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**INFLUENCE OF TECHNOLOGICAL FACTORS OF GROWING ON
WINTER GRAIN WINTERING****ВЛИЯНИЕ ТЕХНОЛОГИЧЕСКИХ ФАКТОРОВ ВЫРАЩИВАНИЯ НА
ПЕРЕЗИМОВКУ ОЗИМЫХ ЗЕРНОВЫХ КУЛЬТУР****Svystunova I. / Свистунова І.***PhD, / к. с.-г. н., доц.***Rak O. / Рак О.***student / студент**National university of life and environmental sciences of Ukraine, Kyiv***Poltoretskyi S. / Полторецкий С.***d. a. s., professor / д. с.-г. н., профессор**Uman national university of horticulture, Uman, Ukraine***Guz K. / Гузь К.***researcher / ст. н. с.**Ukrainian Institute for Plant Varieties Examination, Kiev***Orlovskiy N. / Орловский Н.***PhD. / к. с.-г. н., доц.**Polish national university, Zhytomyr, Ukraine*

Annotation. *The results of researches of studying of winter hardiness of winter grain crops depending on technological factors of cultivation are stated. It is established that carrying out of winter grain crops, including winter triticale, in the most optimum, according to biological requirements of grades, terms allows to manage winter hardiness of plants to a large extent.*

Key words: *sowing date, variety, tillering node, amount of sugars.*

Introduction.

The creation of triticale, a new grain and forage crop, is one of the greatest achievements of modern plant breeding. Much attention is paid to this new cereal, due to the hopes of combining in one genotype all the valuable qualities that are found in two widely used grain crops - wheat and rye. According to experts, triticale will become one of the leading grain crops in the near future.

Triticale grain is a promising raw material in the food industry, since, due to its high starch content, it is used for the production of alcohol, and due to the high enzymatic activity of triticale malt, its grain is used in the brewing and non-alcoholic food industries. Today, technologists have also developed a number of recipes for making bread and confectionery products from triticale flour. The proposed technologies provide for the use of triticale flour both as an improver and for the production of bread from pure triticale flour. According to scientists, triticale flour is quite suitable for making crackers, muffins, waffles, as well as for high quality biscuits.

However, today, due to a number of objective reasons, among which the prevailing is the general warming of the climate, there is a need to adjust the scientifically grounded sowing dates for winter crops, including triticale. Moreover, as a result of an increase in temperature, mainly during the cold season, the dominant causes of death of winter crops during the winter period have noticeably changed [11]. An important argument regarding the clarification of the optimal sowing dates is



the change in the set of varieties recommended for production and their different response to growing conditions [2].

Proceeding from this, the research was supposed to study and develop technological bases for increasing the winter hardiness of winter triticale, as an important factor influencing the yield of vegetative mass.

Materials and research methods.

Field studies were carried out at the agronomic research station of the National University of Life and Environmental Sciences of Ukraine in typical low-humus chernozems. The humus content in the arable layer is 4.34-4.68%, pH is 6.8-7.3.

The object of research was winter crops: wheat Polisska 90 (control), rye Kyivska fodder (control) and triticale varieties (AD 3/5, AD 44, ADM 9, Polissky 29 ADM 11 AD 52), sown in five calendar dates: August 25, 5, 15, 25 of September and 5 October. The predecessor is corn for silage.

Research results and discussion.

Among the factors affecting the resistance of plants to the winter period, an important role belongs to the depth of the tillering node, where, as is known, most of the reserve nutrients accumulate. The closer the tillering node lies to the soil surface, the more likely the plants will freeze out, since with increasing depth, the soil temperature rises significantly. The depth of the tillering zone is mainly determined by varietal characteristics and abiotic factors, which can be indirectly controlled using the sowing dates.

Early crops are marked by a shallow tillering node. This pattern was also noted in our observations (Table 1).

Table 1.

The depth of the tillering node in plants of winter grain crops at the time of the termination of the autumn growing season, depending on the sowing date, cm

Culture, variety	Sowing date				
	25.08.	5.09.	15.09.	25.09.	05.10.
Rye (control)	1,8	2,0	2,9	3,4	2,3
Wheat (control)	2,3	2,7	3,4	3,7	2,6
AD 3/5	1,7	2,2	3,4	3,5	2,5
AD 44	2,1	2,2	3,3	3,7	2,5
ADM 9	1,8	2,0	2,8	3,4	2,4
Polissky 29	2,2	2,5	3,4	3,8	2,6
ADM 11	1,8	2,1	3,0	2,3	2,5
AD 52	2,0	2,5	3,4	3,7	2,6

Thus, the crops of the early sowing period developed at elevated temperatures, which, with sufficient moisture, intensified plant growth and caused the formation of a tillering node closer to the soil surface. Under such conditions, the depth of the tillering zone of the August crops was 1.7-2.2 cm. In all the years of research, the tillering node was deeply laid at late sowing dates.

The research has shown that the depth of the tillering zone of plants of the same calendar sowing time varies significantly according to the growing season and is mainly determined by the moisture conditions. With an increase in soil moisture, regardless of the intensity of heat, the tillering node was laid closer to the soil surface,



with low moisture – deeper.

Among the varieties that were studied, an excessive growth of tillering nodes in ADM 9 and AD 3/5 was noted on the August crops. Varieties Polissky 29 AD 44 and AD 52, in contrast to ADM 11, are marked by a weak intensity of growth of underground internodes at all sowing periods.

According to the results that were obtained, the crops of the II-IV sowing period are marked by the highest amount of synthesized water-soluble carbohydrates - 17.9-21.2% of dry matter, depending on the variety. Plants sown in August, in all the years of research, accumulated the least amount of reserve substances - (17.2-18.6%), which is explained by the consumption of carbohydrates for respiration and growth processes of the overgrown vegetative mass [8]. On average, over the years of research, the highest intensity of sugar accumulation was characterized by varieties AD 3/5, AD 44, Polissky 29 and AD 52.

However, the high sugar content in plants at the beginning of the winter period does not always provide high winter hardiness of crops - the nature and economy of carbohydrate consumption during the winter period and the content of these substances during the restoration of spring vegetation are more important [5].

During the process of emerging from winter, a high content of carbohydrates is characteristic of plants of the III-V sowing period - 8.6-11.1% of dry matter. Plants of early sowing terms contained significantly less sugars, which is associated with increased activation of respiration of overgrown plants, the intensity of which increased during winter thaws [5]. Among the varieties that were studied, sugar varieties AD 3/5 and AD 44 were used most economically during wintering.

On average, over the years of observation, the most resistant to a complex of unfavorable conditions of the winter period were plants of the II-IV sowing period - the number of preserved winter triticale plants was at the level of 81.2-91.0%. Among the varieties that were studied, AD 3/5, AD 44, Polissky 29 and AD 52 were distinguished by high winter hardiness, and ADM 11 and ADM 9 were low.

Conclusions.

Sowing winter triticale at the most optimal time, in accordance with the biological requirements of the varieties, gives us the opportunity to significantly control the resistance of plants in winters.

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***Аннотация.** Изложены результаты исследований изучения зимостойкости озимых зерновых культур в зависимости технологических факторов выращивания. Установлено, что проведение озимых зерновых культур, в том числе, тритикале озимого в наиболее оптимальные, в соответствии с биологическими требованиями сортов, сроки позволяет в значительной степени управлять зимоустойчивостью растений*

***Ключевые слова:** срок сева, сорт, узел кущения, сума сахаров.*

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