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PHYTOCENOTIC AND CHEMICAL METHODS AFFECTING WEEDINESS OF WINTER WHEAT

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The article summarizes the research results on crops and weeds interaction, and the herbicide effect on weediness and their harmfulness in agrophytocenoses of winter wheat. A group of dicotyledonous weed species (89%) prevailed in the crops. Eliminating the competitive strain between plants by using the herbicide Ellay Super has had a positive impact on winter wheat vegetation. All experimental varieties responded by increasing both the total number of stems and the number of productive stems. A greater number of stems were formed in the areas where the herbicide was applied in autumn than when it was applied in spring for 2 experimental years. The share of productive stems from the total number ranged from 88.6% to 90.4%. There is a sharp decrease weediness level after the third stage of the crop's cultivation (stem emergence) because the above-ground winter wheat shades and suppresses segetal vegetation. All experimental wheat varieties demonstrated a highly competitive ability to weeds, i.e., the index was above 80%. The mass of segetal vegetation was insignificant, i.e., 19-24 g/m^2. However, their mass was 105-148 g/m^2 on areas without crops. The lowest weed pressure index was in the Shestopalivka variety (80.4%), and the highest one was observed in the Legenda Bilotserkivska variety (83.8%) for two experimental years.

Autumn application of Ellay Super herbicide provided better starting conditions for growth and development for all experimental varieties of winter wheat than spring application. It also allowed cultivated plants to realize their genetic potential and form a high yield level. The increase in grain yield was from 0.7 t/ha in the Karmeliuk variety to 0.73 t/ha in the Legenda Bilotserkivska variety. The highest yields (5.92 t/ha and 5.67 t/ha) were obtained on the plots of winter wheat of the Legenda Bilotserkivska variety.

***Keywords**: weeds, winter wheat, competition, suppression of growth processes, herbicide.*
Table 3. Fig. 1. Lit. 19.

Introduction. Our state traditionally has been called the breadbasket of Europe for ages. Nowadays, growing high and stable crops of winter wheat is an important task of the agricultural sector of Ukraine. In the conditions of martial law and the energy crisis it is still necessary to solve the problem of supplying quality food to Ukrainians and residents of other countries.

The presence of segetal vegetation in winter wheat agrophytocenoses worsens the crops cultivation leading to their productivity decrease. Thus, it is necessary to implement scientific research regarding varietal agrotechnics of winter wheat and the specifics the use of herbicides in its crops in order to increase the productivity sustainability and competitiveness of crop phytocenoses and increase the profitability indicators. The structure of crop rotation, the predecessor effect, the presence of weed seeds in the soil play a vital role in regulating the weediness. Competitive interaction between plants begins at the seed germination phase, and we can record their results quantitatively and qualitatively later. It is well-known that weeds and crops need the same elements and life factors. Weeds reduce crop yield and worsens its quality.

Therefore, during the growing season of winter wheat, farmers should support beneficial organisms of the coenosis and create unfavorable conditions for the existence of harmful organisms by their actions. A significant amount of scientific information has been accumulated regarding the suppression of crops by weeds. However, crops can also suppress segetal vegetation. The competitive properties of winter wheat are high. However, in the conditions of different agrotypes of weeding its modern varieties can show their competitive pressure in different ways. In addition, the response of winter wheat varieties to the application of herbicides also differs significantly. Therefore, it is important to study the relationship between wheat plants and weeds, and the results of the removal of competitiveness in the coenosis due to the use of herbicides. The problem of effective and stable cultivation of high-quality winter wheat grain remains relevant at present.

Analysis of recent research and publications. Wheat is the leader of global and domestic grain production. In the last decade, Ukraine entered the top ten major grain-producing countries and became one of the world's leading exporters of wheat.

In general, the increase in winter wheat acreage took place in 14 regions at the level of 1 thousand hectares in Luhansk region to 64.1 thousand hectares in Kirovohrad region for the period from 2019 to 2021. The 2021 winter wheat acreage average of 285.42 thousand hectares was exceeded in 9 regions, including Dnipropetrovsk, Kherson, Mykolaiv, Donetsk, Vinnytsia, and Kirovohrad. In 2019, the top three regions in terms of winter wheat yield in Ukraine included Khmelnytskyi, Vinnytsia, and Cherkasy regions, where the indicators were 5.79 t/ha; 5.55 t/ha and 5.45 t/ha, respectively. In 2021, the situation has changed; Cherkasy region has been replaced by Ternopil region with a yield of 5.90 t/ha. The average yield of winter wheat varied from 4.15 to 4.83 t/ha in 2019-2020. The indicator increased by 14% [1]. Modern varieties of winter wheat in Ukraine have the potential to form grain yield at the level of 10-15 t/ha. However, they but realize their genetic potential by only 45-50%. This is due to the violation of crop rotation, including oversaturation of arable land with grain crops, which leads to the accumulation of infection and the spread of harmful organisms [3].

The formation of a sustainable agroecosystem requires solving a number of problems by biotic and phytocenotic methods. Crops form a larger volume on fertile soils. As a result, they better suppress weeds in their crops.

Organic products have got increased consumers demand in recent years. Grain crops are the most suitable for growing in organic farming. Their technologies have been tested for the Polissia, Forest-Steppe and Steppe zones; modern varieties are characterized by high resistance to harmful organisms; the cost of basic resources increases; their sales are well-established. Reducing the pesticide load on the fields is the main task of farmers who care about the ecological safety of products and soil.

In Ukraine 48% of agricultural land with organic farming is occupied by grain crops [15].

In the system of adaptive crop production, special attention should be paid to varietal policy, which contributes to the targeted construction of agrocenoses and

agroecosystems. The significance of the reaction of various varieties of winter wheat to biotic and abiotic factors of the environment, the nature of manifestation and the relationship of quantitative traits are the basis for the targeted use of these varieties in the program of adaptive crop production [13].

The interspecific interaction between plants can be recorded at the stage of germination of their seeds.

According to Shao Q. Q. et al. (2019), extracts of Descurainia sophia, Galium tricorne, Vicia sativa demonstrated allelopathic inhibition of wheat seed germination. The allelopathic indicators of germination of wheat seeds ranged from -0.12 to -0.19, seedling height and root length from -0.70 to -0.87 and from -0.70 to -0.91, respectively.

Allelopathic potential is a measure of allelopathic effect in a weed test system. It shows the level of competitiveness in relation to a specific type of weed without taking into account the vegetation growth rate, its life activity and other factors. However, it divides the species according to the threshold value important at the beginning of the competition, which significantly determines the further success of the formation of the agrocenosis of any cultivated plant [19].

Phytocenotic control measures are based on the use of the competitive ability of winter wheat and the biological incompatibility of crops and weeds. This is reflected in the growth suppression and development of weeds. In the conditions of intensive agriculture, crops have high productivity, and the ability to successfully suppress weeds and significantly weaken their harmful activity. The ability of wheat to form side shoots allows it to use better all factors for vital activity during the growing season in order to form the maximum yield. Thus, the crop rapid initial growth serves as a guarantee of its highly competitive pressure on weeds during the subsequent growing season [10, 11, 14].

There are many scientific theories explaining the decrease in the competitiveness of agrocenoses by the lack of soil moisture or the deterioration of their nutrition conditions. However, there are a few research on photosynthetic radiation of crops. The maximum phytocoenotic suppression of weeds by sowing winter wheat (Ukrainka Poltava variety) is achieved at the sowing rate of 4.5 million similar grains per 1 ha (intensive crop cultivation technology is observed), when a reduction in photosynthetically active radiation in crops is up to 0.19-0.24 cal/cm^2. As a result, Ambrosia artemisifolia and other weeds do not go through the light stage of development. Thus, they do not bloom and do not form viable seeds. Biological control of A. artemisifolia and other weeds allows to reduce the herbicides application in crop rotation and to improve the phytosanitary condition of crops [12].

If phytocenotic measures to protect winter wheat cannot control the level of its weeding below the threshold of economic damage, then chemical measures have to be used. Herbological protection of wheat in the critical period allows to establish a high level of its potential productivity [10, 11]. Therefore, it is necessary to take care of the high-quality phytosanitary condition of its crops before sowing winter wheat. First of all, it is necessary to decide on the varieties that would be most adapted to the

agro-ecological conditions of the farm. Due to climate change and global warming, the genetically determined good resistance of varieties to drought is very valuable. In stressful arid conditions, genotypes with increased drought resistance are able to vegetate and form an economically valuable crop, experiencing less negative impact than those with low drought resistance [16].

According to the research data of Yu. O. Klipakova (2019), the hydrothermal conditions effect on Antonivka variety yield is 60.1%, and Shestopalivka variety yield is 33.1%. It indicates its greater stability and plasticity in conditions of unstable moisture. Winter wheat varieties selected for growing should have highly competitive ability to weeds and high stress resistance to herbicides. The largest amount of growth inhibitors accumulates in the phase of full grain maturity of winter wheat [5].

According to scholars of the Department of Soil Cultivation and Control of Segetal Vegetation of the NSC Institute of Agriculture of the National Academy of Sciences, the sulfonylurea derivatives are highly effective when applied in autumn. It has some advantages, i.e., the effectiveness is higher or at the level of spring application, less dependence on weather conditions, the moisture reserves of the autumn-winter period increase the effectiveness of preparations with soil action and accelerate their detoxification, the time of application increases to 30–40 days (autumn + spring) instead of 10–12 (in spring), the level of ecological danger decreases (lower intensity of evaporation at a temperature of + 5-10^{o}C, the risk of damage to neighboring crops and aftereffects in crop rotation decreases due to the increase in the time from the moment of application of the drug to the time of sowing the next crop) [6, 8, 9, 16].

Crop losses from the harmful effect of segetal vegetation, which appears in the spring in the budding phase (BBCH 11–13), are 2–4 times lower compared to the losses caused by weeds of the autumn vegetation [16].

The weed control can be successful if it is scientifically based taking into account information about the species composition and quantitative indicators of weediness of crops for different soil and climatic conditions, which cause zonal differences in weed vegetation [7].

The purpose of our study was to research the interaction of winter wheat and weeds, and different periods of Ellay Super herbicide application effect on Shestopalivka, Karmeliuk, and Legenda Bilotserkivska varieties.

Conditions and methods of conducting research. During the 2 years of research, hydrothermal conditions were favorable for growing winter wheat. They were approaching long-term averages. The amount of precipitation in the years of research varied within 555-565 mm, of which the main part fell during the growing season. The soil is dark gray forest with 2.8% humus content. The predecessor of winter wheat is peas. All agrotechnical measures in the experiment were generally accepted for the Right Bank Forest Steppe zone of Ukraine. 4.8 million pieces/ha of similar seeds were sown to a depth of 3–4 cm on September 23 (in 2021) and September 24 (in 2022). Amphos, ammonium nitrate and potassium chloride were used as mineral fertilizers: N80P60K80. Fertilization of wheat crops was carried out

twice: on frozen soil (in a dose of N30) and at the phase of stem emergence (in a dose of N30). Winter wheat was protected from pathogens and pests by applying insecticidal and fungicidal drugs in spring. In our experiments, phenological observations of the stages of development of winter wheat were carried out according to the BBCH-scale, biometric measurements and determination of the growth of raw and air-dry mass of plants, yield and structure according to the methods of V. O. Yeshchenko [2]. Total and productive number of wheat stalks, determining the state of overwintering and survival of winter wheat and weeds during the growing season was carried out by counting on fixed micro-plots size 50 x 50 cm. The grain harvest was calculated by the method of continuous threshing of each experimental plot with subsequent conversion to 14% moisture and 100% purity.

Field studies on competitive pressure of crops and weeds were conducted on fixed microplots of 1 m^2: crop without weeds, cenosis of crop with weeds, weeds without crop. According to the Lazauskas method, plant samples were selected, weighed, and the decrease in the mass of the crop under the influence of weeds and, conversely, the decrease in the mass of weeds under the influence of the crop were determined [4].

The effectiveness of Ellay Super herbicide (15 g/ha + surfactant Trend 90 0.25-0.3 l/ha) was studied on 20 m^2 plots with a working fluid consumption rate of 250 l/ha. It was planned to apply Ellay Super herbicide in autumn and spring in the tillering phase of the crop in order to evaluate the reaction of winter wheat varieties Shestopalivka, Karmeliuk and Legenda Bilotserkivska. Calculations of stem density of winter wheat and weeds (quantitative and weight) were carried out 20 days after herbicide treatment and before crop harvesting. The weed effect on crops and the crop effect on weeds were determined by the competitiveness index, which was calculated according to the formula: IC = (YPS – YWP) / YPS *100, where IC is the index of competitiveness, %; YPS – yield of pure sowing, g/m2; YWP – yield of weedy crops, g/m2 [4].

Characteristics of winter wheat varieties. *Shestapalivka.* Early ripe variety. Plant height is 86-90 cm. Erythrospermum variety. The stem of plants has an average thickness. The shape of the bush is dense. The ear is large (10-12 cm), dense, fusiform, white, unbreakable. Awns are shorter than spikes. High resistance to diseases, lodging and shedding. The weight of 1,000 grains is 45-50 g.

Karmeliuk. The variety is erythrospermum. The bush is upright. The ear is spiny. The variety is maximally adapted to environmental changes. Increased ability to root. high resistance to disease and shedding. The mass of 1000 grains is 39.0 g.

Legenda Bilotserkivska. A variety of lutescens. The ear is thornless, white. The plant has a strong wax coating. The variety is mid-late. Its winter hardiness and drought resistance are above average. Medium-sized, has increased lodging resistance. Grain size is red large, weight of 1,000 grains is up to 45-50 g, plant height from 102 cm to 115 cm.

Characteristics of Ellay Super herbicide. The drug includes such active substances as tribenuron-methyl (500 g/kg) , and metsulfuron-methyl (200 g/kg). It

can be used to spray winter crops from +5°C average daily temperatures. It allows you to significantly expand the application term depending on the time of weed germination. The rate of herbicide application is 15 g/ha + surfactant Trend 90 0.25-0.3 l/ha. Due to the presence of metsulfuron-methyl, the effect of the herbicide is also soil-based, which prevents the appearance of new weeds. The drug is characterized by high selectivity. We used such research methods as field, statistical and analytical during the experiment.

Research materials. Winter wheat is highly competitive to weeds. As a rule, its protection from unwanted segetal vegetation is carried out in the spring, starting from the bushing phase until the tube emergence. However, its herbocritical period begins with the emergence of seedlings. Therefore, it is necessary to take care of the crops in the autumn. The ability of winter wheat to suppress weeds is caused by its biological characteristics and growing conditions. Selection of varieties can significantly reduce the weediness of its crops.

The species composition and intensity of winter wheat weeding depends on the number of weed seeds in the soil and the conditions in the phytocenosis. Almost all agricultural lands of Ukraine are characterized by medium and high levels of potential weediness of the arable soil layer. If it is almost impossible for farmers to influence the process of germination of weed seeds, it is quite possible to create unfavorable conditions for the growth of segetal vegetation among crops. Neotenic forms of weeds can be present in crops but the damage from them is absolutely imperceptible. It is necessary to expand knowledge about the interaction of plants in agrophytocenoses of winter wheat in order to purposefully and rationally regulate it during the growing season.

The analysis of weed species in the winter wheat crops on the experimental field revealed a preference for the overwintering group. The weeds with development biology closest to the crops is usually the most widespread. The following weeds were most often found: cornflower (*Centaurea cyanus L.*), field pansy (*Viola arvensis Murr.*), Canadian horseweed (*Erigeron canadensis L.*), scentless mayweed (*Matricaria perforata Merat*), shepherd's purse *(Capsella bursa pastoris)*, common poppy (*Papaver rhoeas L.*), common stork's-bill (*Erodium cicutarium*). There also were lamb's quarters (*Chenopodium album L.*), catchweed (*Galium aparine L.*), and chickweed (*Stellaria media L.*). Sometimes there were perennial weeds, i.e., plumeless thistles (*Cirsium arvense L.*) and field bindweed (*Convolvulus arvensis L.*). Common windgrass (*Apera spica venti L.*) and couch grass (*Elytrigia repens L.*) were also present.

The group of dicotyledonous weed species was the most abundant in winter wheat crops (89%), monocotyledonous species represented only 11% of the total number. In the phase of autumn tillering of wheat, the maximum projective cover was formed by the common stork's-bill (5.1%), lamb's quarters (4.2%), and chickweed (3.4%).

Pre-sowing tillage is creating favorable conditions for wheat seed germination, and destroying adult vegetative weeds (usually perennial) and young seedlings.

Crops have a significant effect on the weed seedlings in the agrophytocenosis. First of all, the effect of the intensity of the light flux, that is, the energy of the PAR, reaching the surface of the soil, is significant. If it does not exceed 1-2% the photophilous weed species cannot fully grow and develop in crops. That is, the selection of optimal sowing density allows crops to control their phytosanitary status. But in the initial phases of crop development, when wheat has not yet begun to sprout, care should be taken to protect it from weeds.

Phytocenotic measures to control segetal vegetation are formed in the process of crop cultivation technology. Therefore, three different variants of their cultivation were selected for the experimental varieties: without chemical protection against weeds (control) and spraying with Ellay super herbicide in different phases of winter wheat development, i.e., BBCH 10-13 and BBCH 21-23. The research results of Shestopalivka, Karmeliuk and Legenda Bilotserkivska variety's reaction to the possibility of implementing phytocenotic measures to control weed vegetation are presented in (Table 1).

Table 1

The influence of the timing of application of Ellay Super herbicide on the bushiness of winter wheat varieties, units/m^2 (average for 2021-2022)

Options	Varieties	Total number of stems	Number of productive stems
No herbicide (control)	Shestapalivka	573±8	512±4
	Karmeliuk	579±7	520±5
	Legenda Bilotserkivska	590±8	532±5
Autumn application of Ellay Super herbicide	Shestapalivka	584±6	528±5
	Karmeliuk	589±7	536±5
	Legenda Bilotserkivska.	600±7	544±6
Spring application of Ellay Super herbicide	Shestapalivka	580±7	521±5
	Karmeliuk	583±8	524±5
	Legenda Bilotserkivska.	595±9	527±6

Source: obtained from own study results

The difference in the total number of stems between Shestopalivka and Karmeliuk varieties on the herbicide-free area was 6 pcs. /m^2, the number of productive stems difference was 8 pcs. /m^2. The mid-late variety Legenda Bilotserkivska formed respectively 590 and 532 pcs. /m^2. The applying herbicide had a positive effect on the bushiness of winter wheat. The total number of stems and the number of productive stems has increased. A greater number of stems has been formed in the areas where Ellay Super herbicide was applied in autumn than in spring for 2 years of experiment. The share of productive stems ranged from 88.6% to 90.4%.

Plants of winter wheat treated by the herbicide bushed better, and had a higher height by 2 cm (in Shestopalivka and Karmeliuk varieties) and by 3.5 cm (in Legenda

Bilotserkivska variety) at the time of harvesting. Thus, crops had the opportunity to better suppress those weeds that were resistant to Ellay Super herbicide or that germinated in the spring period.

In autumn the secondary root system begins to form in winter crops and the bushing phase begins. Segetal vegetation takes root well in the autumn period, and in spring, they can consume a significant part of the nitrogen applied in the early spring top dressing. As a rule, slightly higher rates of herbicides should be used to control weeds in the spring. In addition, overwintering weed species restore their vegetation in the spring a little earlier than crops. When the weather conditions finally allow spraying with herbicides, the weeds have been growing for a long time and are quite competitive with winter cereals.

The analysis of the dynamics of weed seedlings among winter wheat plants showed that a few weeds begin its vegetation during the period of budding. That is, during this period, winter wheat plants form the maximum area of leaves and, accordingly, the highest optical density of crops. According to the research data, there is a sharp decrease in the number of weeds after the third stage of the crop development. At this time, the above-ground mass of winter wheat best shades and suppresses segetal vegetation. Then, the weeds in the lower tier usually die. The varieties remained in the wheat coenosis are tall or have long, winding stems.

The most critical winter wheat period is the phase of stem emergence (BBCH 30–39) when there is rapid growth of the shoot, and ear laying and development. This period is characterized by that lack of moisture and nitrogen due to competition with weeds, diseases or pests. As a result, it can lead to a sharp decrease (Fig 1).

Thus, the formation of optimal density of crops, productive stem is one of the main elements to ensure high yield of winter wheat.

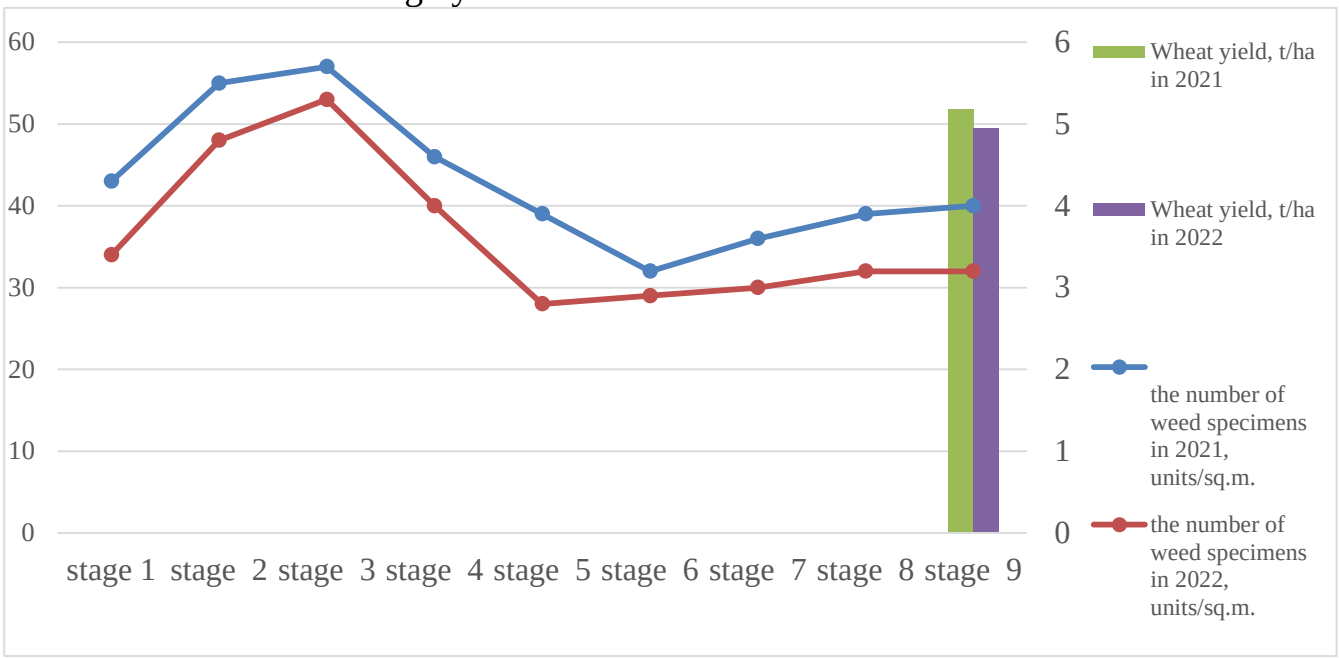

Fig. 1. Dynamics of weeds number in Legenda Bilotserkivska winter wheat variety

Source: obtained from own study results

The plant samples were taken before harvesting in order to evaluate the competitiveness of winter wheat varieties without the use of herbicides. The experiment included three variants within each variety in three repetitions: crop without weeds, crop with weeds and weeds without crop. Subsequently, their air-dry mass was determined and the competitive pressure of the culture on weeds was calculated. The results are presented in (Table 2).

Table 2

Competitiveness of winter wheat varieties (average for 2021-2022)

Varieties	Mass of the crop grown without weeds, g/m^2	Mass of weedy crop, g/m^2	Mass of weeds, g/m^2	Mass of weeds hat grown without crop, g/m^2	Competitiveness index, %
Shestapalivka	1248±25	1195±24	22±4	112±12	80,4
Karmeliuk	1235±24	1175±21	19±3	105±10	81,9
Legenda Bilotserkivska	1273±26	1190±22	24±4	148±13	83,8

Source: obtained from own study results

All experimental varieties demonstrated a highly competitive ability to weeds, the index was above 80%. The mass of segetal vegetation was insignificant, it was 19-24 g/m^2. Their mass was in the range of 105-148 g/m^2 Whereas on the areas without crops. The lowest weed pressure index was in the Shestopalivka variety (80.4%), and the highest one was in the Legenda Bilotserkivska variety (83.8%). The indicators of coenotic pressure on weeds by winter wheat were higher in 2021 than in 2022.

However, crops are pressured by weeds. The mass of the crop on weedy areas decreased by 53 g/m^2 (in the Shestopalivka variety), by 60 g/m^2 (in the Karmeliuk variety), and by 83 g/m^2 (in the Legenda Bilotserkivska variety). Accordingly, the indices of competitiveness of segetal vegetation in crops of these varieties were 4.2, 4.9 and 6.5. The weather conditions of each research year also had their influence on the species composition of weeds, their mass and the yield of winter wheat. In 2021 humidity stimulated a greater number of chickweed and lamb's quarters in wheat crops. In the dry year of 2022, the number of field bindweed increased. The mass of weeds was formed by 10-14% more in 2021 than in 2022. Studies of the competitive ability of weeds of various species in winter wheat allow us to control their harmfulness to crops. The shading of the species located in the lower tier led to their significant suppression. However, the tall weed species (plumeless thistles, scentless mayweed, lamb's quarters) caused damage to crops.

It is necessary to have detailed information about specific species: their biological features, biochemical processes, distribution in nature, ability to adapt, features of relationships with other types of plants for quality control of segetal vegetation. Thus, it is possible to successfully develop and implement effective systems for the control of weeds in crops. It should be taken into account that segetal plants do not form single-species synucia. In natural phytocenoses, multispecies synusia consist of species that vegetate together. These species have similar

requirements for environmental conditions for their vegetation and show a certain mutual allelopathic tolerance to neighboring plants. This interaction of plants of different species was formed over a very long time. This feature should be taken into account when protecting crops from weeds. When applying herbicides, it is important to take into account such indicators as average daily air temperature, development phases of the crop and weeds. The most vulnerable are annual grass weeds in the phase of 1–4 leaves, and annual dicotyledons in the presence of 2–6 leaves. Perennial dicotyledonous weeds also differ in their resistance to herbicides, thistles are most vulnerable in the phase of 6–8 leaves (i.e., rosettes), and field bindweed is most vulnerable when the shoot is up to 15 cm long. Regarding couch grass, there is information about the best control effect when it reaches a 10–15 cm height.

Application of herbicides is very often accompanied by stress for crops, but its results are not always visually noticeable. Therefore, it is important to carefully select the drug and strictly observe the terms of its introduction to exclude the formation of chemical stress of crops and ensuring the necessary level of effectiveness.

In 2022 the yield of winter wheat was significantly lower than in 2021, it is explained by worse weather conditions during the growing season (Table 3).

Table 3

The yield of winter wheat depending on the timing of application of Ellay Super herbicide, t/ha (average for 2021-2022)

Options	Varieties	In 2021	In 2022	Average	Deviation
No herbicide (control)	Shestapalivka	5.03	4.56	4.80	-
	Karmeliuk	5.05	4.59	4.82	-
	Legenda Bilotserkivska	5.18	4.95	5.07	-
Autumn application of Ellay Super herbicide	Shestapalivka	5.78	5.24	5.51	0,71
	Karmeliuk	5.81	5.22	5.52	0,70
	Legenda Bilotserkivska	5.92	5.67	5.80	0,73
Spring application of Ellay Super herbicide	Shestapalivka	5.67	5.16	5.42	0,62
	Karmeliuk	5.72	5.21	5.47	0,65
	Legenda Bilotserkivska	5.84	5.59	5.72	0,65
$SSD_{05,}$ t/ha		0.07	0.06		

Source: obtained from own study results

According to the research data in Table 3, the autumn application of Ellay Super herbicide provided the best starting conditions for growth and development for all experimental varieties of winter wheat, which allowed crops to realize their genetic potential and form a high level of yield.

The increase of yield ranged from 0.7 t/ha in the Karmeliuk variety to 0.73 t/ha in the Legenda Bilotserkivska variety. The difference in grain yield between Shestopalivka and Karmeliuk varieties has not been significant for two years. The highest yield was obtained on the plots of the Legend of Bilotserkivska variety, i.e., 5.72 t/ha and 5.80 t/ha. The yield increase for the autumn application of the herbicide

was 0.73 t/ha, and 0.65 t/ha for the spring application. The grain yield increased in the areas treated with Ellay Super herbicide in the autumn from 14.4% (the Legend of Bilotserkivska variety) to 14.8% (the Shestopalivka variety). The protection of plants does not mean total destruction, it means controlling the level of unwanted vegetation in the agrophytocenosis, regulating their reproductive capacity, influencing the level of reproduction of weeds.

Conclusions and prospects for further research. Phytocenotic measures to control segetal vegetation in winter wheat crops suppressed the growth and development of weeds at a high level. The index of competitiveness in the Shestopalivka variety was 80.4%, and 81.9%in the Karmeliuk variety, and it was the highest in the Legenda Bilotserkivska variety (83.8%). The weight of the crop on weedy areas decreased by 53 g/m^2 (in the Shestopalivka variety), by 60 g/m^2 (in the Karmeliuk variety), and by 83 g/m^2 (in the Legend Bilotserkivska variety).

The increase in the grain yield of experimental varieties with the autumn application of Ellay Super herbicide was 0.70-0.73 t/ha, and 0.62-0.65 t/ha with its spring application. Thus, the removal of competitive tension between crops and weeds in the autumn period is more effective than in the spring.

We plan to study the influence of weather conditions on the competitive pressure of winter wheat against weeds and the reaction of crops to the effect of the chemical method of controlling segetal vegetation.

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АНОТАЦІЯ
ФІТОЦЕНОТИЧНИЙ ТА ХІМІЧНИЙ МЕТОДИ ВПЛИВУ НА ЗАБУР'ЯНЕННЯ ОЗИМОЇ ПШЕНИЦІ

У статті узагальнено результати вивчення взаємного впливу між культурними та бур'янистими рослинами, а також гербіцидного впливу на присутність бур'янів та їх шкодочинність в агрофітоценозах озимої пшениці.

У посівах переважала група дводольних видів бур'янів – 89 %. Зняття конкурентної напруги між рослинами шляхом внесення гербіциду Еллай Супер позитивно вплинуло на кущистість пшениці озимої. Всі дослідні сорти відреагували на звільнення від сегетальної рослинності збільшенням як загальної кількості стебел, так і кількості продуктивних стебел. На ділянках осіннього внесення гербіциду за 2 роки досліджень сформувалася більша кількість стебел, ніж за весняного його внесення. Частка продуктивних стебел від загальної чисельності коливалася в межах від 88,6% до 90,4%. Після третьої стадії розвитку культурних рослин (вихід в трубку) йде різке зниження чисельності бур'янів в посівах. Надземна маса пшениці озимої на цей час найкраще затіняє та пригнічує сегетальну рослинність. Всі дослідні сорти пшениці продемонстрували високу конкурентну здатність до бур'янів – індекс був вище 80%. Маса сегетальної рослинності під покривом культури була незначною: лише 19-24 г/м^2. Тоді як на фіксованих ділянках без присутності культури їхня маса була в межах 105-148 г/м^2. В середньому за два роки досліджень найнижчим показник тиску на бур'яни був у сорту Шестопалівка – 80,4%, а найвищим у сорту Легенда білоцерківська – 83,8%. Осіннє внесення гербіциду Еллай Супер порівняно із весняним забезпечило кращі стартові умови росту й розвитку для всіх дослідних сортів пшениці озимої, що дозволило культурним рослинам реалізувати свій генетичний потенціал та сформувати високий рівень урожайності. Прибавка врожаю зерна була від 0,7 т/га у сорту Кармелюк до 0,73 т/га у сорту Легенда білоцерківська. Найвищий урожай отримано на ділянках вирощування пшениці озимої сорту Легенда білоцерківська – 5,92 та 5,67 т/га.

Ключові слова: *бур'яни, пшениця озима, конкуренція, пригнічення ростових процесів, гербіцид.*

Табл. 3. Рис. 1. Літ. 19.

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