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INFLUENCE OF HYDROTHERMAL CONDITIONS AND TECHNOLOGICAL FACTORS OF GROWING ON DEVELOPMENT AND GROWTH OF WINTER CULTURES IN THE AUTUMN PERIOD

ВПЛИВ ГІДРОТЕРМІЧНИХ УМОВ ТА ТЕХНОЛОГІЧНИХ ФАКТОРІВ ВИРОШУВАННЯ НА РІСТ І РОЗВИТОК ОЗИМИХ КУЛЬТУР В ОСІННІЙ ПЕРІОД

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The article presents the results of research of the impact of technological measures of cultivation and hydrothermal resources on the growth and development of winter cereals in the autumn in the Forest-Steppe right bank. There was an increase in the number of shoots, plant height, number of nodular roots and the mass of raw aboveground mass in the direction from late to early sowing period. October crops in all years of research lagged significantly behind both in stage development and in terms of phytometric parameters. The most expedient is the sowing of winter crops in the period from 5 to 15 September.

Key words: *triticale, rye, wheat, sowing date, variety, hydrothermal conditions, , plant height, plant mass, weather conditions.*

Introduction.

The vegetation period of winter crops takes place in 2 cycles, separated by a period of forced dormancy due to unfavorable weather conditions in winter. The first is that winter crops take place in autumn and the state in which they complete the autumn vegetation is the main precondition for their good overwintering and high yields. The physiological, biochemical and morphological development of winter before the end of the growing season is significantly influenced by sowing dates, the shift of which causes different hydrothermal conditions during the growth and development of plants in the autumn [3, 5].

Both overgrown and underdeveloped plants have reduced winter hardiness, therefore are highly liquefied during the winter. Early autumn plants often overgrow and are significantly affected by pests and diseases. On crops sown in the late calendar period plants haven't time for tillering and enter the winter in the germination phase or, forming only 2-3 leaves. In this state, they do not have time to accumulate enough carbohydrates, harden and form a well-developed secondary root system, which reduces their resistance to adverse conditions during winter and especially in spring, when the rapid rise in air temperature dries the top layer of soil, leading to death a significant number of plants [2].

The optimal development of winter plants before winter is possible under conditions when 50-70 days pass from sowing to the end of autumn vegetation. In this case, for the period from germination to the cessation of vegetation, plants accumulate temperatures above 5 0C - in the range of 400-500 0C [1, 5], which causes the formation of the optimal number of shoots - 2-4 pieces per plant [2]. However, opinions on the optimal parameters of plant development at the end of the growing season and the required amount of effective temperatures differ. This is due to the zonal growing conditions and varietal characteristics of winter crops [1].

The aim of the research was to establish the influence of hydrothermal conditions and technological measures of cultivation on the growth and development of winter cereals in the autumn in the right-bank forest-steppe.

Materials and methods of research.

Field experiments were conducted at the Agronomic Research Station of the National University of Life and Environmental Sciences of Ukraine on chernozems typical low-humus medium loam with a humus content of 4.51%, lightly hydrolyzed nitrogen - 111, mobile phosphorus - 64 and exchangeable potassium - 98 mg/kg, the pH of the salt extract is 7.1. Object of research: wheat Polesskaya 90 (control), Kyiv fodder rye (control) and triticale varieties (AD 3/5, AD 44, ADM 9, Polesskiy 29 ADM 11 AD 52), sown in five calendar dates: August 25, 5, September 15, 25 and October 5. The precursor is corn for silage.

Research results and their discussion.

In the experimental field, the range of optimal, according to scientists [2, 5], abiotic factors was formed during sowing on September 15. At the same time, the period from sowing to the end of autumn vegetation lasted an average of 53,3 days. During this time, crops accumulated about 452 ^{0}C temperatures above 5 ^{0}C, which is 2.2 times more than accumulate October crops. In general, depending on the sowing date and the date of termination of autumn vegetation, the duration of this period was 33.3-74.3 days, the duration from the phase of full germination to the termination of vegetation in autumn - 10.7-64.0 days.

Since the first cycle of ontogenesis of winter crops for sowing in different calendar terms of sowing takes place in different hydrothermal conditions [5], respectively are forming bases and different future crop productivity [9]. In this regard, it is interesting to identify the specifics of the implementation of the biological characteristics of the studied varieties of triticale under the conditions of a complex of abiotic and technological factors.

There are different opinions on the criteria for evaluation the state of winter crops at the end of the autumn vegetation [1, 3, 5, 8]. In addition, not all varieties respond equally to the timing of sowing - each variety has its optimal period of time during which the most fully or satisfactorily revealed its potential [2]. To determine possible changes in the complex of morphological parameters depending on the type of plants and sowing dates, we can make appropriate approximations by regression equations (Fig. 1-4).

One of the indicators that most fully characterizes the state of crops at the end of the growing season is the degree of tillering - a parameter that significantly determines the viability of the plant and its overwintering and is a reflection of the

effect on the plant body of meteorological, agronomic and soil conditions [1, 5].

Our research also revealed a clear dependence of the degree of tillering of plants on the time of sowing, variety and weather conditions during the growing season.

It is noted that with the reduction of vegetation duration the shoot-forming ability of all crops decreases - in rye from 7,3 to 1,5, in wheat - from 6,0 to 1,3 shoots / plant; triticale on this indicator, in terms of varieties, occupied an intermediate position - the coefficient of its tillering ranged from 7,1-5,7 (August 25) to 1,4-1,1 (October 5).

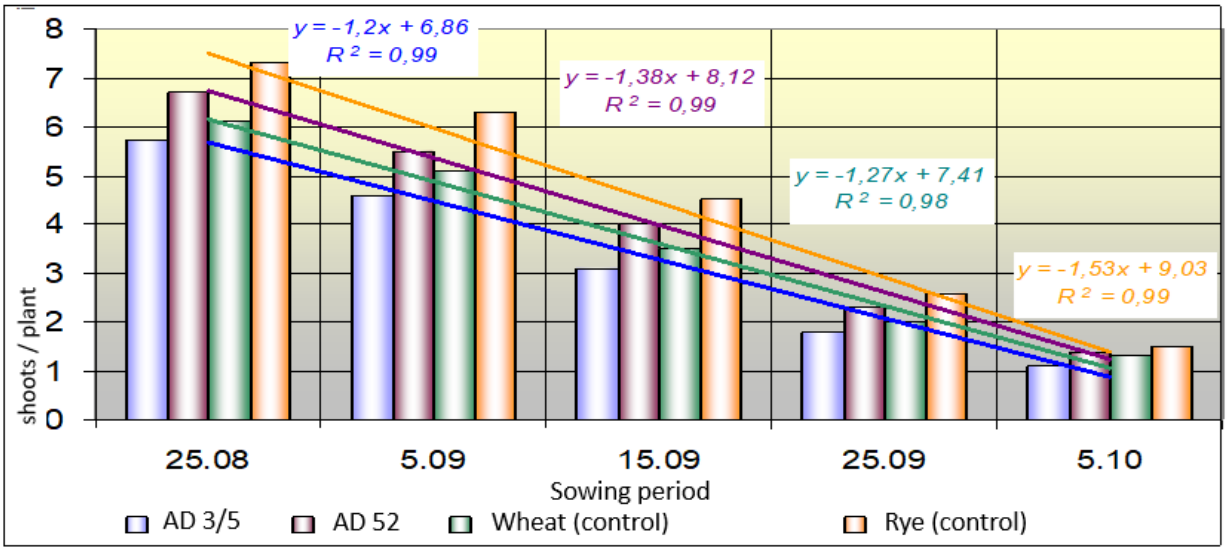

Fig. 1. Dependence of tillering rate of winter crops from the time of sowing, shoots/plant

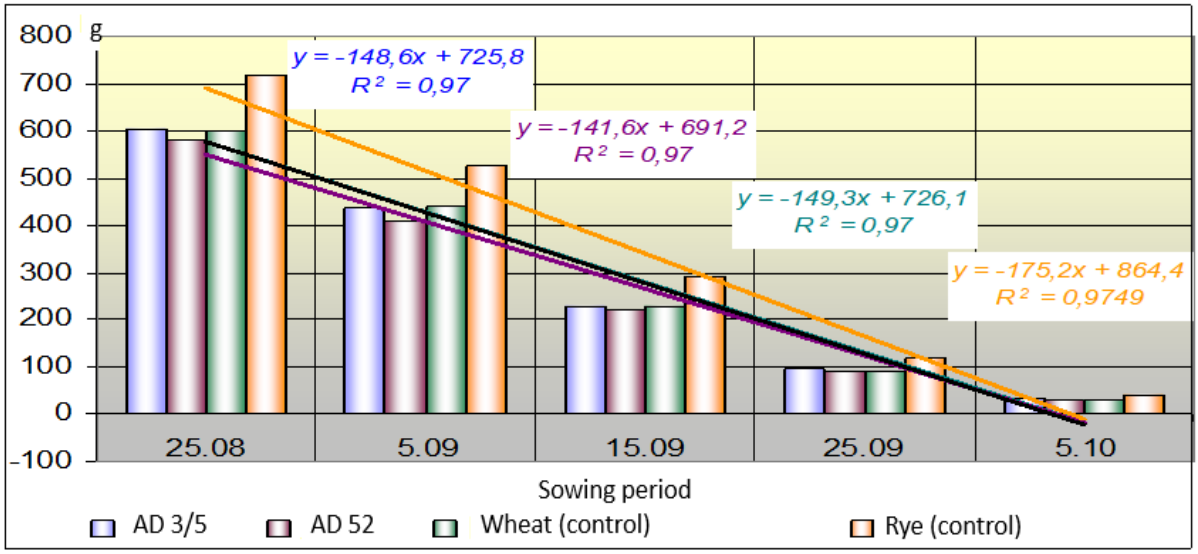

Fig. 2. The influence of sowing time on the formation of the mass of 100 raw plants, g

In general, the optimal amount – 2,8-5,5 ungrown shoots on triticale plants was formed by the accumulation of crops 312,1-460,5 °C of the sum of average daily and 27,.0-426,4 ^{0}C effective air temperatures. Under such thermal conditions, the active vegetation of crops from the germination phase to the end of the autumn vegetation lasted on average 39-54 days at an average daily air temperature of 8,0–8,7 ^{0}C; the sowing – cessation period of autumn vegetation was 51–61 days.

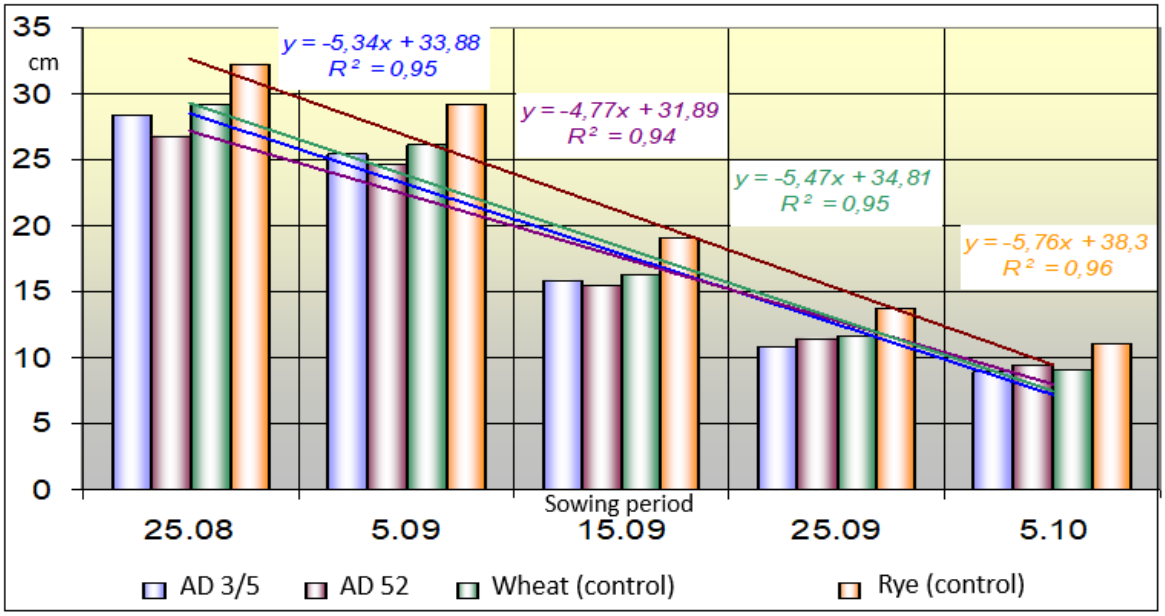

Fig. 3. The influence of sowing time on the linear growth of winter crops, cm

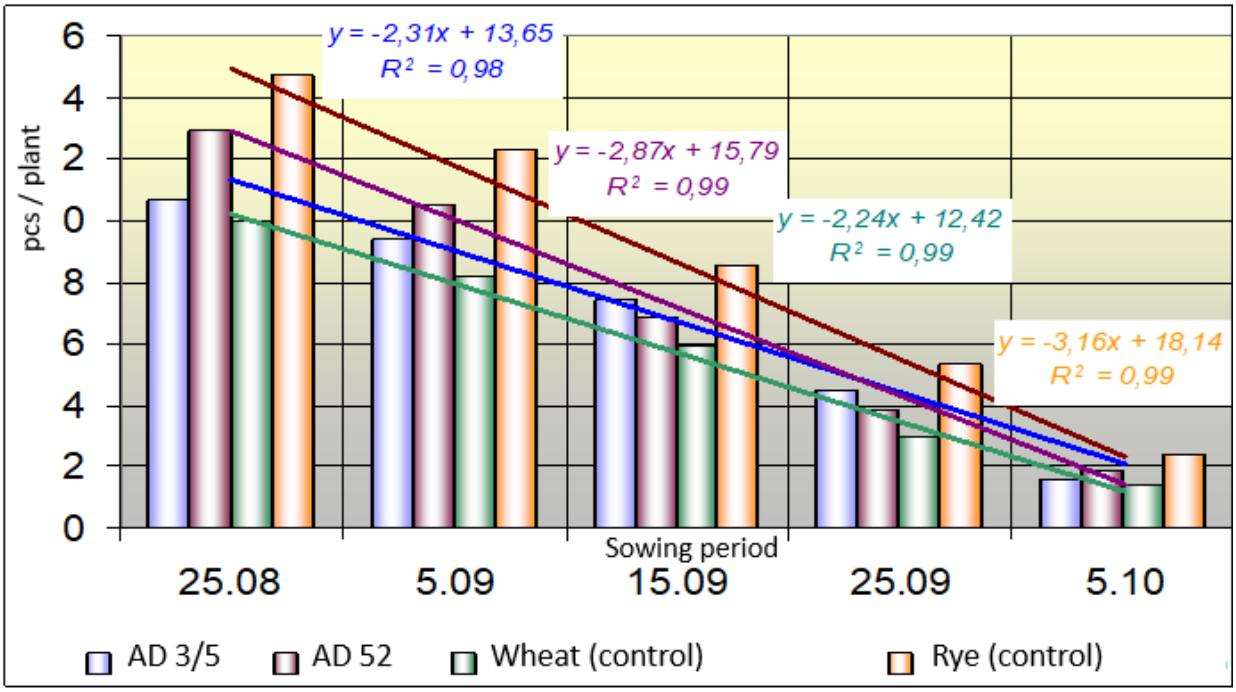

Fig. 4. The influence of sowing time on the formation of the secondary root system of winter crops, pcs/plant

The most intensive autumn tillering is characteristic of the variety ADM 9. The highest plasticity before sowing was characterized by the variety Polisky 29, the lowest - the variety ADM 11. The varieties ADM 3/5, AD 44 formed the lowest tillering.

Conclusions. Common in all years of research is a natural increase in the number of shoots, plant height, number of nodular roots and the mass of raw aboveground mass in the direction from late to early sowing period. October crops in all years of research lagged significantly behind both in stage development and in terms of phytometric parameters. The most expedient is the sowing of winter crops in the period from 5 to 15 September.

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У даній статті викладені результати досліджень щодо вивчення впливу технологічних заходів вирощування та гідротермічних ресурсів на ріст і розвиток озимих злакових зернових культур в осінній період в умовах Лісостепу правобережного. Відмічене зростання кількості пагонів, висоти рослин, кількості вузлових коренів та маси сирої надземної маси у напрямі від пізніх до ранніх строків сівби. Жовтневі посіви у всі роки досліджень значно відставали як у стадійному розвитку, так і за параметрами фітометричних показників. Найбільш доцільною є сівба озимих культур у період з 5 до 15 вересня.

Ключові слова: *тритикале, жито, пшениця, строк сівби, сорт, гідротермічні умови, кущистість, висота рослин, маса рослин, погодні умови.*

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