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WAYS OF PLANT DEFINITION OF RADIO NUCLEAR-LOCED SOILS OF UZBEKISTAN

Abstract: *The article describes the research on plant decontamination of soil pesticides and radioactive elements in the areas of the Republic of Uzbekistan affected by pesticides and radionuclides, adapted to the climate and soil structure (for example, Surkhandarya region). According to the results of the study, the suitability of sunflower for the climate and soil composition of Surkhandarya region and the degree of neutralization of pesticides and radionuclides in the soil is 2.5 times higher than other plants.*

Key words: *radioactivity, radiation, soil salinity, radionuclide, cesium-137, strontium-90, degree of damage, radiometer, a-hexachlorocyclohexane, pavlovnia, fungus, sunflower, agrotechnical treatments.*

Language: *English*

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Introduction

In the 1980s, thousands of tons of pesticides were used in the agricultural sector to control agricultural pests and diseases in order to increase cotton production in the Republic of Uzbekistan. For this purpose, more than 500 agricultural airfields have

been established throughout the country. As a result, due to the unscientific use and storage of DDT, GXTsG and other types of pesticides in agriculture, several thousand hectares of irrigated land have been damaged and the incidence of cancer, cardiovascular and digestive system diseases among the population has increased 4-7 times. By 1990, the use of pesticides in agriculture was banned by the state. But dozens of warehouses where mineral fertilizers and toxic chemicals are stored, as well as hundreds of tons of pesticides that have not been disposed of at former agricultural airfields, have mixed with the soil and continue to damage the soil to this day. In Surkhandarya region alone, there are 52 former agricultural airfields, most of which are now used by farms and the population as agricultural land. Between 1990 and 2018, 45% of the population living in these areas were hospitalized with cancer of the digestive system, and almost half of them died before the age of 60 years. According to the Surkhandarya Regional Oncology Dispensary, the incidence of cancer in the region in 2020 increased by 15 times compared to 1990. Of the 197 patients who applied to the dispensary in 2020, 132 (75.3%) lived on or near the former agricultural airfields [1, pp. 45-49].

Purpose of the study: To conduct research on the selection of plants that absorb pesticides and radionuclides in the soils of agricultural warehouses and agricultural airfields contaminated with pesticides and radionuclides.

Literature review. Pesticides are one of the most effective methods in the fight against weeds, diseases and pests. Pesticides belong to different classes of organic and inorganic compounds. Most of them are obtained artificially. The most important pesticides include organochlorine and organophosphorus compounds, carbamic acid derivatives, plant-derived (pyrethroids), triazines. Compounds of copper, sulfur and other elements can be shown from inorganic pesticides. Organochlorine pesticides are universal. They destroy many species of pests, their potency is long-lasting, and they are dangerous to warm-blooded animals [2, 3, 4].

Radioactive substances, on the other hand, have been present in small amounts since the formation of the earth. The most common of these are members of the potassium-40, uranium-238, and thorium-232 radioactive families, whose levels of distribution and radiation on Earth are not the same for different parts of the world. It depends in many ways on the soil in which we live. Pesticides and radionuclides in the soil can have harmful effects for many years. Small amounts of these harmful substances in the permanently cultivated part of the soil (mainly 30-50 cm part) may be less affected due to reclamation works, groundwater, precipitation and vegetation. However, if their amount increases in the soil and is below 50 cm, it penetrates into the porous parts of the soil, blocking the permeable layer of the soil in the form of a thin film and preventing the passage of water to the subsoil. As a result, soil moisture accumulates in the surface layer, leading to soil salinization and concentration of pesticides and radionuclides. Soils contaminated with pesticides and radionuclides, in turn, damage drinking water and plants due to precipitation, which in turn infects living organisms, including the human body, and causes various oncological diseases. Therefore, it is important to find convenient ways to neutralize pesticides and radionuclides in the soil [5,6,7].

Of course, collecting and disinfecting or recultivating soil contaminated with pesticides and radionuclides will give good results. However, these activities require sufficient funds and the use of various special techniques. In addition, decontamination of the soil in this way can lead to the loss of the fertile layer of the soil. We, on the other hand, are proposing ways to decontaminate without changing the structure of the soil, which increases soil fertility. To do this, the work of a number of researchers was studied. A plant growing in the soil in the affected area absorbs the radioactive isotope, not the radiation. As the plant grows, radionuclides from the soil enter the tree trunk and remain radioactive as before. Either way, we will have to wait for them to disintegrate. Therefore, it is easier to remove the plant from which the isotopes have accumulated and dispose of them as radioactive waste. It cannot be simply burned or discarded. If dust and smoky isotopes enter the air and water and then the food chain of animals and humans, their harmful effects on the body increase [8,9].

Pavlovniya tree has been studied for its neutralization of pesticides and radionuclides in the soil and has been known for several thousand years, grown in China for two thousand years and in the United States for 200 years. This is a tree

1/3 lighter than other tree species, grows flat, does not dry out, resistant to various diseases.

Picture 1

Improves soil fertility composition and structure due to deep root system. There are six species of this tree, the Pavlovnia Clone in Vintro 112 species planted artificially in the lands damaged by the Chernobyl NPP accident. In addition to disease resistance, this tree is able to grow in extreme conditions. It can grow at -25-270C in winter and at + 450C in summer. Due to its rapid growth, it absorbs radionuclides and pesticides along with nutrients from the soil. Observations in Parshev, Ilyintsy, Kopachi and Chernobyl regions of Ukraine for 5 years have proven to neutralize up to 25% of radionuclides in soil and up to 19% of pesticides. But it takes a lot of work to grow this tree. Because pavlovnia seedlings require special care until they reach a height of 1 m [10,11].

Russian researchers have recommended planting mushrooms in radioactively contaminated soil. During the study, maslyata-type mushrooms were planted in the affected area near the Zheleznogorsk ore plant. According to scientists from the Institute of Biophysics of the Russian Academy of Sciences, fungi can neutralize 5% of radionuclides. However, it has been proven to reduce oil residues in the soil by up to 60% [12].

Picture 2

A number of scientists also recommend planting a pine tree in large areas affected. These trees do not choose the soil, grow in any soil, and clean the air along with the soil. However, the main disadvantage of these trees is the risk of fire [13].

Picture 3

In the UK, in 2009, the British Nuclear Fuels Ltd's (BNFL) project carried out practical work on decontamination of contaminated soil by the sunflower plant and a number of positive results were obtained [14].

Picture 4

Part of the experiment. After studying the research of the above scientists, we started planting sunflower varieties in the southern regions of the country (Surkhandarya region) in April 2019 around the "Cemetery of Toxic Chemicals" in Gulbahor massif of Termez district, contaminated with radionuclides and pesticides. . We took soil samples during each vegetative period of the plant (budding, branching, flowering, and fruit formation and ripening) and determined the amount of pesticide and radionuclide (mainly cesium-137 and strontium-90) in the Delta-Plus mass spectrum. The detection results are presented in Table 1.

Table 1. Analysis of soil contaminated with pesticides and radionuclides planted in sunflower (2019)

№	Soil samples taken during the growing season of sunflower	Amount of pesticide in soil (α-GXTsG), mg	Amount of cesium-137 radionuclide in soil, mg / kg	Amount of strontium-90 radionuclide in soil, mg / kg
	Soil sample before planting sunflower	0,012	0,25	0,21
1	The budding period	0,011	0,23	0,19
2	Branch	0,011	0,20	0,18
3	Flowering period	0,009	0,16	0,15
4	Fruiting period	0,008	0,12	0,12
5	The ripening period of the fruit	0,008	0,12	0,12

As can be seen from Table 1, the harmful substances in the soil have been decreasing since the time the sunflower sprouted. While this condition has been slow in pesticides, radionuclide depletion has been found to be significant. In addition, the absorption of harmful substances from the soil after the flowering period of sunflower is declining. This means that the sunflower plant gives good results in neutralizing pesticides and radionuclides in the soil. Our studies in 2020 and 2021 showed that planting sunflower in contaminated soil for 3 years reduced soil pesticides by 1.4 times and radionuclides (cesium-137 and strontium-90) by 2.5 times.

Conclusion.

Low-cost, water- and labor-intensive sunflower plant, which can be used in the southern regions of the Republic of Uzbekistan, helps to increase soil fertility in areas contaminated with pesticides and radionuclides without changing the soil structure and composition. Harvested in August) can reduce pesticides in the soil by 1.4 times and radionuclides by 2.5 times in 3 years.

Recommended.

It is recommended to grow sunflower for 3 years on lands contaminated with pesticides and radionuclides that are not used in agriculture in Surkhandarya region.

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