is not composed of lipid substances, but between them there are gaps of a certain size, through which polar substances of appropriate size can pass [15].

The diffusion of soluble substances in lipids is not affected by their molecular size. In such cases, an increase in the molecular volume of the substance does not reduce their diffusion rate. In this case, the substances pass into the cell protoplasm through the dissolution of lipids [16].

The entry of pesticides into cells is sometimes explained by enzymatic theory. In this process, special proteins in the cell membrane transfer pesticides to the protoplasm with the help of cell energy. Adsorbed molecular cytoplasm is transported by special transport systems (membrane carriers). Examples of such membrane carriers are ATFs. The adsorbed substance is first transferred from one part of the membrane to another with the help of a membrane carrier and then directed to the cytoplasm. According to modern data, sugars and amino acids enter the cell in this way [4, 8].

When toxins enter cells, they undergo various physical and chemical changes. They react with the protein fragments of the cells. As a result, the normal physicochemical state in the protoplasm is disrupted, which leads to a violation of the physiological functions of the cell. Under certain conditions, this disorder can even lead to cell death.

The group of pesticides called pyrethroids is one of the most important modern pesticides, which belong to this group due to the similarity of their composition and mechanism of action. The development of artificial extraction of pesticides belonging to this group and the creation of various pesticides depend on the discovery of the law that light-resistant pyrethroids can be invented. It is also necessary to create artificial pyrethroids because of their high insecticidal properties [13].

All artificial pyrethroids are purely lipophilic and insoluble in water. Consequently, they are more susceptible to insects and have less systemic or absorptive effects. Artificial pyrethroids are substances similar to natural pyrethroids (esters) in the chamomile basket. Natural pyrethroids have long been used in agriculture under the name "pyrethrum". Pyrethrum was characterized by low stability in the external environment and rapid decomposition under the influence of light [9].

All pyrethroids can be stored at the level of sun-resistant, inanimate objects for up to 12 months. They are less mobile in the soil, have good absorption and storage (up to 1 month), decompose in 2-4 weeks under the influence of soil microorganisms, initially breaking off the bonds or hydrolyzing the ether bond [18,19].

Karate lambdatsigalotrin is a pyrethroid that contains the active substance, which belongs to the second generation of pyrethroids. Karate is a superficial and gastrointestinal pyrethroid with a very wide range of action for insects, although the drug does not belong to a special group of acaricides, but is effective against canals. When using it, especially when dealing with pests (mites, aphids, aphids) living on the back of the leaf, it is necessary to completely cover all parts of the plant with working fluid, for OVX sprayers use 300 liters of working fluid per hectare [13].

The drug is highly toxic to warm-blooded animals (for rats its LD50 is equivalent to 118mg / kg). However, the relative toxicity of the active substance is not very significant, as the rate of application of the active substance per hectare is very low (10-25 g). Therefore, when the beehives are treated with the drug, it is enough to cover it for only 1 day [20].

The effects of pesticides - Karate zeon and Karache - on the activity of antioxidant enzymes in the plant cell - catalase and peroxidases - were studied when the experiments were performed on the seeds of wheat plants.

Preparation of supernatant: 1 gram is extracted from the raw tissue or liver of the extracted plant and homogenized in 50% ethanol. The extract is centrifuged at 7000g for 10 minutes. The resulting filtrate is presented.

Inorganic and organic substances were used to determine the activity of the peroxidase enzyme, which is observed in the formation of colored products under the oxidation of hydrogen peroxide.

In this study, 0-dianizidine and potassium ferrocyanide were selected as the substrates of the peroxidase enzyme, and the maximum absorption values of the oxidation products of the peroxidase characteristic were calculated to be 460 and 420 nm, respectively.

The activity of the enzyme catalase is determined by adding 2 ml of 0.03% hydrogen peroxide to 0.1 ml of plant homogenate. 0.1 ml of distilled water is added to the control solution. The enzyme activity is measured on a spectrophotometer according to the intensity of the color generated at a wavelength of 410 nm relative to the control sample, 2 ml of water was added to the control sample instead of hydrogen peroxide.

The determination of peroxidation of lipids is based on the reaction between malone dialdehyde and thiobarbituric acids, i.e., a colored trimethyl complex is formed at high temperatures and acidic pH. The complex is measured at 532 nm.

The seeds of cereals are in a state of forced dormancy in a low temperature and dry environment. However, when the seeds germinate, metabolic processes are activated, the respiration of the seeds is maximized, and as a result, the plant germinates, grows and develops. It is known that in activated wheat seeds there is an activation of oxygen uptake, which in turn is associated with an increase in the process of peroxidation (LPO) of lipids in seed tissues and cells, and this process is intensified. oxidative damage to tissues and cells [20].

Active forms of oxygen (CAF) O_2, N_2O, NO, NOSl and others play a key role in increasing the process of oxidative stress in plants [21].

Accumulation of active forms of oxygen in cells leads to disruption of transcription and replication processes in the cell and changes in the lipid composition of cell membranes [21].

Active forms of oxygen (CAF) modify proteins in tissues and cells, disrupt the structure of DNA, and break down hormones and other physiologically active substances [21].

Therefore, one of the main tasks of general biology today is to study the effect of CAF on the growth, development and development of plants in modern times.

Peroxidation of lipids from living organisms and the presence of physiologically normal amounts of free radicals are involved in the regulation of lipid content, membrane permeability, and a number of biosynthetic processes in cells [9].

The antioxidants in the seeds control the amount of CAF in the seeds. The components of the antioxidant system in living organisms are low and high molecular weight antioxidants.

The group of low-molecular antioxidants in the body includes steroids, ubiquinones, some amino acids, polyamines, urea, tocopherols. The group of high-molecular antioxidants includes superoxidismutase (SOD), peroxidase (PO), catalase (CAT), as well as proteins (albumin, transferin, ferrigin, etc.) from enzymes. The enzymes SOD, KAT and PO form a single enzymatic group.

In general, the enzyme peroxidase has the ability to catalyze oxidase, peroxidase and oxygenase oxidation reactions. It has been reported in the scientific literature that the swelling and germination of seeds is always accompanied by an activation of the oxidase process [20].

In this study, we studied the effect of pesticides Karate and Karache on the activity of peroxidase and catalase enzymes involved in the process of peroxidation of lipids in the germination and growth of wheat germ seeds.

In the first experiment, the effect of pesticides on the activity of the enzyme peroxidase (PO) in the cells of wheat germ produced was studied. (Table 1)

Table 1

Effects of pesticides on the activity of peroxidase (PO) enzyme in wheat germ cells

№	Ferment / Pestidsid	Peroxidase (mk.mol / min.gr.)		
		3 days	5 days	10 days
1	Control	8,46±0,089	25,1±0,288	32,3±0,371
2	Karache super	11,2±0,024	32,6±0,07	10,3±0,055
3	Karate zeon	22,8±0,168	34,9±0,119	45,1±0,148

The results showed that in 3-5 days of the germination period of the studied wheat plant during the germination period, an increase in the activity of the enzyme peroxidase under the action of karache pesticide was observed, on the 3rd day at 11.2 µ.mol / min.gr. ; On day 5, enzyme activity decreased to 32.6 µmol / min.gr., and on day 10, enzyme activity decreased to 10.3 µ.m / mol. It was found that enzyme activity increased by 1.2 and 1.7 times in 3-5 days compared to this control, and decreased by 3 times in 10 days.

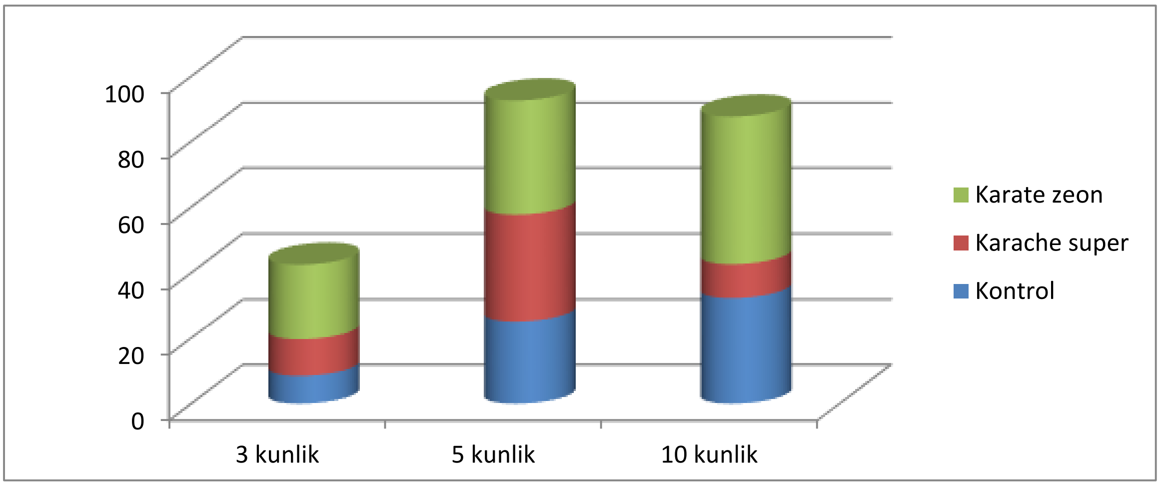

Figure 1. Effects of pesticides on peroxidase enzyme activity in harvested wheat grass

Under the influence of the karate pesticide, an increase in enzyme activity was observed during the study period at the object under study. Peroxidase enzyme activity under the influence of karate zeon pesticide on day 3 was 22.8 μ.mol / min.gr, on day 5 was 34.9 μ.mol / min.gr, on day 10 was 45.1 μ.mol / min.gr. that is, the enzyme activity increased 2.5, 2.9, and 1.2 times, respectively.

Increased peroxidase enzyme activity under the influence of pesticides indicates an increase in the amount of hydrogen peroxide as well as antioxidants during seed germination and growth phase through increased enzyme synthesis [20].

In a subsequent experiment, the effect of pesticides on the activity of the enzyme catalase (CAT) in wheat germ cells was studied. (Table 2)

Table 2

Effect of pesticides on the activity of the enzyme catalase (CAT) in wheat germ cells

№	Ferment / Pestidsid	Katalaza (mk.at/l)		
		3 days	5 days	10 days
1	Kontrol	0,271±0,005	0,177±0,005	0,194±0,005
2	Karache super	0,11±0,06	0,12±0,005	0,24±0,049
3	Karate zeon	0,12±0,074	0,07±0,095	0,13±0,08

In wheat, it is possible to observe an increase in caralase enzyme activity in 3-10 days due to the action of karache pesticide. This indicator is 0.11 mc.at/l on the 3rd day, 0.12 mcat / l on the 5th day, and 0.24 mcat / l on the 10th day, or activity on days 3-5. , Decreased by 1 and 1.6 times, and increased by 1.4 times by day 10. In conclusion, it can be said that the amount and activity of the enzyme catalase is low in the first days of germination and growth of wheat seeds, and from the 7th to the 10th day of growth this indicator increases. This result confirms the information provided in many scientific publications.

Observations of a decrease in catalase enzyme activity under the influence of karate pesticides were observed on days 3, 0.12 mcg / l on day 3, 0.07 mcg / l on day 5, and 0.13 mcg / day on day 10. which indicates a 2, 2.5, and 1.5-fold decrease in activity.

The data obtained in the study of the dynamics of the effect of pesticides on enzyme activity in wheat plants confirm the scientific data obtained by Rogojina and Rogojins [22]. The high effect of pesticides on wheat peroxidase enzyme activity in wheat was 32.6 μ.m / mol.gr on the 5th day of germination in Karache super, and 45.1 μ.mol / min on the 10th day under the action of karate pesticides. .gr.

The high effect of pesticides on wheat on the activity of the enzyme catalase was detected on the 10th day of the germination period and was 0.24 mcg / l under the action of Karache pesticide and 0.13 mcg / l under the action of Karate pesticide. did.2

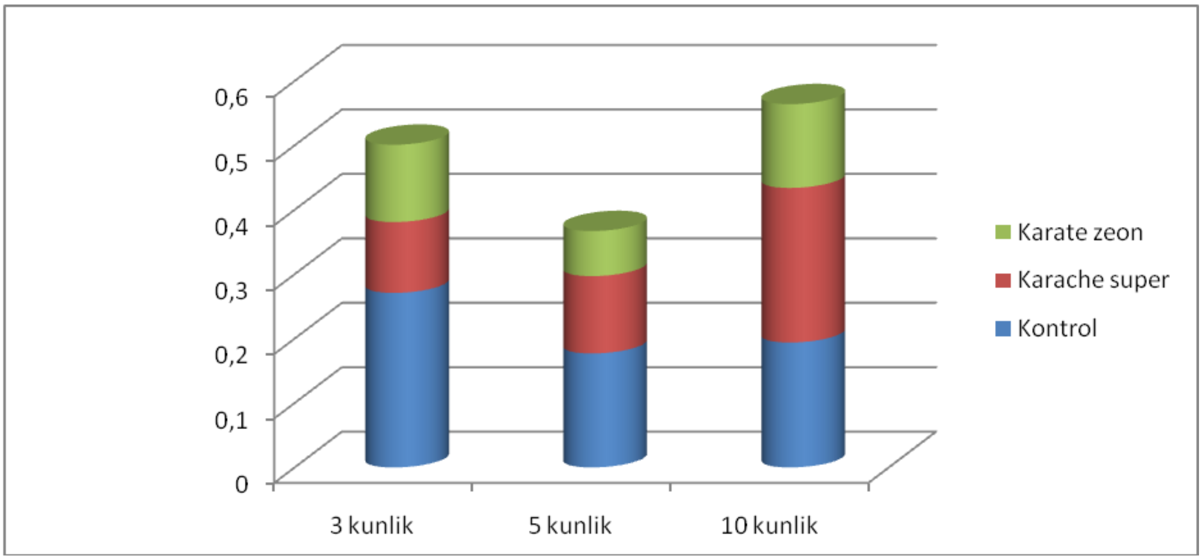

Figure 2. Effects of pesticides on the enzyme activity of catalase in harvested wheat grass

Scientific studies have shown that the structure and function of biological membranes depend on the peroxidation of lipids. From a biological point of view, it is important to study the peroxidation of lipids in cell membranes. Disruption of lipid peroxidation leads to a number of diseases [20].

Biological membrane lipids play an important role in cell metabolism. Peroxidation of lipids plays an important role in the regulation of lipid composition, permeability, synthetic processes [21].

Accumulation of lipid peroxidation products leads to tissue damage. The process of peroxidation of lipids is controlled by the cell's antioxidant defense systems [21].

Peroxidation of lipids in cereals (wheat) during germination is shown in Table 3 below.

Peroxidation of lipids during germination is one of the indicators of the activity of antioxidant systems in plants.

Table 3

Lipids during the germination of wheat germ

peroxidation oxidation

Growth days	Peroxidation of lipids (mk.mol / g).
1 kunlik	12.145 ± 0.100
3 kunlik	22.83 ± 0.006
5 kunlik	10.645 ± 0.006
7 kunlik	9.753 ± 0.003
9 kunlik	9.753 ± 0.002

Based on the changes in enzyme activity, it can be concluded that the increase in cell enzyme peroxidase activity and the decrease in catalase enzyme activity during germination after fertilization of wheat seeds with pesticides Karate and Karachel indicate a decrease in cellular lipid peroxidation.

In the study of the dynamics of peroxidation of lipids, the germination period of wheat was carried out from 1 to 9 days.

The dynamics of peroxidation of lipids is shown in the following table..

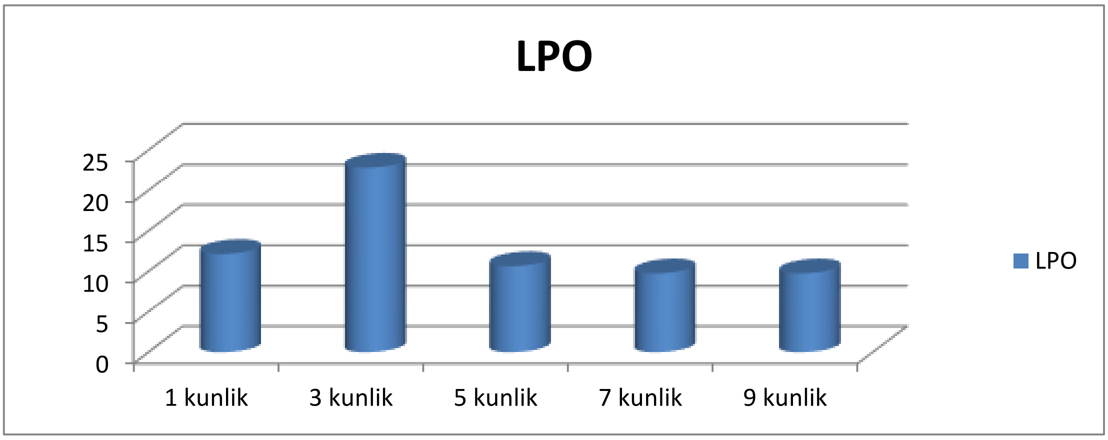

Figure 3. Dynamics of peroxidation of lipids by peroxidation (mk.mol / g) in the grasses of harvested wheat seeds.

The results showed that the peroxidation of lipids during the germination of the studied wheat plant was 12.14 μ.mol / g on the 1st day, 22.83 μ.mol / g on the 3rd day, and in the following days. indicators decreased to 9.75 μ.mol / g on day 10.

Peroxidation of lipids in wheat was high on the 3rd day of the germination period at 22.83 μmol / g, while in the remaining days it decreased to an average of 9.75 μmol / g.

The scientific findings are important in that peroxidation of lipids can lead to reversible changes in the cell. A decrease in the peroxidation of lipids leads to an increase in their activity due to the inverse interaction of the enzymes with peroxidase and catalase. Based on similar data and experimental results in the literature, it can be shown that the studied pesticides Karache super and Karate zeon also affect the process of peroxidation of lipids in wheat germ cells, increasing the activity of enzymes peroxidase and catalase reduces this process. shows.

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