



## Biological Effectiveness of Chemicals Used Against Fungi Yellow Rust and Flour Dew Disease of Wheat

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**Abstract:** *The article describes the effects of fungicides and suspensions on the plant, changes in disease development, and biological effectiveness of the used fungicides and suspensions against yellow rust and powdery mildew. 0,25 l/ha (etalon)+IFO PZN 3,0 l/ha on average from 90,3% to 87,9%, compared to etolon Rauma 490 k.e.1,25 l/ha+ IFO PZN 3, 0 l/ha and AZOTE 320 SC 32% K.S 0,3 l/ha+IFO PZN 3,0 l/ha were found to have a high positive effect on average from 98,6% to 99,1%.*

**Keywords:** *Research, wheat, yellow rust, powdery mildew, chemical control, fungicide, suspension, experiment, control, etolon, research, methodology, chlorophyll, object, fungus, productivity, biological efficiency.*

**Enter.** "India 30 mln. ha, Russia 27 mln. ha, Spain 26 mln. ha, China 24 mln. ha, USA 15 mln. is planting in the fields. Of this, China, India, and Russia account for 46% of the total harvest. However, in recent years, due to the global climate change, the development and spread of fungal diseases of wheat in the grain fields is affecting large areas. As a result, wheat cultivation is becoming one of the most pressing issues from year to year. Nowadays, yellow rust and powdery mildew diseases of wheat have been proven to seriously affect grain yield in all grain-growing countries. 20-25% of yield is lost due to yellow rust and brown rust diseases of wheat, and 15-20% due to powdery mildew disease.

It is desirable to use effective methods against fungal diseases found in grain fields of our republic. One of the best measures is to first plant disease-resistant varieties and prevent the spread of diseases. Chemical control of diseases in grain crops begins when 5-20% are affected, depending on the level of disease. In areas prone to rust diseases, preventive chemical control before the spread of rust diseases prevents the spread of epiphytota of rust diseases and preserves grain yield. DRUNK 300 EC 0.3 l/ha fungicide, used in the chemical control of yellow rust disease in irrigated grain fields of Andijan region, compared to the control variant and other variants, it was found that the biological efficiency increased by 85,4%, and the yield increased by 8,4 t/ha [4]. Abakus Ultra fungicide at a rate of 1-1,5 l/ha inhibited 93,7-96,3% of rust-causing spores from developing and biological efficiency was 87-89% during chemical control of rust diseases in winter wheat in fields. [5].

One of the most effective ways to protect plants from fungal diseases is the creation of resistant varieties, high biological efficiency, ecologically effective method [6]. With the use of propiconazole + tebuconazole active substance preparations for fungal diseases, with OVX and a bar sprayer, the consumption of the drug is 0,2-0,3 liters per 1 hectare, adding 0,4-0,6 liters to 600 liters of water, and applying it to 2 hectares is a good result gives [7]. To protect grain crops from rust disease, it is considered an effective method to use mineral fertilizers (potassium-ammophos) with a solution "Suspension", and spraying "Alto Super" fungicide at the rate of 0,3 l/ha together with a suspension dissolved in 200-300 liters of water is an effective method. [8]. The damage level of each leaf of plants was calculated according to Peterson's scale for brown rust and Manners' scale



for yellow rust out of 10. When taking into account the diseases of the plant stem, the crop was preserved until full in the options where chemical control was carried out [9]. Altazol KE, Adeksar KE, Zantara KE drugs were used in the chemical treatment against yellow rust in the winter wheat fields. Among them, the highest efficiency from the biological and economic point of view is Adexar KE fungicide, when it is used at the consumption rate of 1,4 l/ha, its biological efficiency is 99,2% compared to Altazol KE and Zantara KE preparations, and the productivity is increased by 3,4 s/ha [10]. Yellow rust disease of wheat causes 70-100% damage to the plant during the entire growing season, resulting in 40-60% yield loss and reduced germination energy due to the destruction of seeds due to the disease [11]. The annual loss of wheat rust disease is 5-17%, and in epiphytotic years, this indicator leads to 45-70% damage per year [12]. The initial symptoms of powdery mildew are white powder on the leaves of lawns, then cottony spots are formed, and the disease develops and spreads very quickly when the relative humidity of the air is 90-99% and the air temperature is 15-20 0C [13]. As a result of repeated use of one fungicide for yellow and powdery mildew diseases in wheat, fungi begin to develop immunity against them [14]. The only reliable way to protect wheat from rust diseases is treatment with fungicides. Fungicides stop the development of rust for 25-30 days, but if the disease spreads strongly or spot diseases occur along with rust in the field, after the first treatment, taking into account the weather temperature. After 15-20 days, the second and after the same time, the third processing is necessary [15].

**Research methods.** Conducting field experiments, phenological observation, harvest and counting, and laboratory analyzes in "Generally accepted methods", distribution of wheat yellow and powdery mildew diseases Chumakov, 1974; Murat Koishibaev 2002; B. Hasanov carried out research in 2013 and determined yellow rust damage in field conditions (Manners, 1950) and powdery mildew damage (Hasanov, 2013 (%)) scale [1; 2; 3].

**Research results.** The biological effectiveness of fungicides is mainly determined by two indicators: the spread of diseases and its intensive development (level of damage). According to the results of a three-year scientific study conducted in 2020-2022, the development of yellow rust (*Puccinia striiformis*) and powdery mildew (*Erysiphe graminis.f.sp.tritici*) diseases in the "Kesh-2016" variety of autumn soft wheat selected as an object and their control in fighting Duazol 40% (k.e.c.) 0,25 l/ha (Etalon), Bi-Kanazol 400 g/l 0,3 l/ha, AZOTE 320 SC, 32% K.S 0,3 l/ha, Rauma 490 c.e. Treatment with 1,25 l/ha, Alta Super 40% 0,3 l/ha, Altus Duo 32,5% 0,3 l/ha fungicides and IFO PZN 3,0 l/ha suspension, and their most effective Experiments were conducted to recommend the selective production of the fungicide (Table 1).

According to the results of taking into account the level of yellow rust (*Puccinia striiformis*) damage during the study before chemical treatment, when the number of plants per 1 m<sup>2</sup> was determined, the average number of infected plants was 399 units in the control (untreated) variant, and 239 units after 7 days. It was noted in the studies that the rate was 59,9%, after 14 days, the number of infected plants was 287 units, in three years, the average rate of disease was 71,9%, after 21 days, the number of infected plants was 296 units, and the rate of disease was 74,2%. done. Duazol, 40% (k.e.c.) 0,25 l/ha (Etalon) before chemical treatment, when the number of plants in 1 m<sup>2</sup> was determined was 392 units.



Table 1. Biological efficiency in fungicide applied options

Rakhmatov Akbar Khurramovich from Shahrissabz district of Kashkadarya region. 2022-2022 in the farm.

Options №	Type of disease	Drugs used	The number of plants, pieces per 1 m <sup>2</sup>									
			Until processing	The number of diseased plants			Incidence rate %			Biological efficiency %		
			7	14	21	7	14	21	7	14	21	
1	Yellow rust, (Puccinia striiformis)	Control (Not Processed)	399	239	287	296	59,9	71,9	74,2	-	-	-
2		Duazol, 40% k.e.c 0,25 l/ha (etalon)	392	34	24	22	8,7	6,1	5,6	85,5	91,5	92,4
3		Bi-Kanazol 400 g/10,3 l/ha	399	29	24	22	7,3	6	5,5	87,9	91,6	92,6
4		AZOTE 320 SC, 32% K.S. 0,3 l/ha	395	22	14	13	5,6	3,5	3,3	90,7	95,1	95,6
5		Rauma 490 k.e. 1,25 l/ha	393	23	16	12	5,9	4,1	3,1	90,2	94,3	95,9
6		Alta Super 40% 0,3 l/ha	394	33	21	20	8,4	5,3	5,1	86	92,6	93,2
7		Altus Duo 32.5% 0,3 l/ha	397	31	21	20	7,8	5,3	5	87	92,6	93,2
8		Control (Not Processed)	401	172	213	218	42,9	53,1	54,4	-	-	-
9		Duazol, 40% k.e.c 0,25 l/ha (etalon)	404	56	24	22	13,9	5,9	5,4	67,7	88,8	90
10		Bi-Kanazol 400 g/10,3 l/ha	403	31	24	22	7,7	6	5,5	82,1	88,8	90
11		AZOTE 320 SC, 32% K.S. 0,3 l/ha	403	21	15	11	5,2	3,7	2,7	87,9	93	95
12		Rauma 490 k.e. 1,25 l/ha	406	21	13	12	5,2	3,2	3	87,9	94	94,6
13		Alta Super 40% 0,3 l/ha	402	32	20	19	8	5	4,7	81,4	90,6	91,3
14		Altus Duo 32.5% 0,3 l/ha	403	29	20	18	7,2	5	4,5	83,2	90,7	91,8

After 7 days after chemical treatment, the average number of diseased plants per 1 m<sup>2</sup> was 34, the disease rate was 8,7%, and the biological efficiency was 85,5%. In the case of using Duazol, 40% 0,25 l/ha (Etalon), the average number of infected plants per 1 m<sup>2</sup> after 14 days was 24, the incidence rate was 6,1%, and the biological efficiency was 91,5%. was recorded. In the same variant, when the number of infected plants was determined after 21 days, it was found that there were 22 plants, the incidence rate was 5,6%, and the biological efficiency was 92,4%. In the case where AZOTE 320 SC 32% K.S. 0,3 l/ha fungicide was used after 7 days, the average number of infected plants per 1 m<sup>2</sup> was 395, the number of infected plants was 22, the incidence rate was 5,6%, biological efficiency It was 90,7%. After 14 days, the number of infected plants was 14, the incidence rate was 3,5%, and the biological efficiency was 95,1%. It was found in the research that it is.

Pauma 490 k.e. In the variant where 1,25 l/ha fungicide was used, the number of plants before treatment was 393, and after 7 days, these indicators were 23, the incidence rate was 5.9%, and the biological efficiency was 90,2%, after 14 days when the number of infected plants was determined, 16 plants were found, the incidence rate was 4,1%, and the biological efficiency was 94,3%. The number of infected plants after 21 days was determined to be 12, the incidence rate was 3,1%, and the biological efficiency was 95,9%. According to the results of the fight against the disease of flour-dew (*Erysiphe graminis.f.sp.tritici*), the number of plants in the control (untreated) option was 401 units, the number of infected plants was 172 units per 1 m<sup>2</sup> after 7 days, and 213 units after 14 days. units, after 21 days it was 218 units. The morbidity rate was 42,9% after 7 days, 53,1% after 14 days, and 54,4% after 21 days. Duazol, 40% (k.e.k) 0,25 l/ha (Etalon) when the number of plants before chemical treatment was determined was 404, after 7 days the average number of infected plants was 56, after 14 days 24, after 21 days 22 was a grain, the morbidity rate after 7 days was 13,9%, after 14 days was 5,9%, after 21 days was 5,4%, biological efficiency was 61,7%, respectively; 88,8%; It was noted that it was 90%. AZOTE 320 SC 32% K.S. 0,3 l/ha was used in the variant, when the number of plants before processing was determined, it was 403 plants, after 7 days, when the number of infected plants was determined, it was 21 plants per 1 m<sup>2</sup> on average, and after 14 days, the disease level was 15 plants , 11 pieces after 21 days, the morbidity rate was 5,2% after 7 days, 3,7% after 14 days, 2,7% after 21 days, biological efficiency was 87,9% after 7 days, 14 93% after 21 days and 95% after 21 days.



**Table 2. Biological efficiency in variants using fungicide+IFO PZN 3.0 l/ha suspension. 2020-2022 at the farm of Rakhmatov Akbar Khurramovich in Shahrizabz district of Kashkadarya region.**

Options №	Type of disease	Drugs used	The number of plants, pieces per 1 m <sup>2</sup>									
			Until processing	The number of diseased plants			incidence rate %			Biological efficiency %		
				7	14	21	7	14	21	7	14	21
1	<i>Yellow rust, (Puccinia striiformis)</i>	Control (Not Processed)	400	197	211	218	49,3	52,8	54,5	-	-	-
2		Duazol, 40% k.e.c 0,25 l/ha (etalon)	398	33	22	21	8,3	5,5	5,3	83,2	89,5	90,3
3		Bi-Kanazol 400 g/1 0,3 l/ha	398	28	24	19	7	6	4,8	85,7	88,6	91,2
4		AZOTE 320 SC, 32% K.S. 0,3 l/ha	400	17	6	2	4,3	1,5	0,5	91,4	97,2	99,1
5		Rauma 490 k.e. 1,25 l/ha	399	13	7	3	3,3	1,8	0,8	93,4	96,7	98,6
6		Alta Super 40% 0,3 l/ha	399	32	19	17	8	4,8	4,3	83,7	91	92,2
7		Altus Duo 32.5% 0,3 l/ha	399	30	20	18	7,5	5	4,5	84,7	90,5	91,7
8	<i>Flour-dew (Erysiphe graminis f.sp tritici)</i>	Control (Not Processed)	396	169	186	202	42,7	47	51	-	-	-
9		Duazol, 40% k.e.c 0,25 l/ha (etalon)	395	30	20	17	7,6	5,1	4,3	82,2	89,2	91,6
10		Bi-Kanazol 400 g/1 0,3 l/ha	394	25	19	15	6,3	4,8	3,8	85,1	89,7	92,5
11		AZOTE 320 SC, 32% K.S. 0,3 l/ha	398	12	5	2	3	1,3	0,5	92,9	97,3	99
12		Rauma 490 k.e. 1,25 l/ha	397	11	5	2	2,8	1,3	0,5	93,5	97,3	99
13		Alta Super 40% 0,3 l/ha	396	15	16	14	3,8	4	3,5	91,1	91,4	93,1
14		Altus Duo 32.5% 0,3 l/ha	389	14	15	13	3,6	3,9	3,3	91,6	91,8	93,4

Against the disease Pauma 490 k.e. Before treatment of 1,25 l/ha fungicide, the number of plants was 406, 21 after 7 days, 13 after 14 days, and 12 after 21 days. The incidence rate was on average 5,2% per 1 m<sup>2</sup> after 7 days, 3,2% after 14 days, 3% after 21 days, 87,9% after 7 days, and 94 after 14 days. It was noted that it was 94,6% after 21 days (Table 2).

According to the results of the fight against yellow rust (*Puccinia striiformis*) in the variants where Fungicide+IFO PZN 3,0 l/ha suspension was used in the research, the number of plants in the control (untreated) variant was 400 on average, and after 7 days, 1 When the number of infected plants per m<sup>2</sup> was determined, it was 197 units, after 14 days - 211 units, after 21 days - 218 units, after 7 days - 49,3%, after 14 days - 52,8%, after 21 days - 54, It was noted that it was 5%.

Duazol 40% k.e.k 0,25 l/ha (Etalon) Fungicide+IFO PZN 3,0 l/ha in the variant used, the average number of plants before treatment was 398, and after 7 days the number of infected plants was 1 m<sup>2</sup> was 33 pieces, after 14 days 22 pieces, after 21 days 21 pieces, the morbidity rate was 8,3% after 7 days, 5,5% after 14 days, and 5,3% after 21 days, biological efficiency was noted to be 83,2% after 7 days, 89,5% after 14 days, and 90,3% after 21 days.

Compared to the etalon and standard, the best indicators were observed in the variant that used AZOTE 320 SC, 32% K.S 0,3 l/ha+IFO PZN 3,0 l/ha, when the number of plants before processing was determined, the average number of plants was 400, after 7 days infected plants the number is on average 17 pieces per 1 m<sup>2</sup>, 6 pieces after 14 days, 2 pieces after 21 days, the incidence rate after 7 days is 4,3%, after 14 days - 1,5%, after 21 days - 0,5% , the biological efficiency is 91,4%, respectively; 97,2%; It was observed that it was 99,1%.

The best results compared to the control and benchmark Rauma 490 k.e. 1,25 l/ha+Suspension was observed in the variant used, when the number of plants before treatment was determined, the average number of infected plants was 399, after 7 days the number of infected plants was 13 on average per 1 m<sup>2</sup>, after 14 days 7, after 21 days 3, and 7 the incidence rate after 1 day was 3,3%, after 14 days 1,8%, after 21 days 0,8%, biological efficiency was 93,4%, respectively; 96,7%; It was observed that it was 98,6%.

In chemical control of powdery mildew (*Erysiphe graminis f.sp tritici*), when using Fungicide+IFO PZN suspension, which controls plant growth and development, the number of plants in the control (untreated) option was 396 units per 1 m<sup>2</sup>, and the number of infected plants was 7; 14; 169 respectively in 21 days; 186; 202 units, morbidity level 7; 14; 42.7% respectively in 21 days; 47%; It was noted that it was 51%.



In the version where Duazol 40% k.e.k 0,25 l/ha (Etalon (Fungicide+ IFO PZN 3.0 l/ha suspension)) was used, the number of plants before treatment was 395, 7; 14; After 21 days, the number of infected plants is 30 per 1m<sup>2</sup>, respectively; 20; 17; organized the unit. Incidence level 7; 14; 7,6% respectively after 21 days; 5,1; Biological efficiency is 82,2%, making 4,3%; 89,2%; It was observed that 91,6%.

The best results were observed in the version of AZOTE 320 SC, 32% K.S 0,3 l/ha+IFO PZN 3,0 l/ha suspension, in which the number of plants before treatment was 398, and after 7 days the number of infected plants per 1 m<sup>2</sup> was average 12 pieces, 5 pieces after 14 days, 2 pieces after 21 days, 3% after 7 days, 1,3% after 14 days, 0,5% after 21 days, 7; 14; In 21 days, respectively, the average biological efficiency is 92,9%; 97,3%; It was found to be 99%.

Pauma 490 k.e. In the option where 1,25 l/ha + IFO PZN 3,0 l/ha was applied, the number of plants per 1 m<sup>2</sup> was on average 397, and after 7-14-21 days, the number of infected plants was 11, respectively; 5; 2 pieces, morbidity level 7; 14; 2,8% respectively on the 21st; 1,3%; 0,5%, if noted, biological efficiency 7; 14; 92,9% in 21 days; 97,3%; It was 99%.

In summary, from the used drug AZOTE 320 SC 32% K.S 0,3 l/ha+IFO PZN 3,0 l/ha suspension, and Pauma 490 k.e.1,25 l/ha+IFO PZN 3,0 l It was found in studies that suspension, preparations are superior to other options. When used together with a suspension, it increases the amount of green chlorophyll in plant leaves and is easily absorbed into plant tissues, resulting in an improvement in the biochemical composition of cell sap. As a result, resistance to various diseases and unfavorable weather conditions of the external environment increases. Therefore, the use of these chemical preparations against yellow rust and powdery mildew diseases in grain fields ensures a high and high-quality harvest.

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