RESEARCH REGARDING THE EFFECT OF POLLUTION FACTORS ON SOME TRITICALE CULTIVARS IN THE ROVINARI AREA – GORJ COUNTY

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Abstract

Triticale - that is an specific plant of temperate climates and cold conditions, but at the same time supports easily an culture in areas with warm and dry climate. The specific areas in which culture can enter generalize triticale in culture are areas containing large tracts of land with low natural fertility, that wheat, rye, barley, oats or other grains give lower yields, areas that meet common difficult soils, such as soils with high toxicity of Al, Pb, Cd and Zn to prevent the development of appropriate production of wheat (Angelova V., Ivanov K., 2008). Some trace elements are dangerous because they tend to bioaccumulation in food chain. Bioaccumulation means an increase in the concentration of a chemical in a biological organism over time, compared to the chemical's concentration in the environment. This study want to put in the light the behavior of triticale crop in the conditions of cultivation in the area near the Energetically Complex Rovinari and under the influence of pollution factors from this part of industry.

Key words: *triticale, pollution, variability, production*

INTRODUCTION

The industrial revolution brings a new approach in development of the society, with many benefits for humanity, but in the same time, she brings a lot of problems with the pollution. In these days, the pollution isn't an unknown phenomenon, but thru their diversity has created new habitats, very differed by the naturals one, like ashes and cinders situated in the industrial area of Power Stations from Isalnita (Dolj County), Rovinari and Turceni (Gorj County) - (CORNEANU G. AND COLAB., *2011*).

COSTE *at al.* consider that the pollution means "any action of deterioration of normal environmental of organisms". When the pollution and contaminants become dominants in the area they conduct to major changes in the natural ecosystems and has influenced in many ways the development of the crops, reducing plants own basic characters, their capacity of production, natural resistance to diseases, etc.

MATERIAL AND METHOD

Thru this study we propose to observe the evolution of some cultivars in the vicinity of the Rovinari Power Station from Gorj County (figure 1a – Google Erath capture).

After identifying crop lands was made a visual assessment of the homogeneity of the crops to establish a number of representative points that allow sampling of plants. Due to variations in natural fertility of soils in the area, the degree of uniformity of crops was relatively low, which required that for a more accurate assessment of the degree of growth and development of plants, observation points are placed on both diagonals of the cultures studied using the technique recommended for such situations *(*ECATERINA FEHER, GH. MATEI*, 2003)*.

Distance between points of observation was determined using the formula:

$$d = \sqrt{\frac{S * 10000}{n}}$$

in which:

S – area of parcel

n – number of observation points

In every observation point were done determinations as follow:

- ✓ length of straw - the arithmetic average of 30 plants - cm;
- ✓ the number of internodes of the stalk - the arithmetic mean of 30 plants;
- ✓ spike length - the arithmetic mean of 30 plants - cm;
- ✓ average number of spike components - arithmetic mean from 20 spikes;
- ✓ average number of grains / spike - arithmetic mean from 20 spikes;
- ✓ mass of 1000 seeds - grams;
- ✓ average production for each point - kg / ha, making it the correction related the moisture at standards.

a b

Figure 1

a – Researched area near Rovinari Power Station – Gorj County

b – Aspects from field research

Processing of data recorded by the observations and measurements made in the field and laboratory was made, using the statistical computer analysis program 7.0, Basic Statistics/one way ANOVA.

RESULTS AND DISCUSSIONS

From the structure of the studied area crops, triticale cultivated area occupies most of the winter straw cereals group, something which led to the establishment of a greater number of sampling points in comparison to other cultures analyzed. The main characters registered were as follows:

Straw length - is a genetically determined character, while being dependent on the most part by the climatic conditions. At the triticale crops studied the lowest value was recorded in both cultivated areas at the same variety used as control - Haiduc at Şimnic Craiova and in other locations of the same variety were achieve higher values except Moi sample 5, where the difference is insignificant compared to the control (table 1, 2, 3 and figure 2).

Table 1

Analysis of Variance (Triticale 2010). Marked effects are significant at p < ,05000

Factor 1 genotype

	SS	df	MS	SS	df	MS	F	p
Straw length (cm)	343	6	57	593,2	14	42,37	1,34883	0,300407
Number of internodes	7	6	1	3,3	14	0,23	**5,02028**	**0,006098**
Spike length (cm)	18	6	3	13,5	14	0,96	**3,03993**	**0,040540**

Table 2

Analysis of Variance (Triticale 2010). Marked effects are significant at p < ,05000

Factor 2 climatic conditions

	SS	df	MS	SS	df	MS	F	p
Straw length (cm)	205	3	68	731	17	43,0	1,59180	0,228255
Number of internodes	5	3	2	5	17	0,3	**6,35160**	**0,004375**
Spike length (cm)	6	3	2	25	17	1,5	1,45117	0,263070

Table 3

Analysis of Variance (Triticale 2010). Marked effects are significant at p < ,05000

Factor 1 x 2

	SS	df	MS	SS	df	MS	F	p
Straw length (cm)	343	6	57	593,2	14	42,37	1,34883	0,300407
Number of internodes	7	6	1	3,3	14	0,23	**5,02028**	**0,006098**
Spike length (cm)	18	6	3	13,5	14	0,96	**3,03993**	**0,040540**

This is due to a slightly higher rainfall than the area where the central area of Oltenia was grown control.

The degree of variability was different from the samples with higher amplitudes in samples Moi 1, Fântânele 8 and control Şimnic Craiova.

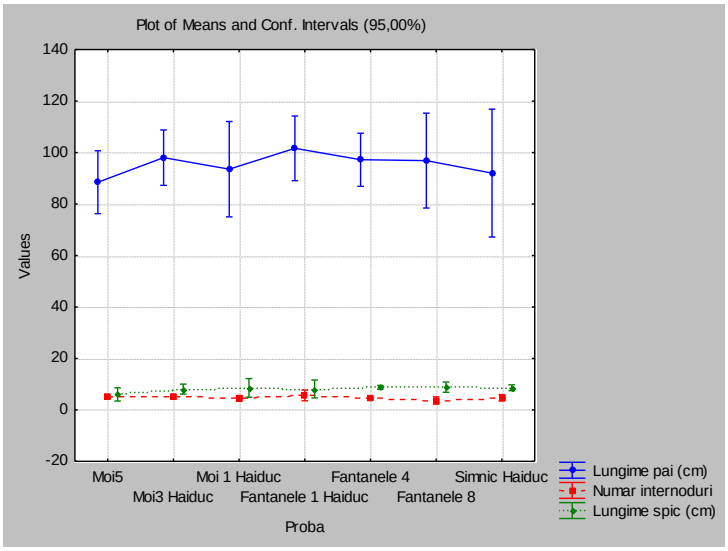

Figure 2 - Variability characters straw length, number internodes and spike length in triticale samples analyzed (2010)

Number of internodes – ranged between 3.7 at sample Fantanele 8 and 5.6 at sample Fantanele 1 grown on meadow. Very significant differences related to the control were registered at samples Fantanele 8, Fantanele 1 and Moi 3. The highest variability was observed at samples Fantanele 8 and Fantanele 1 (table 1-3, figure 2).

Spike length - was a more evenly in this species, with variation limits closer, ranging from 8.1 to Fântânele 1 and 8.8 Fântânele 4 and Fântânele 8 samples (table 1-3, figure 2). Exception was the sample from Moi 5 grown near CET which recorded the lowest ear length, of 6.0 cm, thus a difference statistically assured as highly significant compared to the control.

Number of components/ear - was strongly influenced by the location of culture, this character presenting a very high variability in the samples analyzed. The lowest value was recorded at the sample point located on landfill Fântânele 4 of 25.8 components/ear, and the highest value was obtained for the Moi 1, of 51.0 components/ear (table 4, 5, 6 and figure 3).

Table 4

Analysis of Variance (Triticale 2010). Marked effects are significant at p < ,05000

Factor 1 genotype

	SS	**df**	**MS**	**SS**	**df**	**MS**	**F**	**p**
Number of components/ear	1667	6	278	368,9	14	26,35	**10,54030**	**0,000164**
Number of seeds/ear	916	6	153	38,7	14	2,76	**55,26862**	**0,000000**

MMB - grams	341	6	57	27,4	14	1,96	**29,03388**	**0,000000**

Table 5

Analysis of Variance (Triticale 2010). Marked effects are significant at p < ,05000

Factor 2 climatic conditions

	SS	**df**	**MS**	**SS**	**df**	**MS**	**F**	**p**
Number of components/ear	1467	3	489	568	17	33,4	**14,62640**	**0,000058**
Number of seeds/ear	788	3	263	166	17	9,8	**26,85774**	**0,000001**
MMB - grams	251	3	84	117	17	6,9	**12,13463**	**0,000173**

Table 6

Analysis of Variance (Triticale 2010). Marked effects are significant at p < ,05000

Factor 1 x 2

	SS	**df**	**MS**	**SS**	**df**	**MS**	**F**	**p**
Number of components/ear	1667	6	278	368,9	14	26,35	**10,54030**	**0,000164**
Number of seeds/ear	916	6	153	38,7	14	2,76	**55,26862**	**0,000000**
MMB - grams	341	6	57	27,4	14	1,96	**29,03388**	**0,000000**

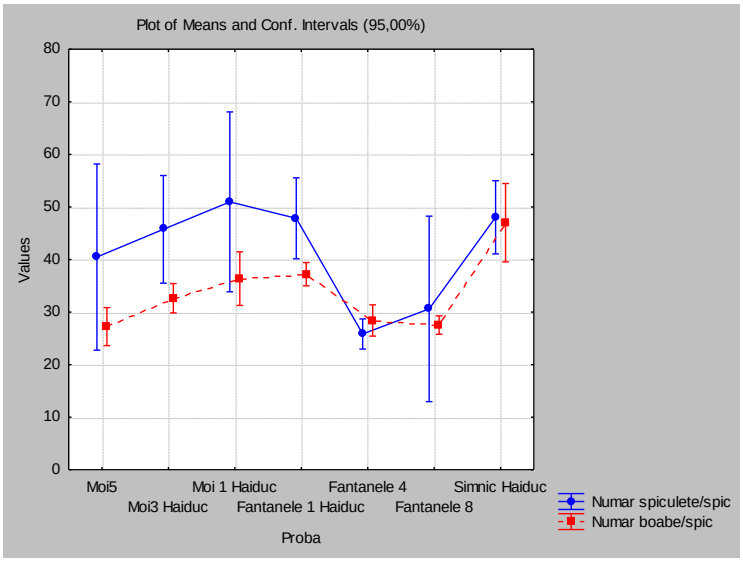

Figure 3 - Variability of characters number of components/spike and number of grains/spike in triticale samples analyzed (2010)

Number of seeds/ear – has presented a low variability, ranging from 27.2 grains/spike the samples placed on heaps, Moi 5 and Fântânele 8, and 37.2 grains/spike the samples located in meadow, Fântânele 1 and Moi 1 (table 4, 5, 6 and figure 3).

Compared to control grown in conditions of Şimnic Craiova which recorded a value of 47.0 grains/ear, all other samples showed highly significant negative differences of this nature.

Weight of 1000 seeds (MMB) – from the analysis of the nature of values presented a low variability of the middle basin of the Jiu river samples and ranged between 33.77 grams at Moi 1and 40.9 grams at Moi 5 sample. The highest value was registered at control – Haiduc variety of 47.0 grams (table 4, 5, 6 and figure 4).

Obtaining such low values of this character at all analyzed samples in which the measurements are performed due to the lower level of natural fertility of the soil in the area characterized by a low organic matter content and total nitrogen.

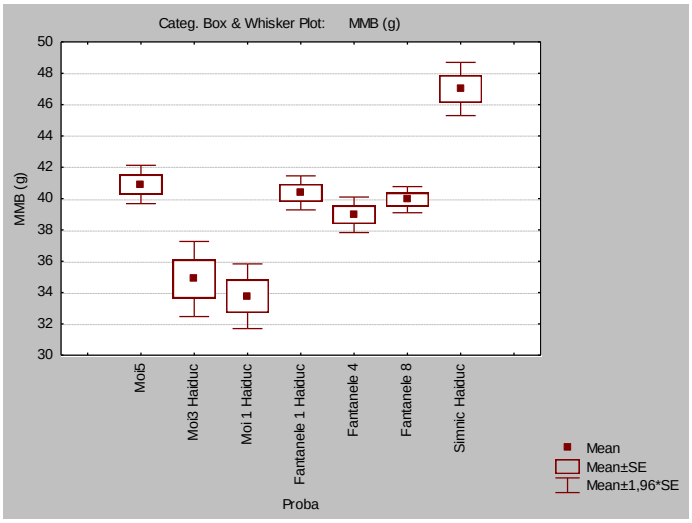

Figure 4 - MMB's variability in triticale samples analyzed (2010)

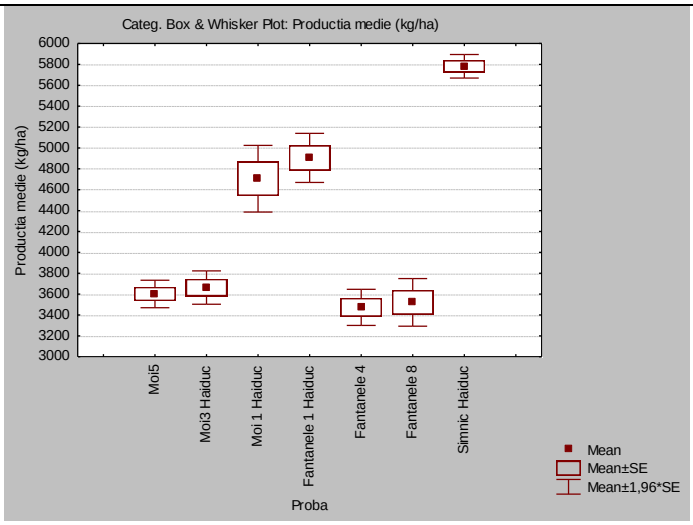

Figure 5 - Variability number of yields at triticale samples analyzed (2010)

Yields kg/ha – had recorded the highest value in the control case of 5782 kg/ha, all other samples from the middle of the basin of Jiu river achieving lower values than this. Negative production differences, significant compared to the control samples were obtained at Fântânele 1 and Moi 1 and very significant evidence at Fântânele 8 Fântânele 4, Moi and Moi 5 samples (figure 5).

CONCLUSIONS

From the presented data we can say that:

- In the studied conditions of industrial activity of Energetic Complexes from Turceni and Rovinari area the variability of cultivate crops are very low, the main crops belongs to the cereals group;
- Triticale crop - found in that area has good conditions for the expression of the productive potential of cultivated varieties, the main limiting factor is soil less fertile and especially its unevenness caused by human activity.
- In the expression of phenotypic characters productivity pursued in this species compared with the control in the cultivated Şimnic Craiova, we can say that most of these characters have values below those obtained in control, with a much higher variability in samples taken from middle basin of the Jiu River.
- For the studied area, the culture of triticale has a very good behavior expressed by a higher level of production than in the case of wheat, providing a viable alternative for high harnessed these lands.

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