Cotton: Effectiveness of Weed Control Measures in Cereal Rotation Fields

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Abstract. The article presents data on weed seed penetration through water and the amount of weed seeds found in the soil of the area where previous crops were cultivated in the cotton:grain rotation system in the conditions of the soils prone to salinity of the Syrdarya region. On the basis of the conducted research, when increasing the effectiveness of chemical control measures against annual and perennial weeds in the fields, the number of annual and perennial weeds is 85.8- Up to 79.4%, and 85.3-95.2% reduction was found when Zellek super herbicide was applied at the rate of 1.0 l/ha in the period of cotton combing. The durations and rates of herbicides used against weeds in the cotton field had a positive effect on yield: 2.3 t/ha when herbicide was applied with seeding, 5.4 t/ha when herbicide was applied with seeding and combing, and weed control at the end of the effective period. it was stated that 1.4 tons/ha of additional yield was obtained as a result of the visit.
Key words: Cotton, winter wheat, weeds, herbicide, salinity prone soils, soil salinity, seed, fertility, growth, development, yield.

1 Introduction

1.1 Relevance of the study

Globally, 19-25% of agricultural crop yields are reduced as a result of weed infestation. There are more than 3,000 weed species in the world, of which 1,800 species cause significant economic damage, and more than 200 species compete strongly with major agricultural crops [1-2]. As a result of improving agrotechnical and chemical control measures in the fight against weeds, high and quality harvest is achieved due to the reduction of their number [3-4].

Today, as a result of an innovative approach to combined agrotechnical and chemical control measures against annual and perennial weeds in the world, it is possible to increase the coefficient of absorption of nutrients, reduce the labor force [5], reduce the costs of agricultural production [6], improve the quality of cotton fiber and increase the seed

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fertility, along with the cultivation of high and quality crops from cultivated crops. scientific research is of particular importance [7].

At the same time, one of the most urgent issues is the cultivation of high-quality and high-yield agricultural crops by determining the optimal period and norms of new herbicides in the fight against annual and perennial weeds in cotton:grain rotation [8-9].

1.2 The level of study of the problem

S. Kott, A. Beshanov, A. Fisyunov, E. Denisov, A. Tsarev on systematics, families and types of weeds found in irrigated fields, D. Wall, R. Lee, A. Tulikov, G. on their damage to agriculture. Gruzdev, A. Likov, A. Safonova, T. Anjum, R. Bajwa, R. Blackshaw, I. Liberstein, A. Zakharenko, A. Borin, I. Lobach, T. Makhankova, V. Kojaev, Yu. Spiridonov, T. Akulova, B. Aleev, E. Alkhasyants, M. Lozavatskaya, A. Yuldashev, S. Bakhromov, F. Khasanova, I. Karabaev on agrotechnical and chemical control measures against weeds in the irrigated lands of our republic. Researches were conducted by A. Khaidarov, Sh. Rizaev, M. Shodmonov, S. Sullieva, U. Chorshanbiev.

A.Q.Ermatov (1983) stated that annually in the world 20 billion are lost due to weeds in agriculture. damage is seen around the dollar. In Uzbekistan, 20-40% of grain, 15-20% of cotton, 10-20% of vegetable crops are harvested every year due to weeds [10].

K. Mamatov, U. Mamajonovlar (1997) noted that there are 72 families and 841 species of weeds in Uzbekistan, of which 519 species are annual and 322 are perennial weeds [11].

K. Bukharov (2019) stated that 14 families and 18 species of weeds are found in wheat fields, which negatively affect the growth and development of the plant [12].

According to M.Ashig, N.Muhammad and N.Ahmadlar (2006), it is not possible to achieve a good result in the effective fight against weeds by using only herbicides [13]. Because there are negative aspects to the use of various herbicides against weeds (ecological degradation, human and animal health issues, etc.) [14]. Therefore, in the fight against weeds, the wide application of various methods of tillage, thermal management of weeds, and the use of geographic information systems are effective

A. Aripov (2016) stated that the period of strong growth of weeds in winter wheat fields planted between cotton rows coincides with the end of March and the beginning of April, and during this period, a strong competition between weeds and winter wheat begins. Since weeds are more adapted to natural conditions than wheat, if they are not effectively controlled in time, they will cause great damage to the yield of winter wheat [15].

S.Saidov, A.Yusupov (2017) stated that Fluroxypir 36% em.k and Strane 200, 20% em.k herbicides, whose active ingredient is fluroxypyr, cause the most damage in the irrigated lands of Samarkand region and sharply reduce the yield and grain quality. It has been reported that gandumak has shown good results against weeds and can be used in cereal crops [16].

S.A. Azimboev's (2006) research concluded that weed seeds enter the cotton fields through wind, birds and irrigation water. The seeds of reeds, snakes, sedges, and grasses are spread by the wind, by sticking to the fur of animals and people's clothes through the sticky and flexible hooks of the sedge and sedge, and by birds. Weed seeds are also spread by seed that is not properly cleaned. As a result of planting untreated wheat seeds, weeds that grow on dry land are also observed to invade irrigated land. It is known from studies that weed seeds are often spread with unrotted manure applied to fields [17].

1.3 The purpose of the study

It consists of studying the spread of annual and perennial weeds found in cotton and winter wheat, the effectiveness of agrotechnical and chemical methods against them, the impact on the growth, development, productivity and quality indicators of the main crops.

2 Research methodology

The researches were conducted in the conditions of long-irrigated, salinized soils of Gulistan district of Syrdarya region, where seepage waters are located at a depth of 1.5-2.0 m. Studies have shown the effectiveness of applying herbicides at seeding and at the end of the cotton season against annual and perennial weeds (Table 1).

Table 1. Experimental system 1

№	Variant name	Herbicide application rate, l/ha	Expiry date
1	Agrotechnical measures used in production (Control)		
2	Etalon Herbicide "Stomp- 33% e.k."	2,0	Along with planting
3	Herbicide "Gaytan k.e."	1,5	Along with planting
4	Herbicide "Gaytan k.e."	2,0	Along with planting
5	Chisel (18-20 cm) + harrow + plow (28-30 cm)		After picking cotton
6	Herbicide "Zelek Super 104 g/l em.k."	1,5	During cotton ripening
7	Herbicide "Zelek Super 104 g/l em.k."	2,0	During cotton ripening
8	Herbicide "Zelek Super 104 g/l em.k."	2,5	During cotton ripening

Phenological observations and biometric measurements carried out in the experiment were carried out according to the "Methods of conducting field experiments" (UzPITI 2007y) [18], observations on the number and types of weeds in designated areas (0.5 m^2) based on the methodological manuals "Metodicheskie ukazaniya po polevomu ispytaniyu herbitsidov v rastenievodstve" (1981) went [19].

3 Research results

According to the conducted researches, irrigation of cotton in the areas where the water table of Syrdarya region is 1.5-2.0 meters, depending on the time of year, mainly corresponds to July-August. During this period, as the seeds of weeds on the edge of the ditch are in the ripening phase, they enter the cotton fields through water during irrigation, which leads to an increase in the type and number of weeds. This is from the weeds portulaca olearcea L., sedum (Shenopodium rubrum L.), thistle (Amaranthus retroflexus L.), black saltwort (Shenopodium album L.), candle (Echinochloa crus galli L.), ituzum (Solanum nigrum L.), the introduction of the seeds of such species as bulrush (Abutilon theophrastii Medic) and yantok (Alchagi pseudoalchagi (MB.) Des.) was determined in scientific studies.

In order to monitor the spread of weed seeds to the fields through irrigation water, an asbestos pipe with a diameter of 200 cm was buried in the water inlet ditch, a small net was installed on the side of the pipe where the water enters and exits, and weed seeds were observed for 1 hour.

As a result of the observations, it was found out that among the perennial weeds, sedge (Artemisia annua L. (110.7 units)), yantok (Alchagi pseudoalchagi (MB.) Des.) (80.7 units), and among the annual weeds, thistle (Amaranthus retroflexus L. (129.3 units)), white (Shenopodium rubrum L. (133 units), black saltwort (Shenopodium album L. (42.7 units)), portulaca olearcea L. (32.7 units)) , it was found that the seeds of coarse alkanop (Abutilon theophrastii Medic (39.7 units)) penetrate.

As a result of the lack of cleaning of several types of weeds, such as the edge of the water channel entering the experimental area, the weeds, such as white sorghum, donkey sorghum, along with the irrigation water, the seeds of the above weeds entered the experimental area. In addition, weed seeds were introduced into the experimental area by wind and birds (Table 2).

Table 2. The number of seeds of weed species that enter with irrigation and are present in the soil, pcs

Names of weeds	**With irrigation water, piece**	**Available in soil, piece**
Salomalaykum	-	3,9
Burgan	110,7	16,3
Pocket	80,7	13,2
Koypechak		8,9
Asshakshora	129,3	21,8
Akshora	133,0	12,4
Obesity	32,7	9,4
Black brine	42,7	-
Candle	-	1,9
Cane	-	5,3
Wheat	-	1,3
Rough	39,7	3,7

In order to determine the number of weed seeds present under the soil, soil samples were taken and analyzed in the form of monolithic 25x25 cm width and depth from five points of the experimental area. As a result of washing the soil samples with water, on average, in 3 years, there were 3.9 pieces of perennial weeds, 16.3 pieces of burgan, 13.2 pieces of sedge, 8.9 pieces of sedge, 5.3 pieces of reed, and annual weeds (Amaranthus retroflexus L. (21.8)) wheat (Elytrigia repens (L.) Desv. (1,3)), coarse alkanop (Abutilon theophrastii Medic (3,7)) grains, and an average of 98.1 grains of one-year weeds were found in 3 years (2 -table).

At the same time as seeding, Stomp-33% e.c. herbicide rate of 2.0 l/ha is applied as a template, and for testing, new Gaytan e.c. 1.5-2.0 l/ha of the herbicide was sprayed in a ribbon method, and its effect on annual and perennial weeds was studied. After 15 and 30 days after the herbicide was sprayed, observations were made on 1.0 m^2 plots marked at three points of each option, and the effect on the number and type of weeds was calculated.

When monitoring was carried out 15 days after spraying herbicides in the experimental field, the number of perennial weeds in the control option was 26.1 units, while Stomp as a standard had 33% e.c. It was observed that perennial weeds germinated 66.1% less than the control in option 2, which was 8.8 units sprayed with herbicide. It was observed that 64.2% of one-year weeds were less than 2.2 units. Perennial weeds increased to 34.2 units in the control variant when observed 30 days after herbicide application, while Stomp 33% e.c. at 2.0 l/ha rate was 14.2 units in variant 2. It was found that 58.5% less sprouted compared to the control. The number of annual weeds was also observed to decrease by 42.3% compared to the control.

Gaitan et al. in options 3-4, where the herbicide was applied at rates of 1.5-2.0 l/ha, after 15 days, the number of annual and perennial weeds decreased by 85.6-85.8% and 71.0-79.4%, respectively, compared to the control option and after 30 days it was observed that it decreased by 73.1-69.5% and 66.2-67.5%.

In the control variant of the experimental field, perennial weeds include convolvulus arvensis L (5.33 units), reed (3.1 units), salomalakum (Cyperus rotundus L. (12 units)), burgan (Artemisia annua L. (1, 2 pieces)) and yantok (Alchagi pseudoalchagi (MB.) Des. (4.44 pieces)) were found, while in the field sprayed with "Stomp-33%" herbicide as a benchmark, Salomalaykum weed was found 0.44 pieces, "Gaytan" e. k. Salomalikum was not found in the sprinkled fields. In the control variant, among the annual weeds, weed, white head, donkey sorghum, white sorghum, and sedge were found. In the herbicide-sprayed options, in the 1st observation, there were no weeds of sedum, sedge, sedge, and sedge, by the 30th day, sedge, sedge, sedge, and sedge were found in the 2nd option, in 3rd variant, sedge, sedge, and in 3rd variant, sedge, sedge, and sedge. annual weeds were observed to sprout. As a result of the observations, it was observed that the number of annual and perennial weeds increased to 1.8-4.5 and 4.0-5.7 units in the herbicide-sprayed options compared to the 15th day (Table 3)

Table 3. Weed reduction when herbicides are used along with seeding, pcs /m2.

Options	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Perennial weeds								
	After 15 days				**After 30 days**			
Total, pcs /m2	26,1	8,84	7,56	5,37	34,22	14,21	11,6	11,11
Total, %		66,1	71,0	79,4		58,5	66,2	67,5
Annual weeds								
	After 15 days				**After 30 days**			
Total, pcs /m2	6,21	2,22	0,89	0,88	11,54	6,66	3,1	3,5
Total, %		64,2	85,6	85,8		42,3	73,1	69,5

By the end of the cotton period, Zellek super herbicide, which has a selective effect against annual and perennial weeds in the experimental field, was sprayed at 3 different rates (1.5-2.0-2.5 l/ha). The number of weeds was calculated based on the above method.

The number of perennial weeds before applying the herbicide to the experimental field averaged 19.1-16.0-18.7 weeds per 1 m^2 in all variants, and 15 days after the herbicide was sprayed, they were 1.5-2.0- 46.6-50.1-52.5% of the variants applied at the rate of 2.5 l/ha were killed, and 57.6-58.6-64.5% were affected after 30 days (Table 4).

Table 4. Effect of Zellek super herbicide applied at the end of the cotton season on the number of perennial and annual weeds, pcs /m2.

Options	5	6	7	8	5	6	7	8
	Number of perennial weeds, pcs/m²							
	Before spraying the herbicide				**After 15 days**			
Total, pcs	24,5	19,1	16,0	18,7	27,6	10,2	8,0	8,9
%						46,6	50,1	52,5
	Annual number of weeds, pcs/m²							
	Before spraying the herbicide				**After 15 days**			
Total, pcs	12,9	12,0	12,4	11,1	15,9	5,9	5,5	4,0
%						51,0	55,5	64,3

It was observed that 95.6% of the used herbicides affected reed, 41.5%, 77.8%, 59.1% salamolaykum, and 62.1% impact on gorse.

The average yield of cotton when weed herbicide was applied along with seeding was 35.5 t/ha in the control option, Stomp 33% e.c. 36.9 ts/ha in the variant with herbicide (2.0 l/ha), Gaytan e.k. herbicide (1.5 l/ha) at the rate of 37.6 t/ha, Gaytan e.k. (2.0 l/ha) yielded 37.9 t/ha, compared to the control option 1.4-2.4 t/ha higher yield was achieved (Fig. 1).

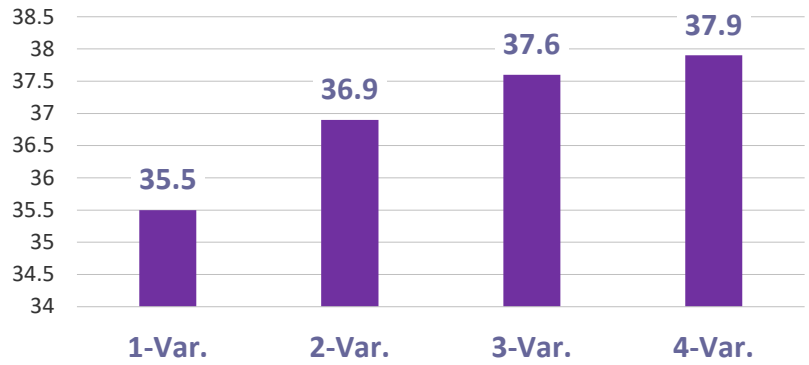

Fig. 1. Effect on cotton yield when herbicides are used along with seeding, ts/ha.

In our experiments, at the end of the cotton season, Zellek super 104 g/l e.c. when herbicide was applied at the rate of 1.5-2.5 l/ha, the yield of cotton was 37.6-38.6 tons/ha, and an additional yield of 0.3-0.6 tons/ha was obtained compared to the control variant (Fig. 2).

4 Conclusion

On average, 568.8 annual and perennial weed seeds entered the cotton fields maintained in the conditions of salinity-prone soils of Syrdarya region, and 98.1 weed seeds remained in the 25x25 cm depth and width of the soil.

Gaitan e.k. with seed planting. when the herbicide was sprayed at 2.0 l/ha, annual and perennial weeds were reduced by 85.8-79.4%, as a result, the growth and development of cotton improved, and an additional 2.4 tons/ha of cotton was obtained.

When Zellek super was sprayed at the rate of 2.5 l/ha at the end of cotton's growing season, annual and perennial weeds were reduced by 84.1-64.5%, as a result, boll opening was accelerated, first harvest weight increased, and an additional yield of 1.4 t/ha was obtained.

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