

QUALITY AND YIELD OF WINTER WHEAT WITH SULPHUR CONTENT FORMULATIONS

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Introduction

Value of good quality wheat realizes in bakery therefore the quality control of the wheat is inseparable from quality control of the flour. The S-S cross-link of the winter wheat's gluten components (cystine) essentially important in the production of good bread-crumbs as in case of sulphur deficiency quality problems occur. The latest Western-European and Canadian researches emphasize the role of sulphur supply in the quality of wheat and increasingly apply sulphur base and/or top dressing of wheat.

A close correlation has been stated between the sulphur content of the wheat grain and the volume of bread. (MOSS et al. 1981, MOSS et al. 1983, SCHNUG et al. 1993). Their results show that adequate sulphur supply has highly important role regarding the quality of wheat as in case of low sulphur supply the cystine content reduces consequently disulphide links of the gluten are not sufficient to ensure the required elasticity (FRATER et al. 1960, KOHLER et al. 1993, KECK and WIESER 1995). According to Mosonyi (1987) quantity of thiol and disulphide groups in the flour refers to the rheological specifics of the dough and to some of the baker quality specifics. The differences in water uptake can be ascribed to the hydration of protein and starch fractions. Water uptake of the flours from wheats containing more gluten is larger (Pollhamerné 1973, 1988), in case of flour of better quality water uptake is larger. Higher gluten expansiveness mostly refers to higher softening.

During processing our results we analyzed the gluten and protein content of the whole grain and the flour and we estimated of great importance to examine baker parameters and with this knowledge the analyzed wheat samples can be ranked into separate processing categories. Beside the mentioned quality characters we examined the effect of the sulphur on the yield as well.

Methods

The examined wheat samples were produced in the DE-ATC Demonstration Farm of Látókép which soil is plain calcareous chernozem with deep humus layer developed on loess, its nitrogen and phosphorus content is medium while potassium content is high.

In the research we applied 8 different fertilizer treatments in 4 repetitions, size of the parcels were 3m x 8m and the produced winter wheat variety was MV Pálma.

We applied only N-fertilizer on the control parcel. In some cases sulphur supply was provided by the by-product of the lysine production, biofert (12,8 % S) which serves as N fertilizer as well, while in other cases by the sulphur containing superphosphate (10,9% S) (Győri 1999). On other two parcels we sprayed FitoHorm 32S solution (30 % sulphate S) as S leaf fertilizer onto the stand in spring. In treatments No 2-4 and 7-8 we made P fertilization consciously by MAP not containing sulphur. Dispersion of phosphorus and potassium was before plough in autumn while the first part of N fertilizer was dispersed before sowing into the finished soil and the second part was dispersed at the end of winter.

The detailed fertilizer dosages applied in our researches are showed in Table 1.

Table 1: Applied treatments

1. controll N 100	5. N 100,P 70,K 80 phosphor szuperfoszfát
2. N 100,P 70, phosphor MAP	6. N 100,P 140,K 80 phosphor szuperfoszfát
3. N 100,P 70,K 80 phosphor MAP + 2 l/ha Fitohorm 32S	7. N 100, P 70 MAP, K 80 N biofert
4. N 100,P 70,K 80 phosphor MAP + 4 l/ha Fitohorm 32S	8. N 150, P 70 MAP, K 80 a N biofert

Our researches were made from whole grains by PerCon 9001 Inframatic apparatus according to ICC Standard No.159 and farinograph researches were executed and evaluated according to MSZ 6369/6-73. Data were analysed by single-factor analysis of variance, by SPSS 12.0 software.

Results and Discussion

Significantly proved effect of fertilization on the yield were not experienced (Figure 1). We reached the highest yield – 4,6 t/ha – in Treatment 6 while gluten content was very low (30,8 %) alike in the control. We measured the highest gluten content in Treatment 2 (Figure 1). Regarding the gluten index we achieved favourably high value in case of all treatment which proves strong gluten structure (Table 2). It refers to good dough structure thus it assumes good ingredient from the aspects of bakery.

Table 2: Gluten index results

Treatments	1.	2.	3.	4.	5.	6.	7.	8.
Gluten index	93,63	94,28	95,37	94,69	94,22	96,6	92,28	92,75

After we had done farinograph measures developed for real measurement of the gluten's strongness and quality we came to the same conclusion. For the effect of fertilization treatments the water uptake, the time of dough formation and the change of softening value statistically proved.

As the wheat was basically of good quality we did not experience significant difference in the results. Comparing the fertilization treatments with the control time of dough formation showed better results. While in the aspect of softening we achieved unfavourable results in Treatments No 6 and 7 compared with the control (in spite of the S supply). Data of Treatment No 2 show the most favourable effect. We did not experience outstanding quality improvement although the received positive results account to continue our research.

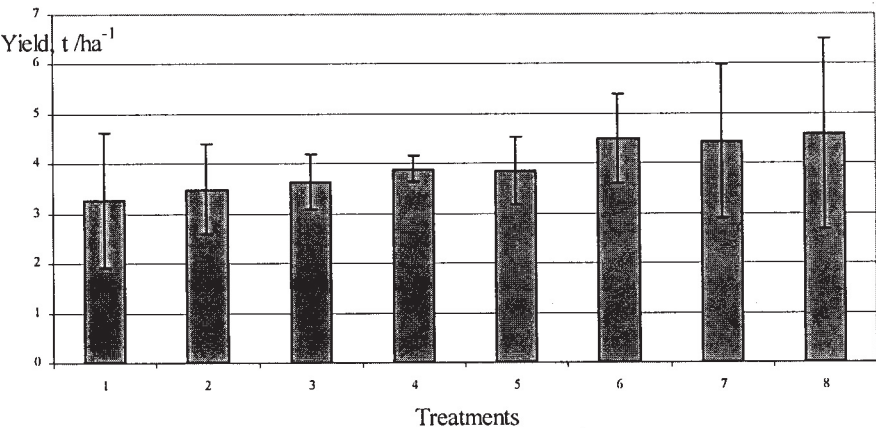


Figure 1: Effects of S content formulations on yield

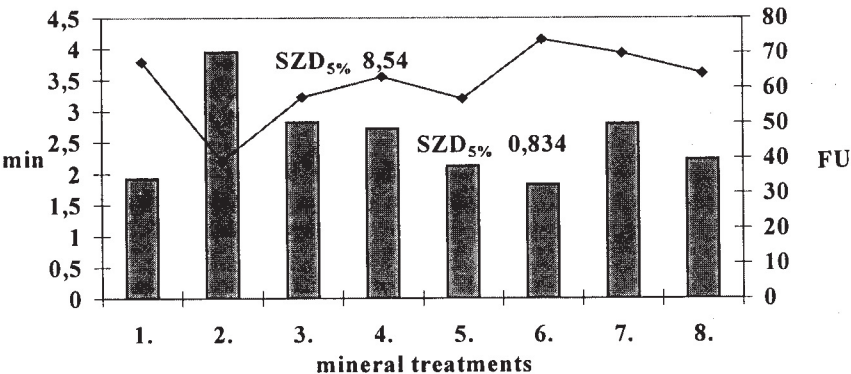


Figure 2: Changes of farinograph parameters (dough development time/ degree of softening)

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