

Effect of Locality and Environment on Productivity of Wheat in Chernozem Soil

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Introduction

Wheat (*Triticum* sp. L.) is one of the oldest and most important cultivated plants today because wheat bread is used by more than 70% of the Earth's population. Wheat had and will play in the future the most important role in the nutrition of the population for a long time (Rakašćan *et al.*, 2019; Rajičić *et al.*, 2019). Worldwide, wheat accounts for about one-third of the sown cereals area, or about 26%. Wheat adapts well to the climate and soil, and has many species and varieties. There is winter and spring wheat so it is grown almost all over the world and is included in the euro-types (Dončić *et al.*, 2019).

Material and Methods

Experiments with the native variety of winter wheat "A" were carried out at three localities in the wider area of Belgrade: Mladenovac, Požarevac and Surčin during 2015/2016, 2016/2017 and 2017/2018 years. During the experiment varietal growing technology was applied. Together with the basic soil managing basic fertilization with the mineral fertilizer formulation of NPK 15:15:15 with the norm of 250 kg ha⁻¹ was performed. Sowing norm for establishing experiment was 250 kg ha⁻¹ of the declared certified seed. Crop fertilization was carried out in spring with Calcium ammonium nitrate (CAN 27% N) with the norm of 200 kg ha⁻¹. The harvest was done in technological maturity. At harvest time plants were taken from each replicate for plant height analysis (cm) and the seeds were taken for determination 1000 grains mass (g) and the yield (kg ha⁻¹).

Results and Discussion

The highest average value for plant height (cm), for all three years of investigation, was recorded at the locality of Požarevac (88.2 cm), while the lowest average value, for all three tested years, was recorded at the locality of Surčin 87.3 cm. Average values for the mass of 1000 grains (g), for all three tested localities in the three-year period were 37.7 g. The largest average value for 1000-seed weight (g), for the experimental period, was at the locality of Surčin 38.0 g, while at the locality of Mladenovac the average value was lower (37.5 g).

The most unfavourable year for wheat production was 2015/2016, the year in which the smallest amount of rainfall was recorded; only 335 mm. Cultivation localities had a statistically significant effect on grain yield. The average values for the yield for all three localities and three-year period were 5189 kg ha⁻¹. In Požarevac place the average yields were higher by 10.2% compared to the locality of Mladenovac.

The highest total yield, for the tested period, was at the locality Požarevac 5.583 kg ha⁻¹ while the lowest average yield for all three years of investigation was recorded at the place Mladenovac 5.067 kg ha⁻¹.

The average deviation of the average grain yield values from the mean value, between the years, was 62. The largest deviation was observed at the locality of Požarevac (201.2). Grain yield between years records stability, 2.9% < Cv < 8.4%.



Figure 1. Total precipitation in the vegetation period, Belgrade, years 2015/2016 - 2017/2018

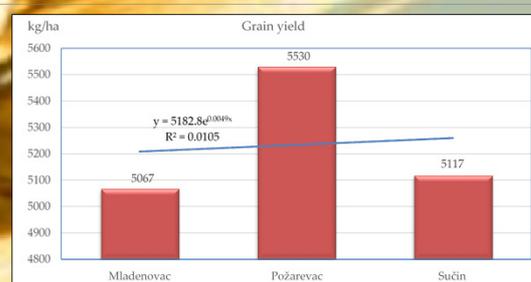


Figure 2. The impact of the locality on the yield of wheat, 2015/2016-2017/2018

Locality	2015/16	2016/17	2017/18	Average	Std. dev.	Cv
Plant height (cm)						
Mladenovac	83.6	88.2	88.0	87.9	2.3	2.97
Požarevac	84.3	89.1	88.3	88.2	2.2	2.95
Surčin	86.6	87.4	87.8	87.3	0.5	0.71
Average	84.8	88.2	88.0	87.0	1.6	2.2
CV	1.9	1.1	0.3	0.5	-	-
Mass of 1000 seeds (g)						
Mladenovac	37.2	38.1	37.2	37.5	0.5	1.4
Požarevac	37.1	38.0	37.8	37.6	0.4	1.3
Surčin	37.6	38.5	38.0	38.0	0.4	1.2
Average	37.3	38.2	37.7	37.7	0.37	1.2
CV	0.8	0.7	1.2	0.7	-	-
Grain yield (t ha ⁻¹)						
Mladenovac	5000	5050	5150	5067	62.4	1.5
Požarevac	5300	5790	5500	5530	201.2	4.5
Surčin	5150	5000	5200	5117	85.0	2.3
Average	5190	5280	5283	5238	62.0	1.5
CV	2.9	8.4	3.6	5.1	-	-

Conclusion

Cultivation locality had a statistically significant effect on grain yield. In Požarevac the average yields were larger by 10.2% compared to the Mladenovac locality. The average values for the yield for all three localities for three-year period were 5.189 kg ha⁻¹. The largest average values for grain yield, for the tested period, were recorded at Požarevac locality (5.583 kg ha⁻¹), while the lowest average yield for all three years of testing was obtained at the Mladenovac locality (5.067 kg ha⁻¹). In order to achieve large yield and profitable wheat production regional division is necessary to be done.

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