INVESTIGATION REGARDING THE PRODUCTION CAPACITY OF TRITICALE UNDER DIFFERENT VARIANT OF NITROGEN FERTILISATION

IRINA JURMESCU*, LUMINITA COJOCARIU*, JUDIT PETER SZUCS, DACIAN LALESCU*, MARINEL HORABLAGA*, FLORIN MARIAN***

*Banat University of Agricultural Sciences and Veterinary Medicine Timişoara
Faculty of Agriculture
Calea Aradului street, no. 119, 300645, Timisoara, Romania
**University of Szeged, Faculty of Agriculture
6800 Hódmezővásárhely, Andrássy u. 15, Hungary
m_irina_m@yahoo.com

ABSTRACT
Some authors say that nitrogen supply through mineral fertilization affects nitrogen biological fixation process in legume plants, Triticale (x*Triticosecale* Wittmack), resulting from crossing between wheat and rye, has the potential to introduce valuable economic benefits to both grain and herbage production systems. Others say that triticale produces at least 20% more forage than wheat, and is higher in forage quality than rye or wheat and triticale has agronomic advantages, it can be grown on more marginal land (arid, acidic, etc.) and requires less agricultural chemicals (fertilizer, agronomic chemicals, etc.).
For this triticale seems to be an interesting alternative to other cereals, particularly bread wheat, in environments where growing conditions are unfavorable or in low-input systems.
The aim of this paper is to find the maximum production of triticale taking under different variant with chemical fertilisation in Batăr conditions, Bihor county and the chemical composition of this.
The research was carried out in the experimental fields that belong to the society SC Frevest SRL from Batăr locality, Bihor county, the experience being placed on a chernozem argiloiluvial soil.
The biggest production of triticale obtained in 2012, under different fertilisation variant was registered at $N_{50}P_{50}K_{50}$ + N_{100} variant (5,4 t.ha^{-1}), which shows us, that exist significant statistic differences between the production obtained at fertilisation variant $N_{50}P_{50}K_{50}$ + N_{100} (5,4 t.ha^{-1}) and the production obtained at fertilized variant $N_{50}P_{50}K_{50}$ that have obtained 4,8 t.ha^{-1}.
Regarding the chemical composition we can conclude that: the dry matter content is 88.56%, crude protein content is 134.41 g/kg, crude fiber content is 17.4 g/kg, NDF is 470.27 g/kg, ADF is 22.13 g/kg and ADL is 18.45 g/kg, content on 1000 g fresh matter.

Keywords: alfalfa, triticale, fertilisation, production, chemical composition

INTRODUCTION

Triticale (x*Triticosecale* Wittmack), resulting from crossing between wheat and rye, has the potential to introduce valuable economic benefits to both grain and herbage production systems (IGNE et al., 2007).
Triticale produces at least 20% more forage than wheat, and is higher in forage quality than rye or wheat (KOCH and PAISLEY, 2002; MUT et al., 2006).
Triticale (*Triticosecale* spp. Wittmack), the first man-made cereal, is the product of a cross between wheat (*Triticum* spp.) and rye (*Secale* spp.) (GLATTHAR J. et all, 2003).
In modern times, it has been reported that triticale is cultivated in more than 30 countries worldwide (MERGOUN M. et all, 2004) on around 3.7 milion ha in total, yielding more than 12 million tones a year (FAO. FAOSTAT, 2008).
Triticale has agronomic advantages, it can be grown on more marginal land (arid, acidic, etc.) and requires less agricultural chemicals (fertilizer, agronomic chemicals, etc.) (CIFTCI I., 2003).
Triticale seems to be an interesting alternative to other cereals, particularly bread wheat, in

environments where growing conditions are unfavorable or in low-input systems (EREKUL and KÖLN, 2006).
Triticale is, in general, more tolerant to environmental stresses than wheat and barley. Breeding for marginal areas (acidic or alkali soils), micro deficiencies (cooper, zinc or magnesium) or toxicity (boron) and drought stress is the main objectives of most spring and winter-triticale breeding programs in the world (OETTLER, 2005).

MATERIAL AND METHOD

The aim of this paper is to find the maximum production of triticale taking in consideration different variant of chemical fertilisation, in Batăr conditions, Bihor county and the chemical composition of it.
The research was carried out in the experimental fields that belong to the society SC Frevest SRL from Batăr locality, Bihor county, the experience being placed on a chernozem argiloiluvial soil.
In this experience was fallowed the application of three different fertilisation variants:

- $N_{50}P_{50}K_{50}$
- $N_{50}P_{50}K_{50} + N_{50}$
- $N_{50}P_{50}K_{50} + N_{100}$

The experience is placed in accordance with the randomized blocks method, in three repetitions, a parcel surface is 45 m^2. Sowing was made on 15th October 2011.
In order to determine the production of triticale, the harvesting was done at 89th phenophase (Fully ripe: grain hard, difficult to divide with thumbnail) of triticale (BBCH - grasses - U. Meier, 2001).
In this paper we take in consideration the production obtained in the experimental year 2012, that allow us to have a few conclusions on the triticale capacity production in the Crişurilor plain conditions.
The statistical analysis has been performed by Statistica 8 package.

RESULTS

The triticale productions obtained in 2012, under different variant of fertilisation have been between 5,4 $t.ha^{-1}$ at variant of fertilisation $N_{50}P_{50}K_{50} + N_{100}$ and 4.8 $t.ha^{-1}$ and the variant of fertilization $N_{50}P_{50}K_{50}$ and is shown in *Figure 1*.
The obtained production at fertilization variant $N_{50}P_{50}K_{50} + N_{50}$ in year 2012 was 5,2 $t.ha^{-1}$.

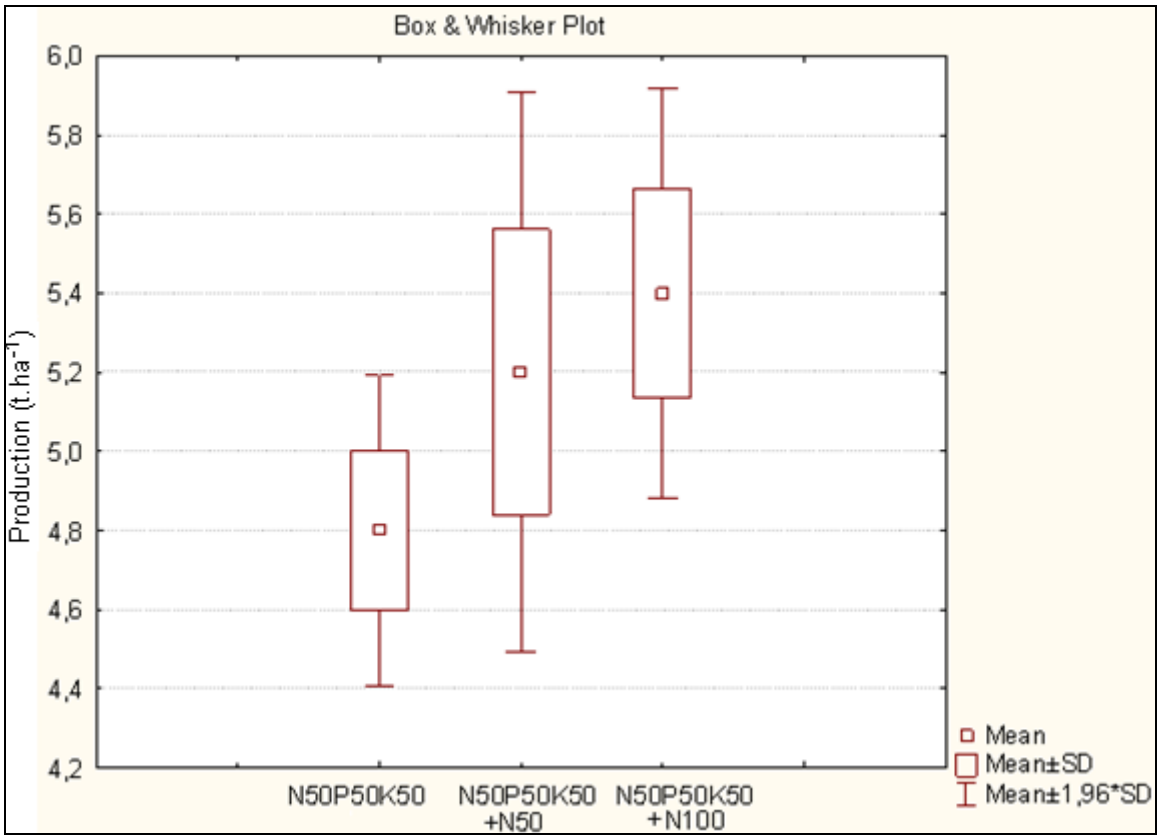

Figure 1. Box & Whisker Diagramme for fertilization variant at triticale studied in 2012

To compare the production capacity of triticale under different treatment of fertilisation, in conditions of year 2012, we used Duncan test for multiple comparations (ANOVA).

Tabel 1.Duncan test for multiple comparations between fertilization variant at triticale studied in 2012

Variant	Variant $N_{50}P_{50}K_{50}$ (4,80 t.ha^{-1})	Variant $N_{50}P_{50}K_{50}$ + N_{50} (5,20 t.ha^{-1})	Variant $N_{50}P_{50}K_{50}$ + N_{100} (5,40 t.ha^{-1})
$N_{50}P_{50}K_{50}$		0,134148	0,046184
$N_{50}P_{50}K_{50}$ + N_{50}			0,419955
$N_{50}P_{50}K_{50}$ + N_{100}			

From table 1 we can observe that do exist significant statistic differences between production obtained at fertilisation variant $N_{50}P_{50}K_{50}$ + N_{100} (5,4 t.ha^{-1}) and at variant fertilized with $N_{50}P_{50}K_{50}$ that have obtained a production of 4,8 t.ha^{-1}.
In which regards fertilisation variant $N_{50}P_{50}K_{50}$ + N_{50}, it have obtained a lower production than fertilisation variant $N_{50}P_{50}K_{50}$ + N_{100}, but higher than fertilisation variant $N_{50}P_{50}K_{50}$, but the production differences are not assured from statistical point of view.

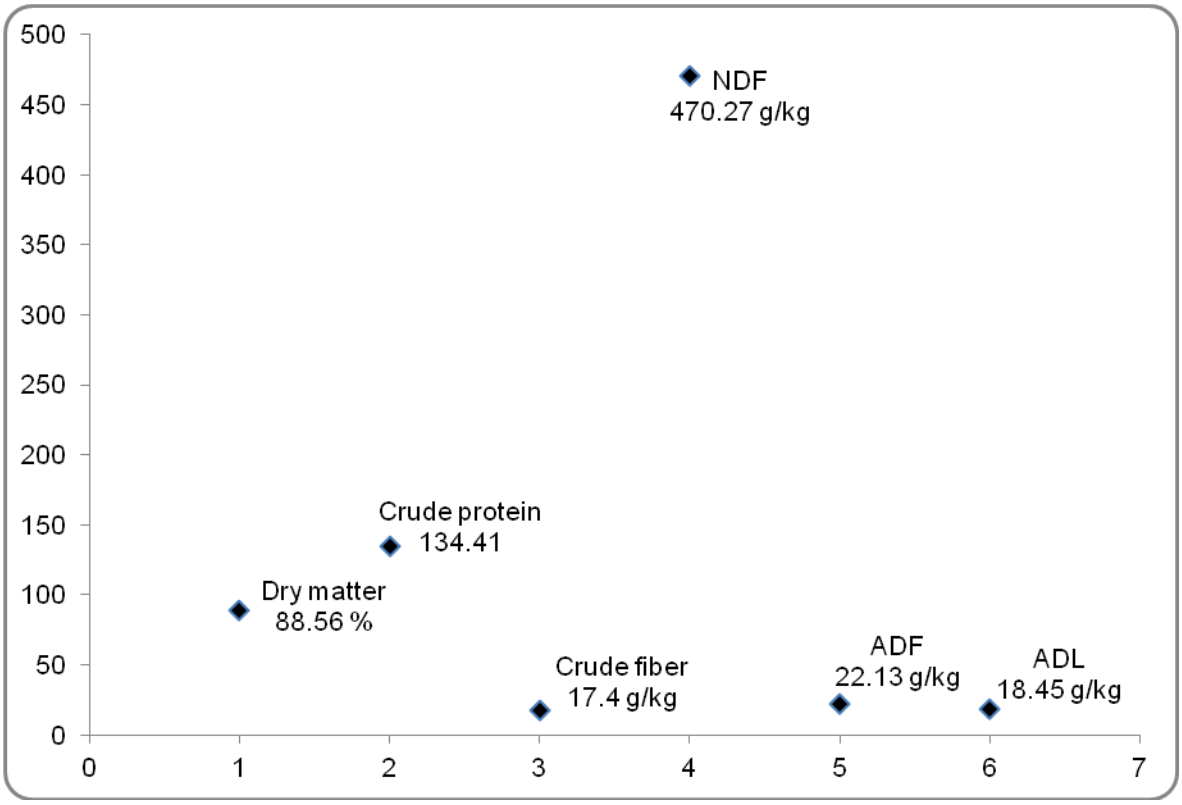

Figure 2. Chemical composition at triticale

Taking in consideration the fact that, the biggest production was obtained at fetilisation variant $N_{50}P_{50}K_{50}$ + N_{100}, at this variant we have realised a set of chemical analyses like: dry matter percentage, crude protein content, the crude fiber content, NDF and ADF.
From *figure 2* we can observe that: the dry matter content is 88.56%, crude protein content is 134.41 g/kg, crude fiber content is 17.4 g/kg, NDF is 470.27 g/kg, ADF is 22.13 g/kg and ADL is 18.45 g/kg, content on 1000 g fresh matter.

CONCLUSIONS

The biggest production of triticale obtained in 2012, under different fertilisation variant, was registered at $N_{50}P_{50}K_{50}$ + N_{100} fertilisation variant (5,4 $t.ha^{-1}$), which show us that exist significant statistic differences between production obtained at fertilisation variant $N_{50}P_{50}K_{50}$ + N_{100} (5,4 $t.ha^{-1}$) and production obtained at $N_{50}P_{50}K_{50}$ fertilized variant, of 4,8 $t.ha^{-1}$.
Regarding of chemical composition we can conclude that: the dry matter content is 88.56%, crude protein content is 134.41 g/kg, crude fiber content is 17.4 g/kg, NDF is 470.27 g/kg, ADF is 22.13 g/kg and ADL is 18.45 g/kg, content on 1000 g fresh matter.

ACKNOWLEDGEMENTS

This work was published during the project "DOCTORAL SCHOOL OF AGRICULTURE AND VETERINARY MEDICINE", POSDRU/80127, co-financed by the European Social Fund through the Sectorial Operational Programme for the Human Resources Development 2007-2013.

REFERENCES

CIFTI I., YENICE E. AND ELEROGLU H. (2003): Use of triticale alone and in combination with wheat or maize: effects of diet type and enzyme supplementation on hen performance, egg quality, organ weights, intestinal viscosity, and digestive system characteristics. Anim. Feed Sci. Technol. 105 1-4, 149-161.

EREKUL O., KOHN W. (2006): Effect of weather and soil conditions on yield components and bread-making quality of winter wheat (*Triticum aestivum* L.) and winter triticale (Triticosecale Wittm) varieties in North-East Germany, J. Agron. Crops Sci. 192: 452-464.

FAO. FAOSTAT (2008): FAO statistical databases Agriculture [WWW document] URL http://faostat.fao.org/site/567/default.aspx # ancor. Viewed on November 30.

GLATTHAR J., J. HEINISCH AND T. SENN (2003): The use of unmalted triticale in brewing and its effect on wort and beer quality. J. Am. Soc. Brew. Chem. 61 4, 182-190.

IGNE B., GIBSON LR, RIPPKE A., HURBURG CR (2007): Triticale moisture and protein content prediction by near-infrared spectroscopy. Cereal Chem., 84: 328-330.

KOCH WD, PAISLEY S. (2002): Forages of All Seasons-Cereal crops: Management for supplemental and emergency forage.

MERGOUN M., PFEFFER H., PEÑA J., AMMAR K., RAJARAM S. (2004): Triticale crop improvement: the CIMMYT programme in: Triticale improvement and production (FAO plant production and protection; Paper 179 (Edited by Morgoum M and Gómez-Macpherson H.), 11-26 Rome: Food and Agriculture Organization of the United Nations.

MUT Z., AYAN I., MUT H. (2006): Evaluation of forage yield and quality at two phenological stages of triticale genotypes and other cereals grown under rainfed conditions. Bangladesh J. Bot., 35(1): 45-53.

OETTLER G. (2005): The fortune of a botanical curiosity – Triticale: past, present and future. J. Agric. Sci. 143: 329-346.

UWE MEIER (2001): Growth stages of mono and dycotyledonous plants, BBCH Monograph, Edition 2.;