Productive Capacity of Varieties of Common Wheat (Triticum Aestivum, L.) in North-Eastern Bulgaria

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***Abstract**: In 2011 - 2013, in the land of the town Glodjevo municipality, Vetovo in Northeastern Bulgaria is displayed experiment to establish productive capacity of four varieties of common wheat. Studied varieties are Aglika, Venka 1, Demetra and Enola (used as a standard). In this research area the most productive variety is Enola. The yield of the grain is formed mainly by the weight of 1000 grains, the length of the class and depending on the weather conditions - the number of productive brothers.*

***Keywords**: Common wheat, varieties, grain yield.*

INTRODUCTION:

Climate change observed in recent years, and demand determine the necessity of creating new and better varieties and hybrids of cultivated plants. Trade shows are the place where researchers present their new developments, and farmers can assess suitability of their products and their implementation into practice. In recent years, studies in a number of authors have shown that the greatest effect on grain yield in wheat varieties have weather conditions during the growing period [9, 3, 7, 8, 2, 4, 5, 6, 1, 10, 11]. Therefore, to use the full productive potential of the variety as a factor in obtaining high yield important is choosing the right varieties for each agro-ecological region.

The aim of the study was to establish the productive capacity of the four varieties of common wheat grown in north-eastern Bulgaria and on the basis of the results to make recommendations for practice.

RESULTS AND DISCUSSION

The study was conducted during the period 2011 - 2013 in the territory of the town Glodjevo, municipality Vetovo in Northeastern Bulgaria on soil type Haplustoll. Experiment is set and displayed under production conditions in block method in four variants and four replications at the size of the plots 100 m ^{2}. We studied four varieties of winter wheat Aglika, Venka 1, Demetra and Enola we used as a standard. Sowing was carried out in the optimum area for a period of 20.09 to 10.10 in the years after predecessor sunflower with 500-550 germinating seeds per m ^{2}. Fertilization was performed with N $_{14}$, P $_8$ a. i./ da. Phosphorus fertilizers were introduced after the first treatment, and one third of nitrogen fertilizer in early spring and as nourishing - the rest of nitrogen fertilizer.

Growth and development of wheat plants during the years of study were conducted under different weather conditions (Fig. 1).

Autumn-winter period (X-III) of 2010-2011 was characterized by rainfall (262.4 mm), which are slightly above normal for the area of 235.1 mm and without extremely low temperatures. The air temperature favors good rooting and growth of wheat. The spring was cool, with a little below normal rainfall for the area. Weather conditions favored to the production of high yields of grain.

Autumn-winter period (X-III) of 2011-2012 was characterized by extremely dry and warm autumn and a very cold winter with prolonged cold snap and snow above the norm. Temperatures in late January and early February fell significantly and reached - 19, 5 ° C, for several days the minimum temperature did not exceed - 18 ° C. At the end of the first decade of February repeated the same scenario with prolonged low subzero temperatures. Thick snow cover kept the wheat from frost.

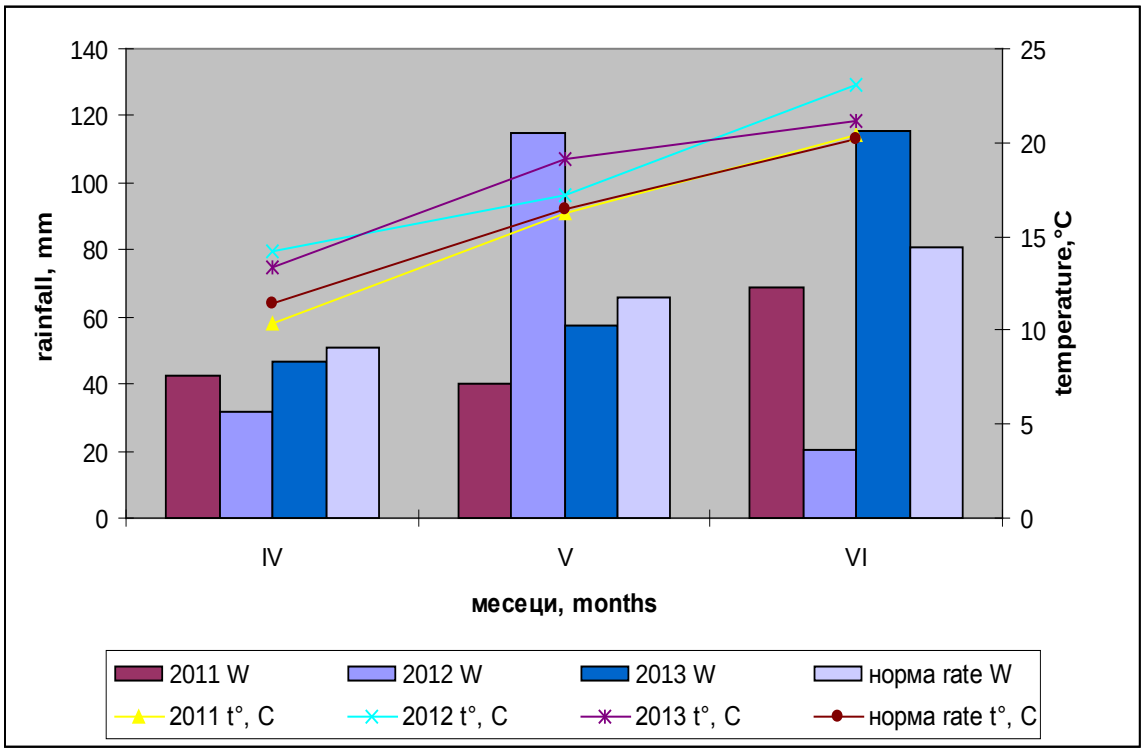

Figure1 A climate graph for the study period

March was dry (7.8 mm) and warm. Rainfalls in April (32.0 mm) are distributed in 14 days and have no particular economic significance. As a result of autumn drought, the wheat could not make brothers, and in the spring did not reach its natural height.

The amount of precipitation in May (114.6 mm) is twice the rate for the region as the main precipitation fell in the second half of the month an average temperature lower than normal. Drought occurred in June adversely affect pouring grain. July was extremely dry at a significantly higher rate compared to average temperature. In conclusion it can be said that the yearly weather conditions are moderately favorable for the development of wheat.

Autumn-winter period (X-III) of 2012-2013 was characterized by an early cold snap occurred without extreme low temperatures. The sum of rainfalls was above than normal, which provide good moisture. Drought in November slowed the growth and development of winter wheat. Precipitation in early December no economic importance due to the ensuing lasting cold. Spring wheat growing season was marked by favorable to its development weather.

Precipitation in June and early July improved soil moisture and helped to fill and feed the grain but made difficult harvest and worsened its quality indicators.

In conclusion it can be said that the year was favorable for the development of wheat.

Plant height to some extent determines the resistance of varieties to lodging and its suitability to intensive farming technologies. Average for the period of the study versus standard Enola three varieties were higher stem, namely: Venka 1 - 88.3 cm Demetra - 83.3 cm and Aglika - 74.0 cm (Table 1). In the period is not accounted for lodging of plants of trial varieties.

The values of the structural elements of the yield showed that all tested varieties have a shorter length compared to the class with the standard Enola. Average for the period of investigation variety Venka 1 had class length 9.2 cm, Demetra - 8.9, Aglika - 8.3 cm at 12 cm for the standard.

Table 1.Height of the plants and structural elements of the yield (mean 2011-2013)

Varieties	Height of the plants, cm	Length of the spike	Spike bearing stems per m^2	Number of grains per spike
Enola	69.0	12.0	550	47.0
Aglika	74.0	8.3	524	39.7
Venka 1	88.3	9.2	577	44.9
Demetra	83.3	8.9	532	41.8

Analysis of the results for crop density indicates that it varies in a narrow range 524-577 class m^{-2}. Average for the study period densest seed (classes 577 m^2) formed variety Venka 1, followed by the standard Enola, Demetra and Aglika with (classes 524 m^{-2}).

Important for yield formation is the number of grains per class. With most grains in a class is a standard variety Enola - number 47, followed by variety Venka 1 Demetra and Aglika 39.7 units. Details of the mass of 1000 seeds showed that all studied varieties are with a low absolute weight of the control (Table 2).

Hectolitre mass of the grain ranged from 77.0 to 81.2 kg / hl, as standard Enola has a small weight, Aglika and Demetra outperform it slightly and variety Venka 1 has the highest hectolitre mass - 81.2 kg / hl.

Table 2.Weight of 1000 grains and hectoliter mass (mean 2011-2013)

Varieties	Weight of 1000 grains, g	Hectoliter mass, kg/hl
Enola	37.5	77.0
Aglika	37.1	77.7
Venka 1	36.1	81.2
Demetra	36.5	78.0

The highest grain yields were realized in 2013 (table 3). Yield reported in Enola variety is highest - 6358 kg / ha. In the first year, any varieties were studied with lower yields than the standard 2.2% Enola (Demetra) to 7.5% in (Venka 1). In 2012, when the standard was again recorded the highest yield, and in 2011 varieties Demetra and Venka 1 exceed the standard with 14.33% and 14.48%.

Table 3.Grain yield, (kg/ha)

Varieties	2011	2012	2013	Mean	
				kg/da	%
Enola	4625	5682	6358	5552	100 %
Aglika	4300	5562	6028	5295	95 %
Venka 1	5295**	5015	5880	5330	96 %
Demetra	5288**	4185	6218	5250	95 %
GD- 5%	317	503	503	293	5.3 %
GD- 1%	481	762	762	443	8.4 %
GD- 0.1%	773	1226	1226	712	13.4 %

The correlation analysis of the yield with certain structural elements of the yield and technological indicators indicates that the main role in the formation of the production had the parameters mass of 1000 grains and a length of a class and to a lesser extent the number of beads in the class. Indirectly negative influence had specific weight and plant height. Exceptions made data of the first year of study, wherein for the formation of significant yields were the number of productive brothers and plant height. The mass of 1000 seeds has an indirect negative effect on grain yield.

Table 4.*Correlation analysis of yield with some structural elements of technological parameters*

Indicators	**Yeild**		
	2011	2012	2013
Length of the spike	-0,17	0,36*	0,69**
Spike bearing stems per m^2	0,51**	0,02	-0,4
Number of grains per spike	0,22	0,26	0,37*
Weight of 1000 grains	-0,86***	0,94***	0,83***
Hectoliter weight	0,33	-0,75***	-0,85***
Height of the plants, cm	0,89***	-0,65**	-0,49*

CONCLUSIONS

For research area of northeastern Bulgaria, where soil type Haplustoll most productive variety, Enola is with an average yield 5552 kg / ha.

Grain yield in variety Enola is formed mainly by the mass of 1000 grains, the length of the class and depending on weather conditions.

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