УДК 632.51

4.1.1. Общее земледелие и растениеводство (биологические науки, сельскохозяйственные науки)

ТЕОРЕТИЧЕСКИЕ АСПЕКТЫ ВРЕДОНОСНОСТИ СОРНОПОЛЕВОГО КОМПОНЕНТА В АГРОЦЕНОЗЕ МЯТЫ В УСЛОВИЯХ ЧЕЧЕНСКОЙ РЕСПУБЛИКИ

Сулумханова Хава Леидовна
khava.sulumkhanova@bk.ru
Чеченский государственный педагогический университет, Грозный, Россия

Магомадов Анди Султанович
magomadov-andi@mail.ru
Чеченский государственный университет им. А.А. Кадырова, Грозный, Россия

Оказова Зарина Петровна
okazarina73@mail.ru
Чеченский государственный педагогический университет, Грозный, Россия

Цель исследования – изучение влияния плотности и продолжительности размещения сорных растений на единице площади на рост и развитие мяты в условиях различных зон Чеченской Республики. В качестве объекта исследований был взят сорт мяты полевой, районированный в условиях Чеченской Республики. В ходе обследования и определения флористического состава сорного компонента ценоза вариантов опыта зафиксирован смешанный тип засоренности и большое разнообразие вредителей и болезней. В лесостепной зоне с увеличением численности сорных растений на единице площади посева мяты, сорт Памяти Кириченко с 5 до 320 шт/м^2 масса одного экземпляра снизилась в 3,7 раза и составила 15,90 г. Масса сорнополевого компонента в горной зоне Чеченской Республики при минимальной плотности произрастания растений на единице площади ценоза мяты сорт Памяти Кириченко 245,30 г/м^2, с ростом плотности этот показатель возрастает до 3250,00 г/м^2 или в 10,3 раза. С ростом численности сорняков в посеве мяты, сорт Памяти Кириченко в горной зоне с 5 до 320 шт/м^2 масса одного экземпляра снизилась в 4,8 раза и составила 10,15 г. При определении критического периода вредоносности сорняков в лесостепной зоне в посеве мяты сорт Памяти Кириченко этот период составил 20 дней с момента появления всходов, в горной зоне – 27 дней

Ключевые слова: МЯТА, СОРНЫЕ РАСТЕНИЯ,

UDC 632.51

4.1.1. General agriculture and plant growing (biological sciences, agricultural sciences)

THEORETICAL ASPECTS OF THE HARMFULNESS OF THE WEED COMPONENT IN THE MINT AGROCENOSIS IN THE CONDITIONS OF THE CHECHEN REPUBLIC

Sulumkhanova Khava Leidovna
khava.sulumkhanova@bk.ru
Chechen State Pedagogical University, Grozny, Russia

Magomadov Andy Sultanovich
magomadov-andi@mail.ru
Chechen State University named after A.A. Kadyrov, Grozny, Russia

Okazova Zarina Petrovna
okazarina73@mail.ru
Chechen State Pedagogical University, Grozny, Russia

The aim of the study is to study the effect of the density and duration of placement of weeds per unit area on the growth and development of mint in the conditions of different zones of the Chechen Republic. The object of the study was a variety of field mint, zoned in the conditions of the Chechen Republic. During the survey and determination of the floristic composition of the weed component of the cenosis of the experimental variants, a mixed type of weediness and a large variety of pests and diseases were recorded. In the forest-steppe zone with an increase in the number of weeds per unit area of mint sowing, the Pamyati Kirichenko variety from 5 to 320 pcs/m2, the weight of one specimen decreased by 3.7 times and amounted to 15.90 g. The weight of the weed component in the mountainous zone of the Chechen Republic with a minimum density of plant growth per unit area of the mint cenosis, the Pamyati Kirichenko variety is 245.30 g/m2, with an increase in density this figure increases to 3250.00 g/m2 or 10.3 times. With the increase in the number of weeds in the mint crop, the Pamyati Kirichenko variety in the mountain zone from 5 to 320 pcs/m2, the weight of one specimen decreased by 4.8 times and amounted to 10.15 g. When determining the critical period of weed harmfulness in the forest-steppe zone in the sowing of mint of the Pamyati Kirichenko variety, this period was 20 days from the moment of emergence of seedlings, in the mountain zone - 27 days

Keywords: MINT, WEEDS, WEED INVASION,

ЗАСОРЕННОСТЬ, КРИИЧЕСКИЙ ПЕРИОД, ПЛОТНСТЬ РАЗМЕЩЕНИЯ, ВРЕДНОСНОСТЬ, СНИЖЕНИЕ МАССЫ, ХЛОРОФИЛЛЫ

CRITICAL PERIOD, POPULATION DENSITY, HARMFULNESS, WEIGHT REDUCTION, CHLOROPHYLLS

http://dx.doi.org/10.21515/1990-4665-210-031

In developing measures to implement the biological potential of crops in the fight against the weed component, it is first necessary to monitor the floristic composition of weeds in the cenosis of cultivated plants. This is especially important when it comes to medicinal herbs [2, 3, 5].

Purpose of the study– study of the influence of the density and duration of placement of weeds per unit area on the growth and development of mint in the conditions of different zones of the Chechen Republic.

Research methods. The work uses the Methodological Guidelines for studying economic thresholds and critical periods of harmfulness of weeds in crops. Model field experiments are laid down, where different degrees of weed infestation and duration of crop care techniques are simulated [1, 4, 6].

Venue and research – forest-steppe zone of the Chechen Republic; period – 2022-2024; object – varieties of mint in Memory of Kirichenko.

Results and discussion. To determine the species that are weeds in the mint cenosis, we used the Weed Plant Identifier. The results of monitoring the floristic composition of weeds in the field mint biocenosis are shown in Tables 1-2.

Table 1. – Susceptibility of mint to harmful objects, variety Pamyati Kirichenko (forest-steppe zone of the Chechen Republic) (2022-2024)

Types of harmful objects	Experience options							
	1	2	3	4	5	6	7	8
I. Weeds								
1. Wintering								
Stellaria media (L.)	-	+	+	-	-	+	+	-
Galium aparine (L.)	-	-	-	+	+	-	-	+

Papaver rhoeas (L.)	-	-	+	-	-	+	+	-
2. Early spring crops								
Galeopsis tetrahit (L.)	-	-	-	+	+	-	-	-
Chenopodium album (L.)	-	+	-	+	+	+	-	+
Chenopodium album (L.)	-	-	+	-	-	+	+	-
Matricaria discoidea (L.)	-	-	-	+	-	+	+	-
3. Late spring crops								
Amaranthus spp.	-	+	+	+	+	-	+	+
Eshinochloa crus-galli (L.)	-	-	+	+	+	+	+	+
Setaria viridis (L.)	-	-	+	+	-	-	-	-
Ambrosia spp.	-	-	-	+	-	+	+	+
Galinsoga parviflora (Cov.)	-	-	-	+	+	+	+	+
Setaria pumila (L.)	-	-	+	+	-	+	-	+
Abutilon theophrastii Medik.)	-	+	+	+	+	+	+	+
Solanum nigrum (L.)	-	-	-	+	-	+	-	-
Portulaca oleracea (L.)	-	-	-	-	-	+	+	+
4. Root suckers								
Cirsium arvense (L.)	-	-	-	+	+	+	+	+
Sonchus arvénsis (L.)	-	-	-	+	+	+	+	-
Convolvulus arvensis (L.)	-	+	+	+	+	+	+	+
Coronilla varia (L.)	-	-	-	-	-	-	+	+
5. Rhizomes								
Cynodon dactylon (L.)	-	-	-	-	+	+	-	+
Sorghum halepense (L.)	-	-	+	-	+	+	+	+
Asclepias syriaca (L.)	-	-	-	-	-	-	+	-
6. Taproot								
Melandrium dioicum (Mill.)	-	-	+	-	-	+	-	-
Plant Major (L.)	-	-	-	+	+	-	+	+

Rumex confertus Willd.	-	-	-	-	-	-	-	-
II. Pests								
Chrysolina herbacea	-	-	+	-	+	+	+	+
Aphidoidea	-	+	+	-	-	+	-	+
Loxostege sticticalis	-	-	+	+	-	-	+	+
III. Diseases								
Puccinia menthae. (exc. Puccinia menthae Pers.)	-	+	-	+	+	+	+	+
Erysiphe cichoracearum f. menthae Jacz. (exc.Erysiphe cichoracearum f. menthae Jacz.)	-	-	+	-	-	-	+	+
Septoria menthae Oud.(exc. Septoria lavandulae Desm.)	-	-	-	+	+	-	-	+
Note: 1 - 0 pcs/m2; 2 - 5 pcs/m2; 3 - 10 pcs/m2; 4 - 20 pcs/m2; 5 - 40 pcs/m2; 6 - 80 pcs/m2; 7 - 160 pcs/m2; 8 - 360 pcs/m2.								

As can be seen from Table 1, in the experimental variants during the years of research, there was a mixed type of weed infestation, with a predominance of late spring, annual weeds. At the same time, quarantine weeds were also recorded, such as common ragweed, three-part ragweed and Syrian milkweed.

With the growth of the density of the field component, the number of diseases and pests increases significantly. Thus, against the background of maximum weed infestation, rust, powdery mildew and white spot were found on all fields. At the same time, against the background of minimum weed infestation (5 pcs/m2), only rust was found.

A similar pattern was recorded with the spread of pests. Aphids were found in almost all experimental variants except the control one.

Table 2. - – Susceptibility of mint to harmful objects, variety Pamyati Kirichenko (mountain zone of the Chechen Republic) (2022-2024)

Types of harmful objects	Experience options							
	1	2	3	4	5	6	7	8
I.Weeds								
1. Wintering								
Stellaria media (L.)	-	+	+	-	+	+	+	+
Galium aparine (L.)	-	+	-	+	+	-	+	+
Papaver rhoeas (L.)	-	+	+	-	+	+	+	+
2. Early spring crops								
Galeopsis tetrahit (L.)	-	-	-	+	+	-	-	-
Chenopodium album (L.)	-	+	-	+	+	+	-	+
Matricaria discoidea (L.)	-	-	-	+	-	+	-	-
3. Late spring crops								
Amaranthus spp.	-	+	-	-	+	-	+	+
Eshinochloa crus-galli (L.)	-	-	+	+	+	-	-	+
Setaria viridis (L.)	-	-	+	+	-	-	+	+
Ambrosia spp.	-	-	-	+	-	+	+	+
Galinsoga parviflora (Cov.)	-	-	-	+	+	+	+	+
Setaria pumila (L.)	-	-	+	+	-	+	-	+
Abutilon theophrastii Medik.)	-	+	+	+	+	+	+	+
Portulaca oleracea (L.)	-	-	-	-	-	+	+	+
4. Root suckers								
Cirsium arvense (L.)	-	+	-	+	+	+	+	+
Sonchus arvénsis (L.)	-	+	-	+	+	+	+	+
Convolvulus arvensis (L.)	-	+	+	+	+	+	+	+
Coronilla varia (L.)	-	+	-	-	+	-	+	+
5. Rhizomes								

Cynodon dactylon (L.)	-	+	-	+	+	+	+	+
Asclepias syriaca (L.)	-	+	+	+	+	-	+	+
6. Taproot								
Melandrium dioicum (Mill.)	-	+	+	+	+	+	+	+
Plant Major (L.)	-	+	+	+	+	-	+	+
Rumex confertus Willd.	-	+	+	+	+	-	+	+
II. Pests								
Chrysolina herbacea	-	-	+	+	+	-	+	+
Aphidoidea	-	+	+	-	+	+	+	+
Loxostege sticticalis	-	-	-	+	+	-	+	+
III. Diseases								
Puccinia menthae. (exc. Puccinia menthae Pers.)	-	-	+	+	-	-	+	+
Erysiphe cichoracearum f. menthae Jacz. (exc.Erysiphe cichoracearum f. menthae Jacz.)	-	+	-	-	+	+	-	+
Septoria menthae Oud.(exc. Septoria lavandulae Desm.)	-	-	+	+	+	-	+	+
Note: 1 - 0 pcs/m2; 2 - 5 pcs/m2; 3 - 10 pcs/m2; 4 - 20 pcs/m2; 5 - 40 pcs/m2; 6 - 80 pcs/m2; 7 - 160 pcs/m2; 8 - 360 pcs/m2.								

In the mountainous zone of the Chechen Republic, the species composition of the weed component is less diverse, despite its ability to adapt to growing conditions.

In the mountainous zone, the susceptibility to pests and diseases is significantly lower compared to mint plants growing in the forest-steppe zone.

The next stage of our research was the direct study of the influence of plant density per unit area on the accumulation of biomass of the weed component and on the growth and development of field mint plants (Table 3).

For this purpose, we laid out a model field experiment, in 4-fold repetition, the total area of the plot was 25 m2, the accounting area was 10 m2. The number of weeds in the experimental variants increased exponentially, every 2 weeks it was adjusted by cutting off the above-ground part of excess specimens with scissors and was, respectively, 5, 10, 20, 40, 80, 160 and 320 pcs/m2. The modeled weed infestation allowed us to estimate the probable crop losses, determine the economic thresholds of weed harmfulness. This is necessary to improve the set of measures to combat weeds in crops of a specific crop, in this case, field mint.

Table 3. - The influence of plant density per unit area on the accumulation of weed component biomass in mint crops, Pamyati Kirichenko variety, g/m2 (2022-2024)

Weeds in the cenosis, pcs/m2	A mass of weeds,	Weight of 1 weed plant	
		G	from min. clogged,%
5	298.00/245.30	59.60/49.06	-/-
10	483.48/415.25	48.30/41.52	81.00/84.63
20	831.00/770.50	41.55/38.50	69.71/78.47
40	1368.80/1148.00	34.20/28.70	57.38/58.49
80	2328.00/1665.90	29.10/20.82	48.82/42.44
160	3455.60/2460.10	21.60/15.37	36.24/31.32
320	5088.00/3250.00	15.90/10.15	26.67/20.68

Note: the numerator is the forest-steppe zone; the denominator is the mountain zone.

The mass of the weed component in the forest-steppe zone of the Chechen Republic with a minimum density of plant growth per unit area of the mint cenosis of the Pamyati Kirichenko variety is 298.00 g / m2, with an increase in density this indicator increases by 17 times, up to 5088.00 g / m2. A similar

indicator for the Rozovskaya Aroma variety: 315.20 g / m2 and 5578.40 g / m2, respectively. Thus, there was an increase in the mass of the weed component by 17.7 times - the rate of increase in the mass of the weed component is approximately the same.

With the increase in the number of plants per unit area, there was a decrease in the mass of 1 weed against the background of a general increase in the mass of plants. The increase in the mass of weeds is directly dependent on the increase in their number. In the forest-steppe zone, with an increase in the number of weeds per unit area of mint sowing, the Pamyati Kirichenko variety from 5 to 320 pcs/m2, the mass of one specimen decreased by 3.7 times and amounted to 15.90 g.

The mass of the weed component in the mountainous zone of the Chechen Republic with a minimum density of plant growth per unit area of the mint cenosis of the Pamyati Kirichenko variety is 245.30 g/m2; with an increase in density, this figure increases to 3250.00 g/m2 or 10.3 times.

Air-dry mass of weeds in mint crops in the mountainous zone of the Chechen Republic with the number of weed component of 5 pcs/m2 is 245.30 g/m2, with the growth of density this indicator increases to 3250.00 g/m2 or 10.3 times. With the increase in the number of weeds to 320 pcs/m2 this indicator increased to 3250.00 g/m2. Thus, with the growth of the number of weeds in mint crops, the Pamyati Kirichenko variety in the mountainous zone from 5 to 320 pcs/m2, the mass of one specimen decreased by 4.8 times and amounted to 10.15 g.

One of the stages of the work was to determine the content of pigments in mint leaves; the content of pigments is an indicator of the intensity of photosynthesis, and therefore the yield and quality of medicinal raw materials.

With the increase in the number of weeds in the mint agrocenosis, the content of pigments decreases, which is an indirect sign of interspecific competition and a decrease in the intensity of photosynthesis.

The main weed in the experiment in the studied zones, on the two studied varieties of mint, is barnyard grass.

With an increase in the number of weeds, a decrease in the chlorophyll content in the weed leaves is noted. Thus, in the variant where 5 weeds grew pcs/m2, the chlorophyll content was 2.05-2.80 mg/g, and with an increase in the number of weeds to 320 pcs/m2 - 0.42-0.60 mg/g, or 4.8-4.6 times less. At the same time, the amount of chlorophyll was minimal, carotene prevailed. All of the above indicates the presence of interspecific and intraspecific competition between the components of the agrocenosis.

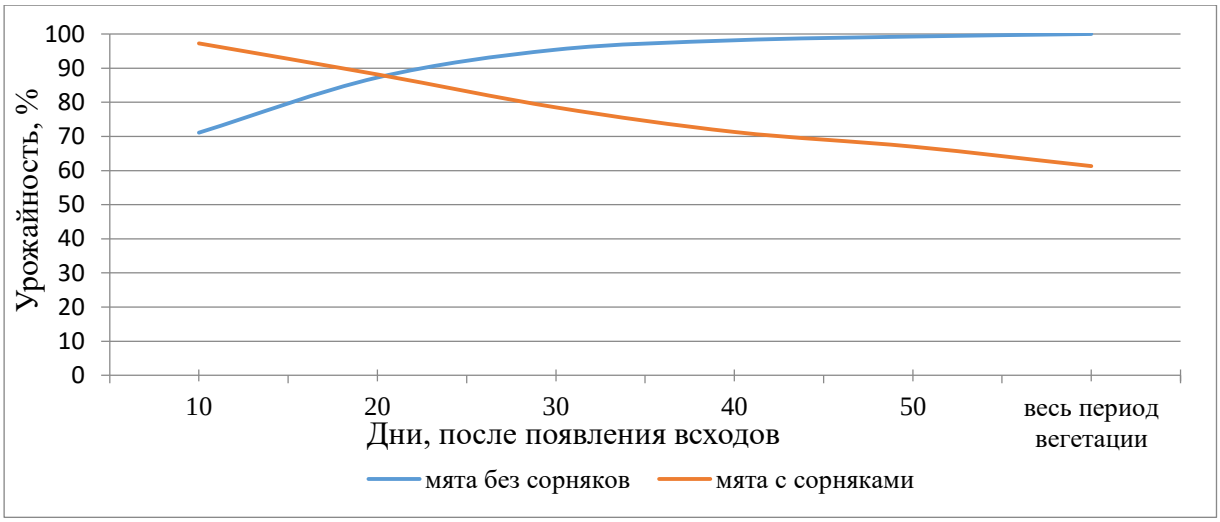
A similar pattern has been established in the mountainous zone.

The yield of green mass of mint in the forest-steppe zone, the variety Pamyati Kirichenko against the background of the absence of weed vegetation is 9.5 t/ha, and against the background of 320 pcs/m2 of weeds 6.8 t/ha, yield losses amounted to 28.5%. As the density of the weed component per unit area increased, yield losses reached 45% and amounted to 4.90 t/ha.

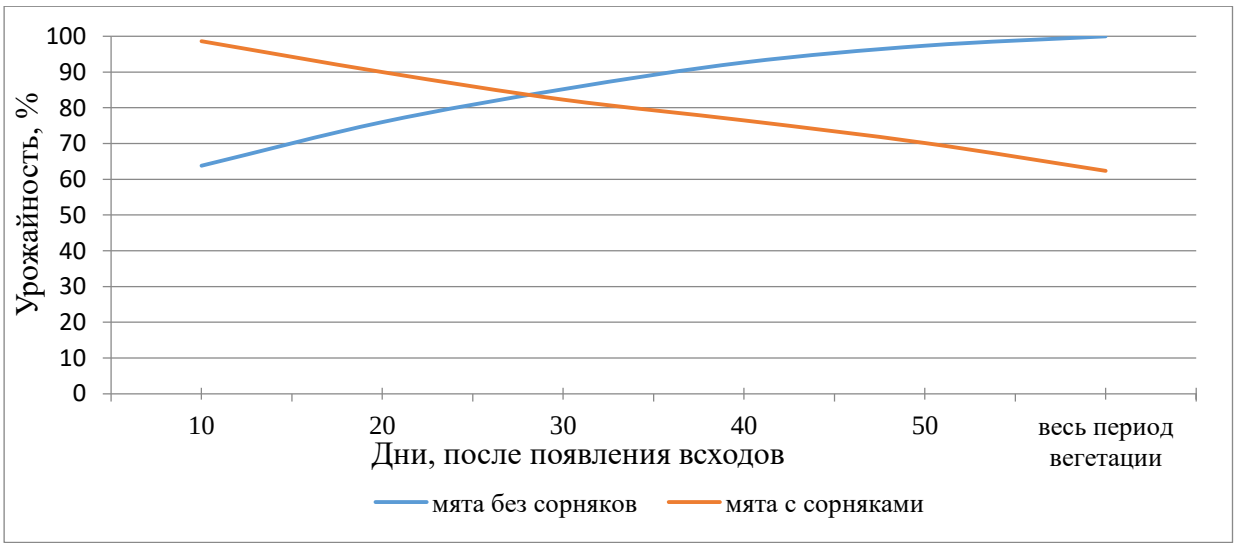
A similar pattern was established in the mountainous zone: crop losses amounted to 23.0% and 36.0%, respectively [8, 9].

The next stage of the work was the graphical determination of the critical period of harmfulness of weeds in the mint agrocenosis, or more precisely, the assessment of the duration of the critical period of harmfulness of weeds [7, 10, 11].

It is necessary to establish a set of conditions that ensure a reduction in the critical period of harmfulness of the weed component in order to improve the set of measures to protect crops from harmful objects, the reservoirs of which are weeds (Fig. 1-2).



Forest-steppe zone



Mountainous zone

Figure 1. – Graphical definition of the critical period of harmfulness of weeds of the mint agrocenosis in various zones of the Chechen Republic (2022-2024)

During the experiment, laid in the forest-steppe zone, it was established that the first 20 days from the moment of emergence of shoots, the mint variety Pamyati Kirichenko was the least competitive in relation to the weed component, this time interval was the critical period of weed harmfulness in its crops. In the mountain zone - 27 days.

Conclusion. Based on the results of a model field experiment, a mixed type of weed infestation of mint agrocenosis was established. With the increase in the number of components of the cenosis, its yield decreases. Crop losses are

more than 55% at maximum weed infestation. When determining the critical period of weed harmfulness in the forest-steppe zone in the sowing of mint variety Pamyati Kirichenko, this period was 20 days from the moment of emergence, in the mountain zone - 27 days.

Literature

1. Abanina, O.A. Scientific research on the study of weeds of Russia / O.A. Abanina, N.S. Bespalova, S.Yu. Kivva // International Journal of Humanities and Natural Sciences. - 2024. - No. 5-5 (92). - P. 77-79.
2. Astarkhanova, T.S. Features of growing chamomile with different sowing methods and growth stimulants / T.S. Astarkhanova, M.A. Takaeva // Problems of development of the regional agro-industrial complex. - 2023. - No. 2 (54). - P. 25-34.
3. Gushchina, V.A. Raw material productivity of calendula officinalis in the forest-steppe of the Middle Volga region / V.A. Gushchina, E.A. Kutikhina // Niva Povolzhya. - 2020. - No. 4 (57). - P. 65-73.
4. Gushchina, V.A. Use of growth regulators in the technology of cultivation of calendula officinalis on meadow-chernozem soil of the forest-steppe of the Middle Volga region / V.A. Gushchina, E.A. Kutikhina // Fertility. - 2023. - No. 6 (135). - P. 58-64.
5. Batalov, S. Yu. Harmfulness of the weed component in the agrocenosis of field mint / S. Yu. Batalov, Z. P. Okazova, I. M. Khanieva // International Agricultural Journal. - 2024. - Vol. 67, No. 1.
6. Zakota, T.Yu. Species composition of weeds of field crops of the steppe zone of the Krasnodar Territory as the basis for agrotechnical methods of plant protection / T.Yu. Zakota, N.N. Luneva // Plant protection from pests: Proceedings of the International Scientific and Practical Conference, Krasnodar, 2023. - P. 156-159.
7. Isupov, A.N. Methods of weed control in chamomile crops / A.N. Isupov, E.F. Vafina, F.A. Yunusov, S.V. Gromov // Modern trends in technological development of the agro-industrial complex: Proceedings of the International Scientific and Practical Conference, Izhevsk, 2024. - P. 10-14.
8. Magomadov, A.S. Application of growth regulators in the technology of cultivation of field mint - a guarantee of obtaining environmentally friendly products / A. S. Magomadov, L. A. Titova, Z. P. Okazova // International Agricultural Journal. - 2025. - No. 1 (403). - P. 124-127.
9. Okazova, Z.P. Harmfulness of weeds in crops of calendula officinalis / Z.P. Okazova, V.S. Gappoeva, Z.G. Khabaeva [et al.] // International Agricultural Journal. - 2023. - No. 1 (391). - P. 67-69.
10. Popov, V.M. Elements of the theory of designing means of destroying weeds / V.M. Popov // Achievements of science - to the agro-industrial complex: modern trends in the development of agricultural engineering, energy and economics: Proceedings of the International scientific and practical conference. Chelyabinsk, 2024. - P. 52-56.
11. Savchenko, O.M. Yield of fenugreek depending on treatments with growth-stimulating drugs and a retardant / O.M. Savchenko, F.M. Khazieva // Bulletin of KrasSAU. - 2020. - No. 8 (161). - P. 3-8.