Preliminary studies on the production capacity of triticale (Triticosecale Wittmack) grains under the influence of fertilization and varieties

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Abstract Cereals (wheat, triticale, rye, barley, oats, corn, sorghum, millet, rice, etc.) represents the group of plants growing importance to human existence and activity. As a general rule, triticale combines the high potential of wheat production and quality with disease resistance and tolerance to environmental factors stepchildren (including soil) from rye. Due to advances in genetic improvement of triticale varieties have been developed commercially viable (the production potential and high stability) competitive with other cereals and even corn, especially for hilly areas with infertile soils and low pH. New varieties of triticale is higher or equal to other cultures for grain yield, biomass production and forage for human food, animal feed or industrial forage crop triticale. Recent research shows that the protein energy ratio is generally higher in forage triticale obtained from than the traditional concentrated fodder. Triticale has higher protein value of wheat, being rich in potassium, phosphorus, sodium, magnesium and zinc. The main objective of the research was to contribute to establishing the structure of sorts of triticale (Triticosecale Wittmack), leading to obtain economically efficient crops and traits of superior quality. To achieve the objectives of the work were studied the following triticale varieties: Cascador, Titan, Stil and Gorun. The experience is two-factor type. The fertilization degree was: N0P0K0, N80P60K60 and N160P60K60. Our results show that grain yield in triticale varies by the influence of factors in the study (variety and fertilization). Interaction kind - fertilizer strongly influence production in experience. Analysis of results shows that the highest grain yields are obtained by Stil triticale variety in variant fertilized with N160P60K60 - 5934kg/ha. It appears that on average the experimental cycle, the highest values of the mass of 1000 grains were registered by varieties of triticale Stil and Titan. Hectoliter mass registered values ranging between 68 kg/hl - 74 kg/hl. Having only one year of research results we can not yet draw conclusions knowing that triticale generally react differently to the climatic conditions of the year of culture.

Key words triticale, variety, fertilisation

Cereals (wheat, triticale, rye, barley, oats, maize, sorghum, millet, rice, etc.) stands for plants growing importance to human existence and activity. It is irreplaceable in human food and animal feed due to the chemical composition of the grains comprising: carbohydrates (60%), protein materials (10-16%), minerals, fats, vitamins. Thanks to advances in genetic improvement of triticale varieties have been developed commercially viable (with high production potential and stability) competitive with the other and even with corn straw cereals, especially for infertile soils and hilly areas with low pH. New varieties of triticale are equal or superior performance to other grain crops, fodder and biomass for human food, animal feed or industrial applications.

Recent research shows that the protein energy ratio is generally higher in forage triticale obtained from than the traditional concentrated fodder. Triticale protein is higher as the value of wheat, being rich in potassium, phosphorus, sodium, magnesium and zinc. Hence the conclusion that it is necessary an adaptation of the bakery industry, the processing of triticale is now recognized that all the techniques used so far have been made to wheat. Triticale grains have a composition allowing their use in the production of malt for brewing calitate. Cereal grains to feed humanity provides 55-60% of total calories consumed, 60% protein, 15% fat and 70% carbohydrates. In human nutrition ensures more than 90% of calories from 30 species of cultivated plants. Foods cereal can be eaten daily as appropriate and appreciated the human body needs
both in terms of taste and their nutritional value. Berries cereal is the raw material for other industries such as liquor industry (production of spirit drinks and beer from maize, triticale, barley, rice, etc.), pharmaceutical industry (manufacture of chemicals antihemoragice of fungus sclerotia produced on Cleviceps purpurea rye, rice of medications etc.). The straw (stems) grain cereals are used in the pulp and paper industry, in small industry (braids) and other manufacturing activities. Corn is the main raw material for the production of meat, milk and eggs. No concentrated feed intake can be deprived of corn, oats, barley, triticale, etc. Among cereals are good bee plants (corn). Debris from the production of cereals (provides an excellent feed and not least of secondary cereals (straw, stalks) are used as bedding or even feeding. Lately gaining global energy purposes cultivation of cereals (sorghum as energy phytomass) and grain cultivation for the production of biofuels (triticale, corn, etc.). The grain is a rich source of trade. Physical and chemical properties of the grains allow their transport over long distances and keeping them without much difficulty. You can eat in harvesting, or after several years without altering or significantly alter nutritional qualities. Interaction variety, density, strongly influences the fertilizer production[1,2,3,4,5,6].

**Material and Methods**

The main objective of the research was to contribute to establishing the structure of sorts, leading to obtain economically efficient crops and traits of superior quality.

To achieve the objectives of the work were studied triticale varieties under the Official Catalogue of Plant Varieties and hybrids of Romania. Studies were conducted in the USAMVB Timisoara. Triticale were studied requirements to environmental factors or requirements of this plant to soil and climate. The experimental field was placed on a mold cambic wet soil type (poorly gleyed) weak decarbonate. The experience is two-factor type.

Factor A - triticale varieties used in the experiment:
- A1 – Cascador,
- A2 – Titan,
- A3 – Stil,
- A4 – Gorun.

Factor B - fertilization degree:
- B1 – N0P0K0,
- B2 – N80P60K60,
- B3 – N160P60K60.

**Results and Discussions**

In Table 1 and Table 2 are shown the results regarding the production (kg/ha) of triticale obtained in 2013. Table 1 presents the production (kg/ha) of triticale obtained from the interaction between triticale varieties and fertilization degree. Between those two factors, variety and fertilization plays a role in increasing the production of triticale grains.

<table>
<thead>
<tr>
<th>Triticale varieties</th>
<th>N0P0K0</th>
<th>N80P60K60</th>
<th>N160P60K60</th>
<th>Production Kg/ha</th>
<th>%</th>
<th>The difference</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>CASCADOR</td>
<td>3454</td>
<td>4565</td>
<td>5451</td>
<td>4492</td>
<td>100</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>TITAN</td>
<td>4423</td>
<td>5050</td>
<td>5660</td>
<td>5045</td>
<td>112</td>
<td>553</td>
<td>xx</td>
</tr>
<tr>
<td>STIL</td>
<td>4564</td>
<td>5409</td>
<td>5934</td>
<td>5302</td>
<td>118</td>
<td>810</td>
<td>xxx</td>
</tr>
<tr>
<td>GORUN</td>
<td>3936</td>
<td>4679</td>
<td>4970</td>
<td>4529</td>
<td>101</td>
<td>37</td>
<td></td>
</tr>
</tbody>
</table>

DI 5% - 326kg/ha; DI 1% -469 kg/ha; DI 0,1% - 711kg/ha;
Table 2

<table>
<thead>
<tr>
<th>Fertilization degree</th>
<th>N0P0K0</th>
<th>N80P60K60</th>
<th>N160P60K60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production (Kg/ha)</td>
<td>4094</td>
<td>4926</td>
<td>5504</td>
</tr>
<tr>
<td>%</td>
<td>100</td>
<td>101</td>
<td>134</td>
</tr>
<tr>
<td>The difference</td>
<td>-</td>
<td>832</td>
<td>1410</td>
</tr>
<tr>
<td>Significance</td>
<td>xxx</td>
<td>xxx</td>
<td></td>
</tr>
</tbody>
</table>

For Stil variety the average production was 5302 kg/ha with 18% higher than the production version control against which to realize a production increase of 810 kg/ha, provided statistically very significant. Titan has been a variety with production of 5045 kg/ha, who made a positive difference in production compared to the control being provided statistically significantly distinct. Analysis of the production potential of the two fertilized variants compared to the production version control (N0P0K0) emphasizes that all options are considered superior to that witness. On N160P60K60 variant we obtained a average production of 5504 kg/ha with a production increase of 1410 kg/ha it is statistically assured as very significant.

Production increase obtained variant fertilized with 80N kg/ha (832 kg/ha) is secured against production statistically as very significant witness.

Analysis of results from the interaction variety of fertilizer grade shows that the highest grain yields are obtained triticale variety in Stil variant fertilized with N160P60K60 – 5934 kg/ha. Among the quality parameters, were determined mass of 1000 grains and hectoliter mass. Figure 1 presents the results of experimental determinations in 2013. The greatest mass of 1000 grains was recorded at over 52g for Stil variety, followed by variety Titan with a mass of 1000 grains of over 47 g. Regarding this quality parameter, Gorun variety registered 43,21g and Cascador variety 32,45g.

![Graph](image-url)

Fig. 1. Changes in the mass of 1000 grains (g) determined in 2013

The results regarding hectoliter mass in 2013 are summarized in Figure 2, which shows that values over 70 kg / hl were registered by the varieties Stil, Gorun and Titan.

The lowest value was recorded by Cascador variety. Analyzing these data in parallel with the values with which these varieties were recommended for zoning that data presented are at the level mentioned recommendations.
Conclusions

Having only one year of research results can not yet draw conclusions knowing that triticale generally react differently to the climatic conditions of the year of culture.

Climatic conditions during sowing and harvesting largely had a favorable effect on triticale grain harvest level.

The soil on which were placed the experiences they provide nutritional support for good plant growth and development of triticale.

Grain yield in triticale varies by the influence of factors in the study (variety and fertilization). Interaction kind - fertilizer strongly influence production in experience.

The highest grain yields are obtained by Stil triticale variety in variant fertilized with N160P60K60 - 5934kg/ha.

It appears that on average the experimental cycle, the highest values of the mass of 1000 grains were registered varieties of triticale Stil and Titan.

In terms of review finds that all varieties of triticale hectoliter mass was raised with values ranging between 68 kg/hl - 74 kg/hl.

References

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