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OPTIMAL PARAMETERS OF SOIL WATER REGIME DURING CROPS CULTIVATION ON DRAINED LANDS

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Abstract. *The results of the research on determining the optimal parameters of the soil water regime during cultivation of promising agricultural crops on drained lands under modern conditions of farm management and climate changes are presented. It was found that the weather conditions of the vegetation seasons of 2022, 2023, and 2024 on the drained lands of the reclamation system of the Sarny Research Station of IWP&LR of NAAS were very contrasting: periods with excessive precipitation alternated with their prolonged absence, and significant fluctuations in temperature indicators were noted. The assessment of the impact of water regime regulation on the yield of spring wheat, winter rapeseed, grain corn, and soybeans was carried out using an unified fertilization system, applying the same rates of mineral fertilizers, and with an identical plant protection system on the background of 3 options for regulating the groundwater level (GWL) – 75–80 cm, 85–100 cm, and 100–140 cm. On the background of the indicated options for regulating the GWL, the lowest moisture reserves were observed in the summer period, and in areas adjacent to the studied territory, where the GWL was not regulated, moisture reserves in the summer in the soil layer of 0–30 cm dropped to the critical values (8–9 mm). On the experimental plots during this period, thanks to timely sluicing, soil moisture reserves did not fall below 47–50 mm. Based on the analysis of the dynamics of dry mass of growth of spring wheat, winter rapeseed, grain corn, and soybeans according to the options for regulating the soil water regime, the optimal parameters of the soil water regime (GWL, moisture, and moisture reserves) were determined for the phenological phases of the studied crops. It was found that the highest yield increase due to the optimization of moisture supply was observed in spring wheat and soybeans. Spring wheat is the most sensitive to soil water regime and reacts more actively than other crops to a decrease in GWL. The regulation of the GWL contributed to an increase in the yield of spring wheat by 41.6 %, winter rapeseed by 18.3 %, grain corn by 32.5 %, and soybeans by 44,8 %.*

Keywords: *drainage system, drained lands, climate changes, soil water regime, optimal water regulation parameters*

Relevance of the research. Modern agricultural production is under the direct influence of climate changes, which is especially felt in the drainage zone, where significant changes have recently occurred in the structure of areas under the crops. Therefore, effective agricultural production is possible only if producers are ensuring the necessary conditions that will allow adapting to climate changes [2, 3, 14].

The current structure of sown areas is subjected to both climate changes and market conditions, which dictate the cultivation of economically attractive crops. Climate changes has made adjustments to the technological flowcharts of crops cultivation and the crop rotation of

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agricultural enterprises. Such economically attractive crops as corn, sunflower, soybeans, and rapeseed gradually became the main ones, and crops of traditional specialization (long-staple flax, sugar beet, rye, oat, etc.) in the drainage zone ceased to be a priority.

At the same time, the formation of new conditions for agricultural crops cultivation and changes in the use of drained lands requires the expansion of the functional tasks of drainage systems, primarily regarding the optimization of water regulation in the humid zone [4, 5, 10].

The presence of a clear trend towards further increase in the aridity of the climate in Ukraine and, accordingly, the formation of conditions not only for overmoistening of soils, but also for their moisture deficit, during the vegetation season, requires the restoration and expansion of water regulation capabilities on drained lands, which is becoming a mandatory and defining component of modern technologies for the production of economically attractive agricultural crops.

Analysis of recent research and publications shows that currently in the drainage zone due to the impact of climate change and at the same time the demand of external and internal markets for certain types of agricultural products, there has been a shift in crop growing areas and significant changes in the production structure of the areas under the crops [3, 8, 9].

From 1990 to 2021, the area under sunflower increased by 4.1 times; under corn for grain – 4,5 times; under rapeseed – 14,6 times; under soybeans – 11,4 times, making their products the basis of export. At the same time, from 42 to 83 % of the areas under these crops are located in the Forest-Steppe and Polissya zones [7].

The total area of cereals and leguminous crops in Ukraine on average has remained almost unchanged over the past five years compared to 1990, but the share of their production by natural and climatic zones has changed. Due to the increase in productivity, 65 % of cereals is grown in Polissya and the Forest-Steppe, although the percentage of areas under those crops in these regions is 53 % [6, 7].

As for the cultivation of corn for grain, today in the Forest-Steppe and Polissya this crop is becoming the main one along with winter wheat [9]. Due to climate changes, corn for grain is now successfully grown in the Polissya zone.

The trend of rapeseed cultivation is confirmed by official statistics: in recent years, the area under rapeseed in Ukraine has increased by 66,7 %: from 0,8 million hectares in 2017 to 1,2 million hectares in 2022, and the leaders in terms of yield are Volyn, Khmelnytskyi, Ternopil, Rivne, and Vinnytsia regions [15, 16].

At the same time, in the last 5 years, there has been a significant increase in soybean yield (2,05–2,64 t/ha). The main areas of soybean cultivation are Zhytomyr, Ternopil, Khmelnytskyi, and Kyiv regions [1, 16].

Considerable attention is paid to the study of soil water regime during the cultivation of sunflower, winter wheat, soybeans, and corn. The researches were mainly conducted within the Southern Steppe, Right-Bank Steppe, and Forest-Steppe of Ukraine [11–13, 17]. The conducted studies have established that soil water regime is formed mainly due to the weather conditions, the amount of moisture reserves in soil, the amount and intensity of precipitation throughout the year, including during the vegetation season. To a large extent, the soil water regime depends on the morphological characteristics of hybrids, the density of the crops, sowing dates, and cultivation technologies. Comprehensive studies on determining the parameters of soil water regime in modern farm management conditions in the area of operation of drainage systems have almost not been conducted.

Thus, taking into account the requirements of modern agricultural production regarding the need to ensure the soil water regime in accordance with the current crop rotation, the problem of determining optimal water regulation parameters on drained lands for cultivation of promising agricultural crops under the modern conditions of farm management and climate changes is relevant.

The aim of the work is to determine the optimal parameters of soil water regime during the cultivation of promising agricultural crops on drained lands under the current farm management conditions and climate change.

The object and research methodology. The research was conducted on drained lands of the reclamation system of the Sarny Research Station (SRS) of IWP&LR of NAAS, which is located in the western, the most swampy part of Ukrainian Polissya. The reclamation system includes the main canal and a second-order main canal, which flows into the first-order main canal in the eastern part of the massif. The main canals are laid through the lowest points of the swamp massif and the greatest depths of peat. The collecting canals are laid perpendicular to the main canals. Their length is 1–2 km. The distance between the collecting canals is within 1–2 km, depending on the slope of the surface. Upland trapping canals are used to intercept surface and groundwater. The length of the open network of canals is 27,213 km, the main channel (MK-2) and other conducting canals – 18,803 km, and the regulating channels – 8,410 km. In total, the system includes 36 open canals, two of which are the main ones. The length of the closed network is 107,623 km, of the collectors – 11,56 km, of the drains – 96,063 km. Closed drainage network (pottery, plastic, fiberglass, fascia drainage) serves to drain 289 hectares with 327 mouths in total. The system has 49 hydraulic structures and one automobile bridge. The agricultural lands consist of 355 hectares of lowland peat soils, and 115 hectares of mineral soils.

The basis of methodological approaches to conducting field research is the use of generally accepted methods of conducting meteorological observations (temperature, precipitation), determining the groundwater level (GWL), soil moisture, and biometric characteristics (occurrence of main phenological phases, yield) during the vegetation season. The scheme of experimental research on drained lands of the reclamation system of the Sarny Research Station (SRS) of IWP&LR of NAAS is shown in Fig. 1.

Research results. Analysis of weather conditions on drained lands of the SRS was carried out based on the observation results made by the weather station of SRS of IWP&LR of NAAS, which has been operating since 1946. The weather station is located directly near the research sites, which makes it possible to objectively assess the influence of the main meteorological factors on the growth and productivity of agricultural crops (Fig. 2).

During the vegetation season of 2022 there was 244,3 mm of rainfalls, which is 155,7 mm less than the long-term norm, in 2023 there was 233,3 mm, which is 166,7 mm less than the long-term norm, in 2024 there was 344,0 mm, which is 56 mm less than the average long-term norm. Precipitation during the 2022, 2023, and 2024 vegetation seasons was extremely uneven. During the summer months, the monthly amount was generally less than the long-term norm.

It should be noted that in recent years there has been a steady trend towards a decrease in precipitation during the summer period.

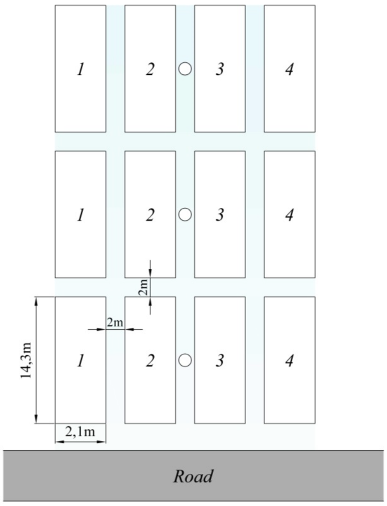

Fig. 1. Scheme of field research on experimental plots of the SRS melioration system, where the following were grown:

1 – winter rapeseed, 2 – corn, 3 – spring wheat, 4 – soybeans

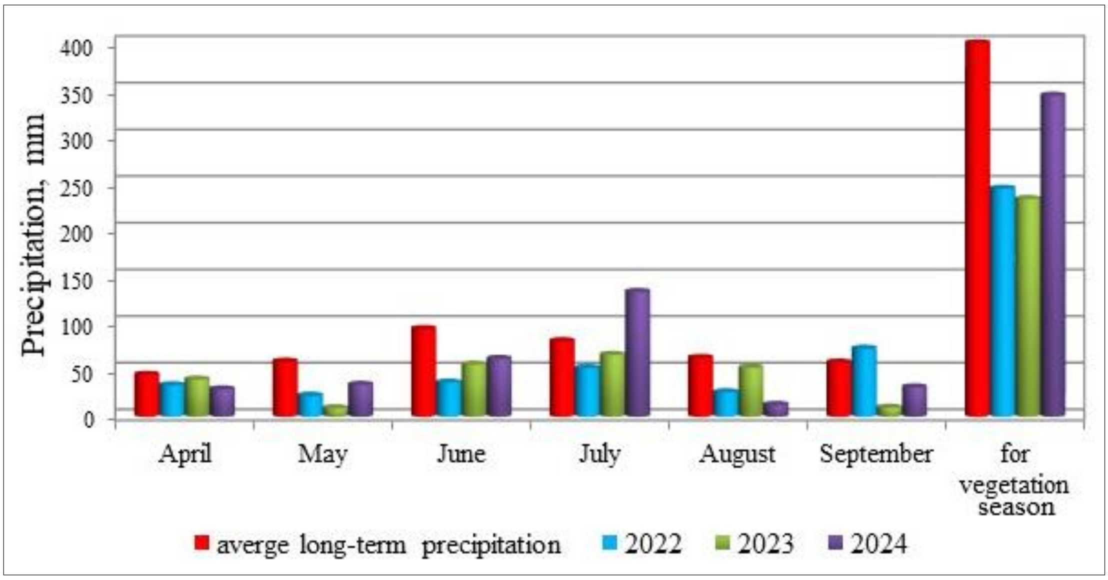

Fig. 2. Precipitations during the vegetation seasons of 2022, 2023, and 2024, SRS melioration system

The temperature regime during the vegetation season of 2022 was characterized by a long and cold spring. May was especially cold, when the average monthly air temperature was 1,4 °C below norm. During June, July, and August, the average monthly temperature was higher by 3,2; 1,2, and 2,6 °C, respectively. At the same time, September was abnormally cold, with the average monthly temperature being 2,6 °C below the long-term norm.

The temperature regime during the vegetation season of 2023 was characterized by a cold period at the beginning of the vegetation season, when the average monthly air temperature in April was 0.6 °C below the long-term norm. The temperature regime was close to the long-term norm during May and June. The average monthly air temperature was significantly higher during July and September.

The temperature regime during the vegetation season of 2024 was characterized by higher average monthly air temperatures comparing to the average long-term indicators. July, August, and September were especially anomalously warm – the average monthly air temperature was higher by 3,9, 3,8, and 4,3 °C compared to the long-term norm (Fig. 3).

Hydrothermal conditions for the active vegetation period on drained lands of the SRS are presented in Table 1.

As can be seen from the data in Table 1, the duration of the active vegetation period (the period of time with an average daily air temperature above 10 °C) for the research period 2022–2024 varied within the range of 146–156 days, and the sum of active temperatures above 10 °C for the same period was 2401–3014 °C,

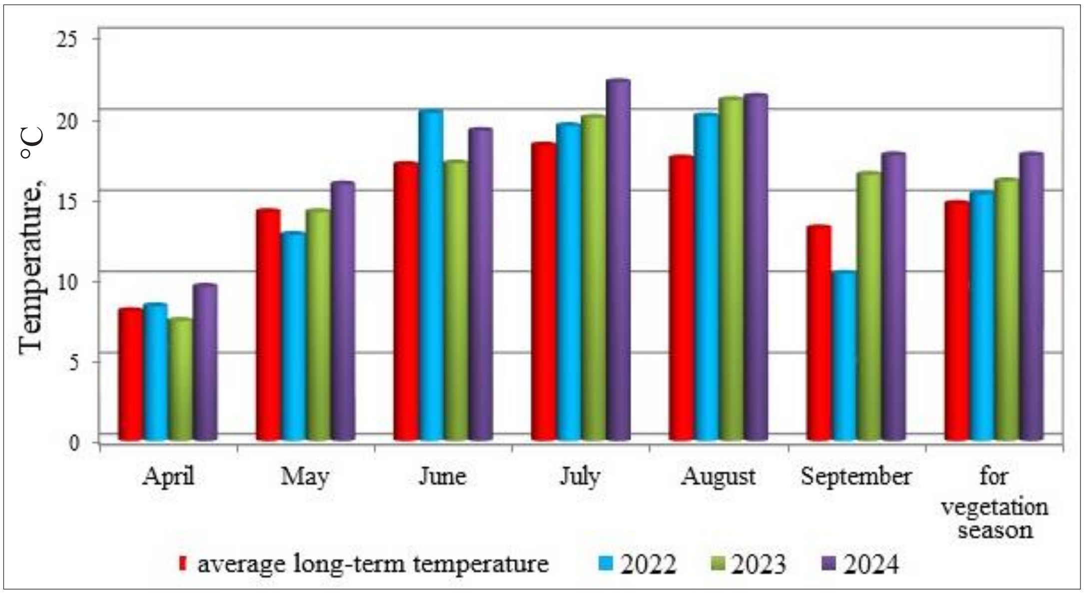

Fig. 3. Average monthly air temperature during the 2022, 2023, and 2024 vegetation seasons, SRS melioration system

1. Hydrothermal conditions for the active vegetation period on the drained peat swamp massif of the Sarny Research Station during 2018–2024.

Years	Dates		Amount of days	Σt>10 °C	Σp, mm	HTC	T average, °C	Σt>15 °C
	beginning	the end						
2018	8.04	24,09	169	3062	246	0,80	18,1	2545
2019	23,04	17,09	147	2643	307	1,16	18,0	2356
2020	28,04	15,10	170	2857	342	1,20	16,8	2178
2021	10,05	17,09	130	2431	220	0,90	18,7	2066
2022	24,04	17,09	146	2401	200	0,76	16,4	1871
2023	11,05	7,10	149	2712	187	0,69	18,2	2447
2024	11,05	30,09	156	3014	274	0,91	19,3	2853
LTN*	25,04	30,09	158	2498	302	1,23	16,3	2356

*long-term norm.

the hydrothermal coefficient was 0,69–0,91, and the average monthly air temperature was 16,4–19,3 °C.

Thus, using the generally accepted ranking of the hydrothermal coefficient, it can be said that the vegetation seasons of 2022–2024 can be classified as slightly arid in terms of moisture conditions, which is uncharacteristic for the Western Polissya zone. This is fully consistent with the statements of other scientists who indicate that the climate change in the Western Polissya zone develops towards the aridization of climate [6–7].

The considered agricultural crops (spring wheat, winter rapeseed, corn for grain, and soybeans) were studied on the background of 3 options for regulating the groundwater level (GWL). The soils on the experimental plots are sod-podzolic light loam. A unified fertilization system was used in all 3 options, which provided for the application of the same rates of mineral fertilizers and an identical system of fungicidal and insecticidal plant protection allowing to assess the impact of water regime regulating on the yield of the studied crops.

Before the experiment started, the experimental plot was limed at a rate of 5 t/ha of $CaCO_3$. In the experiment, the following rates of mineral fertilizers were applied to each crop: winter rapeseed and spring wheat – $N_{60}P_{60}K_{60}$ + seed treatment with the phosphorus-mobilizing product Rice Pi; soybeans – $N_{35}P_{60}K_{60}$ + seed treatment with the phosphorus-mobilizing product Rice Pi and seed inoculation with the product Rhizofix; corn – $N_{120}P_{120}K_{120}$ + seed treatment with the phosphorus-mobilizing product Rice Pi. Also, foliar feeding with a 5 % solution of Urea and a 3 % solution of magnesium sulfate was carried out twice during the vegetation season.

Thus, in the technological flowchart of crop cultivation, we created an opportunity to highlight the importance of the water regime in the formation of the yield of cultivated crops and to determine their sensitivity to its formation. The regulation of water regime was carried out using sluicing.

During the vegetation season of 2023, observations of soil moisture and moisture reserves in the 0–30 cm soil layer were conducted at the experimental plots (Fig. 4, 5).

At the site No. 1, the GWL during the active vegetation period (May-August) was within 100–140 cm below the soil surface. The moisture in the arable soil layer (0–30 cm) during this period was observed within 14,1–66,2 % of the full soil moisture capacity, and the moisture reserves were 25,1–99,0 mm.

At the site No. 2, the GWL during the active vegetation period (May-August) was within 85–100 cm below the soil surface. The moisture in the arable soil layer (0–30 cm) during this period was observed within 18,1–68,6 % of the full soil moisture capacity, and the moisture reserves were 30,8–106,7 mm.

At the site No.3, the GWL during the active vegetation period (May-August) was within 75–85 cm below the soil surface. The moisture in the arable soil layer (0–30 cm) during this period was observed within 23,4–73,3 % of the full soil moisture capacity, and the moisture reserves were 46,7–133,9 mm.

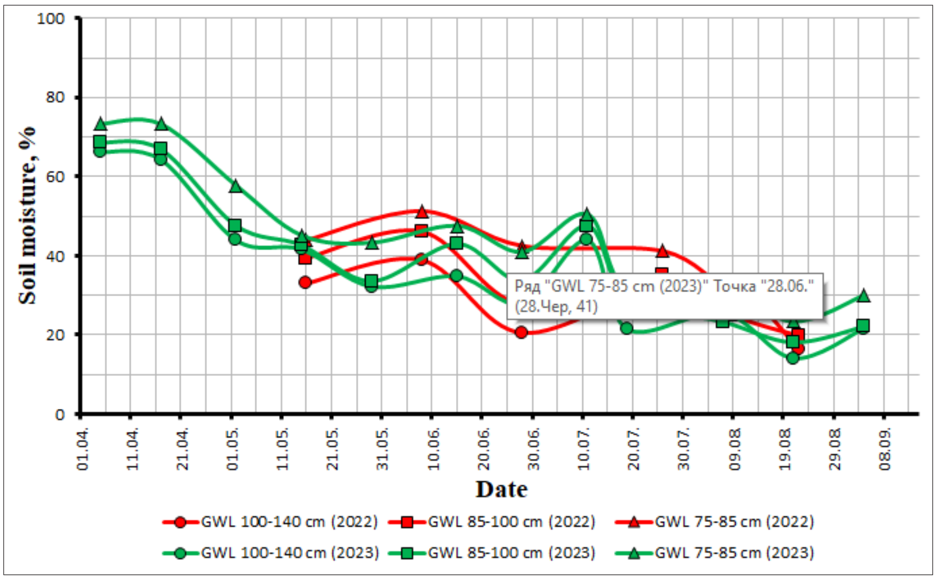

Fig. 4. Dynamics of moisture in the 0–30 cm soil layer within the experimental plots in 2022 and 2023, SRS melioration system

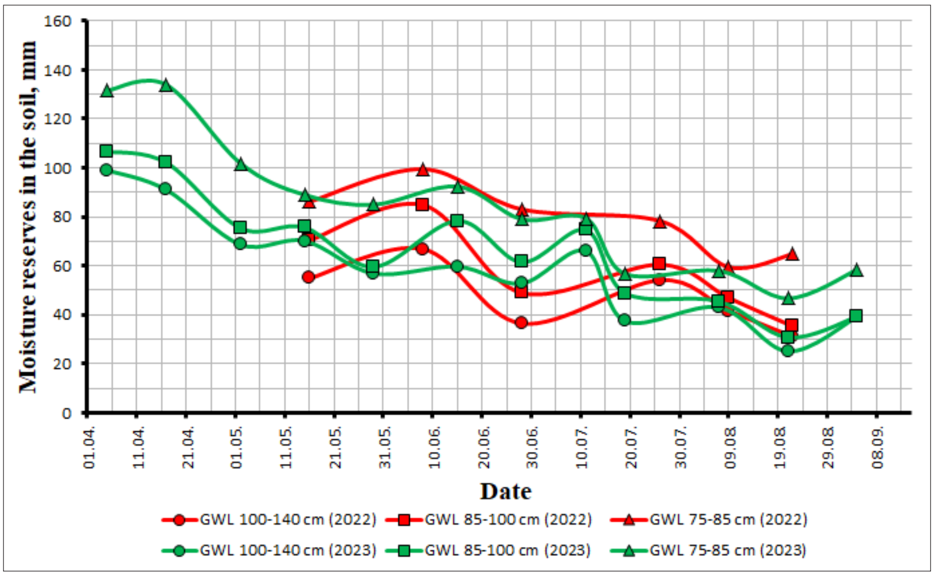

Fig. 5. Dynamics of moisture reserves in the 0–30 cm soil layer within the experimental plots in 2022 and 2023, SRS melioration system

Thus, the GWL in all three variants was located at a depth of maximum 140 cm below the soil surface at plot No. 1, 100 cm at plot No. 2, and 85 cm at plot No. 3. At the same time, the root system of all studied crops at plots No. 2 and No. 3 reached groundwater. The depth of penetration of the corn root system into the soil at plot No. 1 was more than 2 meters.

The lowest moisture reserves were observed during the summer period. In the areas adjacent to the studied territory, where the GWL were not regulated, moisture reserves during the summer period in the 0–30 cm soil layer dropped to critical values and were less than 8–9 mm. At the experimental plots in the same period, thanks to the timely sluicing, soil moisture reserves did not drop below 47–50 mm.

The optimal parameters of the soil water regime (GWL, soil moisture, and soil moisture reserves) during spring wheat, winter rapeseed, corn for grain, and soybeans cultivation were determined based on the analysis of the dynamics of the increase in dry mass of the specified crops by the phases of their development on the background of 3 options for regulating the level of groundwater. As our studies have shown, soybeans and corn grow and develop quite slowly at the beginning

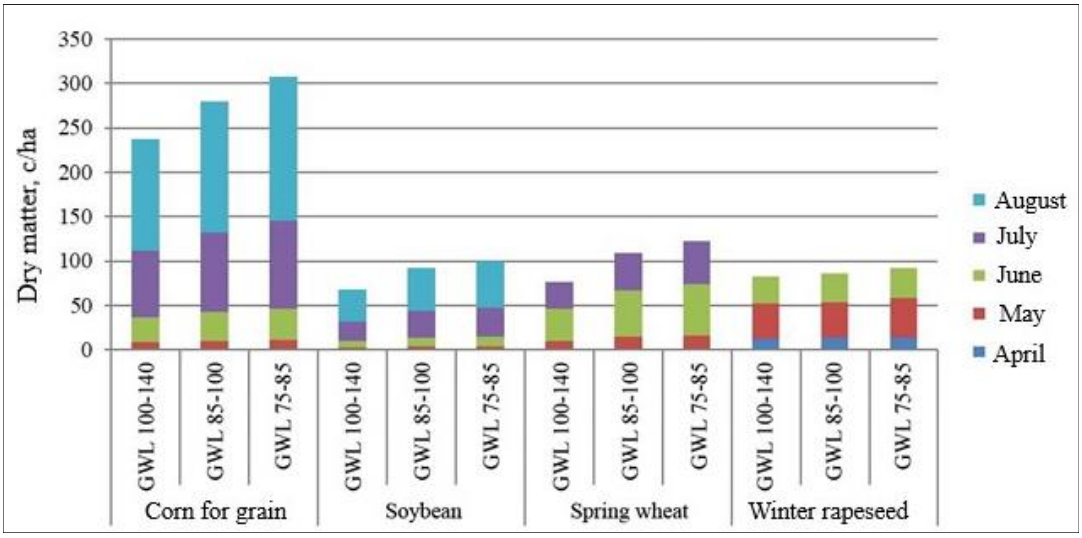

Fig. 6. Dynamics of dry mass increase of promising crops under optimal moisture supply by months of the vegetation season, c/ha

of the vegetation season (from May to the second ten days period of June). Starting from mid-June, growth accelerates significantly and the maximum values of dry mass increase are observed in the second half of the vegetation season (July-August).

The dynamics of the increase in dry mass of spring wheat, winter rapeseed, corn for grain, and soybeans under optimal moisture supply over the ten days period of the vegetation season is shown in Fig. 6.

The optimal parameters of the soil water regime during spring wheat, winter rapeseed, corn for grain, and soybeans cultivation are presented in Table 2.

The yield of cultivated crops on the background of 3 options for regulating the groundwater level on sod-podzolic light loam soils is presented in Table 3 and Figures 7–9.

The analysis of the yield of the studied crops shows that in the context of the 3-year research cycle, depending on the groundwater levels.

2. Optimal parameters of soil water regime during winter rapeseed, spring wheat, corn for grain, and soybeans cultivation

№	Indicator	Crop			
		Winter rapeseed	**Spring wheat**	**Corn for grain**	**Soybean**
1	Critical period of moisture availability	3rd ten days period of April – 1st ten days period of June	3rd ten days period of May – 1st ten days period of July	3rd ten days period of June – 2nd ten days period of August	1st ten days period of July – 2nd ten days period of August
2	The beginning of vegetation	1st ten days period of April	1st ten days period of May	2nd ten days period of May	2nd ten days period of May
	Dry mass increase per ten days period, c/ha	0,8–0,9	0,8–1,2	2,4–3,1	0,7–1,0
	GWL, cm	50–60	65–70	70–90	70–90
	Soil moisture, % of full soil moisture capacity	66–73	44–58	42–45	42–45
	Moisture reserves in a layer of 30 cm, mm	990–1320	690–1020	700–890	700–890
3	Beginning of the period of intensive vegetative mass increase	3rd ten days period of April	3rd ten days period of May	3rd ten days period of June	1st ten days period of July
	Dry mass increase per ten days period, c/ha	8,3–9,3	6,2–9,8	13,2–17,2	5,8–8,4
	GWL, cm	60–70	90–100	105–115	105–120
	Soil moisture, % of full soil moisture capacity	64–73	32–43	28–41	44–51
	Moisture reserves in a layer of 30 cm, mm	910–1340	570–850	530–790	660–790
4	Mid-period of intensive vegetative mass increase	2nd ten days period of May	2nd ten days period of June	3rd ten days period of July	3rd ten days period of July
	Dry mass increase per ten days period, c/ha	12,8–14,4	12,1–19,3	30,0–39,0	8,6–12,6
	GWL, cm	70–90	110–115	120–125	120–125
	Soil moisture, % of full soil moisture capacity	42–45	35–48	26–31	26–31
	Moisture reserves in a layer of 30 cm, mm	700–890	600–920	430–580	430–580
5	Period of maximum vegetative mass increase	1st ten days period of June	1st ten days period of July	2nd ten days period of August	2nd ten days period of August
	Dry mass increase per ten days period, c/ha	24,8–27,8	17,8–28,4	56,9–74,0	16,3–23,9
	GWL, cm	100–110	115–120	110–115	110–115
	Soil moisture, % of full soil moisture capacity	35–48	44–51	14–23	14–23
	Moisture reserves in a layer of 30 cm, mm	600–920	660–800	250–470	250–470

3. Crops yield subject to the GWL on sod-podzolic light loam soils, vegetation seasons 2022, 2023, and 2024

Crop	**Variety/hybrid**	**Yield, t/ha**			**Hip $_{0,5}$ t/ha**
		GWL, cm			
		100–140	**85–100**	**75–85**	
2022					
Winter wheat	Kitri	5,35	5,89	6,41	0,28
Oat	Zubr	4,34	4,91	5,49	0,16
Corn for grain	DK 315	14,1	17,39	18,33	0,52
Soybean	Astor	2,81	3,63	4,11	0,22
2023					
Winter wheat	Kitri	3,31	4,94	5,98	0,23
Winter rapeseed	Atlant	3,44	3,63	4,07	0,19
Corn for grain	Foton	9,96	12,44	14,23	0,47
Soybean	Astor	2,52	3,44	3,81	0,27
2024					
Winter wheat	Kitri	2,60	2,93	3,54	0,19
Oil radish	Lybid	1,42	1,76	2,01	0,13
Corn for grain	R 8834	11,73	12,76	14,87	0,45
Soybean	Astor	2,49	3,03	3,41	0,24

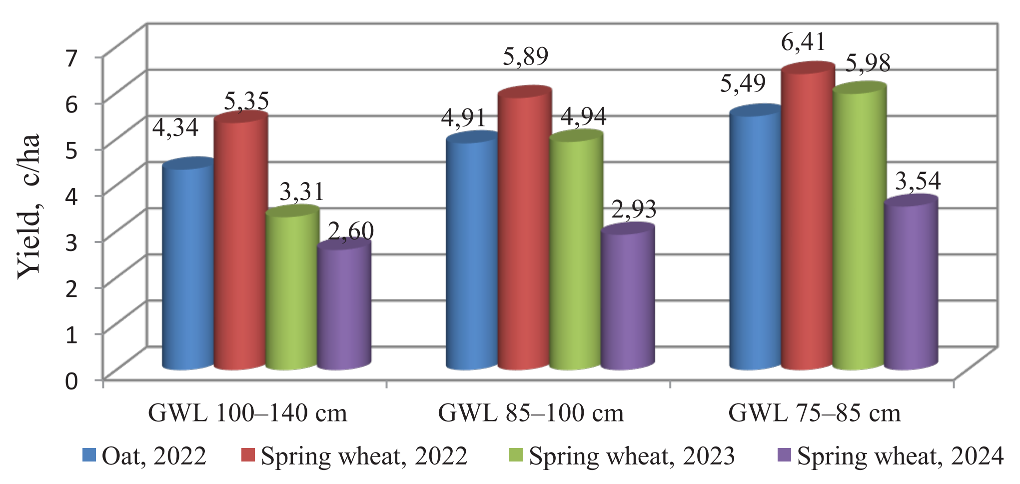

Fig. 7. Yields of spring wheat of the Kitri variety and oat of the Zubr variety subject to the GWL, SRS melioration system

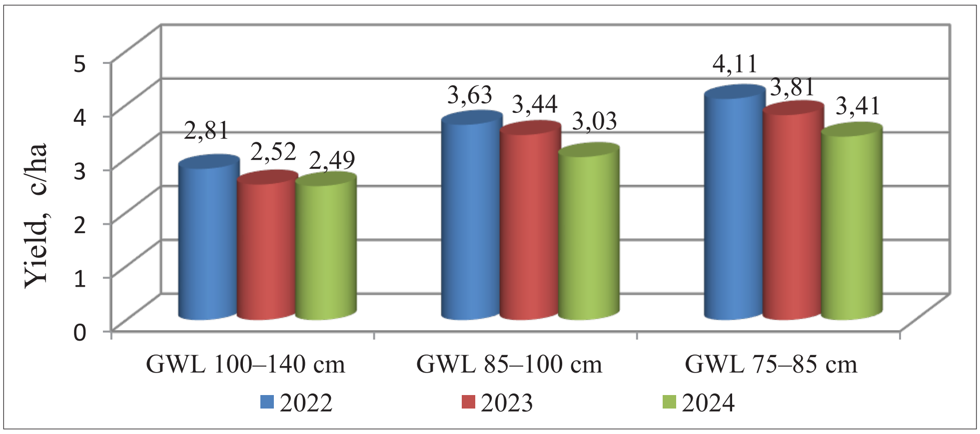

Fig. 8. Yield of soybean variety Astor subject to the GWL, SRS melioration system

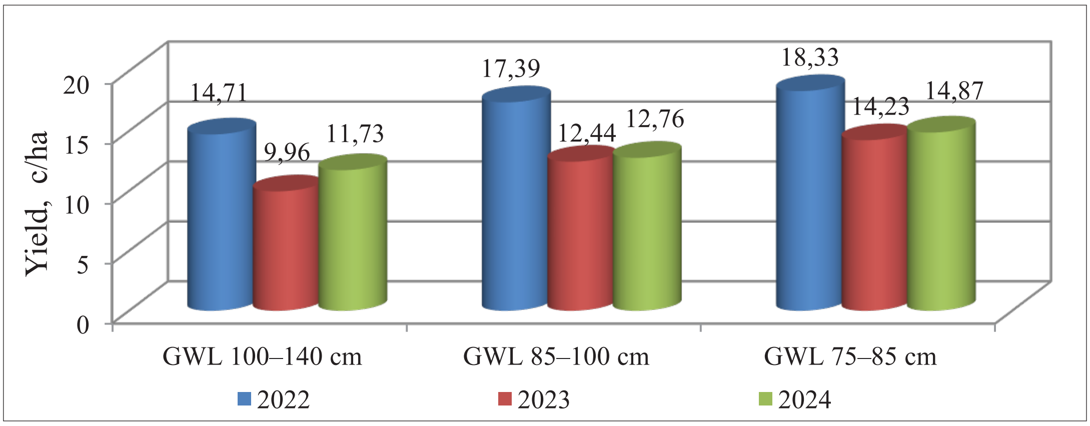

Figure 9. Corn yield subject to the GWL, SRS melioration system

The yield of winter wheat varied in the range of 2,60–6,41 t/ha, of corn – in the range of 9,96–18,33 t/ha, and of soybean – in the range of 2,49–4,11 t/ha. In general, it should be noted that the high yield of corn during the 3-year research cycle indicates the prospects for its cultivation in the Western Polissya zone. This is also confirmed by the results obtained at the Agricultural Polygon of LLC “Zakhidagroprom” in the north of the Rivne region, where under production conditions the yield of individual corn hybrids was over 14 t/ha [18].

It should also be noted that in 2024, compared to the previous 2022 and 2023, during the experiment it was obtained a significantly lower yield of spring wheat – 2,60–3,54 t/ha, which is associated with a prolonged air drought observed in the period from the 3rd ten days period of June to the 2nd ten days period of July (maximum daily air temperatures during this period exceeded 30 °C). Prolonged air drought during the period of intensive spring wheat grain filling led to the formation of grain with a low mass of 1000 seeds, which led to a significant decrease in yield.

As the research results show, over a 3-year research cycle, the difference in yield between the plot where the GWL was at the depth of 100–140 cm below the soil surface and the plot with the GWL at 85–100 cm was 0,84 t/ha for spring wheat, 2,27 t/ha for corn for grain, and 0.76 t/ha for soybeans. The yield increase was 22,4 % for spring wheat, 19,0 % for corn for grain, and 29.1 % for soybeans.

The highest yields values were obtained on plot No. 3, where the GWL during the vegetation season was within the optimal range for the studied crops (75–85 cm below the soil surface). The difference in yields between the plot with the GWL at 100–140 cm was 1,56 t/ha for spring wheat, 3,88 t/ha for corn for grain, and 1,17 t/ha for soybeans. Due to the regulation of the GWL, the yield increase was 41,6 % for spring wheat, 32,5 % for corn for grain, and 44,8 % for soybeans. That is, an increase in the GWL by 30–40 cm leads to a significant increase in crops yield.

The other crops (oat, winter rapeseed, and oil radish) were studied in this experiment only during one year. However, it was found that winter rapeseed was the least sensitive among them to the depth of groundwater levels. Thus, the difference in yield between the plot where the GWL was at the depth of 100–140 cm below the soil surface and the plot where the GWL was at the depth of 85–100 cm was 0,57 t/ha or 13,1 %, and between the plots where the GWL was at the

4. Crops yield subject to the GWL on sod-podzolic light loam soils, average for 2022, 2023, and 2024 vegetation seasons

Crop	**Yield, t/ha**			**Yield increase by the GWL options, cm**			
				t/ha		**%**	
	GWL, cm			**85–100 to 100–140**	**75–85 to 100–140**	**85–100 to 100–140**	**75–85 to 100–140**
	100–140	**85–100**	**75–85**				
Winter wheat	3,75	4,59	5,31	0,84	1,56	22,4	41,6
Soybean	2,61	3,37	3,78	0,76	1,17	29,1	44,8
Corn	11,93	14,2	15,81	2,27	3,88	19,0	32,5

depth of 75–85 and 100–140 cm – 1,15 t/ha or 26,5 %. The weaker response of winter rapeseed to the depth of groundwater levels is explained by the fact that the period of intensive accumulation of vegetation mass for this crop is April-May, when the soil has sufficient moisture reserves accumulated during the winter period.

Among the studied crops over the 3-year research cycle, the highest yield increase due to the optimization of moisture availability was observed in soybean and spring wheat. While analyzing the yield increase of the studied crops in terms of individual years, spring wheat turned out to be the most sensitive to moisture availability and reacted more actively than other crops to a decrease of the GWL due to a relatively weak root system compared to the rest of the studied crops.

Conclusions. It was found that the weather conditions of the vegetation seasons of 2022, 2023, and 2024 on the drained lands of the melioration system of the SRS of IWP&LR of NAAS were very contrasting: periods with excessive precipitation alternated with their prolonged absence. Significant fluctuations in temperature values were also noted.

On the background of the 3 options for regulating the GWL, the lowest moisture reserves were observed during the summer period. In the areas adjacent to the study area, where the GWL were not regulated, moisture reserves in the 0–30 cm soil layer during the summer dropped to critical values (8–9 mm). In the study areas during this period, due to timely sluicing, soil moisture reserves did not drop below 47–50 mm. Based on the analysis of the dry mass increase dynamics of spring wheat, winter rapeseed, corn for grain, and soybeans according to the options for regulating the soil water regime, the optimal parameters of the soil water regime (GWL, soil moisture, and moisture reserves) were determined for the phases of development of the studied crops.

The highest yield increase due to the optimization of moisture availability was observed for spring wheat and soybeans. Spring wheat is the most sensitive to soil water regime and reacts more actively than other crops to a decrease in the GWL. Regulation of the GWL contributed to an increase of the yield of spring wheat by 41,6 %, winter rapeseed by 18,3 %, corn for grain by 32,5 %, and soybeans by 44,8 %.

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ОПТИМАЛЬНІ ПАРАМЕТРИ ВОДНОГО РЕЖИМУ ҐРУНТУ ПРИ ВИРОЩУВАННІ СІЛЬСЬКОГОСПОДАРСЬКИХ КУЛЬТУР НА ОСУШУВАНИХ ЗЕМЛЯХ

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Анотація. *Наведено результати досліджень щодо визначення оптимальних параметрів водного режиму грунту при вирощуванні перспективних сільськогосподарських культур на осушуваних* *землях у сучасних умовах господарювання та змін клімату. Встановлено, що погодні умови вегетаційних періодів 2022–2024 рр. були дуже контрастними: чергувалися періоди з надмірною кількістю опадів, тривалою їх відсутністю та відмічалися значні коливання температурних показників. Досліджувані сільськогосподарські культури (яра пшениця, ріпак озимий, кукурудза на зерно та соя) вивчали на фоні 3-х варіантів регулювання рівня ґрунтових вод (РҐВ). У технологічній схемі вирощування культур створена можливість виокремити значення водного режиму у формуванні урожайності вирощуваних культур та визначити їх чутливість до його формування. Регулювання водного режиму здійснювали за допомогою шлюзування. На фоні регулювання рівня ґрунтових вод (РҐВ) найнижчі показники вологозапасів відмічались у літній період, а на прилеглих до досліджуваної території ділянках, де РҐВ не регулювався, вологозапаси влітку у шарі ґрунту 0–30 см опускались до критичних значень (8–9 мм). На дослідних ділянках у цей період завдяки вчасно проведеному шлюзуванню вологозапаси грунту не опускалися нижче 47–50 мм. На основі аналізу динаміки наростання сухої маси пшениці ярої, ріпаку озимого, кукурудзи на зерно та сої за варіантами регулювання РҐВ визначено оптимальні параметри водного режиму грунту (РҐВ, вологість та вологозапаси) за фазами розвитку досліджуваних культур. Визначено, що найвищий приріст урожайності за рахунок оптимізації вологозабезпечення відмічено у пшениці ярої та сої. Пшениця яра є найбільш чутливою до водного режиму ґрунту і активніше інших культур реагує на зниження РҐВ. Регулювання РҐВ сприяло зростанню урожайності ярої пшениці – на 41,6 %, озимого ріпаку – на 18,3 %, кукурудзи на зерно – 32,5 % та сої – 44,8 %.*

Ключові слова: *дренажна система, осушувані землі, зміни клімату, водний режим ґрунту, оптимальні параметри водорегулювання*