

PRODUCTIVITY OF CROPS OF FIELD ROTATION IN CONTRASTING GROWING SEASONS

Sigitas LAZAUSKAS, Šarūnas ANTANAITIS, Virmantas OVILAITIS, Renaldas ŽYDELIS

Lithuanian Research Centre for Agriculture and Forestry, Institute of Agriculture

Instituto al. 1, LT-58344, Akademija, Kėdainiai distr., Lithuania

Email: sigislaz@lzi.lt

Abstract. *Given the need for sustainable intensification of crop production, experimental assessment of factors contributing to yield variability and uncertainties in nutrient balances in a field crop rotation is essential. The study, aimed at performance of crops under different management in relation to weather conditions, was conducted during 2008-2011 at the Institute of Agriculture, Lithuanian Research Centre for Agriculture and Forestry in Dotnuva, Kėdainiai, Central Lithuania. The soil is characterised as sandy loam, neutral, medium in available potassium and phosphorus. Crop rotation: winter wheat, spring rape, spring barley and red clover were replicated in time. Crops were grown without or with fertilizers and plant protection measures designed for target yield (7; 2.5 and 5 t ha⁻¹ for winter wheat, spring rape and barley respectively). Treatments were replicated twice in space; each experimental plot occupied approximately 790 m² and contained 6 sub-plots 44 m² in size.*

The crop growth period during the experimental years was significantly warmer than the climate normal and with contrasting rainfall. Although modelling indicated temporal water stress in all experimental years, significant yield losses occurred only in a few cases. A drought in the summer 2008 resulted in a low spring rape seed yield and poor establishment of red clover undersown in spring barley, thus the field was ploughed and peas were sown in 2009. The outcome is an increase in nitrate concentrations in drainage water in winter-spring season of 2008-2009 and reduction of yield of winter wheat, which followed peas, in 2010. Heavy rains in late July 2011 resulted in severe lodging of winter wheat grown under conventional management, which substantially contributed to increased year-to-year variation of yield. On average, yield of winter wheat grown without fertilizers and pesticides was 67%, spring barley 70%, spring rape 47% and red clover 124% of that under conventional management. Protein content in winter wheat and spring barley grain was enhanced under conventional management; however, oil content in spring rape seeds was reduced.

Key words: *yield, protein, management, drought.*