

## **Protopish I.**

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### **DEPENDENCE OF GRAIN PRODUCTIVITY OF WINTER WHEAT ON THE AREA OF FLAG LEAF**

**The purpose.** To study correlation of grain productivity of winter wheat with the area of flag leaf. **Methods.** Field, laboratory, statistical analysis.

#### **Results.**

Productivity of operation of factors of technique used in experiment is shown on parameters of the area of flag leaf and dependence on them of grain productivity of wheat. **Conclusions.** The area of flag leaf of wheat on bare fallow made 8754 cm<sup>2</sup>/m<sup>2</sup>, for perennial legume grasses — 7186 cm<sup>2</sup>/m<sup>2</sup>. Under condition of 1-st period of sowing parameters of the area of flag leaf made 7234 cm<sup>2</sup>/m<sup>2</sup>, of the 2-nd — 8706 cm<sup>2</sup>/m<sup>2</sup>. Straight dependence is fixed of productivity of grain of wheat on the index of the area of assimilating area of flag leaf at the level  $r = 0,58$ .

**Key words:** winter wheat, flag leaf, precursors, periods of sowing, cultivar, productivity of grain.

The formation of grain crop yields can be considered depending on the dynamics of the development of plants, its individual organs, the influence of vegetation factors on individual components of yield, and so on. At the same time, great importance was attached to the dependence of grain yield on the intensity of photosynthesis, photosynthetic potential of plants, crops, duration of active leaf functioning. There is data on the correlation of yield with the growth of dry matter, the dynamics of its accumulation [9], the rate of photosynthesis [6], the ratio of the total leaf surface to the total mass of dry matter of plants, which in the foreign literature is indicated as LAR (leaf area ratio) [3]. Due to the value of the energy side of photosynthesis, attention should be paid to the fact that the products of assimilation by wheat plants are created by all aboveground parts. In particular, such include flaky aparat, interstitial, ear, aphids. There are perspectives on the participation of

individual assimilating organs in the accumulation of the total amount of stockpiles in grains. In particular, studies of flagship leaf of winter and spring wheat, spring barley, oats [5, 7, 8, 10] are of particular interest. Attention is drawn to the participation of the distribution of assimilation products of winter wheat at the onset of ear crops, upper leaves in the process of providing productive capacity of plants [4]. The purpose of the research is to examine

**1. Площа прапорцевих листків пшениці озимої сорту Білоцерківська напівкарликова залежно від попередників та строків сівби, см<sup>2</sup>**

Попередник	Строк сівби	Площа поверхні прапорцевого листка			Площа поверхні прапорцевих листків на 1 м <sup>2</sup>		
		2009 р.	2010 р.	2011 р.	2009 р.	2010 р.	2011 р.
Чорний пар	1-й строк	17,2±0,44	17,0±0,70	17,5±0,53	7705	7633	7490
	2-й строк	18,2±0,41	18,3±0,63	19,0±0,76	9500	9552	10602
Багаторічні бобові трави	1-й строк	16,5±0,39	20,0±0,87	17,6±0,75	6105	7660	6846
	2-й строк	18,9±0,46	18,7±0,92	16,8±0,72	7938	8209	7509

the interrelation of wheat grain productivity with the area of the flag leaf.

Research methodology. The research was conducted on the joint research field of the Vinnytsia National Agrarian University and the Institute of Forages and Agriculture of Podillya of NAAS during 2009-2011. Factors included in the study: predecessors - black pairs, perennial bean trawls (clover rayon); sowing dates - the second decade of September, the first decade of October; Varieties - Bila Tserkva half-carcina, Tsarivna. The area of the flag leaf of winter wheat was established by the method of carving [1, 2]. The index of the area of the leaf surface is the ratio of the plane of the leaf surface of the flag leaf to the unit area of sowing to the unit area of the soil surface 1m<sup>2</sup> (1m<sup>2</sup> / 1m<sup>2</sup>). from the unit area of sowing to the unit area of the surface of the ground 1m<sup>2</sup> (1m<sup>2</sup>/1m<sup>2</sup>). The mathematical analysis of the results was carried out using the method of dispersion and correlation-regression analysis using the applied computer program Statistica. Research results. In conducted studies on the development of the flag leaf in terms of the area of its surface, winter wheat, depending on predecessors, sowing dates, varieties and conditions of the year, did not reveal significant logical differences in the data for all possible comparisons, except for: the area of the flag leaf was greater than 18, 9 ± 0.46 in the Bila Tserkva half-carcass variety grown from the predecessor, perennial bean grasses provided the second seeding period

is compared to the data of  $16.5 \pm 0.39$  obtained on the first sowing date (Table 1). An analysis of the data obtained on the area of flag leaflets per 1 m<sup>2</sup> of sowing gives all grounds reasonably to assert a significant advantage over 3 years of this parameter in favor of the 2nd seeding period. It relates both to the precursor black pairs and to the predecessor of perennial bean grasses. Under the condition of the precursor black pairs and the 2nd line of sowing, the area of flag leaflets averaged over 3 years amounted to 9884.6 cm<sup>2</sup> per m<sup>2</sup>, and provided the first seeding period was 7609.3 cm<sup>2</sup> / m<sup>2</sup>. The difference is 2275.3 cm<sup>2</sup>. Under the condition of predecessor, perennial legumes, as well as the area of winter wheat leaflets of winter cm<sup>2</sup> per m<sup>2</sup>, were annually larger in plants in the 2nd seed crops. On average, in 3 years this value was 7885.3 cm<sup>2</sup> / m<sup>2</sup>, with the first sowing date of 6870.3 cm<sup>2</sup> / m<sup>2</sup>, the difference is 1015.0 cm<sup>2</sup>. The results of investigations of the area of the flag leaf for the variety of Tsarivna are given in Table. 2. Significant difference of the data of parameters of the area of the flag leaf depending on the influence of predecessors and timing of sowing was not detected. The area of the flag leaf of the plants of the Karevina variety, cultivated according to the foretelling black pairs during the years of research, was characterized by a slight fluctuation in the data. The maximum data value was 19.2 cm<sup>2</sup>, the minimum value was 17.9 cm<sup>2</sup>. This indicates that under such conditions agrifotocenosis with homogeneous parameters of the area of the flag leaf is formed. The results obtained with respect to the area of flag leaflets per 1 m<sup>2</sup> of sowing indicate the effectiveness of the 2nd sowing period irrespective of the predecessor. Under the condition of the black pairs predecessor, the average value for 3 years in the 2nd period of sowing was 9696 cm<sup>2</sup> / m<sup>2</sup>, and the first seeding period provided the parameter 7828 cm<sup>2</sup> / m<sup>2</sup>. In the case of sowing on predecessor perennial legumes, the 2nd line - the average for 3 years the value was at 7358 cm<sup>2</sup> / m<sup>2</sup>, the first stage of sowing provided the area of the leaf surface of the flag leaf averaged only 6630 cm<sup>2</sup> / m<sup>2</sup>.

**2. Площа прапорцевих листків пшениці озимої сорту Царівна залежно від попередників та строків сівби, см<sup>2</sup>**

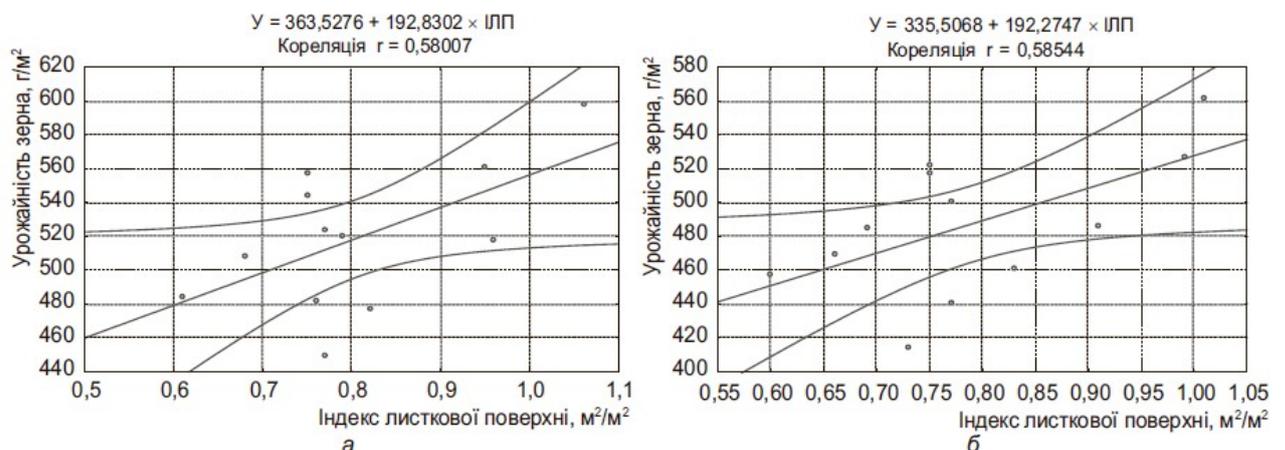
Попередник	Строк сівби	Площа поверхні прапорцевого листка			Площа поверхні прапорцевих листків на 1 м <sup>2</sup>		
		2009 р.	2010 р.	2011 р.	2009 р.	2010 р.	2011 р.
Чорний пар	1-й строк	17,9±0,36	19,2±0,82	18,1±0,64	7697	8294	7493
	2-й строк	18,8±0,49	18,5±0,90	18,7±0,69	9888	9139	10060
Багаторічні бобові трави	1-й строк	15,8±0,36	19,4±0,81	18,0±0,66	5988	7313	6588
	2-й строк	16,4±0,50	19,0±0,74	17,3±0,80	6888	7695	7490

**3. Індекс площі листової поверхні прапорцевого листка пшениці озимої залежно від попередників та строків сівби, м<sup>2</sup>/м<sup>2</sup>**

Попередник	Строк сівби	Сорт Білоцерківська напівкарликова			Сорт Царівна		
		2009 р.	2010 р.	2011 р.	2009 р.	2010 р.	2011 р.
Чорний пар	1-й строк	0,77	0,76	0,75	0,77	0,83	0,75
	2-й строк	0,95	0,96	1,06	0,99	0,91	1,01
Багаторічні бобові трави	1-й строк	0,61	0,77	0,68	0,60	0,73	0,66
	2-й строк	0,79	0,82	0,75	0,69	0,77	0,75

Accordingly, the area of the flag leaflets as wheat plants of the Bila Tserkva half- dwarf varieties, as well as Ts avivna, was higher each year than the wheat was sown in the 2 nd line. In addition, it should be noted that the black pairs predecessor is also characterized by better efficacy with regard to the impact on the square of the flag leaf. On average, the parameters for the Bila Tserkva half-carcass variety were 8747 cm<sup>2</sup> / m<sup>2</sup>, and for crops after many years of legumes - 7378 cm<sup>2</sup> / m<sup>2</sup>. Accordingly, in the class of Tsarivna black pairs as a precursor provided the area of the leaf surface 8762 cm<sup>2</sup> / m<sup>2</sup>, and perennial bean grasses - only 6994 cm<sup>2</sup> / m<sup>2</sup>. To fully substantiate the above-mentioned regularities, a statistical analysis of data from the Duncan test was conducted. The effective influence on the formation of winter wheat crops by the parameter of the area of the leaf surface of the flag leaf for 1 m<sup>2</sup>, the black particle precursor and the 2nd seeding period has been confirmed. The reliability of the substantial data diffusion by comparison of factor analysis is characterized by a level of statistical error less than 0.01. As an addition to the characteristic of the significance of the flag leaf of wheat and

the influence of the factors of the experiment, the given data of the index of the leaf surface of the flag leaf (ILP) (Table 3) is given. Indices of the index indicate that according to the theoretical calculations, the coverage of the soil surface with the area of 1 m<sup>2</sup> by the flag leaf was greater with the 2nd seeding period in black pairs, as respectively in the Bila Tserkva half-carcass variety and the Karyovna variety. On average, for 3 years, the Bila Tserkva half-carcass variety was 99.8%, and the Tsarivna variety was 97.0%. The correlation analysis of the dependence of the grain yield of wheat from the index of the leaf surface of the flag leaf is characterized by the coefficient  $r = 0.58$ , which is classified by a strong direct coupling (figure).



**Залежність урожайності зерна пшениці озимої від індексу листкової поверхні: а – сорт Білоцерківська напівкарликова; б – сорт Царівна**

This proves that the dependence of yield on the source of variation is characterized by determination  $r^2 = 0,34$ . In fact, the yield of grain in the research conducted from the index of the leaf surface of the flag leaf depends on 34%. In the form of dependence, the relation is linearly linear and is described by the regression equations  $U = 363,5276 + 192,8302 \text{ ILP}$  for the Bila Tserkva half-carcass type and  $U = 335,5068 + 192,2747 \text{ ILP}$  - for the variety of Tsarivna. The reliability of the coefficients of the regression equations corresponds to the level of significance of the error less than 5%. Accordingly, the deviation of the theoretical data from the empirical are within the normal limits. According to the forecast, the decrease of the index of leaf surface of the flag leaf of the Bila Tserkva half-carcass variety by 0,1 will reduce the grain yield by 193 kg / ha. Forecasting of grain yield for the

Karevna variety is characterized by the following calculations: an increase in the index of the leaf surface by 0.1 will provide an increase in grain yield by 192 kg / ha.

## **Conclusions**

The direct dependence of the grain yield of wheat of winter from the index of the area of the assimilating surface of the flag leaf is proved on the basis of the correlation coefficient  $r = 0.58$ . The share of the influence of the factor on the formation of the crop is 0.34, or 34%. The best parameters of the area of the leafy surface of the flag leaf for 1 m<sup>2</sup> per averaged over 3 years are set on the crops of winter wheat under the forehead black pairs under the 2nd seeding period.

Accordingly, the index of leaf surface was in the Bila Tserkva half-carcass variety 0.99, and the Tsarivna variety was 0.97. Under the condition of the predecessor, perennial legumes and the first sowing period of the seedlings, the index of the leaf surface was smaller and was equal to 0.69 in the Bila Tserkva half-carcass variety, and 0.66 in the class of Tsarivna.

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