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GROWTH AND DEVELOPMENT OF PLANTS OF WINTER INTERMEDIATE CROPS IN THE AUTUMN PERIOD UNDER THE INFLUENCE OF ORGANIZED FACTORS IN THE CONDITIONS OF THE FOREST-STEP FOREST STEPPE

РІСТ І РОЗВИТОК РОСЛИН ОЗИМИХ ПРОМІЖНИХ КУЛЬТУР В ОСІННІЙ ПЕРІОД ПІД ВПЛИВОМ ОРГАНІЗОВАНИХ ФАКТОРІВ В УМОВАХ ЛІСОСТЕПУ ПРАВОБЕРЕЖНОГО

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The results of researches on studying of influence of technological receptions of cultivation of winter intermediate cultures on growth and development of plants in the autumn period are stated. It was found that with increasing duration of autumn vegetation, plant height, number of nodular roots and mass of raw aboveground mass increased. During sowing on October 5, plants of all crops and varieties of triticale significantly lagged 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 period, variety, plant height, nodal roots, plant weight.*

Introduction.

Autumn vegetation of winter grain crops, regardless of the direction of their use, directly affects the formation of highly productive agrophytocenoses, further development and final harvest. With timely full-fledged seedlings and normal autumn vegetation, the plants develop well in the spring and provide high productivity even in adverse weather conditions in the spring and summer. Given that the level of yield of winter intermediate crops largely depends on unregulated factors (light, heat, moisture), it is important to study the dependence of the production process of winter intermediate crops on sowing dates. The shift of calendar sowing dates significantly changes the hydrothermal conditions of growth and development of plants, and, accordingly, the degree of their preparation for the winter. Preparation for the winter period is greatly influenced by the genetic characteristics of the variety and its reaction to external conditions [1, 2, 3, 4, 5, 6].

The purpose of the research is to establish the influence of weather conditions and elements of technology of growing winter intermediate crops on the growth and development of plants in the autumn in the conditions of the Forest-Steppe of the right-bank Ukraine.

Research materials and methods.

Field experiments were conducted in a SS "Agronomic Research Station" of

NULES of Ukraine on blsck siol of typical low-humus. Object of research: wheat Polesskaya 90 (control), rye Kievskoe Kormovoe (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 predecessor is corn for silage.

Research results and their interpretation.

According to many authors, the most important criteria for plant development before the cessation of autumn vegetation is the intensity of their shoot formation and sugar content in the nodes of tillering. However, no less important characteristic of the degree of development of winter cereals at the end of autumn vegetation is also the linear growth of plants, the power of the root system and the value of aboveground mass [2]. According to a number of scientists [3, 5, 6], for successful overwintering, the optimal height of triticale plants should be within 12-20 cm, which with a sufficient degree of tillering provides the formation of vegetative mass of about 120-140 g [1, 4]. In the course of our observations, the dynamics of linear growth, development of the root system and growth of vegetative mass, as well as shoot-forming ability, were determined by sowing time, biological characteristics of the variety and growing conditions.

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. October crops in all years of research significantly lagged behind both in stage development and in terms of phytometric parameters, which largely determined the future productivity of crops (tabl. 1-3). It was found that with sufficient moisture, the intensity of autumn development of plants of winter intermediate crops of different sowing dates was determined mainly by temperature conditions and the duration of the growing season.

1. Linear growth of winter triticale plants before the cessation of autumn vegetation depending on the sowing date and variety, cm

Culture, variety	Sowing period				
	25.08.	5.09.	15.09.	25.09.	05.10.
Rye (control)	32,2	29,1	19,0	13,7	11,1
Wheat (control)	29,1	26,1	16,2	11,6	9,0
АД 3/5	28,3	25,4	15,9	10,8	8,9
АД 44	29,9	26,7	17,1	11,9	9,2
АДМ 9	30,0	27,1	17,1	12,6	10,0
Polisky 29	25,4	23,0	14,9	11,3	9,8
АДМ 11	26,0	24,1	15,6	11,7	10,0
АД 52	26,8	24,6	15,5	11,5	9,5

Thus, on average over the years of research, the height of plants in the August sowing period was 25.4-30.0 cm, depending on the variety. However, under conditions of long autumn, timely germination and favorable hydrothermal regime during the period of active growth on crops and sowing period, excessive overgrowth of vegetative mass was observed. In years with short, wet and cool autumn before the cessation of vegetation, only crops of the second sowing period could form the optimal parameters of plant habitat: linear growth - 17.1-20.0 cm, weight of 100 raw plants - 211-303 g, the number of roots of secondary root systems - 6,9-8,5 pieces / plant.

Depending on the time of sowing, hydrothermal supply and variety, the mass of 100 raw plants fluctuated widely. Thus, on average over the years of research, the mass of 100 raw winter triticale plants in October crops was 30-39 g, which is 17-18 times less than in August - 541-668 g. Under the same conditions, the mass of 100 raw rye and wheat plants depending on the time of sowing was - respectively 42-716 and 30-601 g. This difference in the development of vegetative mass significantly affected the density of crops and the formation of frost resistance by plants.

Depending on the time of sowing and, accordingly, the development of vegetative mass of plants, the power of the root system also changed significantly (Table 3). Thus, if on October crops the number of roots of the secondary root system was 1.0-1.9 pieces / plant, then on plants during August sowing - 10.3-13.6 pieces / plant.

On average, over the years of research, the optimal development of plants was ensured by sowing on September 15. In the years with cold short autumn plants of the third sowing period, although they form an underdeveloped mass, are still characterized by good winter hardiness.

2. Weight of 100 raw winter triticale plants before the end of autumn vegetation depending on the sowing date and variety, g

Culture, variety	Sowing period				
	25.08.	5.09.	15.09.	25.09.	05.10.
Rye (control)	716	525	290	121	42
Wheat (control)	601	441	229	90	30
АД 3/5	606	437	228	95	34
АД 44	634	473	252	104	39
АДМ 9	668	489	260	106	38
Polisky 29	541	383	219	101	34
АДМ 11	597	425	227	94	30
АД 52	580	409	220	93	30

3. The number of nodular roots on winter triticale plants before termination of autumn vegetation depending on the sowing date and variety, pcs.

Culture, variety	Sowing period				
	25.08.	5.09.	15.09.	25.09.	05.10.
Rye (control)	14,7	12,3	8,6	5,3	2,4
Wheat (control)	10,0	8,2	5,9	3,0	1,4
АД 3/5	10,7	9,4	7,4	4,5	1,6
АД 44	13,6	11,5	7,3	4,1	1,3
АДМ 9	10,9	9,3	6,9	3,5	1,2
Polisky 29	11,4	9,7	7,3	4,3	1,9
АДМ 11	10,3	8,6	6,0	2,9	1,0
АД 52	12,9	10,5	6,8	3,8	1,9

Under conditions of warm and long autumn, these crops can be very developed, but not overgrown, because the plants grow at lower temperatures and on short days, which significantly slows down their staged development.

Natural changes in the parameters of the abiotic factor, characteristic of the late autumn period, had a particularly strong effect on the plants of acceptable late (September 25) and especially late (October 5) sowing dates. The growth and development of these crops took place mainly with sufficient moisture and lack of heat, and was largely determined by the date of the beginning of the winter period. Thus, the plants of the October sowing period were in a state of forced dormancy in the phase of germination-beginning of tillering. During the long warm autumn, plants of all varieties before the cessation of vegetation were in the tillering phase, had 3.0-4.7 roots of the secondary root system and had time to form a vegetative mass at the level of 60-81 g / 100 plants. During the cold autumn with the early cessation of autumn vegetation, the plants did not have time to form a tillering node and, accordingly, the secondary root system before the beginning of winter, which further significantly reduced their resistance to adverse conditions; the vegetative mass of such crops did not exceed 10-13 g / 100 plants. Under such conditions, the ability to overwinter was determined mainly by varietal characteristics.

According to our observations, the intensity of autumn plant development was determined not only by the time of sowing and weather conditions during the years of research, but also by the biological characteristics of the variety. Thus, regardless of the sowing date, the most intensively developed varieties were ADM 9 and AD 44. In the years with long and warm autumn, these varieties for sowing on August 25-September 5 were prone to excessive overgrowth and thickening of crops. A feature of the Polissya 29 variety, with a relatively small vegetative mass, is its ability to form a very strong root system, which significantly increased the resistance of plants of this variety to adverse factors. The least powerful in terms of weight of 100 plants in all calendar terms were varieties ADM 11 and AD 52. Moreover, the latter is able in low temperatures and short daylight to enter the tillering phase and form a developed tillering node and a strong root system. For the grade AD 3/5 is characterized by intensive development in the early stages of sowing; shifting the calendar dates of sowing weakens the intensity of plant growth of this variety. During sowing in the period from September 15 to October 5, the crops of AD 3/5 were marked by the formation of a very powerful tillering node and a secondary root system.

Conclusions. It is noted that with the increase in the duration of autumn vegetation, the height of plants, the number of nodular roots and the mass of raw aboveground mass increased. During sowing on October 5, plants of all crops and varieties of triticale significantly lagged 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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Викладені результати досліджень щодо вивчення впливу технологічних прийомів вирощування озимих проміжних культур на ріст і розвиток рослин в осінній період. Встановлено, що зі зростанням тривалості осінньої вегетації зростали висота рослин, кількість вузлових коренів та маса сирої надземної маси. За сівби 5 жовтня рослини всіх культур та сортів тритикале 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, висота рослин, вузлові корені, маса рослин.*

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