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MOISTURE SUPPLY AND WEED INFESTATION OF SPRING BARLEY CROPS (*HORDEUM VULGARE* L.) DEPENDING ON THE BASIC TILLAGE SYSTEM

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Spring barley (Hordeum vulgare L.) is one of the most common crops in the world of agriculture. Field research was conducted at the Poltava State Agricultural Experimental Station. M. I. Vavilov during 2021–2022. The research results show that the smallest number of weeds in crop crops (32.8 pcs./m2) was counted during tillage using Mini-till technology. When tillage, according to classical technology, there was an increase in the number of weeds by 2.4 pcs/m2 compared to the Mini-till system. The maximum abundance of weeds was observed on the No-till variant, which is 5.1 pcs/m2 more compared to Mini-till tillage. A similar level of weed infestation of crops was observed with shallow tillage (37.4 pcs./ m2). A decrease in the number of weeds was achieved on average during the growing season of spring barley by 7.1%, compared to No-till technology when tillage according to the classical scheme, which provided for plowing to a depth of 20-22 cm. Studies have revealed that the most negligible mass of raw weed plants in an air-dry state was formed with shallow primary tillage. Compared to other experiment variants, their mass was less, by 4.7–20.7 and 4.6–20.3 %, respectively. Studies have found that regardless of the technology of primary tillage, annual monocotyledonous and dicotyledonous species prevailed in the structure of biological groups of weeds. As for perennial weeds, there was an increase in their share by 2.9–3.8 times compared to other variants of the experiment, only with shallow tillage. It was found that the largest reserves of available moisture in a meter layer of soil both at the time of sowing and harvesting spring barley were formed on the variants of non-flange tillage, which were more extensive, respectively, by 5.7–13.3 and 4.1–4.7 mm, compared to the variant of the classic primary tillage.

Key words: spring barley (Hordeum vulgare L.), classic cultivation, shallow tillage, Mini-till, No-till, available moisture, total water consumption, weeds.

ВОЛОГОЗАБЕЗПЕЧЕНІСТЬ ТА ЗАБУР'ЯНЕНІСТЬ ПОСІВІВ ЯЧМЕНЮ ЯРОГО (*HORDEUM VULGARE* L.) ЗАЛЕЖНО ВІД СИСТЕМИ ОСНОВНОГО ОБРОБІТКУ ҐРУНТУ

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Ячмінь ярий (Hordeum vulgare L.) входить до складу найбільш розповсюджених сільськогосподарських культур світового землеробства. Польові дослідження проведено на Полтавській державній сільськогосподарській дослідній станції ім. М. І. Вавилова впродовж 2021–2022 рр. Результати досліджень свід-

чать, що найменшу кількість бур'янів у посівах культури (32,8 шт./м^2) нараховували за обробітку ґрунту по технології Mini-till. За обробітку ґрунту за класичною технологією відзначено збільшення кількості бур'янів на 2,4 шт./м^2, порівняно з системою Mini-till. Максимальну рясність бур'янів спостерігали на варіанті No-till, що на5,1 шт./м^2 більше відносно обробітку ґрунту за технологією Mini-till. Подібний рівень забур'яненості посівів культури відзначено за мілкого обробітку ґрунту (37,4 шт./м^2). За обробітку ґрунту за класичною схемою, яка передбачала оранку на глибину 20–22 см, досягнуто зниження чисельності бур'янів у середньому за вегетаційний період ячменю ярого на 7,1 %, порівняно з технологією No-till. Дослідженнями виявлено, що найменша маса як сирих рослин бур'янів, так і в повітряно-сухому стані формувалася за мілкого основного обробітку ґрунту. Порівняно з іншими варіантами досліду їх маса була меншою, відповідно на 4,7–20,7 і 4,6–20,3 %. Дослідженнями встановлено, що не залежно від технології основного обробітку ґрунту у структурі біологічних груп бур'янів переважали однорічні однодольні та дводольні види. Що стосується багаторічних бур'янів, то відзначено збільшення їх частки у 2,9–3,8 разу, порівняно з іншими варіантами досліду, лише за проведення мілкого обробітку ґрунту. Встановлено, що найбільші запаси доступної вологи в метровому шарі ґрунту як на час сівби, так і збирання ячменю ярого формувалися на варіантах безполицевого обробітку ґрунту, які були більшими, відповідно на 5,7–13,3 і 4,1–4,7 мм, порівняно із варіантом класичного основного обробітку ґрунту.

Ключові слова: ячмінь ярий (Hordeum vulgare L.), класичний обробіток, мілкий обробіток, Mini-till, No-till, доступна волога, сумарне водоспоживання, бур'яни.

Spring barley (*Hordeum vulgare* L.) is one of the most widespread crops in world agriculture, widely cultivated since prehistoric times. In terms of cultivation area, this crop ranks fourth in the world's crop structure after wheat, rice, and corn. The sown area of barley in the world is about 55-60 million hectares, from which 135-150 million tons of grain are obtained. It is predominantly used for grain forage and brewing purposes. It should be noted that over the past 20 years, the total world production of barley has decreased by 20%, and the area under crops has decreased by 30%. It is well known that spring barley is considered the leading grain fodder crop in Ukraine and ranks third after winter wheat and corn in terms of sown area. The area under spring barley has sharply decreased recently, from 4317 thousand hectares in 2010 to 763 thousand hectares in 2023, i.e., by 82.3%. In 2023, the share of spring barley in the structure of sown areas of cereals and leguminous crops is 10.2% (Hanhur V. V., et al., 2021; Romaniuk V. I., 2019).

In the context of the functioning of the market economy in Ukraine, when the formation of selling prices for grain occurs under the influence of supply and demand and is characterized by their instability during the marketing year, increasing the profitability of spring barley cultivation is possible both by increasing grain productivity and by reducing production costs (Korotkova I., et al., 2021).

The world experience of agriculture shows that the leading countries in grain production have long since moved from classical to resource-saving technologies, contributing to savings in production costs from 30 to 80% (Wacławowicz R., et al., 2023). A scientifically grounded approach to the introduction of resource-saving technologies by specific meteorological conditions, the type of soil and its provision with the main elements of mineral nutrition, and the biological characteristics of spring barley varieties will make it possible to grow relatively high yields of this crop in different soil and climatic zones of Ukraine.

The formation of spring barley grain productivity occurs under the influence of several factors, including predecessors, the system of primary and pre-sowing tillage, a rational system of mineral nutrition of plants, effective measures to control the spread of pests, diseases and weeds in crops, varietal properties and technological features, which ensures effective regulation of plant growth and development processes (Hanhur V., et al., 2020; Korotkova I., et al., 2021; Chauhan, B.S., 2020). In this regard, there is a need to find effective measures to increase the grain productivity of spring barley under specific soil and climatic conditions of its cultivation.

Among the reasons for the low productivity of arable land in Ukraine, the key problem is the presence of segetal vegetation in agrophytocenoses. The negative effect of weeds primarily leads to a decrease in the economic and energy indicators of the efficiency of the crop rotation and tillage system, technological methods of applying fertilizers, plant protection preparations, the introduction of the latest achievements in breeding and seed production (Gharde Y., et al., 2018). Due to the increased competitiveness of weeds over cultivated plants, the shortfall in the yield of grain crops, depending on their composition and the degree of favorable weather conditions of the growing season, can vary from 5 to 30% or more (Wacławowicz R., et al., 2023; Kadziene G., Suproniene S., et al., 2020).

Although spring barley belongs to the group of medium-competitive crops, it requires effective measures to reduce the number of weeds in crops to an economically acceptable level. A significant number of weeds in crops, especially at the initial stages of vegetation, decreases grain yield by 25–40% or more (Chernelivska O. O., et al., 2018; Chauhan B. S., et al., 2017).

Mechanical tillage is among the most common methods of regulating the abundance of the weed component in agrophytocenoses. In the scientific circles of Ukraine at present, there is no unanimous opinion on the most reliable methods, optimal measures, depth, and tools for tillage that will ensure effective control of weeds in agrocenoses. This is caused by the duration and nature of weather conditions, regional features of field crop cultivation technologies, the set, and ratio of crops in crop rotations, etc., which have a direct or indirect impact on the formation of a specific group of weeds for a particular agricultural landscape, which requires a differentiated approach to the selection of measures and means of regulating their number in crops (Nikoli´c N., et al., 2021; Travlos I., et al., 2020).

The basis of modern tillage technologies should be the principle of minimization, which reduces the mechanical load on the soil and helps to strengthen its resistance to the manifestation of water and wind erosion, improving the conditions for the reproduction of soil fertility. The most common ways to minimize tillage include the replacement of plough tillage measures with non-flange tillage, as well as reducing the depth of loosening, the using wide-span multi-operation combined units (Kachmar O. Y., et al., 2020; Shevchenko M. S., et al., 2020).

The results of the research, obtained in the conditions of the southern Forest-Steppe of Ukraine, indicate that the most pronounced negative impact of the presence of weeds in crops on the productivity of spring barley was observed at the time of the onset of the earing phase of the crop. According to the average three-year data, it was found that each vegetative weed plant led to a shortfall of 5.73 kg/ha of barley grain (Koval H. V., et al., 2018).

Experiments conducted in the conditions of the Northern Steppe revealed that tillage for spring barley using minimal technology led to an increase in the abundance of weeds, especially ragweed, compared to traditional and non-molded cultivation (Shevchenko M. S., et al., 2019; Syromiatnykov Yu. M., 2020).

In the experiments of O.O. Chernelivska and co-authors, it was noted that the use of herbicides provided a reduction in weed infestation of spring barley crops by 92.9—98.3 %, but the effectiveness of the use of preparations was excellent in different tillage technologies. Thus, primary tillage to a depth of 10–12 cm increased plant protection measures' effectiveness by 5.4% relative to No-till technology (Chernelivska O.O., et al., 2018). According to the data obtained in the conditions of the Forest-Steppe of Ukraine, a twofold increase in the number of weeds in spring barley crops under no-tillage was detected compared to moldboard tillage. However, their air-dry mass did not undergo significant changes. The authors justify this pattern by the increased interspecific competition of segetal vegetation for an increase in its abundance (Ptashnik M. M., et al., 2021). In the conditions of the Right-Bank Forest-Steppe of Ukraine, a decrease in the abundance of weeds by 18.9% was observed in the case of replacing moldboard tillage in crop rotation with moldboard-free tillage. With systematic tillage with tools with chisel and disc working bodies, the weed infestation of crops increased by 1.52 and 1.67 times, respectively (Prymak I. D., et al., 2018).

Spring barley is a relatively demanding crop for moisture conditions during the growing season. It is well known that the methods of basic tillage and the depth of loosening significantly impact the formation of moisture reserves. Thus, according to the results of research in the conditions of the Northern Steppe, it was noted that during chisel and shallow disc tillage, 11.9 and 5.8 % more moisture accumulated, respectively, compared to moldboard cultivation for spring barley (Tsyliuryk O. I., et al., 2014). A similar pattern was observed in the conditions of the Forest-Steppe zone (Davydenko H. A., et al., 2013).

According to experimental data obtained in the conditions of the province of Alberta (Canada), there was an increase in the moisture content in the soil by No-till, compared to traditional tillage (Nyborg M., et al., 1989).

Thus, the analysis of the sources of scientific literature testifies to the significant importance of the primary tillage methods in the regulation of moisture supply and weed infestation of spring barley crops.

The analysis of the sources of scientific literature testifies to the different views of scientists regarding the effectiveness of primary tillage methods in the regulation of moisture supply and weed infestation of spring barley crops. In the context of permanent climate change, in particular, the increase in its aridity, the role of tillage in creating better conditions for accumulating and reducing unproductive moisture consumption, and the harmful effects of segetal vegetation are only increasing. Therefore, it is essential to scientifically substantiate the impact of minimum tillage, exceptionally shallow, mini-till, and no-till, on the formation of productive moisture reserves and quantitative and species composition of weeds in spring barley crops.

The purpose of the research is to find out the influence of different systems of primary tillage on the moisture supply of plants and their abundance, as well as the species composition of weeds in spring barley crops.

Materials and methods. Field research was carried out on the experimental field of the Poltava DSGDS. During 2021–2022, a long-term stationary experiment was laid down in 2008. It is characterized by the following agrochemical indicators: humus content in the soil layer 0–20 cm 4.1 %; easily hydrolyzed nitrogen – 7.1 mg/100 g of soil (according to Tyurin and Kononova); P2O5 in acetic acid extract – 12.8 mg/100 g of soil (according to Chirikov); exchangeable potassium – 17.3 mg/100 g of soil (according to Maslova). The soil solution has a slightly acidic reaction (pH of the salt extract is 6.2).

The research site belongs to the temperate continental climate zone. An ambiguous manifestation of weather conditions characterized the years of the study during the growing season of barley compared to the average long-term data. Thus, the hydrothermal coefficient in May, June, and July 2021 was 0.87, 0.64, and 0.51, respectively, with long-term average values of 1.12, 0.93, and 0.67 units. In 2022, there was also a deviation of this indicator by month. The hydrothermal coefficient was 1.42 and 1.17 in May and June, respectively, 26.8 and 25.8% higher than the long-term average. Along with this, in July, this figure was lower than the norm by 0.27 units.

The scheme of the field experiment included the following options: 1. Classical tillage (plowing to a depth of 20-22 cm), (control). 2. Shallow tillage (shallow tillage to a depth of 10-12 cm). 3. Mini-till (stubble plowing to a 6-8 cm depth + direct sowing). 4. No-till (direct sowing).

The sown area of the plot was 972 m2, and the accounting area was 200 m2. The experiment was repeated four times. Variants and repetitions in the experimental area are placed systematically. The predecessor of spring barley was grain corn. Spring barley was grown against the background of applying mineral fertilizers in a dose of N48P48K48. Sowing of the crop, on all tillage options, was carried out with a Great Plains ADC 2220 direct seeder.

According to the variants of the experiment, weed counting was carried out by the quantitative-weight method in the phase of mass tillering and before harvesting spring barley (Yeshchenko V. O., et al., 2014). Atlases-determinants were used To determine the species composition of segetal vegetation in spring barley crops (Veselovskyi I. V., et al., 1993).

Research results. In recent years, in the Left-Bank Forest-Steppe of Ukraine, the main factor limiting the maximum return from the implemented agrotechnical measures and the realization of the genetic potential of grain productivity of spring barley is the level of provision of crops with affordable moisture. However, significant climate changes observed in recent years are due to an increase in air temperature and a decrease in precipitation and its uneven distribution during the growing season. This, in turn, directly impacts the formation of the soil water regime and the provision of crops with moisture.

The importance of moisture in the ontogeny of crops is hugely multifaceted. It participates in the process of photosynthesis, ensures the maintenance of turgor in cells, prevents overheating of the plant organism, affects the formation of the root system and its distribution along the soil profile, and, therefore, the water consumption of plants. Moisture in the soil has a direct impact on its most critical processes. It determines the biological activity of the soil environment and the nature of nutrient, air, and thermal regimes (Netis I. T., et al., 2012).

In the experiment, using the thermostat-weight method, we determined the moisture supply of a meter layer of soil in two terms - at the time of sowing and before harvesting spring barley. The research results show that, on average, for 2021–2022, the largest reserves of available moisture in a meter layer of soil at the time of sowing spring barley were contained in the variant with the No-till tillage system. Thus, against the background mentioned above, the content of available moisture in the layer 0–100 cm was 190.1 mm, which is 13.3 mm or 7.5% compared to the variant of classical tillage (Table 1). The improvement of the process of moisture accumulation using No-till technology was facilitated by the plant residues of the previous crop left on the soil surface, which, during the winter, ensured the retention and more even distribution of snow in the field.

Table 1

Influence of tillage methods on the content of productive moisture under spring barley, average for 2021–2022

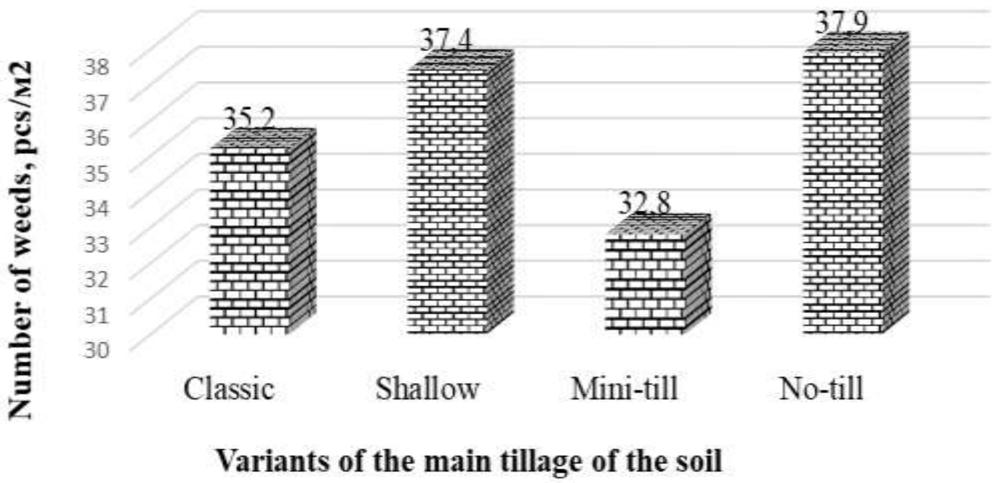
Basic tillage options	Available moisture content in 0–100 cm soil layer, mm		Total moisture consumption per unit of dry matter, m^3/t
	at the time of sowing	at the time of assembly	
Classic (control)	176,8	73,6	717
Shallow	175,9	77,7	720
Mini-till	182,5	78,0	731
No-till	190,1	78,3	779

When carrying out shallow tillage to a depth of 10-12 cm, the content of available moisture was almost at the level of classical tillage; the difference between these options was only 0.9 mm. Comparatively large reserves of productive moisture in the soil layer of 0–100 cm were formed against the background of surface tillage to a depth of 6–8 cm in the Mini-till system. Thus, the content of available moisture in this variant of primary tillage was 5.7 mm higher compared to the background of classical tillage. However, at the same time, it was inferior to No-till technology by 7.6 mm. The determination of soil moisture before harvesting spring barley shows that until this period, the previously identified trend regarding the difference in the reserves of productive moisture in a meter layer of soil depending on the methods of soil cultivation has been preserved. The largest reserves of available moisture were contained using No-till technology, where the difference compared to classical tillage, which involved plowing by 20-22 cm, was 4.7 mm or 6.4%.

One of the ways to substantiate the efficiency of using moisture for the formation of a unit of dry matter of the main barley product is the calculation of its total costs. Thus, in the experiment, the yield of barley grain according to the options of primary tillage, in terms of dehydrated matter, was classic – 3.78; shallow – 3.70; mini-till – 3,72; no-till – 3.61 t/ha.

Calculations show that the total moisture consumption per unit of dry matter was 62.0 m3/t lower compared to the background, where spring barley was grown using No-till technology. It should be noted that in the case of shallow tillage for barley to a depth of 10-12 cm or cultivation of the crop against the background of Mini-till. The total amount of moisture consumed by crops to form a unit of dry matter was almost the same and exceeded the control by only 0.4–1.9%.

The analysis of the obtained results made it possible to identify differences in the abundance of the weed component in spring barley crops on average during the crop's growing season in different variants of basic tillage. Thus, on average, over the years of research (2021–2022), the smallest number of weeds in spring barley crops was counted when tillage using Mini-till technology, where it was 32.8 pcs/m^2 (Fig. 1).



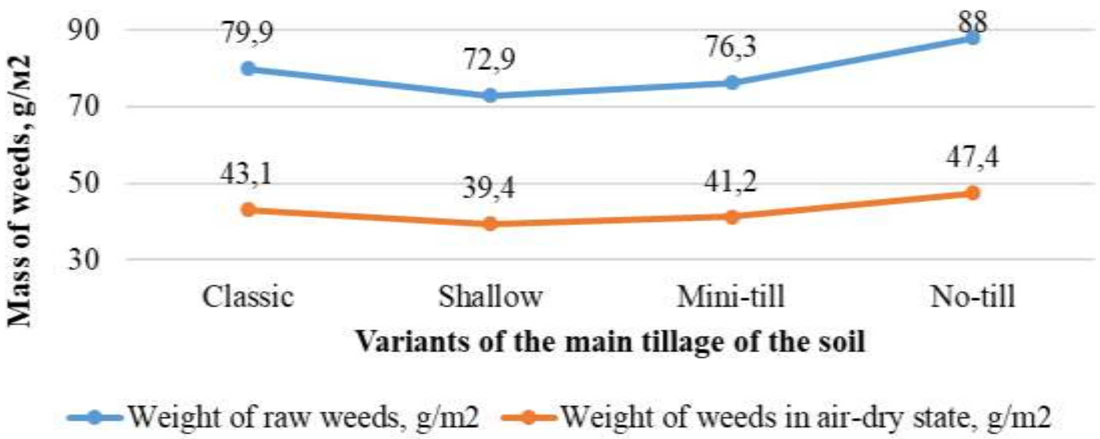
R&D $_{0.5}$ = 6.3 pcs/m^2

Rice. 1. Abundance of weeds in spring barley crops depending on tillage technology, average for 2021–2022

During the classic tillage for barley, the number of weeds increased by 2.4 pcs/m^2 compared to the Mini-till system. The maximum abundance of weeds was observed in the No-till technology variant, where their number was higher by 5.1 pcs/m^2 relative to soil cultivation using Mini-till technology and by 2.7 pcs./m^2 relative to the variant with classic primary tillage. With shallow tillage, where only the soil was loosened to a depth of 10-12 cm with a heavy disc harrow, the level of weed infestation of crops (37.4 pcs./m^2) was almost at the level of the No-till version. The difference between the variants of primary tillage mentioned above, in terms of the abundance of weed plants, was only 0.5 pcs./m^2 or 1.3%.

Studies conducted in irrigated agriculture show that the nature of competitive relations in field crops is significantly influenced by the number of weed plants per unit area and the degree of development of their vegetative mass (Vozhehova R.A. et al., 2020). As for the weight of weed plants in the damp and air-dry state, it should be noted that the highest values of these indicators were both on the variant with the highest number of them in spring barley crops, in particular the No-till system (88.0 and 47.4 g/m2, respectively), and against the background with the most favorable conditions for the formation of vegetative mass of segetal vegetation, in particular under classical primary tillage (79.9 and 43.1 g/m^2, respectively) and Mini-till technology (76.3 and 41.2 g/m^2, respectively) (Fig. 2).

The most negligible mass of both raw weed plants and in the air-dry state was characterized by the version of the experiment where shallow primary tillage was carried out. Compared to other variants of the experiment, the wet weight of weed plants in the air-dry state decreased by 3.4–15.1 and 1.8–8.0 g/m^2 or 4.7–20.7 and 4.6–20.3 %.



R&D 0.5 = 10.7 g/m2 (for the mass of raw weeds); R&D 0.5 = 5.4 g/m2 (for the mass of weeds in an air-dry state).

Rice. 2. **Weight of weeds in spring barley crops depending on tillage technology, average for 2021–2022**

The variants of the experiment also differed in the effect on the ratio of biological groups of weeds to their total number in spring barley crops (Table 2).

Table 2

Structure of biological groups of weeds in spring barley crops depending on the tillage system, average for 2021–2022

№	Basic tillage options	Total weeds, pcs./m^2	Including, %		
			Perennial	Annual monocots	Annual dicotyledonous
1.	Classic (control)	35,2	4,8	60,1	35,1
2.	Shallow	37,4	14,2	49,2	36,6
3.	Mini-till	32,8	4,8	55,9	39,4
4.	No-till	37,9	3,7	74,0	22,3
	NIR $_{0.5}$	6,3	–	–	–

Thus, the No-till variant of primary tillage characterized the maximum proportion of annual monocotyledonous weeds. Annual dicotyledonous species were relatively evenly represented in the structure of biological groups of weeds, except the No-till variant of primary tillage, where their share was the smallest. The most significant percentage of perennial species of segetal vegetation accounted for shallow tillage, 14.2%, and for other variants of the experiment, this figure was 3.7–4.8 %.

In the agrophytocenosis of spring barley, the juvenile type of weeds with the dominance of cereal weeds prevailed. The most common cereal weeds in the years of research were chicken millet (*Echinochloa crus-gali L.*), gray mouse (*Setaria glauka L.*). Annual dicotyledonous species were represented mainly by weeds such as white quinoa (*Chenopodium album L.*), Amaranthus retroflexus L., *Poligonum* convolvulus *L.* The most common perennial weeds were field bindweed (Convolvulus arvensis L.) and pink thistle (*Cirsium arvense L.*).

Discussion. Thus, the research results show that with the use of spring tillless primary tillage or No-till in the technology of growing barley, conditions are created to improve the moisture supply of crops both at the time of sowing and before harvesting, compared to classical tillage. The results obtained are consistent with the data of the experiments of the Kharkiv NAU. V. V. Dokuchaev, according to which it was noted that for the cultivation of spring barley according to the No-till system, the moisture content in the arable layer of soil at the time of harvesting exceeded the control by 6.9 mm or 25.9 % (Syromiatnykov Yu. M. 2020).

As for weed infestation, the research results show that during spring barley cultivation using the Mini-till technology, the least number of weed plants vegetated in the crops. Compared to other experiment variants, their number was lower by 7.3–15.5%. Scientific research has established that the first and most crucial link in the primary tillage system is stubble plowing. With the help of this technological operation, vegetative plants and weeds are destroyed, and the proper conditions for germinating their seeds are formed. With sufficient moisture supply of the sowing layer, stubble plowing provokes the germination of about 40% of fresh weed seeds and significant reserves from previous years (Pavlichenko A.D., 2018).

It should be noted that the highest level of weed infestation of crops was with No-till technology. Tillage ensured a decrease in the number of weeds on average during the growing season of spring barley by 7.1%, compared to No-till technology according to the classical scheme, which provided for plowing to a depth of 20-22 cm. According to O. I. Tsyliuryk and V. P. Shapka (2014), the decrease in the number of weeds against the background of moldboard tillage is due to the movement of seeds of segetal vegetation from the upper to the lower layers, which limits their germination from deeper horizons.

The difference was only 1.3% with shallow tillage, and the abundance of segetal vegetation in the crops was almost at the level of the variant with No-till technology. Studies by V.P. Borona et al. (2009) also indicate an increase in weed infestation of crops by 1.4–2.3 times, with no-till tillage. According to experimental data obtained in Right-Bank Ukraine, it was found that the highest level of weed infestation at the time of harvesting spring cereal crops was formed against the background of carrying out direct sowing. Thus, in the variant mentioned above, the abundance of segetal vegetation was higher by 27.8% compared to the variant where shelf cultivation was carried out to a depth of 20–22 cm and by 19.8%, according to the variant where the technology provided for only disking at 6–8 cm (Behei S. S., et al., 2020). Similar research results were obtained in the experiments of O. M. Khilnitsky and co-authors (2007). S. P. Tanchyk, Y. Mykolenko (2016) believe that the main reason for the increase in the number of weed plants in field crops before harvesting, using No-till technology, is the presence of mulch from plant residues on the soil surface, which prevents the germination of weed seeds, as it leads to a decrease in soil temperature, which in turn inhibits the germination and emergence of seedlings of segetal vegetation at the initial stages of growth. However, with stable warming of the topsoil, the number of weeds in crops increases.

Studies have found that, regardless of the technology of primary tillage, the structure of biological groups of weeds was dominated by annual monocotyledonous and dicotyledonous species. As for perennial weeds, there was an increase in their share by 2.9–3.8 times compared to other variants of the experiment, only with shallow tillage. In the experiments of Y.P. Manko, the dominance of one- and two-year-old weeds during plowing and the increase in weed infestation by perennial species during flat-cut weeds were observed. tillage (Manko Yu. P., 1991). M. M. Ptashnik, S. V. Dudnyk, F. Y. Bruhal, N. E. Borys (2021) believe that rational tillage plays a significant role in managing the level of weed infestation of agrocenoses. It should provide a high anti-weed effect when favorable conditions are formed for the growth of the ability of agrocenoses to self-regulate the presence of segetal vegetation in crops with a decrease in its share.

Conclusions:

1. Due to the No-till system, the accumulation of moisture in autumn-winter precipitation improves, and a higher content is formed when sowing the crop.

2. The lowest level of weed infestation of spring barley crops (32.8 pcs./m2) is ensured by Mini-till technology, which involves stubble plowing to a depth of 6-8 cm and direct sowing of the crop.

3. Cultivation of crops using No-till technology led to the formation of the highest level of weed infestation. The increase in the number of weeds, compared to other variants of primary tillage, was 1.3–15.6%.

4. The classical method of tillage for barley, which provided for plowing to a depth of 20-22 cm, ensured a decrease in weed infestation of crops compared to the option of minimum tillage and No-till technology, by 5.9 and 7.1 %, respectively

5. Studies did not reveal an evident influence of primary tillage methods on the structure of biological groups of weeds; annual monocotyledonous and dicotyledonous species dominated in spring barley crops.

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