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V.M. Yula,

M.O. Throat,

candidates of agricultural sciences

National Scientific Center "Institute of Agriculture of NAAS"

Influence of weather environment and fertilizers upon productivity of spring solid wheat in the Northern part of Forest-steppe region

Goal. Determine the optimal parameters of use in the technology of growing wheat in the hard forests in the northern part of the forest-steppe, taking into account weather conditions and economic feasibility of production for obtaining high-quality grain. Methods. Field, laboratory, mathematical and statistical. Results. The optimum fertilizer parameters in growing technology and their influence on yield and quality of wheat grain of solid spring are established. Conclusions. In order to obtain quality 2nd grade grains, it is necessary to grow wheat of a solid spring using the technology that involves the introduction of P90K90 under the basic soil tillage with the background of the production of the byproduct of the precursor, N45 - under pre-sowing cultivation, and also nitrogen fertilization by 45 kg / ha on IV and VIII stages of organogenesis and integrated chemical protection of crops.

Key words: hard winter wheat, hydrothermal coefficient, fertilizer, yield, quality, profit.

Wheat is the main source of food for the winter months, it is approaching grain grains in Ukraine. An analysis of the state of its output and yield. If soft wheat production for 1990-2013 indicates that for a long time the role of gross wheat production has been set aside for 92-98% of a single cereal crop insurance in the case of winter wheat. In Ukraine, the loss of winter wheat in the unfavorable wheat of the yard takes up the crop area, which in the conditions of hibernation, that is, solid wheat does not at all constitute 5.5% of the wheat crops, paid due attention. However, this is the grain of this winter. This is primarily due to higher crops, as well as hard winter wheat, is the price-productive potential of winter wheat for the production of its special popularity (more than 290 varieties have been added to the varieties of flour - pitlivka, production of mantillo in the State Register for 2014) and gross collections High quality cereals and macaroni products. We, who in some years exceed 20 million tons. In the State Register of Plant Varieties, however, wheat is a valuable grain date for distribution in Ukraine in 2014, it is a culture that does not yield to quality - 19 wheat varieties of hard winter wheat. Winter wheat, and in separate, extreme and 9 varieties of solid spring. However, despite the sufficient varietal composition, the macaroni industry is in dire need of flour of hard wheat because of its insignificant distribution in the structure of the crop area. In Ukraine, the total harvest area occupied by wheat of hard varieties is 500 thousand hectares [9], which is clearly not enough to provide domestic needs. Attention is drawn to the experience of the European Union in supporting the producers of hard varieties of wheat, at the age of seven in the EU countries 28-36% of the world's production of hard wheat is concentrated. In Ukraine, the issue of stimulating the production of durum wheat for internal processing needs to be solved at the state level [4].

The highest gross collections of grain of solid varieties are provided by winter wheat, which is grown in the steppe regions and southern and southeastern regions of the forest-steppe zone. Hard winter wheat is prevalent in the central and eastern regions of the forest-steppe. In order to increase the production of solid grain, it is important to study the possibility of extending the range of spread of spring wheat to the northern regions of Ukraine, where cultivating durum wheat varieties is limited to increased risks due to adverse conditions of transplantation. The cultivation of hard wheat is economically justified [8], since the price of such a grain exceeds the purchase price of soft wheat grain by an average of 30% depending on its quality, and production costs are not very different from the cost of growing wheat. Which one. To obtain high wheat yields of solid spring, the necessary condition is to ensure the plants throughout the period of growth and development with the optimal amount of nutrients, because this culture is quite sensitive to the use of fertilizers [3, 11]. It is

believed that hard wheat more needs nitrogen and phosphorus fertilizers than soft [10, 11]. According to VV Lychees [6], the formation of 1 ton of wheat grain of a solid yarrow uses 35-45 kg of nitrogen, 8-12 kg of phosphorus and 17-27 kg of potassium, so it is necessary to make a sufficient, economically justified amount of fertilizer for its cultivation Taking into account the varietal signs. The purpose of the research is to determine the optimal fertilizer parameters in the technology of growing wheat of solid spring in the northern part of the forest-steppe, taking into account weather conditions and economic feasibility of production. Research methodology. Investigations with hard yard wheat were conducted during 2011-2014 in a stationary long-term experiment of the NSC "Institute of Agriculture of the NAAN" in 4-bed crop rotation after soybean. Accounting area of sites - 25 m², repetition of the experiment - 4-time. The subject of research was a variety of wheat of solid grass of the Giselle breeder of Mironovsky wheat institute named after V.M. NAAS Handicrafts, entered in the State Register of Plant Varieties, suitable for distribution in Ukraine for cultivation in the areas of Forest-Steppe and Polissya. The seed sowing rate is 5 million similar nisinin per hectare. Soil cultivating system is accepted for the zone conducting research. The soil of the experimental site is dark gray podzolized lignified loam with loamy loam with humus content of 2.01% (according to Tyurin); Light hydrogenated nitrogen - 6.1 - 7.8 mg / 100 g of soil (according to Cornfield); Of mobile phosphorus and mine-exchangeable potassium (according to Chirikov) - respectively 11.6 -22.8 and 10.5 -18.8 mg / 100 g of soil; PH is sol. - 5.2. The system of protection of wheat, in addition to obligatory screening of seeds and introduction of herbicides, provided for a complex of measures against diseases and pests for the establishment of the EPPS. The fertilizer system contained options for the removal of various doses of mineral fertilizers against the backdrop of earning by-products of the pooperrednik. Scheme of experiment is shown in Table. 1. Ammophos (52% P₂O₅) and potassium salt (60% vs. K₂O) were introduced under ground tillage, ammoniac saltpeter (34.4% vs. N) - under pre-sowing cultivation and in feeding In the IV and VIII stages of organogenesis (e. O.). In the course of the research applied general-scientific and special methods: field, laboratory, mathematical-static. Research results. Efficiency of fertilizers, as well as the content of protein in wheat grains, is largely determined by hydrothermal conditions of vegetation, and the main component of their action is the level of moisture-richness. The level of grain yield depends on the SCC for the period from sowing to the output of the tube, and the technological properties of the grain - from the GTK during the period of grain filling [2]. It was established that the effective implementation of the genetic potential of wheat production of hard spring genus Gisel was limited to a certain extent by an unbearable combination of hydrothermal indices in separate periods of vegetation in 2011-2012. In particular, the period from the beginning of the tubing to the end of the formation of grain in 2011 was quite unfavorable Due to precipitous precipitation (SCC 0.1-0.42 units) (Fig. 1). The period of reaching spring wheat this year took place under conditions of high humidity (the amount of precipitation was three times higher than the average long-term value) and heat deficit. Weather conditions of the vegetation period of spring wheat in 2012 were characterized by a certain contrast of the temperature regime and the uneven distribution of precipitation at certain stages of the phase development of culture, but in general, they were close to average long-term values. The vegetation period of spring wheat in 2013 was characterized by a significant deficiency of pollution and an excess of the sum of active temperatures, in 2014 there was an excess of average long-term rainfall and a lack of heat in the first half of the growing season.

Fig. 1. the characteristic of periods of vegetation of wheat of solid spring in 2011-2014 by hydrothermal coefficient: - 2011; - 2012; - 2013; - 2014; - average perennial

Consequently, the analysis of weather conditions showed contrasting conditions of hydrothermal provision of growing periods in the years of research, which respectively affected the productivity of hard wheat wheat. The main indicator that allows you to quantify the effects of environmental factors on plants is yield. In studies F.M. Barley yield of wheat bran was almost 50% dependent on suitable conditions [7]. In our research, the share of the factor "torture" of the year on the yield of wheat from the solid yarrow was 31%, while the factor "fertilizer" this indicator was 54% (Fig. 2). It has been established that the potential fertility of dark gray podzolized soil in the variant, where for 27 years (since 1987) did not use any fertilizers (control), on average, in 2011-2014 provided 2 , 69 t / ha grain of the 4th class of quality in accordance with the requirements of DSTU 3768: 2010 [5]. For the cultivation of spring wheat on the background of earnings of byproducts of predecessor (soya) its yield and quality practically did not change. And only the introduction of the minimum in the experiment dose of mineral impurities (to the N₃₀P₃₀K₃₀ + N₁₅ sowing in the IV stage of organogenesis) made it possible to obtain a significant yield increase of 0.57 t / ha (NIR05 0.36 t / ha) and

improve Quality of grain (Table 1). It should be noted that for the above-mentioned variatric fertilizer obtained the highest mass of 1000 grains in the experiment - 45.9 g, significantly increased the nature of the grain - up to 752 g / l. According to the technology, which introduced the introduction of N30P60K60 and N30 into the IV and VIII stages of organogenesis with the background of the production of byproducts of the precursor and the complex maintenance of crops from weeds, diseases and pests, the yield of wheat of hard Jider variety was 3, 44 t / ha, which is 0.75 t / ha higher than in the control version, and only 0.18 t / ha higher than in the case with a lower fertilizer dose. Grain quality corresponds to the 3rd class. The same indices were obtained in the variant of fertilizer, where only nitrogen fertilizers were broken down in stages of organogenesis, and in the soil there was a high content of mobile phosphorus and potassium.

Fig. 2 Influence of weather conditions and fertilization on spring wheat in 2011-2014: • 2011; - 2012; - 2013; - 2014; Average

1. Impact of fertilizer on yield and quality of grain of wheat of solid spring (average for 2011-2014)

With the subsequent increase in the dose of fertilizers to 315 kg / ha d.r. NPK, in combination with the chemical protection measures for crops, received the highest yield crop yield of 1.06 t / ha compared to the control variant. The content of protein in the grain obtained in this fertilizer application, due to late nitrogen fertilization, increased to 13.5%, which, in combination with high mass, corresponded to the 2nd class in quality. In modern conditions of price disparity for the main means of production (fertilizers, means of defense, fuel) and for grain, the most optimally should combine the elements of cultivation technology, which would ensure the profitability and profitability of the production of high quality wheat grain of solid spring. The main factors of effective cultivation of wheat are the value of production costs per unit of production, its price, taking into account the quality and the level of profitability. The highest profit was 5553 UAH / hectare, with a yield of 3.45 tons / ha of Grade 3, which was used to grow wheat according to the technology, which provided for the reduced application of nitrogen fertilizers (N30 to sowing, at stages IV and VIII Organogenesis), but against the background of a high level of content in the soil of mobile forms of phosphorus and potassium for the complex use of the means of protection and earnings of byproducts of the precursor (Table 2). The lowest production cost of 1 ton of hard wheat was obtained without pre-bay, but the quality of the grain, as well as the background of the only side-products, was answered by the 4th class. For the introduction of mineral fertilizers, the cost of cultivation is increasing, while yields are improving and the quality of the grain improves. It is noteworthy that a variant with a minimum dose of N-30P30K30 + N15 at the IV stage of organogenesis, which yielded a yield of 3.26 t / hectare of Grain 3rd class, was 4837 UAH / ha, profitability - 78%.

2. Economic efficiency of growing wheat of solid spring, average for 2011 - 2014 (in prices as of November 28, 2014 *)

Conclusions

The influence of weather conditions and fertilization on the yield and quality of wheat grain of solid spring for its growing on dark gray, podzolized soil in the conditions of the northern part of the forest steppe has been established. In order to obtain wheat grain of solid spring, which in the favorable years meets the requirements of the 2nd class of quality, it is necessary to apply technology that involves the introduction of P90K90 under basic tillage with the background of earnings of byproducts of the precursor, N45 for pre-sowing cultivation, and also Nitrogen fertilization by 45 kg / ha in IV and VIII stages of organogenesis and integrated chemical protection of crops. The most profitable (5553 UAH / ha) variant was available with only nitrogen fertilizers applied at a dose of 90 kg / ha, but provided high levels of phosphorus and potassium in the soil after soybean growth were provided.

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