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**ВЛИЯНИЕ РЕГУЛЯТОРА РОСТА  
ПРИРОДНОГО ПРОИСХОЖДЕНИЯ НА  
ПРОДОЛЖИТЕЛЬНОСТЬ  
КРИТИЧЕСКОГО ПЕРИОДА  
ВРЕДНОСТИ СОРНЯКОВ В  
АГРОЦЕНОЗЕ РАЗЛИЧНЫХ ВИДОВ  
МЯТЫ В ЛЕСОСТЕПНОЙ ЗОНЕ  
ЧЕЧЕНСКОЙ РЕСПУБЛИКИ**

**INFLUENCE OF A NATURAL GROWTH  
REGULATOR ON THE DURATION OF THE  
CRITICAL PERIOD OF WEED HARMFULNESS  
IN THE AGROCENOSIS OF VARIOUS MINT  
TYPES IN THE FOREST-STEPPE ZONE OF  
THE CHECHEN REPUBLIC**

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Цель исследования – изучение возможности уменьшения продолжительности критического периода вредности сорной растительности путем применения регулятора роста Гумат+7 в агроценозе различных видов мяты в лесостепи Чеченской Республики. Исследование проводилось в 2022-2025 гг. в модельном полевом опыте, где моделировалась различная продолжительность приемов ухода за посевами мяты в лесостепной зоне Чеченской Республики на почвах, типичных для этой зоны. Использовались два вида мяты: полевая, сорт Памяти Кириченко и перечная, сорт Розовская Арома. По результатам проведенного исследования можно сделать следующие выводы. Использование регуляторов роста природного происхождения на основе производных гуминовых веществ позволяет сократить продолжительность критического периода вредности сорнополевого компонента в агроценозе мяты, что особенно

The aim of the study is to investigate the possibility of reducing the duration of the critical period of harmfulness of weeds by using the growth regulator Humate+7 in the agrocenosis of various types of mint in the forest-steppe of the Chechen Republic. The study was conducted from 2022 to 2025 in a simulated field experiment, which simulated different durations of mint crop management practices in the forest-steppe zone of the Chechen Republic on soils typical for this zone. Two mint species were used: field mint, the Pamyati Kirichenko variety, and peppermint, the Rozovskaya Aroma variety. Based on the results of the study, the following conclusions can be drawn. The use of natural growth regulators based on humic substance derivatives can reduce the critical period of weed damage in mint agrocenosis, which is especially relevant today, given the desire of scientists and agricultural practitioners to reduce pesticide loads and, consequently, strengthen food security. Thus, the use of this growth regulator reduced the critical period of infestation in peppermint crops (Rozovskaya Aroma

актуально на современном этапе в контексте стремления ученых и аграриев-практиков к снижению пестицидной нагрузки, и, следовательно, укреплению продовольственной безопасности. Так, использование указанного регулятора роста позволило сократить критический период вредоносности в посевах мяты перечной, сорт Розовская Арома до 18 дней, а в посевах мяты полевой, сорт Памяти Кириченко, до 20 дней. Следовательно, в лесостепной зоне Чеченской Республики возможно производство экологически чистого сырья мяты полевой

Ключевые слова: МЯТА, СЫРЬЕВАЯ БАЗА, ФЛОРИСТИЧЕСКИЙ СОСТАВ, СОРНОПОЛЕВОЙ КОМПОНЕНТ, ПОТЕРИ УРОЖАЯ, КРИТИЧЕСКИЙ ПЕРИОД ВРЕДОНОСНОСТИ

variety) to 18 days, and in field mint (Pamyati Kirichenko variety) to 20 days. Consequently, the production of environmentally friendly field mint raw materials is possible in the forest-steppe zone of the Chechen Republic

Keywords: PEPPERMINT, RAW MATERIAL BASE, FLORISTIC COMPOSITION, WEED COMPONENT, CROP LOSS, CRITICAL PERIOD OF HARMFULNESS

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## Introduction.

Currently, herbal-based medicinal products are preferred. Consequently, a demand for medicinal plant raw materials has arisen. Research is needed to explore the possibility of expanding the area of their cultivation in the Russian Federation [4, 6, 12].

The importance of mint cultivation is difficult to overstate. The raw material is essential in many industries. In addition to its well-studied uses, mint is now a component of the urban environment. Under current conditions, a severe shortage of raw materials has arisen due to the crisis in the industry. Measures to strengthen the domestic raw material base for this crop are essential. The Chechen Republic possesses all the necessary conditions and can compete with such cultivation regions as Krasnodar Krai, the Republic of North Ossetia-Alania, and the Republic of Crimea. Cultivation of mint, despite the high percentage of manual labor, is economically profitable, since the crop is characterized by high productivity, resistance to unfavorable environmental conditions and non-target objects of the agrocenosis [5, 13, 14].

The scientific novelty lies in the fact that for the first time in the Chechen Republic a model field experiment was conducted, clearly demonstrating the

<http://ej.kubagro.ru/2026/04/pdf/42.pdf>

importance of determining the critical period of harmfulness of the weed component and the feasibility of improving measures to combat weed vegetation, taking into account the biological potential of the crop.

**The aim of the study** is to investigate the possibility of reducing the duration of the critical period of harmfulness of weeds by using the growth regulator Humate+7 in the agrocenosis of various types of mint in the forest-steppe of the Chechen Republic.

#### **Research methods.**

The study was conducted from 2022 to 2025 in a model field experiment simulating different durations of agrotechnical measures for growing mint in the forest-steppe zone of the Chechen Republic on soils typical for this zone. The experiment was replicated four times, the plot area was 25 m<sup>2</sup>. Two weed component censuses were conducted: a quantitative-species census during the flowering phase and a quantitative-weight census before harvesting. The duration of care measures was simulated through manual weeding. Two mint varieties were used: field mint, the Pamyati Kirichenko variety, and peppermint, the Rozovskaya Aromatnaya variety. The vegetation period of the studied varieties is approximately 120 days. Climatic conditions during the study period were favorable for growing all components of the agrocenosis [10].

#### **Results and discussion.**

The technology of mint cultivation is generally accepted for the zone [10].

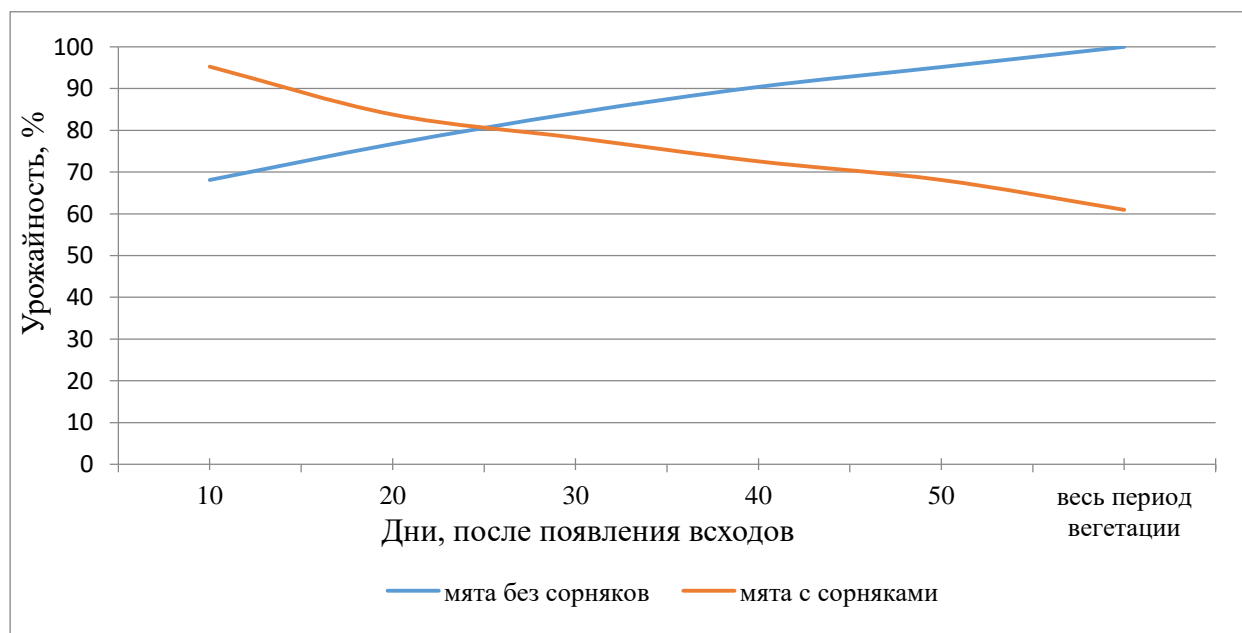
The occurrence of weeds is shown in Table 1.

Table 1. - Frequency of occurrence of weeds in the mint agrocenosis (forest-steppe zone of the Chechen Republic) (2022-2025) [2]

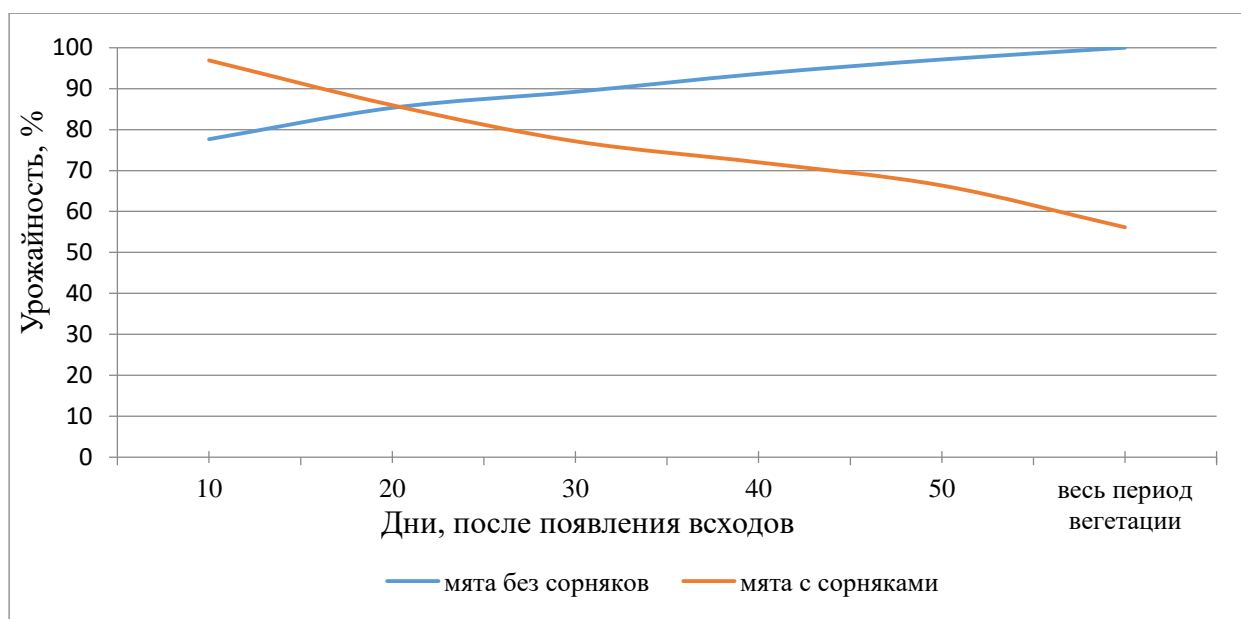
Types of weeds	Experience options							
	1	2	3	4	5	6	7	8
Early spring crops								
<i>Galeopsis tetrahit (L.)</i>	-/-	-/+	-/+	+/-	+/-	-/+	-/+	-/+
<i>Chenopodium album (L.)</i>	-/-	-/+	+/-	-/+	-/+	+/-	+/-	-/+
<i>Matricaria discoidea (L.)</i>	-/-	-/+	-/+	+/-	-/+	+/-	+/-	-/+
Late spring crops								
<i>Amaranthus spp.</i>	-/-	+/-	+/+	+/+	+/-	-/+	+/-	+/-
<i>Echinochloa crus-galli (L.)</i>	-/-	-/+	+/-	+/-	+/-	+/+	+/-	+/-
<i>Setaria viridis (L.)</i>	-/-	-/+	+/-	+/-	-/+	-/+	-/+	-/+
<i>Ambrosia spp.</i>	-/-	-/+	-/+	+/-	-/+	+/-	+/-	+/-
<i>Galinsoga parviflora (Cov.)</i>	-/-	-/+	-/+	+/+	+/-	+/-	+/-	+/-
<i>Setaria pumila (L.)</i>	-/-	-/+	+/-	+/-	-/+	+/-	-/+	+/-
<i>Abutilon theophrastii Medik.)</i>	-/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-
<i>Solanum nigrum (L.)</i>	-/-	-/+	-/+	+/-	-/+	+/+	-/+	-/+
<i>Portulaca oleracea (L.)</i>	-/-	-/+	-/+	-/-	-/+	+/-	+/-	+/-
Wintering								
<i>Stellaria media (L.)</i>	-/-	+/-	+/+	-/+	-/+	+/-	+/-	-/+
<i>Galium aparine (L.)</i>	-/-	-/+	-/+	+/+	+/-	-/+	-/+	+/-
<i>Papaver rhoeas (L.)</i>	-/-	-/+	+/-	-/+	-/+	+/+	+/-	-/+
Root suckers								
<i>Cirsium arvense (L.)</i>	-/-	-/+	-/+	+/+	+/-	+/-	+/-	+/-
<i>Sonchus arvensis (L.)</i>	-/-	-/+	-/+	+/+	+/-	+/-	+/-	-/+
<i>Convolvulus arvensis (L.)</i>	-/-	+/-	+/+	+/+	+/-	+/-	+/-	+/-
<i>Coronilla varia (L.)</i>	-/-	-/+	-/+	-/+	-/+	-/+	+/-	+/-
Rhizomes								
<i>Cynodon dactylon (L.)</i>	-/-	-/+	-/-	-/-	+/-	+/-	-/+	+/+
<i>Sorghum halepense (L.)</i>	-/-	-/+	+/-	-/+	+/+	+/-	+/-	+/+
<i>Asclepias syriaca (L.)</i>	-/-	-/+	-/+	-/+	-/+	-/-	+/-	-/+
Taproots								
<i>Melandrium dioicum (Mill.)</i>	-/-	-/+	+/+	-/+	-/+	+/+	-/+	-/+
<i>Plantago major (L.)</i>	-/-	-/+	-/+	+/+	+/+	-/+	+/-	+/+
<i>Rumex confertus Willd.</i>	-/-	-/+	-/+	-/+	-/+	-/-	-/+	-/+
Note: 1 - 0 pcs/m <sup>2</sup> ; 2 - 5 pcs/m <sup>2</sup> ; 3 - 10 pcs/m <sup>2</sup> ; 4 - 20 pcs/m <sup>2</sup> ; 5 - 40 pcs/m <sup>2</sup> ; 6 - 80 pcs/m <sup>2</sup> ; 7 - 160 pcs/m <sup>2</sup> ; 8 - 360 pcs/m <sup>2</sup> . The numerator is the Kirichenko Memory variety, the denominator is Rozovskaya Aroma.								

As can be seen from Table 1, the floristic composition of the weed component in the agrocenosis of the studied mint species is approximately the same. It should be noted that late spring weeds predominate (approximately 65%), which can be explained by the specific cultivation technology of the crop. Of the quarantine weeds, a small number of common ragweed was noted.[1, 7, 11].

The critical period of weed damage, according to the Textbook and Methodological Guide for Conducting Research in Agronomy (Adinyaev, E.D., 2012), was determined graphically using yield data expressed as a percentage. The control variant was a crop cleared of weeds throughout the growing season (Tabl.2-3, Fig. 1).



In memory of Kirichenko



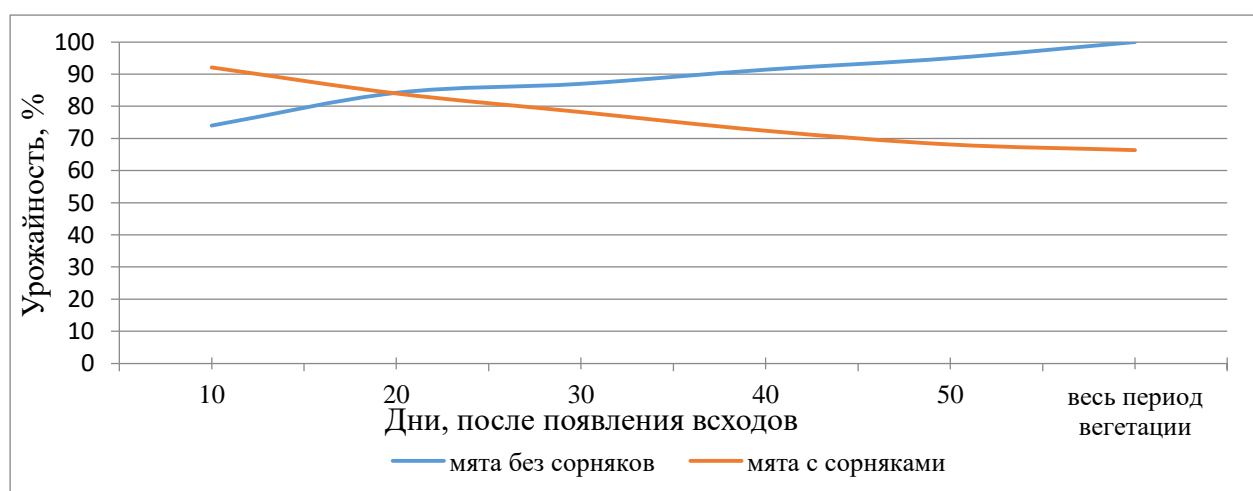
Rozovskaya Aroma

Figure 1. Determination of the critical period of harmfulness of weeds in the agroecosystem of various types of mint against the background of the use of a growth regulator (forest-steppe zone of the Chechen Republic) (2022-2025)

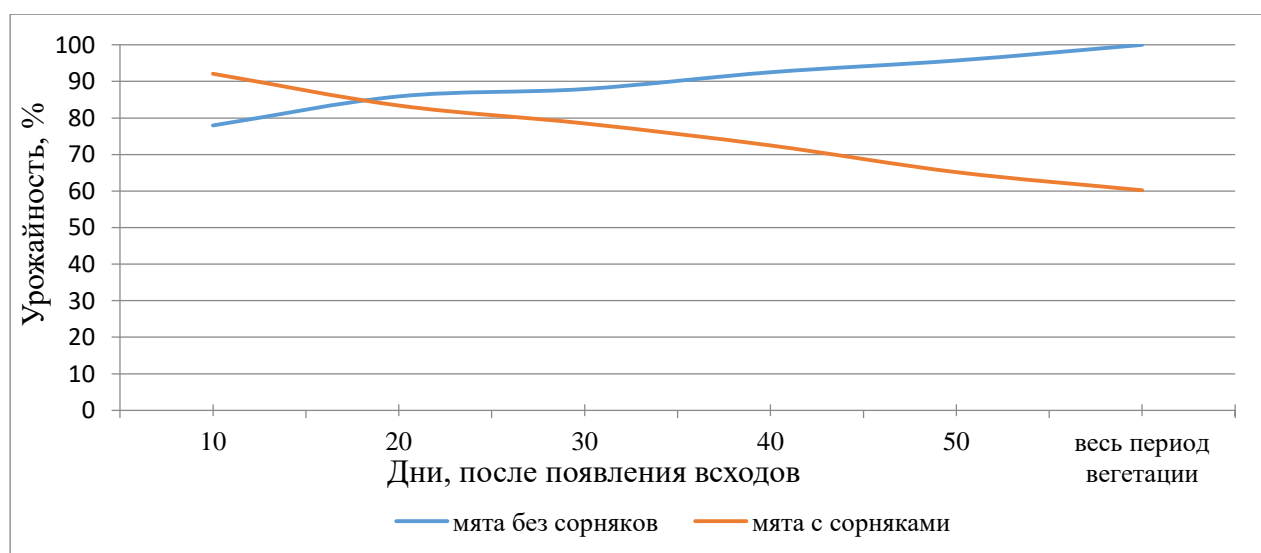
Table 2 - Critical period of weed harmfulness in the agrocenosis of various mint species in the forest-steppe zone of the Chechen Republic (2022-2025)

Beginning of care	Yield, t/ha					
	2022	2023	2024	2025	average	%
10 days from emergence	12,97/9,22	13,81/9,05	12,30/8,70	14,05/9,68	13,28/9,16	77,66/68,10
20 days from emergence	15,22/10,16	14,96/10,52	13,43/9,80	14,75/10,83	14,59/10,32	85,32/76,72
30 days from emergence	16,26/11,84	15,51/11,46	14,14/10,43	15,14/11,56	15,26/11,32	89,23/84,16
40 days from emergence	16,78/12,52	16,11/12,29	14,81/11,29	16,34/12,57	16,01/12,16	93,62/90,40
50 days from emergence	17,14/13,06	16,66/13,03	15,58/12,04	17,09/13,07	16,61/12,80	97,13/95,16
Sowing is clean throughout the growing season	17,30/13,61	17,00/13,40	16,40/12,80	17,70/13,99	17,10/13,45	100,0/100,0
10 days from emergence of seedlings is clogged	16,98/13,07	16,84/12,86	15,30/12,29	17,16/13,02	16,57/12,81	96,90/95,25
20 days from emergence of seedlings is clogged	15,12/11,29	14,77/11,26	13,45/10,75	15,46/11,78	14,70/11,27	85,96/83,78
30 days from emergence of seedlings is clogged	12,97/10,61	12,75/10,45	12,30/9,98	14,74/11,04	13,19/10,52	77,13/78,21
40 days from emergence of seedlings is clogged	12,42/9,93	12,07/9,78	11,64/9,14	13,11/10,21	12,31/9,76	72,00/72,56
50 days from emergence of seedlings is clogged	11,42/9,39	11,22/9,25	10,82/8,46	11,90/9,56	11,34/9,16	66,34/68,10
Weedy throughout the growing season	9,68/8,30	9,52/8,17	9,18/7,81	10,02/8,52	9,60/8,20	56,14/60,95

The research examined the growth and development of all components of the agrocenosis, specifically assessing the rate of photosynthesis in both the weed and crop components. It was found that the rate of photosynthesis increased with the use of the natural growth regulator Humate+7, which enhanced the competitiveness of the crops. It should be noted that field mint plants are more sensitive to this growth regulator than peppermint plants (Fig. 2) [3, 8, 9].



In memory of Kirichenko



Rozovskaya Aroma

Figure 2. Determination of the critical period of harmfulness of weeds in the agrocenosis of various types of mint (forest-steppe zone of the Chechen Republic) (2022-2025)

Table 3 - Critical period of weed harmfulness in the agrocenosis of various mint species in the forest-steppe zone of the Chechen Republic (2022-2025)

Beginning of care	Yield, t/ha					
	2022	2023	2024	2025	average	%
10 days from emergence	13,09/10,65	15,41/11,05	14,46/11,70	14,08/10,68	14,26/11,02	77,95/74,00
20 days from emergence	15,50/12,76	16,80/12,00	15,03/12,40	15,55/13,00	15,72/12,54	85,90/84,20
30 days from emergence	15,79/13,07	17,10/12,65	15,43/12,76	16,00/13,36	16,08/12,96	87,92/87,00
40 days from emergence	17,10/13,47	17,90/13,00	16,06/13,90	16,62/14,07	16,92/13,61	92,51/91,40
50 days from emergence	17,65/13,56	18,40/14,03	16,90/14,14	17,09/14,87	17,51/14,15	95,73/94,96
Sowing is clean throughout the growing season	18,68/14,61	17,95/14,40	18,91/14,80	17,66/15,79	18,30/14,90	100,0/100,0
10 days from emergence of seedlings is clogged	17,02/14,91	16,39/13,86	17,19/13,29	16,80/12,82	16,85/13,72	92,10/92,10
20 days from emergence of seedlings is clogged	15,48/14,45	14,40/12,26	15,91/11,55	15,25/11,78	15,26/12,51	83,40/84,00
30 days from emergence of seedlings is clogged	14,13/13,51	15,27/11,35	14,30/10,70	13,74/11,04	14,36/11,65	78,50/78,20
40 days from emergence of seedlings is clogged	13,88/11,39	14,00/10,98	12,92/10,14	12,24/10,61	13,26/10,78	72,48/72,40
50 days from emergence of seedlings is clogged	11,63/11,08	12,96/10,05	12,18/9,46	10,91/10,01	11,92/10,15	65,17/68,12
Weedy throughout the growing season	11,01/10,62	12,06/9,89	11,47/8,81	10,20/9,52	11,01/9,71	60,21/65,19

As can be seen from Figure 1, the critical period of harmfulness of weeds in the agrocenosis of Poles mint, variety Pamyati Kirichenko is 25 days from the moment of emergence, peppermint, variety Rozovskaya Aroma - 20 days.

The use of a natural growth regulator based on humic derivatives, Humate+7, reduced the critical period of weed damage in the Rozovskaya Aroma peppermint agrocenosis to 18 days and the Pamyati Kirichenko variety of field mint to 20 days.

### **Conclusion.**

The following conclusions can be drawn from the results of the study. The use of natural growth regulators based on humic derivatives can reduce the critical period of weed damage in mint crops, which is particularly relevant today, given the efforts of scientists and agricultural practitioners to reduce pesticide loads and, consequently, improve food security. The use of this growth regulator reduced the critical period of damage in peppermint (Rozovskaya Aroma variety) to 18 days, and in field mint (Pamyati Kirichenko variety) to 20 days. Consequently, the production of environmentally friendly field mint raw materials is feasible in the forest-steppe zone of the Chechen Republic.

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