RESEARCHES REGARDING THE PRODUCTION CAPACITY OF ALFALFA IN DIFFERENT VARIANTS OF FERTILIZATIONS, IN BATĂR CONDITIONS, BIHOR COUNTY

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Abstract: *Alfalfa is a lot appreciated due to the multiple uses as fodder plant, having a great production capacity and a good perennity. Also is resistant at frost and drought, answering very well at watering. It has a great capacity of growth, and in exceptional culture conditions can be harvested of 5-6 times per year (Luminița Cojocariu, 2005). Alfalfa can be used as green fodder, hay, semihay, silo (in mixture with graminees) and at the preparation of combined forages. Also, alfalfa is a basic part of temporary meadows used by mowing (Dragomir N. and colab., 2005). Alfalfa is forage with good quality and yield superior in the cold season because it can be transformed in hay. Alfalfa is a crop proper for organic fertilisation because it removes a great amount of nitrogen from soil and can diminish the high level of nitrites from the root area. Some researches realised in U.S. show that alfalfa yield can be improved applying manure in comparison with other fertilisation sources (Lory J.A., 2000; Herbert S.J. et Daliparthy J., 2001). The aim of this paper is to find the maximum production of this culture taking in consideration the fertilisation with chemical fertilisers in Batăr conditions, Bihor county. 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 experience is placed in accordance with the randomized blocks method, in three repetitions, a parcel surface is 45 m^2. Sowing was made on October 05th 2010. In order to determine the production, the harvesting was done at 61th phenophase (Beginning of flowering: 10% of flowers open) of alfalfa (the extended BBCH-scale, general - U. Meier, 2001). After the analysis regarding the production capacity of alfalfa we can observe that exist differences statistically assured as beeing very significant, between alfalfa production obtained at $N_{50}P_{50}K_{50}$ fertilisation variant of 28,2 $t.he^{-1}$ and $N_{50}P_{50}K_{50}$ + N_{50} fertilisation variant that have obtained a production of 45,8 $t.he^{-1}$. The differences statistically assured as beeing very significant have been registered also between alfalfa production obtained at $N_{50}P_{50}K_{50}$ fertilisation variant of 28,2 $t.he^{-1}$ and at $N_{50}P_{50}K_{50}$ + N_{50} + N_{50} fertilisation variant at which was obtained a production of 53,0 $t.he^{-1}$. Also, differences statistically assured as beeing significant have been registered between alfalfa production obtained at $N_{50}P_{50}K_{50}$ + N_{50} fertilisation variant of 45,8 $t.he^{-1}$ and $N_{50}P_{50}K_{50}$ + N_{100} fertilisation variant at which have been obtained a production of 53,0 $t.he^{-1}$.*

Key words: *alfalfa, production, fertilisation, optimisation.*

INTRODUCTION

Alfalfa's importance as fodder is due to her chemical composition, a composition that is different and depends on harvesting phase (Moisuc A. and Dukic C., 2002).

Alfalfa is a lot appreciated due to the multiple uses as fodder plant, having a great production capacity and a good perennity. Also is resistant at frost and drought, answering very well at watering. It has a great capacity of growth, and in exceptional culture conditions can be harvested of 5-6 times per year (Luminița Cojocariu, 2005).

Alfalfa can be used as green fodder, hay, semihay, silo (in mixture with graminees) and at the preparation of combined forages. Also, alfalfa is a basic part of temporary meadows used by mowing (Dragomir N. et all, 2005).

Alfalfa is forage with good quality and yield superior in the cold season because it can be transformed in hay. Alfalfa is a crop proper for organic fertilization because it removes a great amount of nitrogen from soil and can diminish the high level of nitrites from the root area. Some researches realized in U.S. show that alfalfa yield can be improved applying manure in comparison with other fertilization sources (Lory J.A., 2000; Herbert S.J. et Daliparthy J., 2001).

MATERIAL AND METHOD

The aim of this paper is to find the maximum production of this culture taking in consideration the fertilisation with chemical fertilisers in Batar conditions, Bihor county.

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 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 experience is placed in accordance with the randomized blocks method, in three repetitions, a parcel surface is 45 m^2. Sowing was made on October 05th 2010.

In order to determine the production, the harvesting was done at 61th phenophase (Beginning of flowering: 10% of flowers open) of alfalfa (the extended BBCH-scale, general - U. Meier, 2001).

In this paper we take in consideration the production obtained in the experimental years 2011, that allow us to have a few conclusions on the alfalfa capacity production under different types of fertilization in the Crişurilor plain conditions.

The statistical analysis has been performed by Statistica 8 package.

RESULTS AND DISCUSSION

Green mass total production that was obtained in 2011 at alfalfa culture, at the three studied fertilisation variants, was between 28,2 $t.he^{-1}$ at $N_{50}P_{50}K_{50}$ fertilized variant and 53,0 $t.he^{-1}$ at $N_{50}P_{50}K_{50} + N_{100}$ variant (fig. 1).

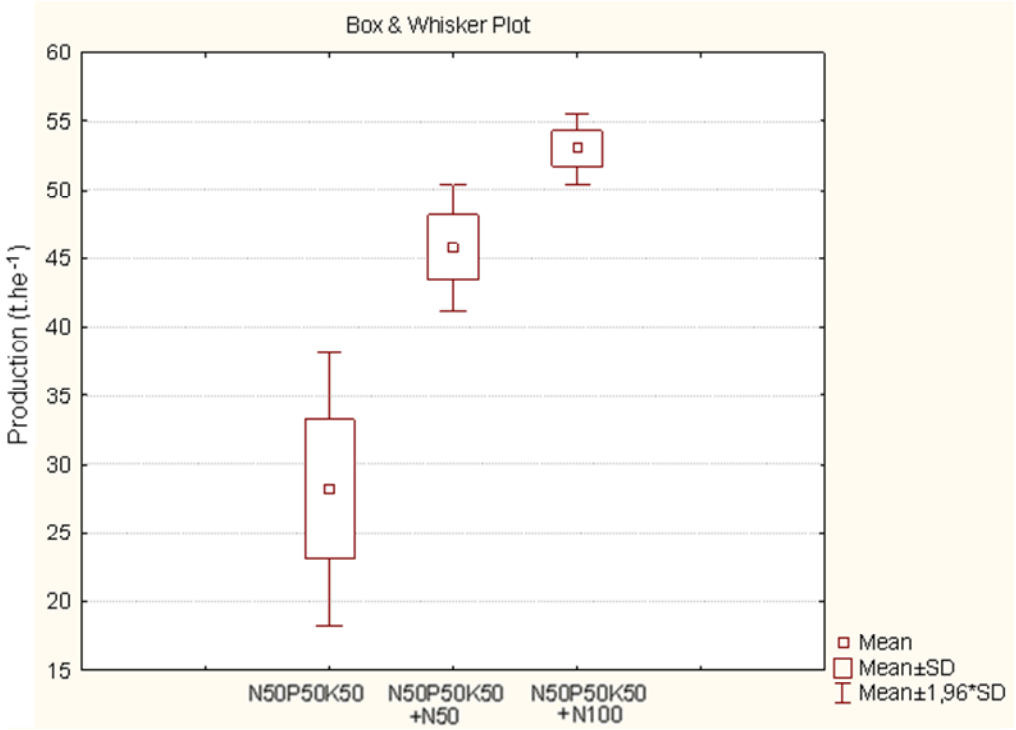

Fig. 1. Box & Whisker diagramme for total production of alfalfa obtained in 2011 in different fertilisation variants

Green mass total production obtained at variant of fertilisation $N_{50}P_{50}K_{50} + N_{50}$ was of 45,8 $t.he^{-1}$.

To compare the production capacity at alfalfa culture in different fertilisation variants, in the conditions of year 2011, we have used Duncan test, for multiple comparations (ANOVA).

Tabel 1.

Duncan test for multiple comparations between the fertilisation variants for the total production obtained at alfalfa in year 2011

Crt. No.	**Variant**	**$N_{50}P_{50}K_{50}$ 28,2 $t.he^{-1}$**	**$N_{50}P_{50}K_{50} + N_{50}$ 45,8 $t.he^{-1}$**	**$N_{50}P_{50}K_{50} + N_{100}$ 53,0 $t.he^{-1}$**
1	$N_{50}P_{50}K_{50}$		0,000834	0,000213
2	$N_{50}P_{50}K_{50} + N_{50}$			0,037511
3	$N_{50}P_{50}K_{50} + N_{100}$			

From table 1 we can observe that do exist differences statistically assured as beeing very significant, between alfalfa production obtained at variant of fertilisation $N_{50}P_{50}K_{50}$ of 28,2 t.he^{-1} and at variant of fertilisation $N_{50}P_{50}K_{50} + N_{50}$ that have obtained a production of 45,8 t.he^{-1}.

The differences statistically assured as beeing very significant have been registered also between alfalfa production obtained at variant of fertilisation $N_{50}P_{50}K_{50}$ of 28,2 t.he^{-1} and at variant of fertilisation $N_{50}P_{50}K_{50} + N_{100}$ at which was obtained a production of 53,0 t.he^{-1}.

Also, differences statistically assured as beeing significant have been registered between alfalfa production obtained at variant of fertilisation $N_{50}P_{50}K_{50} + N_{50}$ of 45,8 t.he^{-1} and variant of fertilisation $N_{50}P_{50}K_{50} + N_{100}$ at which have been obtained a production of 53,0 t.he^{-1}.

We have used regression equation $y=b_0+b_1x+b_2x^2$ to describe the dependency of alfalfa total production obtained in 2011 in dependence with the fertilization with nitrogen applied in spring.

Thus, in previously presented conditions, the alfalfa average production can be expressed in terms of nitrogen quantity applied in spring, by the equation:

$$y = 28,2 + 0,456*x - 0,0021*x^2 .$$

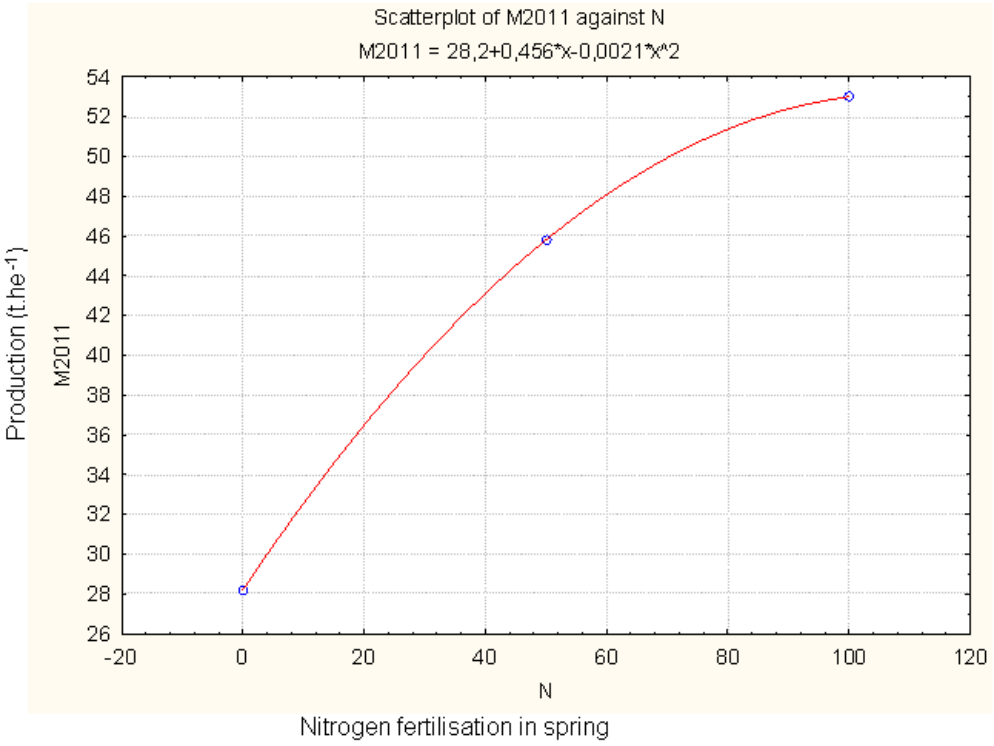

Fig.2. The influence of different fertilisation variants on the total production of green mass obtained in year 2011

The maximum production of 52,95 t.he^{-1} is estimated to be obtained at fertilisation with 108,57 kg/ha nitrogen.

This maximum (see Fig. 2) was obtained as the local extremum of the quadratic function above and it was calculated by the vanishing of its first derivative.

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CONCLUSIONS

After the analysis regarding the production capacity of alfalfa we can observe that exist differences statistically assured as beeing very significant, between alfalfa production obtained at variant of fertilisation $N_{50}P_{50}K_{50}$ of 28,2 $t.he^{-1}$ and at variant of fertilisation $N_{50}P_{50}K_{50} + N_{50}$ that have obtained a production of 45,8 $t.he^{-1}$.

The differences statistically assured as beeing very significant have been registred also between alfalfa production obtained at variant of fertilisation $N_{50}P_{50}K_{50}$ of 28,2 $t.he^{-1}$ and at variant of fertilisation $N_{50}P_{50}K_{50} + N_{100}$ variant at which it was obtained a production of 53,0 $t.he^{-1}$.

Also, differences statistically assured as beeing significant have been registred between alfalfa production obtained at variant of fertilisation $N_{50}P_{50}K_{50} + N_{50}$ of 45,8 $t.he^{-1}$ and at variant of fertilisation $N_{50}P_{50}K_{50} + N_{100}$ which have been obtained a production of 53,0 $t.he^{-1}$.

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