Current Trends in Natural Sciences Vol. 7, Issue 13, pp. 239-243, 2018

Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521

Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

RESPONSE OF AN WINTER WHEAT ASSORTMENT TO THE ECOLOGICAL CULTIVATION SYSTEM ON LUVISOIL FROM SIMNIC CRAIOVA

Gabriela Păunescu [1*], Gabriel Păunescu [1], Aida Păunescu [1], Claudia Borleanu [1]

[1] SCDA Simnic, Soseaua Balcesti, nr.54, Simnicu de Jos, Craiova, Dolj, Romania

Abstract

Fifteen varieties of autumn wheat, most of them recently approved, were tested in an ecological system in the experimental field at ARDS Simnic. For two years (2016 and 2017) determinations have been made regarding height, number of spice/mp, yield, test weight, weight of 1000 grains, number of grains/ear, weight grains/ear and protein content, both in ecological and conventional systems, last as a reference base. The differences were presented percentually to see to what extent the ecological system influenced the determined characters. The control used were the average of all tested varieties and the Alex variety - that showed the highest average yield in the ecological system.

In ascending order, the studied characters were affected by ecological system in relation to the conventional system, on average, as follows: yield (52.6%); weight grain/ear (69%); number grains/ear (69.1%); height (83.9%); number spice /mp (84.2%); protein content (89.6%); the weight of 1000 grains (96.9%); test weight (102%) - the only uninfluenced character. In relation to Alex variety, only Litera variety showed significantly higher reductions in terms of test weight, number of graines/ear and weight grains/ear. Compared to the average of the varieties, significant differences were noted only at the test weight in Miranda (+ 4.2%) and Ursita (-7.1%). The results suggest that the ecological system influenced the characters studied, indifferent of the varieties tested.

Keywords: conventional system, ecological system, wheat.

1. INTRODUCTION

Organic farming was born at the beginning of the 20th century, but the principles of this farming system were promoted after the Second World War by consumers and doctors concerned by the effect of food on human health (Berca, 2011).

Lord Nothbourne first used the term organic farming. The term derives from the concept of "farm as a body" and it is explained in his book "Look to the Ground" (1940) where the author makes a holistic and ecological description of the farm (http://en.wikipedia.org).

From a historical perspective, in Europe, organic farming showed the following trend (Nicolescu et al., 2007):

- release of Rudolf Steiner's Biomedical Agriculture Course in Germany in 1924 marks the beginning of organic farming;
- between 1930 and 1940, Dr. Hans Müller worked in Switzerland, where he developed the organo-biological farming system, which is now the most widespread organic farming system in the Germanic countries (represented by "Bioland" in Germany and "BioSuisse" in Switzerland).
- in 1946 the "Soil Association" was established in the UK;

* Corresponding author, E-mail address: paunescucraiova@yahoo.com

Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521

Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

- the year 1967 corresponds to the first organic standards by the "Soil Association" in the UK;
- in 1972 it was founded "International Federation of Organic Agriculture Movements" (IFOAM) Versailles France;
- in 1973 was established "Research Institute for Organic Agriculture" in Switzerland, which is currently the largest research institute for organic farming in the world;
- in 1975 the Foundation "Ecology and Agriculture" was founded in Germany;
- the majority of organic farming associations and organizations were set up in the 1980s, and IFOAM's basic standards were published;
- in 1985, France adopted legislation on organic farming;
- in 1990, the first organic farming exposition took place in Germany in Nurenberg;
- the "IFOAM Regional Group" of the European Union was established in 1991;
- in 1991 appears EC regulation no. 2092/91 on organic farming, which became law in 1993;
- in 1992 the EC Regulation no. 2078/92 which provides for financial support measures for organic farming in the EU and establishes the IFOAM accreditation program;
- in 1995 the first action plan for organic farming was released in Denmark;
- in 1999 appear the Regulation no. 1257/1999 on Rural Development, which provides for financial support for organic farming in the EC; EC Regulation no. 1804/19 July 1999, which refers to the production of organic agricultural products of animal origin and adopted "Codex Alimentarius guidlines".
- in 2000 is release Copenhagen "Agenda 2000" for the EU, which provides financial support measures for organic farming;
- in Romania, the legal bases for organic farming were laid down in 2000, with the approval of HG no. 54/2000;
- in May 2001, Copenhagen made the first steps for "European Action Plan for Organic Farming ";
- on September 28, 2005, the "IFOAM General Assembly" published the "Principles of Organic Farming ";
- in 2005, the FAO set up the "Information Management System for Organic Farming" which includes information from each country on organic farming;
- in 2006, the Ministry of Agriculture and Rural Development of Romania issued the "ae" logo used for certification-identification of organic agro-food products;
- in May 2007 the FAO organized for the first time a Conference dedicated exclusively to organic farming;
- on 12 June 2007, the agriculture ministers of the European Union reached a political agreement on the adoption of EC Regulation no. 834/2007 on organic farming and labeling.

Worldwide, in 2017, India, the country where more than 600,000 organic farmers are operating, hosted the 19th edition of the OWC World Organic Congress, where there were five parallel conference departments addressing topics distinct ecological sector.

2. MATERIALS AND METHODS

Fifteen varieties of autumn wheat, most of them recently approved, were tested in an ecological system (organic farming) in the experimental field at ARDS Simnic. For two years (2016 and 2017) determinations have been made regarding height, number of spice/mp, yield, test weight, weight of 1000 grains, number of grains/ear, weight grains/ear and protein content, both in ecological and conventional systems, last as a reference base. The differences were presented percentually to see to

* Corresponding author, E-mail address: paunescucraiova@yahoo.com

Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521

Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

what extent the ecological system influenced the determined characters. The results were analyzed and interpreted through the ANOVA program. The control used were the average of all tested varieties and the Alex variety - that showed the highest average yield in the ecological system.

3. RESULTS AND DISCUSSIONS

The most pronounced reduction was recorded by yield (an average of 52.6%), but the reduction had one of the lowest amplitude (13.6%). This was followed by the reduction in the number of grains/ear and weight of grains/ear (averaging 69.1% and 69% respectively). Reduction range of the minimum value and the maximum value was 22.7% and 28.2% respectively (figure 1).

Studies conducted in Estonia show that the yield decrease in spring wheat was the biggest (34%) in organic conditions compared to conventional conditions (Ingver et al., 2008).

Two of the characters studied had little reduction or not. It is the case of weight of 1000 grains, with a slight reduction and test weight (102%), the only element not influenced by organic farming. The height (83.9%), the number of ears/ms (84.2%) and protein content (89.6%) had very close reduction values when determined in an ecological system compared to the conventional system.

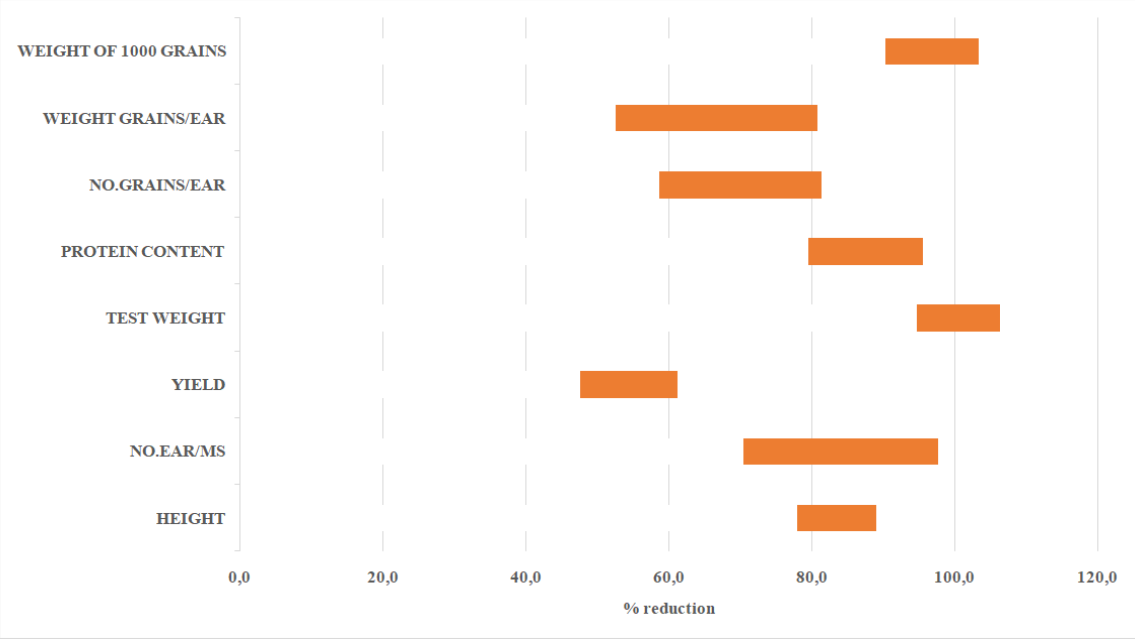

Figure 1. Reducing values of the studied characters in an assortment of wheat grown in an ecological system compared to the conventional system

Studies that analyzed the effect of nitrogen reduction showed that the effect was larger for grain yield than for protein concentration in conventional system. For grain yield and protein yield per hectare the highest reduction was found in cultivars originating from the Fundulea breeding program, while the smallest reduction was found in cultivar Adelina (bred at Şimnic), suggesting a possible relationship with the natural soil fertility at the breeding site (Marinciu et al, 2018).

Also the performance of winter wheat was evaluated under organic (ORG) and conventional (CON) management systems in the Nafferton Factorial Systems Comparison (NFSC) long-term field trial by Bilsborrow et al. (2013).

The conventional management system (CON-CP CON-FM) out-yielded the organic management system (ORG-CP ORG-FM) in all years by an average of 3.1 t ha−1, i.e. 7.9 t ha−1 vs. 4.8 t ha−1.

* Corresponding author, E-mail address: paunescucraiova@yahoo.com

Current Trends in Natural Sciences Vol. 7, Issue 13, pp. 239-243, 2018

Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521

Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

Fertility management was the key factor identified limiting both yield and grain protein content in the ORG management system. The CON-FM produced on average a 3% higher protein content than ORG-FM in all years (12.5% vs. 9.7%) .

In our study in relation to Alex variety, only Litera variety showed significantly higher reductions in terms of test weight, number of graines/ear and weight of grains/ear. Compared to the average of the varieties, significant differences were noted only at the test weight in Miranda (+ 4.2%) and Ursita (-7.1%) (Table 1).

Table 1. Response of an winter wheat assortment to the ecological cultivation system on luvisoil from Simnic Craiova

Varieties	Height % reduction	Number ear/m^2 % reduction	Yield % reduction	Test weight % reduction	Protein content % reduction	Number grains/ear % reduction	Weight grains/ear % reduction	Weight of 1000 grains % reduction
GLOSA	80.9	87.9	51.5	101.3/^{o}	91.7	68.0	67.5	98.2
BOEMA	84.6	82.1	55.7	101.2/^{o}	90.2	70.2	68.0	97.0
SEMNAL	89.0	81.0	51.6	101.2/^{o}	90.2	68.4	72.1	103.3
LITERA	86.0	81.1	51.2	101.4	90.5	58.6/^{o}	52.5/^{o}	90.2
MIRANDA	77.9	84.6	48.0	106.2*	86.9	64.6	66.1	102.9
IZVOR	87.6	77.5	55.7	105.1	88.0	67.3	60.6	99.1
OTILIA	87.7	97.6	47.5	102.4	88.7	59.1/^{o}	57.1	95.4
PITAR	87.2	92.5	54.2	102.0	95.5	76.5	75.6	91.9
PAJURA	83.1	90.6	48.5	98.3/^{oo}	89.7	65.8	70.9	100.7
URSITA	79.0	70.3	61.1	94.9$^{oo/ooo}$	79.7	60.8	73.9	90.5
UNITAR	84.1	73.5	49.3	102.7	89.0	80.2	80.7	101.2
ADELINA	81.5	88.9	48.4	103.2	92.7	68.3	67.3	96.0
SIMNIC 60	84.6	81.4	53.3	105.0	92.4	71.3	69.7	94.8
ALEX	81.6	85.2	58.3	105.4	85.9	81.3	79.2	97.2
BEZOSTAIA	83.1	88.5	55.5	98.9/^{oo}	92.2	76.3	73.3	94.6
	83.9	84.2	52.6	102.0	89.6	69.1	69.0	96.9
DL 5%	9.0	25.7	15.2	4.1	12.8	17.5	23.3	9.5
DL 1%	12.3	34.8	20.5	5.5	17.4	23.7	31.6	12.9
DL 0.1%	16.4	46.6	27.5	7.4	23.3	31.7	42.4	17.3

significance to the average/ significance to the cultivar control

4. CONCLUSIONS

In ascending order, the studied characters were affected by ecological system in relation to the conventional system, on average, as follows: yield (52.6%); weight grain/ear (69%); number grains/ear (69.1%); height (83.9%); number spice/mp (84.2%); protein content (89.6%); the weight of 1000 grains (96.9%); test weight (102%) - the only uninfluenced character.

In relation to Alex variety, only Litera variety showed significantly higher reductions in terms of test weight, number of graines/ear and weight grains/ear. Compared to the average of the varieties, significant differences were noted only at the test weight in Miranda (+ 4.2%) and Ursita (-7.1%).

The results suggest that the ecological system influenced the characters studied, indifferent of the varieties tested (with the exception mentioned above – test weight).

5.REFERENCES

Berca, M. (2011). Agrotehnică – Transformarea modernă a agriculturii [Agrotechnics - The modern transformation of agriculture]. Ed. Ceres. Bucuresti.

* Corresponding author, E-mail address: paunescucraiova@yahoo.com

Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521

Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

Bilsborrow, P.E., Cooper, J.M., Tetard-Jones, C., Średnicka-Tober, D., Baranski, M., Eyre, M., Schmidt, C.S., Shotton, P., Volakakis, N., Cakmak, I., Ozturk, L., Leifert, C., Wilcockson, S. (2013). The effect of organic and conventional management on the yield and quality of wheat grown in a long-term field trial. *Eur J Agron*, *51*, 71–80.

Ingver, A., Tamm, I., Tamm, Ü. (2008). Effect of organic and conventional production on yield and the quality of spring cereals. *Agronomijas Vēstis (Latvian Journal of Agronomy)*, *11*, 61-67.

Marinciu, C.M., Șerban, G., Ittu, G., Mustățea, P., Mandea, V., Păunescu, G., Voica, M., Săulescu, N. (2018). Response Of Several Winter Wheat Cultivars To Reduced Nitrogen Fertilization. *Romanian Agricultural Research*, *35*, First online: February, 2018. DII 2067-5720 RAR 2018-36.

Nicolescu, M., Delphin, A., Barnabot, H., Paunescu, G., Badescu, M., Vladu, M., Alexandru, T., Soare, M. (2007). Manualul fermierilor pentru producția vegetală [Farmers' Handbook for Plant Production] Ed. Universitaria.

***Organing farming from http://en.wikipedia.org

* Corresponding author, E-mail address: paunescucraiova@yahoo.com