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FUNGAL DISEASES OF SUNFLOWER AND MEASURES AGAINST THEM

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Sodikov Bakhrom Sattarovich [1], Rakhmonov Ubaydullo Normamadovich [2], Khamiraev Urol Kakhramonovich [3], Akbarov Mirzhamol Mirodilovich [4]: Fungal Diseases Of Sunflower And Measures Against Them-- Palarch's Journal Of Archaeology Of Egypt/Egyptology 17(6). ISSN 1567-214x

Keywords: sunflower, Helianthus annuus L., fungal disease, vegetation period, pathogen, damage, fusarium wilt, gray rot, alternariosis, fungicide, experimental variant, biological efficacy.

ABSTRACT:

No special research on sunflower mycobiota has been conducted in Uzbekistan. According to regional mycological and phytopathological sources, there is very little information on sunflower diseases in Uzbekistan, so it is important to identify diseases caused by fungi in sunflower, study the cultural, morphological and biological characteristics of pathogenic species, develop measures to combat them.

This article presents the results of our research on the main fungal diseases of sunflower in 2016-2019 in the fields of farms in Tashkent region in Uzbekistan, which provides information on the symptoms of the main fungal diseases of sunflower, the spread and development of the disease and the biological effectiveness of chemicals. given.

The results of the study:

common and multifaceted fungal diseases of sunflower were identified and measures were developed to control them, including Shavit F 72% s.e.g. against gray rot. fungicides were applied in two different doses of 2.0 kg / ha and 2.5 kg / ha. Shavit F 72% s.e.g. The highest result was obtained in the variant treated with fungicide at the rate of 2.5 kg / ha, with a biological effect of 89.5% on the leaves, 89.5% on the stem and 89.2% on the baskets, and this method was also recommended for practice;

follicle BT against alternariosis 22.5% em.k. The drug recorded the highest result. After 15 days of treatment with this drug at the norm of 0.15 l / ha, the biological efficiency was achieved in the leaves 78.9%, in the stem 81.4% and in the basket 83.7%;

Introduction. The growing population of the world is causing the demand for vegetable oil to grow day by day. Vegetable oil or animal oil is used in all sectors of the economy: in the manufacture of food, canning, varnish, alif, soap, linoleum, perfumery, printing paints, in medicine and for lubricating equipment. Sunflower is grown in more than 100 countries for 135 million. It is grown on an area of more than a hectare and is one of the main oil-bearing crops. This crop plays a key role in meeting the world's demand for food products, including protein, carbohydrates and vegetable oils [17].

In many countries of the world where sunflower is grown, pests pose a significant threat to the crop of sunflower. 8-10 types of fungal diseases, including fake flour-dew, fomopsis, septoriosis, rust, white and gray rot, dry rot of baskets, root rot, verticillium wilt and fusarium wilt cause the greatest damage to sunflower crop and crop quality. One of the most pressing issues today is the protection of sunflower from these diseases and the development of effective and modern control measures against them [7].

REVIEW OF LITERARY SOURCES. Sunflower (Helianthus annuus L.) is an annual plant belonging to the family of flowering plants, one of the main oilseeds. According to Academician VLKomarov, the first information about the sunflower was given in 1852 by the Spanish botanist Nicolaus Monardes. Swedish naturalist Carl Linnaeus named the sunflower after the genus Heliantus, annus annual. Thus, the scientific name of the sunflower is Helianthus annuus, an annual sunflower [12].

No special research has been conducted on the prevalence and harm of oilseed sunflower diseases grown in Uzbekistan. A system to protect sunflowers from fungal diseases has not been developed, which means that the chosen research topic is relevant.

In the cultivation of sunflower always harmful organisms-pests, diseases and weeds have a strong impact on productivity.

According to V.F.Peresypkin, sunflower diseases can be divided into two groups according to their effect on the plant.

Diseases in the first group can weaken and destroy the plant. These include rot and drying of baskets. Most of these diseases are characterized by short-term development, as a result of which the affected plants die quickly.

The second group consists of leaf diseases that do not lead to emergency plant death, but with significant damage significantly reduce yields [14].

According to V.M. Lukomets, V.T. Piven, N.M. Tishkov, diseases cause great damage to sunflowers. Especially when affected by white rot, gray rot, gray rot, fomopsis, pink rot and other fungal diseases, sunflower crop is lost 2-3 times more, and the quality of seeds and the quality of the oil obtained from it deteriorates sharply [6; 7].

The world science of phytopathology has a lot of material on sunflower diseases. In particular, according to V.M. Lukomets, more than 40 diseases were detected in sunflower, 35 of which are caused by fungi. The main ones are: False un-dew (Plasmopara halstedi Berl. Et de Toni), rust (Puccinia

helianthi Schw.), Phomosis (Phoma oleraceae var. Helianthi Sacc.), Fomopsis (Phomopsis helianthi, Diaporthe helianthi.). , septoriosis (Septoria helianthi Ell. et Kell.), alternariosis (Alternaria alternata (Fr.) Keissl. A.cheiranti, A. helianthi), embilliziya (E.helianthi Pidopl.), helmintosporioz (Helminthosporium helianthi. Hansf. Verticillium dahliae Kleb.), White rot (Sclerotinia clerotiorum de Bary), gray rot (Botrytis cinerea Pers.), Dry rot of baskets (Rhizopus nodosus Namysl .; Rh. Nigricans Ehi.), Pink rot of baskets, fixol (Fusarium). rot (Rhizoctonia sp. Fusarium sp., Sclerotinia sp.) □7□.

M.K. According to Khokhryakov et al. (2003) [24], 14 pathogenic microorganisms were identified in sunflower. In this case, the contribution of micromycetes is further increased by staining (Ascochyta helianthi Abramov., Septoria helianthi Ell. Et Kell., Alternaria alternata (Fr.) Keisl., Plasmopara helianthi Novot.), As well as un-dew (Erysiphe cichoracearum Dicho.).), rust (Puccinia helianthi Schw), rot (Botrytis cinerea Pers., Rhizopus nodosus Namysl, Fusarium sp, Sclerotinia sclerotiorum Fuck.) and verticillosis (Verticillium dahlia Kleb.) [22].

NM Pidoplichko (1978) identified 8 pathogens from fungal diseases that infect sunflowers: root rot, dry rot, dry rot of baskets, fake flour-dew, rust, wilting and staining [16].

According to V.M. Lukomets and co-authors, data were provided on 16 diseases and 33 pathogenic pathogens found in sunflower. It also provides detailed information on the diseased organs of the plant and the origin and damage of the disease [7].

RESEARCH MATERIALS AND METHODS OF SCIENTIFIC WORK. The research materials are “Shonli Diyor Fayz”, “Khurram Rustam Agro”, “Ofarin Moytepa”, Yukori Chirchik district, “Oq tepa aq oltin”, “Surantkent Orzu Invest” and “Samandar Agro Ideal” farms in Zangiota district. Sick specimens of sunflower harvested during 2016-2018 served. Collection of materials was carried out by the route method during the growing season of sunflower growing areas. Herbarium preparation was carried out according to generally accepted methods.

Isolation of pure cultures of fungal species. To identify fungal species, their pure cultures were first isolated. To do this, artificial nutrient media were prepared: suslo agar, potato agar, carrot agar, plum agar and other media. The prepared media were sterilized by placing in test tubes, and the fungal colonies growing on them were transferred to test tubes in front of an alcohol lamp flame and placed in storage.

The following identifiers were used to identify fungal species isolated from all pure cultures: N.S.Novotelnova, M.A.Litvinov, A.A.Milko, T.G. Mirchink, V.A.Melnik, N.M.Pidoplichko, M.K.Khokhryakov, etc., we used MBEllis and volumes I-VIII of the book “Flora gribov Uzbekistana” □1; 2; 5; 8; 9; 10 ; 13; 15; 23; 24□.

Taking into account the spread of disease. In the examined fields, if the diseases were evenly distributed, the samples were taken in a diagonal direction or along the neck, and if one was not flat, the samples were taken in a checkerboard pattern over several parallel rows. We determined their distribution on the basis of the following formula:

$$P = \frac{n \cdot 100}{N}, \quad \text{here}$$

P - the spread of the disease,% ;
n - number of diseased plants in the sample, pcs;
N - total number of plants in the sample, pcs;

Taking into account the intensity (degree) of the disease. The degree of disease is a qualitative indicator of the intensity of damage to the plant or the manifestation of the disease. This is determined by the area of the affected surface of the plant organs or the intensity of the disease symptom. Different scales are used to determine the degree of damage. Because it is not possible to use a single rating scale for all diseases.
All diseases were recorded by the following methods: 50 plants (500 in total) were taken from 10 locations, along both edges, and from the center in areas up to 50 ha. Subsequently, 2 samples (100 plants) were added from each 10 hectare area. In this case, the number of each plant killed and damaged by the disease is taken into account separately.
Forms in baskets of fake flour, white and gray rot were calculated as a percentage according to the method of M.D. Vronskih (1984) [3].
0 points - spots occupied 10% of the basket surface;
1 point - spots occupied 11-25 percent of the basket surface;
2 points - spots occupied 26-50 percent of the basket surface;
3 points - spots occupy 51-75% of the basket surface;
4 points - spots occupy 76-100 percent of the basket surface;

The development of alternative scarring was determined on the following scale:
0 points - healthy plant;
1 point - up to 10% of the leaf surface is damaged;
2 points - 11-25% of the leaf surface is damaged;
3 points - 26-50% of the leaf surface is damaged;
4 points - more than 50% of the leaf surface is damaged.

The degree of disease development is calculated using the following formula:

$$\mathbf{R} = \frac{\mathbf{\Sigma(ab)}}{\mathbf{NK}} * \mathbf{100}, \text{ here}$$

R – stage of disease development (points,%);
Σ (ab) – total number (percentage) of affected plants);
N – the total number of plants taken into account;
К – the highest score on the identification scale.

Determining the damage caused by disease. Due to the studied diseases, the lost yield of the sunflower plant was found based on the following formula [3; 17; 18].

$$B = \frac{(A - a) \cdot 100}{A}, \text{ here}$$

B – lost crop,%
A - yield of healthy plants, ts / ha
a - yield of diseased plants, ts / ha.

Determination of biological effectiveness of fungicides against diseases. The determination of the biological efficacy of fungicides used against sunflower diseases was determined using the following formula [17;18;19;20;21;22].

$$C = \frac{(Ab - Ba)}{Ab} * 100 \text{, here}$$

C – biological efficiency, %;
A – average damage of plant parts (leaves, twigs, baskets) in the experimental variant, the score when not processed;
a – the average damage of the relevant plant parts in the experimental variant, the points after processing (within 15, 30 or 45 days of the term);
B – average damage of plant parts (leaves, twigs, baskets) unprocessed points in the control option;
b – the average damage of the relevant plant parts points after processing in the experimental variant (within a period of 15, 30 or 45 days).
The cost-effectiveness of fungicides used against sunflower diseases was achieved using the methods of Chenkin et al. [25].

RESEARCH RESULTS. MEASURES AGAINST SUNFLOWER DISEASES

Biological efficacy of seed pesticides against fusarium wilt . Root rot is one of the most common and harmful diseases of sunflower. To protect the seedlings from root rot, before sowing sunflower seeds should be treated with seed pesticides with protective functions. Finding seed pesticides against fusarium wilt and other root rot diseases is a huge economic benefit.
In our experiments, we tested several seed pesticides that have shown good results against root rot disease of many agricultural crops.
To do this, the seeds were treated with seed pesticides a month before planting.
In our experiments, the following seed pesticides were used against fusarium wilt: Baraka 60% p.s. (1.0 and 2.0 kg / t), Protection, 10% liquid., (3.0 and 4.0 l / t), Maxim XL 035 FS, 3.5% sus. (2.0 and 4.0 l / t) and Blyumovit s.e.g. (8.0 kg / t). Vitavax 200 75% n.kuk, which gives good results in the fight against root rot disease of many crops for andaza. (4.0 and 5.0 kg / t) were selected.
Seeds were sown on March 28, 2016, and on March 25, 2017.
After 6–8 days the seeds germinate. The mass was counted every 3 days after the onset of the lesion.
As shown in Table 1, the incidence of fusarium wilt in sunflower in the untreated variant was 31.1%.
In our experiments, Maxim XL 035 FS, 3.5% sus.k. The seed pharmacist recorded the highest result. Fusarium wilt reported 80.0% biological efficacy in the treated variant at 4.0 l / t and 74.7% in the treated variant at 2.0 l / t.

Vitavaks 200 75% n.kuk. In the variant treated with the norm of 4 l / t, the incidence of fusarium wilt in sunflower was 13.1%, and the biological efficiency was 77.3%. Our template option is Vitavaks 200 75% n.kuk. When treated with the drug at a rate of 3 l / t, the biological efficiency was slightly lower, ie did not exceed 74.3%.

When using the protective drug at the norms of 3.0 and 4.0 l / t, the damage was 10.3 and 10.0%, and the biological efficiency was 65.7 and 66.7%.

The lowest biological efficacy of 64.0% among seed pharmacologists was observed in Baraka.

1-Table.

Biological efficacy of seed pesticides against fusarium wilt. (Field experience, Tashkent region, Yukori Chirchik district "White hill white gold" f / x, 2017)

№	Experiment options	Application rate, l / t, kg / t	Number of seedlings produced, pcs	Sick of them, pcs	Degree of damage,%	Disease development,%	Biological efficiency,%
1	Control	-	386	120	31,1	30,0	-
2	Vitavaks 200 75% n.kuk. (Template)	3,0	436	60	13,8	7,7	74,3
	Vitavaks 200 75% n.kuk.	4,0	444	58	13,1	6,8	77,3
3	Baraka 60% ps.	1,0	412	62	15	10,2	66,0
		2,0	423	60	14,2	10,8	64,0
4	Protection 10% liquid.	3,0	415	67	16,1	10,3	65,7
		4,0	422	65	15,4	10	66,7
5	Maxim XL 035 FS, 3.5% sus.k.	2,0	448	55	12,3	7,6	74,7
	Maxim XL 035 FS, 3.5% sus.k.	4,0	449	53	11,8	6,0	80,0
6	Blyumovit s.e.g.	8,0	408	62	15,2	10,1	66,3
	EKF $_{05}$						3,4

The incidence of fusarium wilt with Blumovit was 10.1% and the biological effectiveness was 66.3%.

Fight against gray rot of sunflower. Gray rot affects all surface parts of the sunflower during the growing season. In young plants, the disease occurs at the base of the stem and leaves. The affected areas turn brown and

are covered with gray dust, followed by the formation of tiny black sclerotia in these areas. Such plants die quickly.

A characteristic sign of the disease is the appearance of yellow spots on the back of the baskets, then the tissue is covered with reddish-gray mold. Then the whole basket is covered with mold. After 7–10 days, the basket rots. When the disease develops strongly, the seed coat becomes porous and marbled. Sclerocytes form on the surface of the seeds and inside them.

We conducted our experiments on combating gray rot of sunflower in the fields of the farm "Agro Stimul Tex Service" in Piskent district of Tashkent region. Against disease Shavit F 72% s.e.g. we used fungicides in two different doses of 2.0 kg / ha and 2.5 kg / ha. By default, Topsin-M is 70% n.kuk. (1.0 kg / ha) were used [19].

In the experiment, using a motor sprayer, we prepared 1000 liters of working solution per hectare and sprayed the first time after flowering and the second time after 20 days.

Testing of drugs, accounting of digital data was carried out in accordance with the "Methodological guidelines" of the State Chemical Commission of the Republic of Uzbekistan (2004).

We conducted our experiments when the sunflower was 10–12% damaged by gray rot. The results of the experiment showed that in the variant treated with Shavit F 72% s.e.g fungicide at the rate of 2.0 kg / ha, the development of the disease was 5.2% in the leaves, 7.0% in the stem and 5.9% in the baskets. and biological efficiency was 83.0% in leaves, 82.1% in stems, and 83.2% in baskets.

2-Table

Biological efficacy of fungicides against gray rot in sunflower. Agro Stimul Tex Servis farm, Piskent district, Tashkent region. (Field Experience 2018).

№	Experiment options	Application rate, kg / ha	Affected organs	Disease prevalence,%	Disease progression, %	Biological efficiency, %
1	Shavit F 72% s.e.g.	2,5	In leaf	14,2	3,2	89,5
			footstalk	11,0	4,1	89,5
			In the basket	12,1	3,8	89,2
2	Shavit F 72% s.e.g.	2,0	In leaf	15,7	5,2	83,0
			footstalk	10,3	7,0	82,1
			In the basket	11,5	5,9	83,2
3	Topsin-M 70% n.kuk. (Template)	1,0	In leaf	8,1	8,3	72,8
			footstalk	7,6	8,5	78,3
			In the basket	9,2	8,8	75,0
4	Control	-	In leaf	42,3	30,5	-
			footstalk	46,5	39,2	-
			In the basket	56,6	35,2	-
EKF 05						3,7

Shavit F achieved the highest efficiency in the variant treated at the norm of 2.5 kg / ha with 72% s.e.g fungicide. In particular, the development of the disease was 3.2% in the leaves, 4.1% in the stems and 3.8% in the baskets, the biological efficiency was 89.5% in the leaves, 89.5% in the stems and 89.2% in the baskets. did.

Topsin-M used as template 70% n.kuk. In the variant treated with fungicide at the rate of 1.0 kg / ha, the biological efficiency was 72.8% in the leaves, 78.3% in the stem and 45.0% in the baskets. The development of the disease increased to 8.3% in leaves, 8.5% in stems and 8.8% in baskets. An increase in disease incidence was found in the untreated variant Table 2.

Fighting albternariosis spot disease during the growing season of sunflower. Pre-sowing treatment of seeds and short-term harvesting, thorough cleaning and drying of sunflower are the most important measures in the fight against alternariosis [6, 20].

In our experiments, the effect of some fungicides approved for use in the Republic of Uzbekistan against alternariosis against this disease of sunflower was studied.

We conducted our vegetative experiments to determine the effect of fungicides against this disease in 2018 in the fields of the farm "Surankent Orzu Invest" in Yukori Chirchik district of Tashkent region in the variety of sunflower "Yulduz".

Each experimental variant was conducted in five reps and on a 10 m2 plot of land. Since none of the fungicides approved for testing in the Republic of Uzbekistan is recommended for use against alternariosis of sunflower, the recommended standards for alternariosis of other agricultural crops were tested in experiments.

In our experiments, alternariosis was mostly observed in baskets of sunflower, and less common in leaves and stems.

Folicure BT against alternariosis of sunflower is 22.5% em.k. fungicide 0.15 l / ha, Bayleton 25% n.kuk. fungicide 0.3 kg / ha, and Topaz 10% em.k. fungicide at a rate of 0.15 l / ha. By default, the Alto Super is 33% em.k. fungicide at a rate of 0.3 l / ha.

We started our experiments by studying how sunflower is affected by alternariosis. The results of the experiment showed that Folicur BT was 22.5% em.k. After 15 days of treatment with 0.15 l / ha of fungicide, the incidence was 7.2% in the leaves, 7.1% in the stems and 8.6% in the baskets, and 7.1% in the leaves after 30 days. was 6.8% in the stem and 7.2% in the baskets, and we observed a decrease in the effect of the fungicide after 45 days. It was found that the incidence of the disease reaches 12.8% in the leaves, 13.6% in the stems and 14.6% in the baskets, respectively.

3-Table

Biological efficacy of fungicides against alternariosis. Surankent Orzu Invest farm in Yukori Chirchik district, Tashkent region. (Field Experience 2018).

Use of fungicides against alternariosis			Alto Super 33% em.k. 0.3 l / ha	Bayleton 25% n.kuk. 0.3 kg / ha	Folicure BT 22.5% em.k. 0.15 l / ha	Topaz 10% em.k. 0.15 l / ha	Control (unprocessed)
Development of the disease,%	After 15 days	In leaf	7,4	7,6	**7,2**	8,2	34,2
		footstalk	7,6	7,9	**7,1**	8,6	38,1
		In the basket	9,0	9,2	**8,6**	9,5	41,2
	After 30 days	In leaf	7,3	8,5	**7,1**	8,0	36,2
		footstalk	7,1	7,8	**6,8**	8,2	42,8
		In the basket	8,4	8,4	**7,2**	8,4	44,3
	After 45 days	In leaf	14,6	14,0	**12,8**	14,3	38,4
		footstalk	15,4	14,8	**13,6**	16,5	44,2
		In the basket	16,8	15,6	**14,6**	18,1	47,1
Biological efficiency,%	After 15 days	In leaf	78,4	77,8	**78,9**	76,0	-
		footstalk	80,1	79,3	**81,4**	77,4	-
		In the basket	78,2	77,7	**79,1**	76,9	-
	30-кундан сўнг	In leaf	79,8	76,5	**80,4**	77,9	-
		footstalk	83,4	81,8	**84,1**	80,8	-
		In the basket	81,0	81,0	**83,7**	81,0	-
	45-кундан сўнг	In leaf	62,0	63,5	**66,7**	62,8	-
		footstalk	65,2	66,5	**69,2**	62,7	-
		In the basket	64,3	66,9	**69,0**	61,6	-
EKF_{05}			2,1	2,7	3,5	1,9	

Bayleton 25% n.kuk. in the variant treated at the norm of 0.3 kg / ha with fungicide, the incidence of alternariosis of sunflower was slightly higher. In particular, after 15 days of treatment, the incidence of the disease was 7.6% in the leaves, 7.9% in the stems and 9.2% in the baskets, and after 30 days it was 8.4% in the leaves, 7.8% in the stems and baskets. 8.5% and after 45 days it was 14.0% in the leaves, 14.8% in the stems and 15.6% in the baskets.

The Alto Super used as a template is 33% em.k. In the variant treated with fungicide at the rate of 0.3 l / ha, after 15 days the development of the disease was 7.4% in the leaves, 7.6% in the stems and 9.0% in the baskets, and after 30 days in the leaves 7.3%. , 7.1% in the stem and 8.4% in the baskets, and after 45 days it was 14.6% in the leaves, 15.4% in the stem, and 16.8% in the baskets.

In the uncontrolled variant, we observed an increase in disease infestation, and the most affected member of the sunflower with this disease was the baskets. Damage to the baskets was found to be 47.1% damaged after 45 days.

After 15 days of treatment with sunflower fungicides against alternariosis, Folicur BT was found to be 22.5% em.k. 78.9% in leaves, 81.4% in stems and 83.7% in baskets, 80.4% in leaves after 30 days, 84.1% in stems and 83.7% in baskets and 66.7% in leaves after 45 days. the biological efficiency in stems and baskets was 69.2% and 69.0%, respectively. Alto Super 33% em.k. After 15-30 days, the drug is 78.4-79.8% in the leaves, 80.1-80.3% in the stems, 78.2-81.0% in the baskets and 62.0% in the leaves after 45 days, respectively. , 2% and 64.3% in baskets reported biological efficacy.

Bayleton 25% n.kuk. After 15 and 30 days, the drug showed 77.8% and 76.5% of the biological effect on the leaves, 79.3-81.8% on the stem and 63.5% on the leaves after 45 days, 66.5% on the stem and 66.9% on the baskets, respectively. formed. The lowest result is Topaz 10% em.k. showed the drug. After 15 days, the biological efficiency was 76.0% in leaves, 77.4% in stems and 76.9% in baskets, and 77.9% in leaves, 80.8% in stems and 81.0% in baskets after 30 days. These data suggest that Folicur BT is 22.5% em.k. The drug showed a higher result than other drugs.

ХУЛОСАЛАР. Кунгабоқарнинг фузариоз ва бошқа илдиз чириш касалликларига қарши қўлланилган фунгицидлар орасида Максим XL 035 FS, 3,5% сус.к. ва Витавакс 200 75% н.кук. энг юқори биологик ва иқтисодий самарадорликка эга эканлиги аниқланди. Фузариоз илдиз чириш касаллигига қарши курашда Максим XL 035 FS, 3,5% сус.к. уруғ дорилагични қўллаганимизда ҳосилдорлик 28 ц/га, иқтисодий самарадорлик гектарига 9 355 500 минг сўм/га ни, рентабеллик эса 866,7% ни ташкил этди.

In the fight against gray rot, Shavit F 72% s.e.g. High biological efficiency can be achieved when treated with fungicides at a rate of 2.5 kg / ha, and allows to obtain high yields from sunflower.

Folicur BT against alternariosis is 22.5% em.k. The drug noted the highest biological efficacy. From this drug can be obtained high yields of sunflower, used in the fight against alternariosis.

Based on the results of research on fungal diseases of sunflower and measures to combat them:

Shavit F against gray rot disease 72% s.e.g. fungicide application technology in Shonli Diyor Fayz, Khurram Rustam Agro, Ofarin Moytepa, Samandar Agro Ideal in Zangiota district, Oq tepa aq oltin in Yukori Chirchik district and Surantkent Orzu Invest in Tashkent region. a total of 8 hectares of sunflower fields were introduced. As a result, high biological efficiency was achieved and an additional yield of 5.2-4.1 quintals per hectare was obtained;

Seeds against fusarium wilt are treated with Maxim XL 035 FS, 3.5% sus.k. treatment with a seed sprayer at a rate of 4.0 l / t was introduced. As a result, when using this fertilizer, 80.0% biological efficiency was achieved, which is 11.8 ts / ha more than the control.

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