RESPONSE OF SPELT AND COMMON WHEAT TO CULTIVATION IN VARIOUS CROP ROTATION SYSTEMS

Mariola Parzonka

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Abstract

The PhD Thesis was written on the basis of results from a 3-year (2016-2018) field experiment carried out at the Production and Experimental Station in Bałcyny (a research facility of the University of Warmia and Mazury in Olsztyn). The experimental factors were: 1. Subspecies of winter forms of spelt and common wheat. 2. Cultivation of spelt and common wheat in four crop rotation systems: A. winter rapeseed + inter crop (phacelia) - spring barley - peas - spelt/common wheat; B. winter rapeseed - spelt/common wheat + inter crop (phacelia) - peas - spelt/common wheat; C. winter rapeseed + inter crop (phacelia) - peas - spelt/common wheat - spelt/common wheat; D. winter rapeseed - winter spelt wheat + inter crop (phacelia) - spring barley - spelt/common wheat. The main objective of the experiment was to compare the response of spelt and common wheat to cultivation in various crop rotation systems in terms of weed infestation, biomass production, grain yield as well as grain quality characteristics. Greater weed infestation was determined in the plots with spelt than common wheat. The cultivation of spelt and common wheat on plots one after another (crop rotation C) and after barley (D) led to increased weed infestation and a reduced spike number per unit area. Spelt wheat cultivation after barley facilitated the development of longer spikes, but with less grains. The order of wheat in the crop rotation had no effect on its spike structure elements. In the case of spelt wheat, the crop rotation type did not influence the daily increase in plant biomass. In contrast, a faster biomass growth was observed for common wheat cultivated on the plot after barley in crop rotation D. In the case of both wheat subspecies, rapeseed (as a forecrop) had a beneficial effect on the chlorophyll content, whereas in the case of wheat – the same effect was also observed for peas. The photosynthesis process in spelt wheat plants was positively influenced by the order in crop rotation, i.e. by cultivation after rapeseed and peas in crop rotation B and after peas in crop rotation C, while negatively affected by cultivation after barley in the four-species crop rotation D. In wheat plants, the greatest assimilation was noted after peas in crop rotation A and after barley in crop rotation D. The type of crop rotation was found not to affect the quality features of spelt and common wheat grain. For spelt wheat, the most favorable forecrops turned out to be peas and rapeseed (regardless of the crop rotation). The cultivation of spelt and common wheat one after the other and after barley decreased the grain yield. The magnitude of grain yield reduction was similar for both spelt and common wheat sown after cereal forecrops.