

The reaction of winter wheat on the application of biostimulators Asahi SL and Kelpak SL and stimulator Tytanit

Reakcja pszenicy ozimej na stosowanie biostymulatorów Asahi SL i Kelpak SL oraz stymulatora Tytanit

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Development of modern agriculture is accompanied by constant improving and looking for new means and cultivation technologies of field crops. In intensive modern cultivation technology of cereals a number of supportive preparations are used, such as biostimulants (growth stimulants or phytostimulants), which aim at accelerating and regulating the vital processes, increasing plant resistance to stress conditions, facilitating nutrient uptake and stimulating development of all plant parts. The effect of those preparations on plants does not result from direct participation in control of vital processes but from the effect on their metabolism. These preparations are safe to the natural environment and may partly supplement the action of chemical means of plant production. They are produced using marine organisms, especially algae and seaweeds, which contain nutrients, trace elements (e.g. titanium) as well as growth substances and vitamins. Therefore, research was undertaken which aimed to estimate if and by as much the application of the biostimulants Asahi SL and Kelpak SL and the growth stimulant Tytanit, applied in different doses and phenological phases, determined the grain size and quality of the winter wheat cultivar "Muszelka" and affected the chlorophyll content and root weight, in comparison with mineral fertilization (NPK).

The study was conducted over 2012–2014 at the Research Station of the Faculty of Agriculture and Biotechnology UTP in Mochelek in the *Luvisols*, based on a one-factorial field experiment. The experimental factor was two biostimulating preparations: Asahi SL, Kelpak SL and the fertilizer Tytanit applied in different doses and phenological phases (BBCH 23, 37, 69) and the control treatment ($n = 4$).

It was found that the applied preparations significantly determined the quantity of winter wheat grain yield and values of the studied technological parameters (total protein content, gluten and sedimentation index value acc. to Zeleny). It was proved that the application of the above preparations usually significantly decreased values of the studied technological characters of wheat as compared with the values found on the control treatment. Grain collected from the treatment where Tytanit in phases BBCH 23 and 37 was applied was characterized by the most favourable values of the studied parameters in respect of baking value. Considerable increase in grain yield was observed after the application of biostimulants Ashasi SL and Kelpak SL, as compared with the control, as well as higher contents of chlorophyll in leaves and of the root weight. This particularly referred to treatment where the biostimulant Asahi (in phase BBCH 37), and the fertilizer Tytanit (BBCH 69 and 37) were used. Also significant correlations were found only between grain yield and gluten content ($r = -0.49$), sedimentation index ($r = 0.35$) and between the root weight and gluten ($r = -0.73$) and sedimentation index ($r = -0.63$), as well as between chlorophyll content and root weight ($r = 0.73$). For these relationships linear regression equations were calculated and presented graphically.