EVALUATION OF PRODUCTION AND ECONOMIC DIFFERENT TILLAGE SYSTEM IN WINTER WHEAT

Abstract

Key words: winter wheat, preceding crop, tillage system, soil properties, weed infestation, fungal

The field experiment was conducted in 2008-2010 in two statistics large-area experiments. The size of each fields was approximately 1 hectare. First experiment was established on brown and heavy alluvial soil developed from a silty clay in RZD IUNG Kępa – Puławy in 2006. Second experiment was established on brown alkaline soil developed from a silty clay in Rogów in 2002. Soils in both locality were belonged to II quality class and good wheat complex. Their content of phosphorus, potassium and magnesium was a high, pH close to neutral, and content of humus of about 2.2% in Kępa to 1.8% in Rogów. In both experiments, three-field crop rotation without repetitive was tested: winter rape - winter wheat - winter wheat in Kępa and winter wheat - winter wheat in Rogów.

The main aims of this studies was to evaluate the impact of long-term use of simplifications of tillage on selected soil properties, the yield of winter wheat, grain quality, weed infestation and severity of stem base diseases, and to assess the effectiveness of economic and energy efficiency of different tillage systems.

The results showed that different three-field crop rotations haven't a clear impact of a soil fertility in Kępa. In contrast, content of soil organic matter (on average for 3 years) was significantly higher in the no-tillage and direct sowing than in a ploughing system.

Grain matter yield of wheat was 7.9 t/h in Kępa and 7.4 t/h in Rogów, regardless of soil cultivation system and forecrop. In Kępa a winter wheat had the highest grain yield in no-tillage system, regardless of forecrop and yield was significantly higher than in ploughing system and direct sowing. However, forecrop had a positive effect of production of grain in Kępa, as well as in Rogów. Impact of different cultivation system haven't shown clear effect on quality of grain winter wheat. The highest content of crude protein and wet gluten was observed in ploughing system and the lowest was found for direct sowing. Moreover, ploughing system encouraged higher concentration of crude protein in grain winter wheat.

The results showed that a severity of diseases of culm base and root system of winter wheat in the milky-wax maturity phase dependson the examined factors and habitat

conditions. For objects with direct sowing, severity of culm base diseases of winter wheat in both locations, regardless of the forecrops, were substantially smaller than for the other two methods of cultivation. This pattern is clearly marked tofbothforecrops and in all the years of research. Shock culm base index in the crop rotation: winter wheat - wheat, was about 40% higher than in the location after the rape. The severity of this group of diseases clearly depends on the weather through the years.

A present studies showed that a simplified economic analysis calculating direct surplus, depended on the previous crop in both locations. In the case of sowing of wheat after a good forecrops gross margin on the object of direct sowing was even greater than the ploughing system. The application of simplified tillage allowed the reduction in the labor costs and consumption by approximately 15 - 20% compared to the conventional tillage. In the case of direct sowing, this difference was approximately 40%.