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PRODUCTIVITY OF CROPS IN DIFFERENT CROP ROTATIONS ON TYPICAL BLACK EARTH

The purpose. To sum up results of long-term investigation in productivity of crops depending on weather conditions during a year, fertilizing and place in different crop rotations. **Methods.** General scientific and special: field — for determination of effect of technological provisions on soil characteristics, quantity indicators of productivity of different crop rotations; laboratory — determination of quantitative and qualitative indicators of subjects of inquiry using physical and chemical methods; mathematical-and-statistical — for determination of reliability of the gained results. **Results.** Dependence of high efficiency of some crops on growing after the best precursors is fixed at keeping normative of crop rotation and length of rotation of experimental crop rotations. **Conclusions.** In conditions of unreliable moistening of Left-bank Forest-steppe for typical black earth the productivity of crops largely depended on weather conditions of a year, place in different crop rotations (3 – 10-field), fertilizing and optimum structure of sown area. With decrease of length of rotation, especially in simplified 2 – 3-field ones, productivity dropped.

Key words: crop rotation, precursors, fertilizing, crops, productivity, weather conditions, typical black earth.

Without a strictly regulated set of technologies and organizational and economic measures that correspond to the production specialization of farms and the accepted system of agriculture, modern high-quality agricultural production is impossible. High harvests with the simultaneous increase in soil fertility receive the optimum structure of crop area, set, ratio and alternation of crops in non-rotation crop

rotations. Only in the presence of rational crop rotation conditions are created for the planned application of technologies in each field, increasing the productivity of each crop. Because unaltered cultivation dramatically reduces yields, soil fertility, worsens the phytosanitary condition and crops compared to crop rotation. A properly composed crop rotation is of great importance for improving the culture of agriculture, the growth of yields of each crop and the profitability of agriculture [1 - 3]. Analysis of recent research and publications. In modern agriculture, new agribusiness with different land tenure and land tenure and specialization areas has been formed. Analysis of the yield of major crops over the past 20 years has shown that the biological potential of varieties and hybrids is realized only by 40-75% [4]. Since in the variety or hybrid of individual crops only the potential possibilities of biological productivity of a particular crop are laid, then they can be realized only in the real conditions of the field due to the proper technologies of cultivation, taking into account the soil-climatic conditions [1, 5-7]. The current level of farming and production needs in market conditions require such placement of crops in crop rotation, which would satisfy the needs of the market, contributed to increasing the productivity of all crops, stabilizing the soil fertility, and not violating environmental ecology [8 - 10]. The purpose is to summarize the results of long-term studies of crop yields, depending on meteorological conditions of the year, fertilization and placement in diversified crop rotations. Research methodology. The research was carried out in a long stationary experiment, which was laid in 1961 on typical black earths of the Drabovskiy experimental field (the former Drabiv experimental station NSC "Institute of Agriculture of the NAAN"), located in the zone of unstable moisture of the forest-steppe. The size of the sown area is 230, the registration number is 100 m² in a 3-time repetition. The experiment determined the productivity of diversified crop rotation with different saturations, placement and ratios of grain, technical and fodder crops. Research results. Growth and development of plants of field crops depended on weather conditions, precursors, fertilizers, etc. Water and phytosanitary regimes of the soil are largely controlled by the crop rotation factor, nutrition level, and soil cultivation. Observance of scientifically grounded alternation of crops of continuous sowing and propagation with optimum level of fertilizer helps

to clear fields from weeds, reduces plant damage by diseases, increases yield of grain, technical and fodder crops. The yield of winter wheat of Zolotocolos after peas was the highest - 4.0 - 4.1 t / ha on average for 5 years (2006 - 2010) in 10-crop rotations. In the 5-year-olds - almost at the level of 4.3 - 4.5 t / ha, the 4th and 3rd-breeding ones declined to 3.9-3.7 t / ha. High yield of wheat was also obtained for placement in crop rotations after annual grasses and corn on silage - 4.0 t / ha, and the yield of soya as a precursor does not exceed 3.7 - 3.8 t / ha. In favorable weather conditions in 2009, in 10-field crop rotation, the grain yield of wheat after peas and corn on silage was 5.3 - 6.17 t / ha, perennial grasses, one-year-old - 5.0 t / ha, and even after soybeans - 4.3-4.8 t / ha. While in unfavorable 2006, 2010 she declined to 3.5 - 2.8 t / ha. In the 5-way crop rotation, wheat also yielded high yields after peas - 6.1 t / ha, and in 3-volumes it decreased by 1.9 - 0.8 t / ha. Wheat of the Jara variety of Suite as the second important food culture significantly inferior to the yield of winter. On average, over 5 years, its yield was 2.1 - 2.5 t / ha and almost did not depend on the length of rotation. The highest yield of grain was noted in crop rotation for placement after prassapnyh predecessors in comparison with the stalks. In favorable 2008-2009 yields of spring wheat after winter wheat amounted to 2.8 to 4.0 t / ha, sugar beet - 3.1 to 3.5, corn for grain - 2.9 to 3.4 t / and. In the unfavorable years of 2007 and 2010, it declined after the headings according to 1.7 - 1.0; 1,9 - 1,2 and 1,1 - 1,0 t / ha. The yield of barley of the variety Magnificent for many years in unequal crop rotation was 3.2 - 3.4 tons / ha of grain.

In favorable 2009, the equivalent precursors for this crop were sugar beet, corn for grain, wheat forage and winter, where yield was 5.26 - 5.48 tons per hectare, in unfavorable 2006 - 1.5 - 2.4 t / ha with a tendency to decrease after beet sugar. Oats were sown in a 5-way crop rotation after wheat wheat, its yield on average of 5 years was 3.26 t / ha grain, in favorable 2009 - 4.8 t / ha. The yield of barley and oats is close in these soil-climatic conditions, and these crops among grain-growing are tolerant in crop rotations. Sorghum varieties in crop rotation were placed after corn for grain, wheat bran, sugar beet and sunflower. Average yield over 5 years was 2.5 - 3.2 t / ha, in favorable years - 3.6 - 4.2, unfavorable - 1.4 - 2.8 t / ha. For the placement of peas after sunflower in the link: winter wheat - sunflower - peas

obtained the lowest yield - 1.6 t / ha. The yield of soybeans as the second important leguminous crop was lower and amounted to 1.9-2.2 t / ha, in favorable 2007, 2009 - 2.5 - 3.2, unfavorable in 2010 - 1.4 - 2.4 t / ha. The Pereyaslavl corn hybrid 920 cv was placed in crop rotations after winter wheat, sugar beet, canola, soya and again after corn. On average, over five years, the grain yield of maize in varied crop rotations was 7.38 - 9.49 t / ha depending on its saturation in crop rotation, precursors and fertilizers. Corn is characterized by slow growth and low amount of moisture in the beginning of the vegetation. It uses the highest amount of moisture during the 30 days of the critical period, which begins 10 days before the vaginal discharge and lasts until the middle of the milk ripeness (from end of June to the end of July). In this regard, the grain yield of this crop is also significantly dependent on weather conditions and rainfall. Therefore, in the best weather conditions of 2006 and 2009, the grain yield of corn amounted to 9.23 - 10.0 t / ha, and the green mass - 45.2 - 61.6 t / ha; in unfavorable 2010 - respectively, 5.3 and 38.3 t / ha. Despite the self-compatibility in the crop rotation of this crop in its re-crops, its yield decreased. Thus, on average, for five years, the grain yield in the 10-way soybean crop rotation - corn for grain - corn for grain - corn for grain was 1.97, respectively; 8.66; 7.77; 7.43 t / ha, that is, the second second corn does not make up 0.89 t / ha, the third - 1.23 t / ha of grain. High yields of other crops were obtained in experimental variability crop rotations. In particular, on average, in 2006-2010, the yield of root crops of beet sugar was 43.0 - 59.4 t / ha (in favorable years - 61.1 - 67.2 t / ha); sunflower seeds - 2.46 - 2.68 t / ha (3.22 - 3.82 t / ha); the green mass of annual and perennial grasses - 24,7 - 31,9 and 18,9 - 28,3 t / ha (46,5 - 48,0 and 33,2 - 54,8 t / ha); The green mass of winter wheat siderate is 38.1 - 45.8 t / ha (in favorable years - 50.2 - 52.1 t / ha). The results of temperature and precipitation monitoring confirm that global anthropogenic warming is accelerating. Ukraine's food security will largely depend on how effectively agriculture adapts to the expected climate change, future agro-climatic conditions for growing crops. Therefore, an important issue is the assessment of the impact of expected climate change on agro-climatic conditions of production, productivity and gross collections of each crop. Meteorological conditions in 2014 were favorable for most cultivated crops in different crop

rotations. In particular, the highest yield of winter wheat was obtained in 5- and 10-crop rotations - 6,0 - 6,5 t / ha, 7-fowl after grasses - 5,4 - 6,06 and in 3-crop rotation after peas - 6 , 06 t / ha. The yields after soybeans were lower - 5.4 - 5.41 t / ha and low after corn on silage - 4.76 - 4.98 t / ha, and in crop rotation without fertilizers the yield decreased to 3.51 - 3.74 t / ha. The highest yield of spring wheat was obtained in 5-crop rotation after radish oil - 3.55 t / ha, lower - after corn and sugar beet - 2.85 - 3.0 t / ha, and after soybean - 2.7 - 2.8 t / ha, high yield of barley was in 10-crop rotation after winter wheat and beet sugar - 1.02 - 4.19 t / ha and low - 2.83 t / ha in the case of no fertilizer. For the placement of peas after corn for grain in a 10-crop crop, yield was at 2.43 - 2.60 t / ha, in the 5-trough - 2.3 - 2.38, 3-trough - 2.23 t / ha . For maize, the critical period for the reserves of productive moisture in the soil and sediments was July, at that time only 6.5 - 8.5 mm of precipitation fell, high temperatures and low relative humidity (23-25%) negatively affected its productivity. The yield of corn, depending on predecessors and fertilizers, was 4.86 - 5.9 t / ha; root sugar beet sugar - 50.5 - 56.3 t / ha, sunflower - 2.20 - 2.61; soybeans - 1.76 - 2.20 t / ha, the best predecessor was radish oil and wheat yar. The high yield of corn on silage was obtained - 35.1 - 44.0 t / ha, annual grasses - 19.8 - 39.7, perennial herbs - 26.6 - 30.1 and green mass of radish oil - 29.7 - 34 , 4 t / ha.

Conclusions

In conditions of unstable wetting of the Livoberezhny Forest-steppe on typical black soil, the crop yields depended to a great extent on the meteorological conditions of the year, the placement of varied crop rotations (3-10 livestock) and fertilization. A leading factor in the high productivity of agricultural crops is the crop rotation: placing after the best predecessors for observance of duty regulations, the application of optimal fertilizer doses and optimal crop structure in crop rotations. Fertilizers - one of the important factors in increasing the productivity of crop rotation. The yield of grain grows by 1.3 - 2.0 t / ha, and 25 - 30 tons per cent, including maize for grain - by 0.8 - 1.1 t / ha, silage and green biomass of annual and perennial grasses - by 0, 7 - 0.9 t / ha. For the cultivation of winter wheat and early spring, the proportion of fertilizer exposure was 40-68%, corn, soybeans, and sunflower - 22-26%. The direct relationship between the length of rotation of crop rotation and the productivity of crops is determined: with decreasing rotational length, especially for simplified 2 - 3-cubic, productivity decreases.

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