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CAPITALIZING OF THE SANDY SOILS FROM SOUTHERN OLTENIA THROUGH CULTIVATION OF NEW VARIETIES OF TRITICALE

Drăghici Iulian, Reta Drăghici, Mihaela Croitoru
Development Research Center for Field Crops on Sandy Soils, Dabuleni, Dolj County, Romania,
Phone: +40251334402, Fax: +40251334347,
E-mail ccdcpndabuleni@yahoo.com; http://www.ccdcpndabuleni.ro/
Corresponding author:iuliandraghici54@yahoo.com

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ABSTRACT

The knowledge the biological particularities of the plant and response of new varieties developed to environmental conditions, is an important prerequisite for the starting promote a certain species of plants in the structure of crops from a given area. In this regard, triticale crop is a requirement of the current agriculture, which consists in exploitation of less productive areas for wheat and maize, areas affected by drought and poor in nutrients as it is the sandy soils. Research results obtained from 10 triticale varieties, studied during 2013-2015 under the conditions of the sandy soil to CCDCPN Dăbuleni emphasizes the realization of production in the range of 3497 to 4129.3 kg / ha. Were evidenced by production of more than 4000 kg / ha, to the Oda and Rotric genotypes, which have registered the thousand grain weight (TGW) of 45.75 to 47.55 g. In triticale production quality, namely the percentage of protein and gluten, it was influenced by both the variety and the climatic conditions of the year. Were observed at values higher of the protein content registered in 2013, which was a dry year, compared with that obtained in 2014,

INTRODUCTION

Because recombination favorable characteristics of the wheat and rye, which are the two parental species of the triticale crop, this plant has a series of valuable biological properties,in particular the capacity to adapt to the harsh conditions in sandy soils(Gaspar and Botnaru, 1985, Kamaluddin et al., 2007).First cross between wheat and rye held in Scotland in 1875, but the first fertile combinations were produced in Germany in 1888 and triticale name has been first used in literature in Germany in 1935, (Dogan R,et al., 2009 citat de Viorel Ion et al., 2016).By characteristics, they inherited from rye: installing good of the culture,the rapidly growing and increasing in lower temperatures, both in winter and early spring, the triticale plant develop a root system early enough deep, which facilitates to use more effectively than other cereals, water from deeper layers of the soil (Ittu et al., 2007).These characteristics of triticale species can avoid drought very early from spring. The triticale culture, it is a requirement of the present agriculture, which is in exploitation the less productive areas for wheat and corn, on acidic surfaces, affected by drought, ponding, poor in nutrients. Although the main destination of the triticale grain is used in animal nutrition, laboratory tests have shown that it can be used in bakery products (in human nutrition) through a special technology. Analyzing the behavior of in the bakery products, was found that new varieties of the triticale have quality features inferior of the Dropia variety of wheat, which is the best wheat variety in the terms of quality bread, but by using in the bread making of a mixture of 50% flour of the triticale and 50% flour of the Dropia variety, bread obtained had quality parameters similar to those of bread products flour variety wheat mixed use (Ittu et al., 2001, citedt by Simona Florina Poșicanu et al., 2012, Croitoru Mihaela et al.. 2016).In some regions in Turkey, up to 30% of The triticale flour is used in combination with wheat flour for making bread (Furan et al., 2005).The

study conducted on 22 triticale under the Marmara region in the Turkey, showed very good adaptation of the majority of the genotypes studied and high ecological plasticity of this species (R, DOGANand H, VURAL, 2013). In the context presented as a result of increased resistance to drought and reduced requirements to soil fertility, it was imposed the need to study of the some triticale varieties, in the sandy soils conditions, with the aim of effective implementation of land in the south of Oltenia

MATERIAL AND METHOD

During the period 2013-2015, at Development Research Center for Plants Crops on Sands, Dăbuleni, Romania were organized ecological testing of the triticale culture in order zoning most adapted genotypes performance, increase their biodiversity so as to reduce the genetic and environmental vulnerability of agroecosystems.
In this regard, have been studied 10 varieties of the romanian triticale, in a comparative culture of competition, placed after the randomized blocks method in three repetitions.The research was carried out on soil with low nitrogen content, well-stocked phosphorus, potassium supplies are low to medium, with a low organic carbon content and pH slightly acid to neutral. Thus, the extractable phosphorus presented values between 75 ppm and 105 ppm, exchangeable potassium content was between 55 ppm and 95 ppm, the organic carbon has registered values in the range 0.11% - 0.46% and soil pH that ranged between 5.3 and 6.81 values showing a moderate acidic to neutral reaction. The varieties were analyzed in terms of production capacity and quality of the harvest. They determined the protein content using the method Perthen.
The research results were interpreted using the analysis of variance and polynomial functions.

RESULTS AND DISCUSSIONS

The climatic conditions during 2013-2015, highlights the climate change phenomenon by emphasizing drought compared the multiannual average (Figure 1). Thus, the average annual air temperature during in which researches were conducted, exceeded by about 1.2 °C the multiannual average temperature. Rainfall recorded although they were more,they were unevenly spread over the growing crop triticale, so have been registered frequent periods of drought, which for the sandy soils are exacerbated by poor physicochemical properties thereof. Analyzing the climatic conditions of the years of study, recorded during April-July period of growth and development of triticale plant, there is a differentiation between three years compared, the multiannual average (Table 1). The warmest year was 2013, with an average air temperature of 19.95 °C, higher by 1.65 °C from the verage and with rainfalls of 237.7 mm, close to normal period. In terms of the evolution of temperature and rainfalls during the growth and development of triticale plant from April until July, compared the multiannual average, there are two categories of years: the years 2013 and 2015 drought years and 2014 a year rich in rainfalls, which influenced the triticale yields and especially quality.

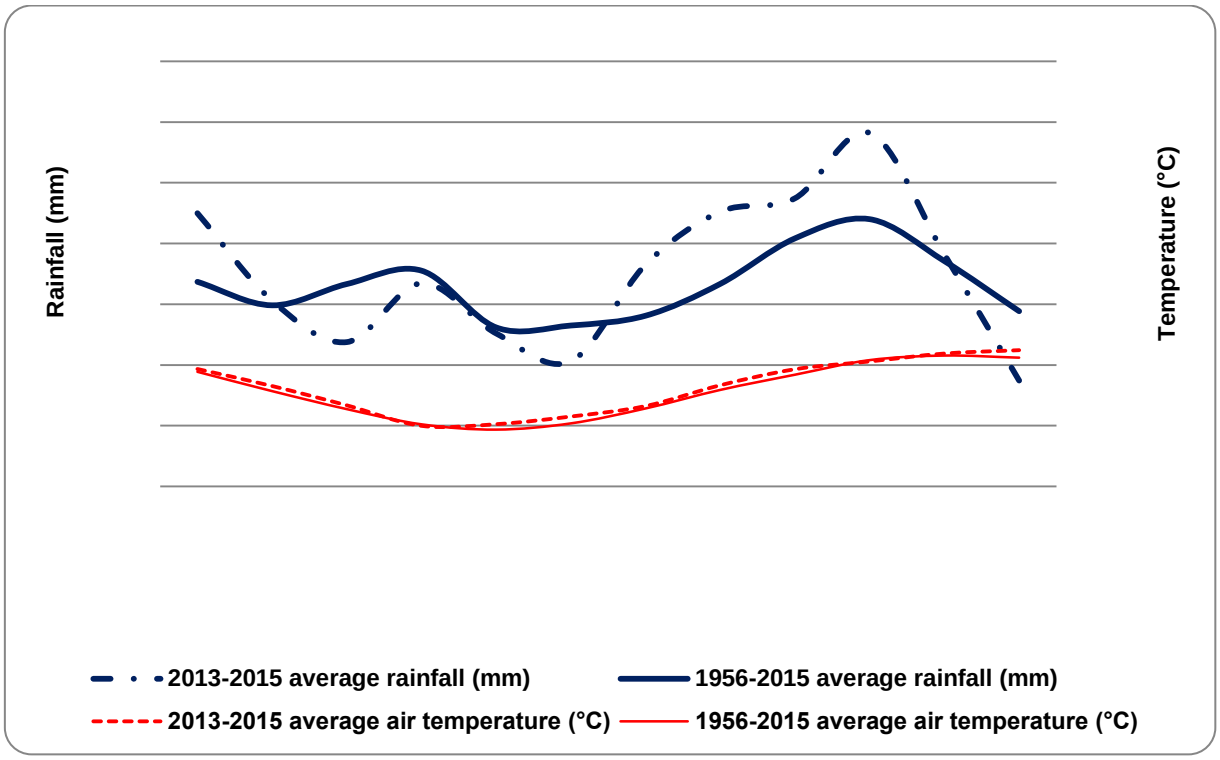

Figure 1. Characterization of climate research period, compared the multiannual average (Data recorded at the weather station DRCPSS Dabuleni)

The biometric analyzes performed on triticale varieties studied under sandy soils from Dabuleni, highlights their differences in terms of plant size, number of ears harvested per square meter, ear length and number of grains per ear (Table 2). Size plant at flowering, ranged from 81.5 to 95 cm, with an average of 89.3 cm. At harvest were, on average 465.61 ears per square meter with ear length of 9.89 cm and 46.23 grains in the ear. Were observed by a large number of ears harvested and over 45 grains in the ear, in the triticale genotypes: Oda, Sitar, Rotric, Tulnic.

Table 1

The evolution of climate conditions during growth and development of triticale plant

Climate conditions / Year		April	May	June	July	Average	Amount
Air temperature (°C)	2013	14.3	20	22.1	23.4	19.95	
	2014	13.2	16.6	20.7	23.1	18.4	
	2015	12.5	19.2	20.7	24.8	19.3	
Average multianual air temperature (1956-2016)		11.79	16.8	21.6	23.1	18.3	
Rainfall (mm)	2013	38.6	61.3	105.2	32.6		237.7
	2014	105.6	111	92	125.6		434.2
	2015	67.2	52.4	92	11		222.6
Average multianual rainfall (1956-2016)		46.71	61.7	68	54.2		230.6

Table 2

Biometry measurements of plant for the triticale varieties cultivated in the sandy soils (average 2013-2015)

Variety	Plant size at flowering (cm)	Number of ears / m^2 at harvest	Ear length (cm)	No. grains in the ear
Plai	89.6	479.7	9.4	44.7
Oda	92.7	455.7	9.7	45. 3
Mezin	82	468.3	9.6	43
Paltin	81.5	501	9.3	44
Pisc	93.7	453.3	10.3	44.7
Rotric	95	532	11.4	54
Sitar	91	457	10.3	45.3
Torent	90	459.7	9.5	44
Tulnic	91	416.7	10.3	51.3
00474 T1-102	91.3	432.7	9.1	46
Average	89.8	465.6	9.9	46.2
Maximum	95	532	11.4	54
Minimum	81.5	457	9.1	43

Results on grain yield obtained from the triticale genotypes, highlights production of grain between 3497-4129.3 kg / ha (Table 3). It was evidenced by production of more than 4000 kg / ha to the Oda and Rotric genotypes, that recorded the thousand grain weight of 45.75-47.55 g and the production differences by 558-632.3 kg / ha, statistically very significant as compared to the variety Plai, taken as witness, which has averaged over three years a production of 3497 kg / ha.Also, showed good behavior Torrent and Mezin varieties, which have differed significantly and very significantly from a reference variety Plai. The thousand grain weight of triticale genotypes studied, recorded values between 40.5 to 47.75 g with an average of 44.84 g, which highlights the good behavior of the species Triticale under sandy soils. It noted a significant positive correlation between grain weight and yields (Figure 2).

Table 3

Production results obtained assortment of triticale studied the sandy soil conditions

No.	Variety	Grain yield		Difference		TWG
		Kg/ha	% Mt	+/- kg/ha	significance	(g)
1	Plai	3497	100	Mt		44.5
2	Oda	4129.3	118	632.3	***	45.75
3	Mezin	3983	96	486	***	46.85
4	Paltin	3764	94	267		43.3
5	Pisc	3709	98	212		47.75
6	Rotric	4055	109	558	***	47.55
7	Sitar	3678. 7	91	181. 7		42.75
8	Torent	3837.3	103	340. 3	*	46.1
9	Tulnic	3699.7	98	202. 7		40.5
10	00474 T1-102	3690. 7	103	193. 7		43.4
			DL 5%	276.6		
			DL 1%	349		
			DL 0.10%	434. 7		

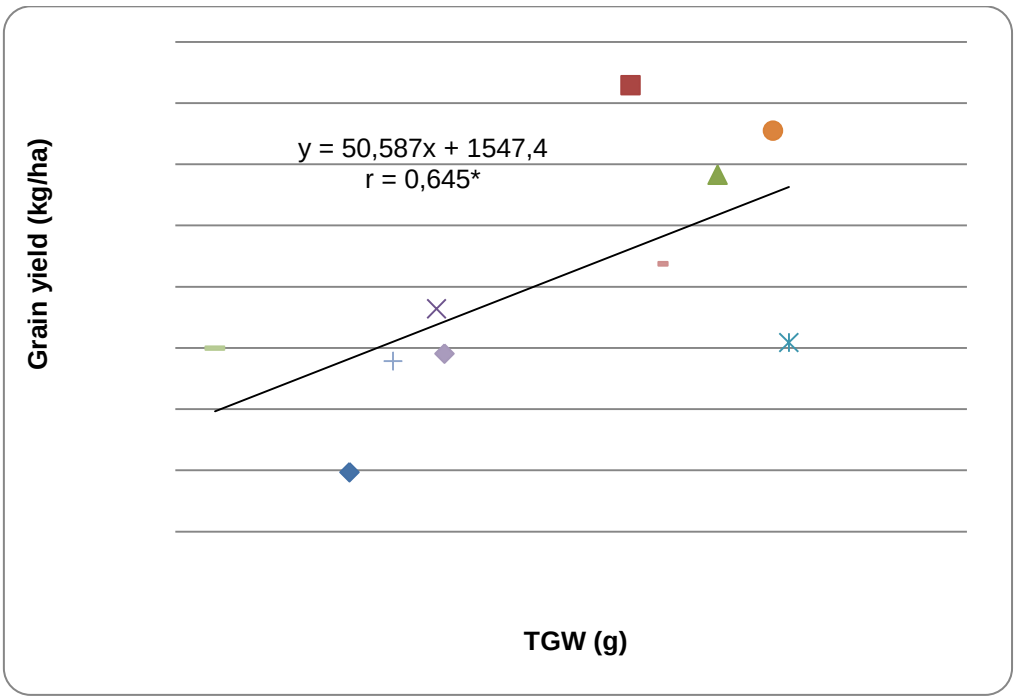

***Figure 2. The relationship between the thousand grain weight and yields* at ten varieties of triticale**

Product quality is influenced by genetic factors and external conditions. The climatic, soil and nutrition conditions create much greater differences, in terms of content of chemical components, rather than a genetic factors. The chemical analyzes of grain quality (Table 4), highlights the protein content averages between 14.5%, by Torent variety and 15.85%, by Rotric variety. Protein values of 15% have been registered to triticale genotypes Oda, Pisc, Plai and Mezin. Analyzing the quality of the grain on the two-year study (2013-2014), highlights the significant influence of climatic conditions. There is a positive correlation between protein percentage and air temperature and a negative correlation between protein percentage and rainfall recorded.

Table 4

Quality production of triticale obtained under sandy soils (2013-2014)

No.	Variety	Protein content (%)		
		Year 2013	Year 2014	Average
1	Plai	16..2	13.9	15.05
2	Oda	17.4	13.3	15.35
3	Mezin	16.9	13.2	15.05
4	Paltin	16.3	13.2	14.75
5	Pisc	16.9	13.7	15.3
6	Rotric	17.9	13.8	15.85
7	Sitar	17	12.5	14.75
8	Torent	16.9	12.1	14.5
9	Tulnic	17.5	12	14.75
10	00474 T1-10-2	17.4	13.8	15.6
Climatic conditions in APRIL- JULY	Air temperature (°C)	19.5	18.4	
	Rainfall(mm)	237.7	43.2	

CONCLUSIONS

Climate and soil conditions in the sandy soils are favorable for plant growth and development of triticale.

Were evidenced by production of more than 4000 kg / ha, to the Oda and Rotric genotypes, which have registered the thousand grain weight (TGW) of 45.75 to 47.55 g.

The chemical analyzes of quality grain emphasizes mean values for protein content, between 14.5% to the Torrent variety and 15.85% to Rotric variety.

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