ISSN 2226-6070

Ахмет Байтұрсынов атындағы
Қостанай мемлекеттік университеті

Костанайский государственный университет
имени Ахмета Байтурсынова

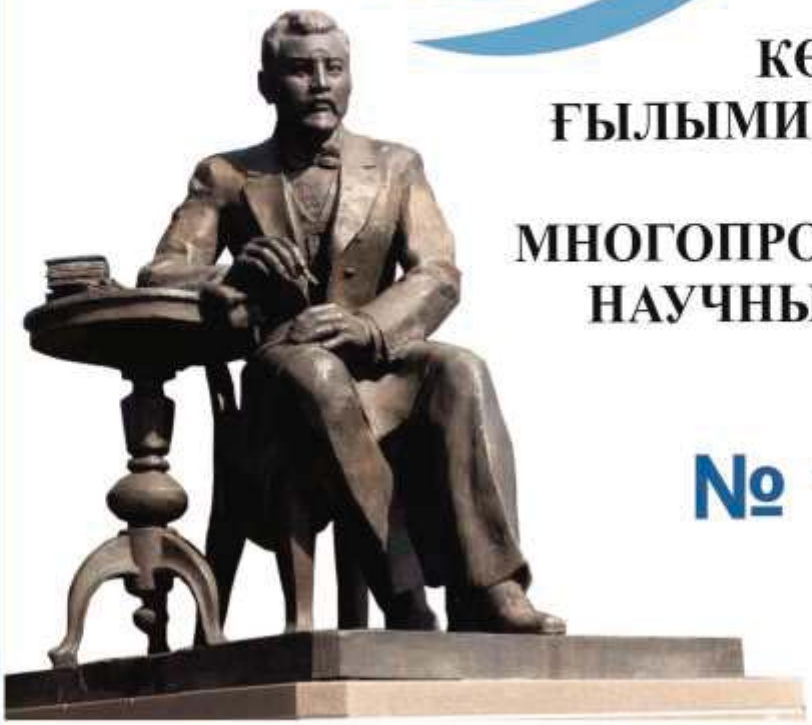
intellect, idea, innovation

3i

интеллект, идея, инновация

КӨПСАЛАЛЫ ҒЫЛЫМИ ЖУРНАЛЫ

МНОГОПРОФИЛЬНЫЙ НАУЧНЫЙ ЖУРНАЛ



№ 1 2020 «3i: intellect, idea, innovation – интеллект, идея, инновация»

№ 1 2020

Исследованиями ученых доказаны, что состав обменных катионов в ППК оказывает непосредтсвенное влияние на агрохимическую ценность почвенной структуры, общие физические, физико-химические свойства, гидро-термические, воздушные и питательные режимы почвы в итоге определяет уровень почвенного плодородия [10,11,12,13,14,15].

Максимальный показатель емкости поголощения приходится на верхний (0-13см) слой солончака - 9,91 мг-экв., урбанозема (0-10см) -12,77 мг-экв. на 100г. почвы. Колебания показателей емкости обменного катиона в нижних горизонтах находятся почти в одинаковом интервале. В составе обменных катионов преобладающим является катион кальция, в содержании магния четкая закономерность не прослеживается. Процентное участие этого элемента в ППК у солончака меньше, 28,91-42,12% чем у урбанозема (36,21-50,09%). Присутствие натрия в солончаке по профилю колеблется от 6,29 до 13,73%, в урбаноземе от 4,49 – 16,16% от суммы поглощенных оснований, указывающие на различную степень солонцеватости.

Данные анализа водной вытяжки показали, что накопление водорастворимых солей сосредоточено у солончака – лугового только в 0-13см слое, в количестве 1,02% в нижних горизонтах содержание сухого остатка до глубины 68см колеблется от 0,15 до 0,21%, указывая на отсутствие признака засоления.

Верхний 0-10см слой урбанозема содержит сухой остаток 0,16%, а в нижних горизонтах сумма солей постепенно убывает, поэтому почвенный профиль полностью не засолен.

По результатам изучения современного состояния характеристики почв парка отдыха города Балхаш можно сделать следующие заключения:

- почвы территории парка отдыха представлены солончаком луговым и урбаноземом
- эти почва сильно отличаются друг от друга по содержанию гумуса, в верхнем 0-13см слое солончака лугового содержится 1,89%, а урбанозем содержит 5,41%. Накопившийся гумус солончака связано гидроморфным режимом почвообразования и генетической особенностью этой почвы, высокое содержание гумуса в урбаноземе связано с антропогенным фактором, завезенный слой содержит большое количество негумифицированных остатков растительного происхождения, которые очень трудно отделимы от твердой фазы почвы.
- водорастворимые соли в солончаке сосредоточены только в верхнем 0-13см слое, содержание которых составляет 1,02%, до глубины 68см содержание солей колеблется от 0,15 до 0,21%, указывая на отсутствие признака засоления.
- содержание сухого остатка в верхнем слое (0-10см) урбаноземе составляет всего 0,16%, в нижних слоях соли убывают и почвенный профиль полностью не засолен.
- емкость катионного обмена солончака незначительная и верхнем (0-13см) слое составляет 9,91мг-экв, урбанозема 12,77мг-экв на100г.почвы.
- в составе поглощенных основными преобладает катион кальция, на долю катиона натрия приходится у солончака от 6,29 до 13,73%, урбанозема от 4,49 до 16,16% способствующие различную степень солонцеватости изучаемых почв.
- на гидроморфном солончаке можно провести промывку водорастворимых солей пресной водой озера, легкий гранулометрический состав почвы сыграет положительную роль в опреснении верхного слоя почвы.
- для обновления посадки леса можно подготовить широкие ямы (до 80см), завезти плодородный слой почвы из незасоленных территории и можно посадить саженцы, карагача, клена, туранги.

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UDC 68.35.37; 68.29.21

STUDY OF SUNFLOWER CROP CARE TECHNOLOGY

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Nowadays, a complex of intensive soil treatments is used to eliminate weeds on sunflower crops, including pre-sowing cultivation at medium, early sowing periods, pre-emergence and emergence harrowing, 3 ... 4 interrow cultivations using weeding harrows and dusting devices. It leads to soil dispersion, which is extremely harmful in general, and in areas subject to erosion, in particular. In addition, root system and above-ground organs of sunflower receive numerous injuries in post-exposure harrowing and inter-row treatments, which does not contribute to normal vital activity of a plant organism. In this regard, a chemical method of killing weed plants is of great interest. Using effective herbicides reduces negative effect of weeds from the earliest period of sunflower vegetation, and it is possible to reduce the number of mechanical treatments of soil. As a result of the carried out studies, data were obtained, allowing to estimate productivity of sunflower crops in conditions of 1 dry-steppe zone of West Kazakhstan region depending on pre-sowing treatments. According to the data of studies in the zone of dry steppes of West Kazakhstan, in the cultivation of sunflower along with harrowing and one pre-plant cultivation, it is advisable to use Roundup herbicide in a dose of 2 l/ha.

Keywords: sunflower, weeds, herbicides, pre-sowing treatment, yield, oilseeds

КҮНБАҒЫС ЕГІСТІГІН КҮТІП БАПТАУ ТЕХНОЛОГИЛАРЫН ЗЕРТТЕУ

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Қазіргі уақытта күнбағыс дақылы егістіктерінде арамшөптерді жою үшін интенсивті өңдеудің кешені қолданылады, оның ішінде ерте себу, 1 рет тырмалау және 3 - 4 рет арамшөптерге қарсы топырақты қатар арлық қопсыту қолданылады. Арамшөптерді бақылау құралы ретінде қарқынды өңдеудің теріс жақтары бар. Бұл топырақ құрылымының бұзылуына алып келеді, бұл өте зиянды, әсіресе эрозияға ұшыраған жерлерде. Бұған қоса, күнбағыстың тамыр жүйесі мен жер үсті мүшелері тырмалау, қатар аралық қопсыту кезінде жарақаттар алады, бұл өсімдік организмінің қалыпты жұмыс істеуіне ықпал етпейді. Осыған байланысты, арамшөптерді жоюдың химиялық әдісі үлкен қызығушылық тудырады. Тиімді гербицидтерді қолданған кезде күнбағыс өсімдіктерінің ерте кезеңдерінен арамшөптердің теріс әсері азаяды және механикалық өңдеулердің санын азайтуға болады. Жүргізілген зерттеулер нәтижесінде Батыс Қазақстан облысының 1 құрғақ дала аймағы жағдайында өсірілетін күнбағыс егістігінің өнімділігін арттыру үшін егістікті күтіп баптау технологиялары жөнінде деректер алынды. Жүргізілген зерттеулер көрсеткендей Батыс Қазақстанның құрғақ дала аймағында күнбағыстан мол да сапалы май өнімін алу үшін топырақты тырмалау және 1 рет қатар аралық қопсытумен қатар 2 л/га доза есебімен Раундап гербицидін пайланаған тиімді.

Түйінді сөздер: күнбағыс, арам шөптер, гербицидтер, егіс алды топырақ өңдеу, өнімділік, майлылық

ИЗУЧЕНИЕ ТЕХНОЛОГИИ УХОДА ЗА ПОСЕВАМИ ПОДСОЛНЕЧНИКА

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В настоящее время для уничтожения сорняков на посевах подсолнечника применяется комплекс интенсивных обработок почвы, включающих предпосевную культивацию при средних, ранних сроках сева, довсходовое и повсходовое боронование, 3...4 междурядные культивации с применением прополочных боронок и присыпающих устройств. Интенсивная обработка как средство борьбы с сорняками имеет и отрицательные стороны. Она ведет к распылению почвы,

что крайне вредно вообще, а в районах подверженных эрозии, в особенности. Кроме того, корневая система и надземные органы подсолнечника при повсходовом боронование и междурядных обработках получают многочисленные повреждения, что не способствует нормальной жизнедеятельности растительного организма. В связи с этим большой интерес представляет химический способ уничтожения сорных растений. При использовании эффективных гербицидов снижается отрицательное влияние сорняков с самого раннего периода вегетации подсолнечника, создается возможность сократить число механических обработок почвы. В результате проведенных исследований получены данные, позволяющие оценить продуктивность посевов подсолнечника в условиях 1 сухостепной зоны Западно-Казахстанской области в зависимости от предпосевных обработок. Как показали данные исследований в зоне сухих степей Западного Казахстана при возделывании подсолнечника наряду с боронованием и одной предпосевной культивацией целесообразно применение гербицида Раундап в дозе 2 л/га.

Ключевые слова: подсолнечник, сорные растения, гербициды, предпосевная обработка, урожайность, масличность

The introduction of adaptive technologies is the main way to increase efficiency of sunflower as in West Kazakhstan. Improved crop culture and soil fertility, proper and cost-effective resource use, reduced crop losses from pests, plant diseases and weeds are key areas for addressing this important problem.

The purpose of pre-sowing soil preparation, as is known, is not only to create necessary conditions for seed filling and rapid germination (storage of moisture accumulated in soil and preparation of a bed for seeds), but also to force microbiological activity of soil, control of weeds and rapid sowing. Therefore, the depth of cultivation should vary depending on the crops characteristics, the degree of soil compaction, its equilibrium state and fertility level.

Sunflower at optimal feeding area is characterized by high competitive capacity in relations with weed plants. This ability is most fully demonstrated after closing row spacing. In the early period of vegetation, sunflower is severely oppressed by weeds. It is particularly damaged by weeds such as cocksfoot panicum, foxtail, amaranth, white pigweed, etc.

Nowadays, a complex of intensive soil treatments is used to eliminate weeds on sunflower crops, including pre-sowing cultivation at medium rather than early sowing times, pre-sowing and post-sowing harrowing, 3...4 inter-row cultivations using weeding harrows and backfilling devices.

Intensive treatment as a means of weed control has other sides. It leads to soil dispersion, which is extremely harmful in general, and in areas subject to erosion, in particular. In addition, root system and above-ground organs of sunflower receive numerous injuries in post-exposure harrowing and inter-row treatments, which does not contribute to normal vital activity of a plant organism.

In this regard, a chemical method of killing weed plants is of great interest. Using effective herbicides reduces negative effect of weeds from the earliest period of sunflower vegetation, and it is possible to reduce the number of mechanical treatments of soil.

Studies conducted by many scientists have confirmed the use of herbicides in sunflower crops. The usefulness of herbicides is determined primarily by soil clogging with weeds and a number of economic and technological factors [1, p.126, 2, p.11, 3, p.15, 4, p.8, 5, p.3, 6, p.37, 7, p.12, 8, p.10, 9, p.198].

The work is carried out within the framework of the grant financing program of the Science Committee of the Ministry of Science of the Republic of Kazakhstan on the project "Development of adaptive technologies for the cultivation of fodder and oilseeds in relation to the conditions of West Kazakhstan".

The research aim is to study and evaluate adaptive technologies of sunflower cultivation in West Kazakhstan to provide agriculture with full-fledged fodders and producers of vegetable oil with quality raw materials.

In order to solve the set tasks, in conditions of 1 dry-steppe zone field experiments were established.

According to morphological characteristics of profile genetic horizons and agrochemical indicators of arable layer, soil of the test area is characteristic for dry steppe zone of West Kazakhstan.

Sunflower cultivation agricultural machinery is accepted for the zone. Avangard sunflower hybrid was used in the experiments.

During field experiments, accounting, observation of the beginning of phenological phases and growth and development of sunflower were carried out according to the generally accepted method [10, p.25]. Harvesting and registration of crops by continuous method with subsequent reduction to standard humidity. Statistical processing of the research results is by dispersion method, analysis using computer programs [11, p.78].

One of the important elements of adaptive technology of sunflower cultivation is the system of pre-planting soil treatment, which is aimed at maximum destruction of seedlings and seedlings of weed plants, preservation of accumulated reserve of soil moisture and creation of optimal conditions for seed seedling.

Experiments have shown that crop care options studied have not had a significant impact on the development of sunflower plants. The time frame for the appearance of full sprouts for all versions of

experience is the same - May 17. The length of growing period from sowing to seeding on all test variants was 10 days. In the conditions of 2019 year in the 1 decade of May, the hot weather was established, which had an impact on intensity of friendly germination of sunflower plants seedlings. The growth and development of sunflower from the phase of 2 real leaves (May 24) to the end of the phase of 7-8 leaves (June 5) took place with a change of ambient temperature up to 15-18 degrees and in the absence of precipitation. This factor influenced sunflower growth processes. Then at the beginning of anthode formation phase 24 June-July 1, favorable (up to 28-32 degrees) weather was established with the support of short-term precipitation. The anthode formation phase in all test variants was recorded on 24 June. The length of "anthode growth-formation" period on all test variants was 48 days. The interphase period of anthode-blooming formation took place against the background of variable temperatures with short-term rains. 19 days after the anthode formation phase, the blooming phase occurred. Sunflower plants from the time of sowing reached blooming phase in 67 days. Sunflower blooming phase was marked on July 13. Sunflower blooming phase also took place under variable temperatures (25-32 degrees) and accompanied by atmospheric precipitation. During the growth phase of sunflower seeds (July 22) against the background of air temperature 25-30 degrees, summer rains took place, at times shower. The total duration of sunflower vegetation period depending on crop care methods was 118-120 days.

Observations of crops during harvesting showed different degrees of sunflower safety depending on care techniques. Thus, in the studies, the highest safety of 90.65% or 41.70 thousand plants per 1 ha out of 46.00 thousand was noted on the variant harrowing + pre-sowing cultivation with introduction of Roundup herbicide (2 l/ha), and the smallest number of preserved sunflower plants 39.49 thousand hectares or 87.75% was noted on the control variant harrowing + pre-sowing cultivation. Application of 1 inter-row treatment combined with harrowing and pre-sowing cultivation ensures plant safety at 86.93%. 40.25 thousand plants per 1 ha noted here during harvesting period. Application of 2 inter-row treatments combined with harrowing and pre-sowing cultivation increases the safety of sunflower plants up to 89.91% (or 40.46 thousand hectares).

A lot of damage to the sunflower crop is caused by weed plants. Possessing a powerful underground and above-ground mass, sunflower competes with weeds better than many other field crops. However, in clogged fields its harvest, according to VNIIMK, decreases by 2.5 c/ha [2, p.15; 12, p.312, 13, p.183].

Accounting data showed that in our studies in 2019, the greatest clogging in sunflower crops was on variants without herbicide use. Thus, in the phase of 2 real leaves, in the application of technology harrowing + pre-sowing cultivation (control), per 1 m^2 there were 9 of weed plants with a raw weight of 30 g/m^2. In variants 3 and 4, harrowing + pre-sowing cultivation + 1 inter-row treatment and harrowing + pre-sowing cultivation + 2 inter-row treatments, the crop clogging was 9 pieces with a crude weight of 31 g/m^2 and 10 pieces per 1 m 2 with a weight of 32 g/m^2, respectively. When Roundup herbicide is used with the combination of boronization and pre-sowing cultivation, no weed plants were found on sunflower crops in the phase of 2 real leaves. In the test the following weeds were presented: caseweed, white pigweed, black bindweed, amaranth, wild radish, cocksfoot panicum, field bindweed, Canada thistle.

In the blooming phase, the greatest clogging of sunflower crops is under control. Here, on 1 m2, 44 weeds with a crude weight of 202 g/m^2 were recorded. In the applications of 1 and 2 inter-row treatments, the number of weed plants was 18 and 25 pieces with a weight of 122 and 147 g/m^2. In the blooming phase we have also determined the clogging of crops of Roundup herbicide application variant. In this variant, 9 weed plants were found with a total crude weight of 53 g/m^2. The rain period of sunflower blooming-plumpness contributed to the growth and development of weed plants. During the control harvesting period (harrowing + pre-sowing cultivation) compared to the pre-sowing phase, the number of weed plants increased by 6 pieces and the clogging in this variant was 50 pcs/m^2. The weight of crude weight of weeds was 237 g/m^2 (Table 1).

Table 1 - Effect of care techniques on sunflower crops clogging, 2019

Contamination indicators	Crop care options			
	Harrowing + pre-sowing cultivation (control)	Harrowing + pre-sowing cultivation with Roundup (2 l/ha)	Harrowing + pre-sowing cultivation + 1 interrow processing	Harrowing + pre-sowing cultivation + 2 interrow processing
Phase of 2 real leaves				
Number of weeds, pcs/m^2	9	0	9	10
Weight of raw mass of weeds, g/m^2	30	0	31	32
Blooming phase				

Number of weeds, pcs/m^2	44	9	25	18
Weight of raw mass of weeds, g/m^2	202	53	147	122
Before harvesting				
Number of weeds, pcs/m^2	50	12	30	22
Weight of raw mass of weeds, g/m^2	237	72	182	151

On the control, the increase in the number of weed plants during maturation period compared to the phase of 2 real leaves was 41 pcs/m^2. In the application of Roundup herbicide with combination of harrowing and pre-sowing cultivation during sunflower maturation, weeds 12 pcs per 1 m^2 with a crude weight of 48 g/m^2 were found. Intermediate position by clogging is occupied by variants using 1 and 2 inter-row treatments. In these variants, 22 and 30 weeds with a crude weight of 151 and 182 g/m2 were found on sunflower crops by the maturation period. In variants 3 and 4, harrowing + pre-sowing cultivation + 1 inter-row treatment and harrowing + pre-sowing cultivation + 2 inter-row treatments during maturation compared to the initial stage of development, the growth of weed plants was 12 and 21 pieces per 1 1 m^2.

Some of the most important indicators of sunflower productivity are plant height, photosynthetic potential and dynamics of leaf surface formation.

Under the conditions of 2019 in the blooming phase, the highest indicators of sunflower leaves area have been determined by us with the use of harrowing + pre-sowing cultivation technology with the introduction of Roundup herbicide (2 l/ha) - 14.79 thousand m^2/ha.

According to biometric data, in 2019 studies, sunflower plants were the highest growth when used Roundup herbicide along with harrowing and pre-sowing cultivation. In this variant, the height of sunflower plants was 145.50 cm. Sunflower plants in the control variant (125.0 cm) were the lowest growth. Before harvesting, sunflower height at care method including 1 and 2 inter-row treatments, along with spring harrowing and pre-sowing cultivation was 130.5 and 136.5 cm.

In the studies of 2019, the effectiveness of sunflower photosynthesis depended on crop care techniques. Thus, in the blooming phase, if the photosynthetic potential was 0.74 million m^2/day at the control, the addition to the traditional technology of cultivation techniques with the introduction of Roundup herbicide at a dose of 2 l/ha ensured the growth of photosynthetic potential to 0.99 million m^2/day. In the variants of harrowing of crops and cultivation combined with 1 and 2 inter-row treatments, photosynthetic potential of sunflower was 0.84 and 0.93 mln m^2/day, respectively.

When Roundup herbicide is applied to sunflower crops, the surface of the field is equalized and microbiological processes are improved due to decompression of topsoil. All this has a positive impact on sunflower productivity. In the studies, the highest sunflower seed collection is ensured in the applications of Roundup herbicide and soil harrowing with pre-sowing cultivation of 29.69 c/ha. At the control, the yield of sunflower seeds was 20.41 c/ha. When used in combination with pre-sowing cultivation and 1 inter-row treatment, sunflower yield increased by 2.19 c/ha compared to the control and amounted to 22.60 c/ha. When additional second inter-row treatment is included in the sunflower crop care operation, the sunflower seed yield was 25.93 c/ha, which is 5.52 c/ha more than the control.

The weight of 1000 seeds in the single row treatment variant was 40.81 g, with two row treatments combined with harrowing and pre-sowing cultivation of 43.95 g. When Roundup was applied to pre-cultivation and harrowing, the seed weight was increased by 6.32 g, respectively, compared to the control. The number of seeds in one inter-row treatment is 23.97%, in two inter-row treatments 23.80% and 23.72% at application of Roundup herbicide to pre-sowing cultivation with harrowing. The oil content of sunflower at the control was 48.75%. In the experiments, the highest crude fat content was found in Roundup herbicide application variant of 50.12%. When using 1 and 2 inter-row treatments, the oil content of sunflower seeds was at the level of 48.84-49.25% (Table 2).

Table 2 - Seed quality and biological yield of sunflower depending on crop care methods, 2019

Indicators	Crop care options			
	Harrowing + pre-sowing cultivation (control)	Harrowing + pre-sowing cultivation with Roundup (2 l/ha)	Harrowing + pre-sowing cultivation + 1 interrow processing	Harrowing + pre-sowing cultivation + 2 interrow processing
Weight of 1000 seeds, g	39,91	46,23	40,81	43,95
Huskness, %	24,12	23,72	23,97	23,80