Research regarding the unilateral and interaction effects of some technological factors on the growth of grain production in the seed lots at the Dropia variety

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Abstract The productive potential in the seed production process can be much improved by applying optimum culture technology. The optimum density and the nitrogen fertilization level represent two of the basic factors of technology and that influence significantly the grain production level. The study of the separate action but especially of the interaction of these factors permitted the elaboration of more precise conclusions regarding their contribution to the making of some high productions of seed.

Key words biological category of seed, sowing density, unilateral effect, interaction effect, the method of the subdivided lots

In the frame of a modern agriculture, seed production represents an efficient investment and the guaranty of obtaining a high and stable crop, permitting the optimum capitalization of the specific conditions of each crop area [1, 3, and 5].

The obvious contribution that the variety brings can be possible only by obtaining the seed at the level of producer’s needs with a high biological value but also rentable from an economic point of view [2, 3, 4, 6, and 7].

These conditions become achievable only if used scientifically the best crop technologies in accordance with the ecological conditions in which the seed production is made and which will secure the maintenance of the biological indexes of seeds.

The profound study of these aspects regarding crop technology is absolutely necessary not only under economical or biological aspect, respectively the maintenance of the typical characteristics, but also under the aspect of rapid multiplication of the varieties introduced in the crop.

Because of this we experimented at the Dropia variety many things regarding the fertilization level and the sowing density, two of the most important technological factors, following also the unilateral effects and the interaction effects.

Biological Material and Method

The biological material was made from seeds from the Dropia variety approved in 1993, procured from ICDA Fundulea.

Results and Discussions

- The influence of the sowing density on production, following a1=100 b.g/m²; a2=200 b.g/m²; a3=400 b.g/m²; a4=500 b.g/m²; a5=700 b.g/m²;

- The influence of nitrogen fertilization, with the possibilities b1=N60 and b2=N120.

We specify that the experiments were made during a three year period and a constant phosphor fund (80 kg s.a / ha).

The experiments were made in a comparative culture following the divided lot method.

Data processing was made using the variant analysis method.

The experiments were interpreted unilateral and in multi-factorial interactions.

The unilateral influence of the experimental factors *The influence of the sowing density on the grain production

From the unilateral study of this factor we can see that in comparison with the control sample (a1 – 500 b.g./m²), the others determine the obtaining of low productions.

The differences in comparison with the control sample are significant, but reduced in a3 and a5, but big and very negatively significant in a1 and a2.
### Table 1

Grain production in the Dropia variety in concordance with the sowing density

<table>
<thead>
<tr>
<th>Sowing density (b.g/m²)</th>
<th>Average production q/ha</th>
<th>Relative production %</th>
<th>Difference in comparison with the control sample</th>
<th>The significance of differences in comparison with the control sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>a₁ (100 b.g/m²)</td>
<td>40.6</td>
<td>75.89</td>
<td>-12.9</td>
<td>000</td>
</tr>
<tr>
<td>a₂ (200 b.g/m²)</td>
<td>45.5</td>
<td>85.0</td>
<td>-8.0</td>
<td>000</td>
</tr>
<tr>
<td>a₃ (400 b.g/m²)</td>
<td>48.6</td>
<td>80.4</td>
<td>-4.9</td>
<td>0</td>
</tr>
<tr>
<td>a₄ (500 b.g/m²)</td>
<td>53.5</td>
<td>100.0</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>a₅ (700 b.g/m²)</td>
<td>49.3</td>
<td>92.3</td>
<td>-4.2</td>
<td>0</td>
</tr>
</tbody>
</table>

DL 5% = 3.7 q/ha  
DL 1% = 5.7 q/ha  
DL 0.1% = 7.2 q/ha

The data obtained show us the possibility to use a 400 b.g./m² density in the case of rapid multiplication of a new variety, the loss of crop being high.

*The influence of nitrogen fertilization*

Using chemical fertilizers with nitrogen represents a necessary and mandatory measure to secure the growth and development of wheat plants, knowing that because of poorly developed root system and of poor solubility and absorption power of nutrients from the soil, the plants must have necessary quantities of nutritive elements in accessible forms.

The unilateral study of the nitrogen fertilization level (b) highlights what we mentioned above (table 2).

### Table 2

Grain production in the Dropia variety in accordance with the nitrogen fertilization dose

<table>
<thead>
<tr>
<th>Nitrogen dose</th>
<th>Average production (q/ha)</th>
<th>Relative production (%)</th>
<th>The differences in comparison with Mt</th>
<th>Difference significance in comparison with the control sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>b₁ = N₆₀</td>
<td>42.8</td>
<td>100.0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>b₂ = N₁₂₀</td>
<td>53.1</td>
<td>124.1</td>
<td>+10.3</td>
<td>xxx</td>
</tr>
</tbody>
</table>

DL 5% = 4.8 q/ha;  
DL 1% = 6.5 q/ha;  
DL 0.1% = 9.4 q/ha

From the experimental data obtained we can see that the 120 kg s.a/ha dose determines an obvious growth of the grain production, the gain being significant in comparison with the control sample (N₆₀).

These observations show the need to apply large doses of nitrogen, first requirement to obtain high multiplication indexes.

*The influence of the interaction of experimental factors*

The concurrent study of the interactions of many experimental factors allow the obtaining of
ample and more precise data than in the case of unilateral evaluation and respectively the measure in which their effects accumulate.

In table 3 is presented the interaction between the sowing density (a) and the fertilization level (b), two determining factors in realizing high productions.

The experimental data obtained show us that the best results are obtained at a density of 500 b.g./m$^2$ and a fertilization with 120 kg s.a./ha, the gain over 23% being significant.

Good results are obtained in the case of the variants that include a density of 400 b.g./m$^2$ and a fertilization with 120 kg s.a. nitrogen/ha but the growth is smaller – 8 – 9 q/ha.

We can see that low densities of 100 – 200 kg/m$^2$ make small productions.

Table 3

The effects of sowing density (a) x fertilization level (b) on the grain production in the Dropia variety

<table>
<thead>
<tr>
<th>Factors and their degrees</th>
<th>Average production q/ha</th>
<th>Relative production %</th>
<th>Difference in comparison with the control sample (q/ha)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>$a_1b_1$ 100/60</td>
<td>39.6</td>
<td>81.2</td>
<td>-18.7</td>
<td>00</td>
</tr>
<tr>
<td>$a_2b_1$ 200/60</td>
<td>42.3</td>
<td>87.5</td>
<td>-6.0</td>
<td>0</td>
</tr>
<tr>
<td>$a_3b_1$ 400/60</td>
<td>46.5</td>
<td>96.3</td>
<td>-1.8</td>
<td>-</td>
</tr>
<tr>
<td>$a_4b_1$ 500/60</td>
<td>48.3</td>
<td>100</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>$a_5b_1$ 700/60</td>
<td>46.7</td>
<td>96.7</td>
<td>-1.6</td>
<td>-</td>
</tr>
<tr>
<td>$a_3b_2$ 100</td>
<td>43.5</td>
<td>90.1</td>
<td>-4.8</td>
<td>0</td>
</tr>
<tr>
<td>$a_3b_2$ 200</td>
<td>45.0</td>
<td>93.2</td>
<td>-3.3</td>
<td>-</td>
</tr>
<tr>
<td>$a_3b_2$ 400</td>
<td>56.3</td>
<td>116.6</td>
<td>+8.0</td>
<td>xx</td>
</tr>
<tr>
<td>$a_4b_4$ 500</td>
<td>59.6</td>
<td>123.4</td>
<td>+11.3</td>
<td>xxx</td>
</tr>
<tr>
<td>$a_2b_5$ 700</td>
<td>57.2</td>
<td>118.4</td>
<td>+8.9</td>
<td>xx</td>
</tr>
</tbody>
</table>

DL 5% = 3.80 q/ha
DL 1% = 6.30 q/ha
DL 0.1% = 9.60 q/ha

Conclusions

The research regarding the effects of applied technology at seed production in the autumn wheat variety Dropia highlight:

1. In the seed production the variety and the biological categories of seed have an essential part but also indisputable is the contribution of different technological factors in the making of grain production and their quality.
2. The productive potential in the seed production can be much improved through the application of a optimum crop technology. So: * Securing optimum density, being in our experiments 500 b.g./m$^2$, constitutes an essential component of the grain production at this variety of autumn wheat;  * Smaller differences in $a_3 = 400$ b.g./m$^2$ allow us to highlight the reasonable and opportune possibility to use this sowing density in the case of rapid multiplication of a new variety;  * The nitrogen fertilization method, economically efficient is the medium one, of 120 kg s.a./ha that allows the obtaining of high seed productions;  * Under the aspect of the interaction between sowing density x fertilization level we can see significant differences at the 400 b.g./m$^2$ density, with high nitrogen doses.

References

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