Researches concerning the influence of some technological factors over the production of one assortment of lettuce cultivated in a greenhouse at the Didactic Base Timisoara

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Abstract The assortment of lettuce varieties used in experiment, performed in the period October 2009 – February 2010, was constitute by the next varieties: AS 104, AS 106, AS 107, AS 108, AS 6119 și AS 6123. The lettuce varieties we have considered in our study were introduced in experiments of polyfactor type, the set up of the variants being achieved according to subdivided plot method with four repetitions. The insurance of an optimum space of nutrition (12 – 16 plants/m²), contribute very significant at the realization of a cabbages with a superior quality. The use of a natural product Bioplasma at the fertilization assure the obtained of a cabbages with an average weight over 300 grams.

Key words lettuce, fertilization substances, planting density, cabbage weight

Material and Method

The biological material used in experiment, was constitute from 6 lettuce varieties: A.S. 104, A.S. 106, A.S. 107, A.S. 108, A.S. 6119 and A.S. 6123, these was included in a polyfactor type, the set up of the variants being achieved according to subdivided plot method with four repetitions.

- Factor A (the variety) with 6 graduations:
  - a₁ – AS 104;
  - a₂ – AS 106;
  - a₃ – AS 107;
  - a₄ – AS 108;
  - a₅ – AS 6119;
  - a₆ – AS 6123.

- Factor B (fertilization substance) with 3 graduations:
  - b₁ – Elrom 1,5 l/ha;
  - b₂ – Bionex 1,5 l/ha;
  - b₃ – Bioplasma 8,0 l/ha

- Factor C (planting density) with 3 graduations:
  - c₁ – 20 x 25 cm – 20 plante/m²;
  - c₂ – 25 x 25 cm – 16 plante/m²;
  - c₃ – 25 x 30 cm – 12 plante/m².

The seedlings productions was achieved according the general technology used in the forced system of lettuce culture [5]. The application of the fertilization substance was achieved along the vegetation period of lettuce plants, at every 10 days.

At the consumer maturity, were made observations and determinations by the qualitative nature regarding to the weight of cabbages, that make possible the determination of the production on the unit area.

The observations were made using the specifically technical working, and the experimental production data were calculated and interpreted, based on the analysis of the variance [4].

Obtained results

The exprimation of the potential production of one cultivare constitutes, first the externalizing of the genotype, and secondly the interaction of the phenotype with the contrary enviromental factors, according the assurance of a culture technology in optimal parameters. To determinate the influention of the fertilization substance and the planting density, over the weight of the lettuce cabbages at the varieties experimentated in the greenhouse, were compared the varieties (Table1), the fertilization substances (Table 2), the planting density (Table 3), and the interrelations between these parameters.
The influence of the variety over the cabbage weight

(The Didactic Base – 2009)

<table>
<thead>
<tr>
<th>Variety</th>
<th>Average weight (gr.)</th>
<th>Relative weight (%)</th>
<th>The difference (gr.)</th>
<th>Signific.</th>
<th>Variety</th>
<th>Average weight (gr.)</th>
<th>Relative weight (%)</th>
<th>The difference (gr.)</th>
<th>Signific.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a1-a2</td>
<td>276,14-256,52</td>
<td>107,64</td>
<td>19,62</td>
<td>23,42</td>
<td>a3-a1</td>
<td>289,07-265,64</td>
<td>108,82</td>
<td>23,42</td>
<td>1%</td>
</tr>
<tr>
<td>a2-a3</td>
<td>265,64-256,52</td>
<td>103,55</td>
<td>9,11</td>
<td>32,12</td>
<td>a4-a3</td>
<td>233,51-265,64</td>
<td>87,90</td>
<td>32,12</td>
<td>oo</td>
</tr>
<tr>
<td>a4-a3</td>
<td>289,07-256,52</td>
<td>112,68</td>
<td>32,54</td>
<td>37,84</td>
<td>a5-a4</td>
<td>227,80-265,64</td>
<td>85,75</td>
<td>37,84</td>
<td>oo</td>
</tr>
<tr>
<td>a6-a5</td>
<td>233,51-256,52</td>
<td>91,03</td>
<td>-23,00</td>
<td>55,55</td>
<td>a6-a5</td>
<td>233,51-289,07</td>
<td>80,78</td>
<td>55,55</td>
<td>ooo</td>
</tr>
<tr>
<td>a6-a5</td>
<td>227,80-256,52</td>
<td>88,80</td>
<td>-28,72</td>
<td>61,27</td>
<td>a6-a5</td>
<td>227,80-289,07</td>
<td>78,80</td>
<td>61,27</td>
<td>ooo</td>
</tr>
<tr>
<td>a6-a5</td>
<td>265,64-276,14</td>
<td>96,19</td>
<td>-10,50</td>
<td>23,42</td>
<td>a6-a5</td>
<td>227,80-233,51</td>
<td>97,55</td>
<td>23,42</td>
<td>-</td>
</tr>
</tbody>
</table>

Analysing the experimental results presented (Table 1), we can observe the detaching of the A.S. 108 variety, by his significant positive value, under the aspect of cabbage weight. A significant positive value regarding the cabbage weight can be observed by the comparison of the varieties A.S. 108 and A.S. 107. In Table 2 are presented the experimental results regarding the fertilization substances over the analyzed production character.

The influence of the fertilization substance over the cabbage weight

(The Didactic Base 2009)

<table>
<thead>
<tr>
<th>Fertilization substance</th>
<th>Average weight (gr.)</th>
<th>Relative weight (%)</th>
<th>The difference (gr.)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>b2-b1</td>
<td>263,11-249,80</td>
<td>105,32</td>
<td>13,31</td>
<td>*</td>
</tr>
<tr>
<td>b2-b1</td>
<td>261,42-249,80</td>
<td>104,65</td>
<td>11,61</td>
<td>*</td>
</tr>
<tr>
<td>b2-b2</td>
<td>261,42-263,11</td>
<td>99,35</td>
<td>-1,69</td>
<td>*</td>
</tr>
</tbody>
</table>

From the experimental results presented in table 2, can be observed the significant influence of the fertilization substances Bionex and Bioplasma in comparison with Elrom fertilizing substance.

The influence of the planting density over the cabbage weight

(The Didactic Base 2009)

<table>
<thead>
<tr>
<th>Planting distances</th>
<th>Average weight (gr.)</th>
<th>Relative weight (%)</th>
<th>The difference (gr.)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>c2-c1</td>
<td>250,07-251,02</td>
<td>99,62</td>
<td>13,31</td>
<td>*</td>
</tr>
<tr>
<td>c2-c1</td>
<td>273,25-251,02</td>
<td>108,85</td>
<td>22,22</td>
<td>***</td>
</tr>
<tr>
<td>c2-c2</td>
<td>273,25-250,07</td>
<td>109,26</td>
<td>23,17</td>
<td>***</td>
</tr>
</tbody>
</table>

Regarding the experimental data presented in table 3, is observing the realization of a optimal density by 12 plants/m² determinate the realization of lettuce plants over 270 g weight.

In table 4 and 5 are presented experimental data achieved, if the varieties are compared at the same graduation of b and c factors.
The influence of the varieties and fertilization substance on the cabbage weight
(The Didactic base 2009)

<table>
<thead>
<tr>
<th>Factor combin.</th>
<th>Average weight (gr.)</th>
<th>Relative weight (%)</th>
<th>The difference (gr.)</th>
<th>Signif.</th>
<th>Factor combin.</th>
<th>Average weight (gr.)</th>
<th>Relative weight (%)</th>
<th>The difference (gr.)</th>
<th>Signif.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a₁b₁-a₂b₁</td>
<td>247,75-253,30</td>
<td>97,81</td>
<td>-5,54</td>
<td></td>
<td>a₁b₁-a₂b₁</td>
<td>285,46-293,31</td>
<td>98,30</td>
<td>-4,96</td>
<td></td>
</tr>
<tr>
<td>a₁b₁-a₂b₁</td>
<td>259,01-253,30</td>
<td>102,25</td>
<td>5,71</td>
<td></td>
<td>a₁b₁-a₂b₁</td>
<td>288,34-293,31</td>
<td>98,30</td>
<td>-4,96</td>
<td></td>
</tr>
<tr>
<td>a₁b₁-a₂b₁</td>
<td>285,46-253,30</td>
<td>112,69</td>
<td>32,16</td>
<td></td>
<td>a₁b₁-a₂b₁</td>
<td>227,50-293,31</td>
<td>77,56</td>
<td>-65,81</td>
<td>ooo</td>
</tr>
<tr>
<td>a₁b₁-a₂b₁</td>
<td>227,27-253,30</td>
<td>89,72</td>
<td>-26,02</td>
<td></td>
<td>a₁b₁-a₂b₁</td>
<td>252,75-293,31</td>
<td>86,17</td>
<td>-40,55</td>
<td>o</td>
</tr>
<tr>
<td>a₁b₁-a₂b₁</td>
<td>226,02-253,30</td>
<td>89,23</td>
<td>-27,27</td>
<td></td>
<td>a₁b₁-a₂b₁</td>
<td>285,46-259,01</td>
<td>110,21</td>
<td>26,45</td>
<td>-</td>
</tr>
<tr>
<td>a₂b₁-a₂b₂</td>
<td>287,36-270,11</td>
<td>106,38</td>
<td>17,25</td>
<td></td>
<td>a₁b₁-a₂b₁</td>
<td>227,27-259,01</td>
<td>87,74</td>
<td>-31,73</td>
<td></td>
</tr>
<tr>
<td>a₂b₁-a₂b₂</td>
<td>277,44-270,11</td>
<td>102,71</td>
<td>7,33</td>
<td></td>
<td>a₁b₁-a₂b₁</td>
<td>226,02-259,01</td>
<td>87,26</td>
<td>-32,98</td>
<td>o</td>
</tr>
<tr>
<td>a₂b₁-a₂b₂</td>
<td>293,40-270,11</td>
<td>108,62</td>
<td>23,28</td>
<td></td>
<td>a₁b₁-a₂b₁</td>
<td>293,40-277,44</td>
<td>105,75</td>
<td>15,95</td>
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<tr>
<td>a₂b₁-a₂b₂</td>
<td>245,76-270,11</td>
<td>90,98</td>
<td>-24,34</td>
<td></td>
<td>a₁b₁-a₂b₁</td>
<td>245,76-277,44</td>
<td>88,58</td>
<td>-31,67</td>
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</tr>
<tr>
<td>a₂b₁-a₂b₂</td>
<td>204,62-270,11</td>
<td>75,75</td>
<td>-65,48</td>
<td>oo</td>
<td>a₁b₁-a₂b₁</td>
<td>204,62-277,44</td>
<td>73,75</td>
<td>-72,82</td>
<td>ooo</td>
</tr>
<tr>
<td>a₂b₁-a₂b₂</td>
<td>293,31-246,15</td>
<td>119,15</td>
<td>47,15</td>
<td>**</td>
<td>a₁b₁-a₂b₁</td>
<td>288,34-260,46</td>
<td>110,70</td>
<td>27,87</td>
<td></td>
</tr>
<tr>
<td>a₂b₁-a₂b₂</td>
<td>260,46-246,15</td>
<td>105,81</td>
<td>14,31</td>
<td></td>
<td>a₁b₁-a₂b₁</td>
<td>227,50-260,46</td>
<td>87,34</td>
<td>-32,96</td>
<td>o</td>
</tr>
<tr>
<td>a₂b₁-a₂b₂</td>
<td>288,34-246,15</td>
<td>117,13</td>
<td>42,18</td>
<td></td>
<td>a₁b₁-a₂b₁</td>
<td>252,75-260,46</td>
<td>97,03</td>
<td>-7,71</td>
<td></td>
</tr>
<tr>
<td>a₂b₁-a₂b₂</td>
<td>227,50-246,15</td>
<td>92,42</td>
<td>-18,65</td>
<td></td>
<td>a₁b₁-a₂b₁</td>
<td>227,27-285,46</td>
<td>79,61</td>
<td>-58,18</td>
<td>oo</td>
</tr>
<tr>
<td>a₂b₁-a₂b₂</td>
<td>252,75-246,15</td>
<td>102,68</td>
<td>6,60</td>
<td></td>
<td>a₁b₁-a₂b₁</td>
<td>226,02-285,46</td>
<td>79,17</td>
<td>-59,44</td>
<td>oo</td>
</tr>
<tr>
<td>a₂b₁-a₂b₂</td>
<td>259,01-247,75</td>
<td>104,54</td>
<td>11,25</td>
<td></td>
<td>a₁b₂-a₂b₂</td>
<td>245,76-293,40</td>
<td>83,76</td>
<td>-47,63</td>
<td>oo</td>
</tr>
<tr>
<td>a₂b₁-a₂b₂</td>
<td>285,46-247,75</td>
<td>115,22</td>
<td>37,71</td>
<td>*</td>
<td>a₁b₂-a₂b₂</td>
<td>204,62-293,40</td>
<td>69,74</td>
<td>-88,77</td>
<td>ooo</td>
</tr>
<tr>
<td>a₂b₁-a₂b₂</td>
<td>227,27-247,75</td>
<td>91,73</td>
<td>-20,47</td>
<td></td>
<td>a₁b₂-a₂b₂</td>
<td>227,50-288,34</td>
<td>78,89</td>
<td>-60,84</td>
<td>oo</td>
</tr>
<tr>
<td>a₂b₁-a₂b₂</td>
<td>226,02-247,75</td>
<td>91,22</td>
<td>-21,73</td>
<td></td>
<td>a₁b₂-a₂b₂</td>
<td>252,75-288,34</td>
<td>87,65</td>
<td>-35,58</td>
<td>o</td>
</tr>
<tr>
<td>a₂b₁-a₂b₂</td>
<td>277,44-287,36</td>
<td>96,54</td>
<td>-9,92</td>
<td></td>
<td>a₁b₂-a₂b₂</td>
<td>226,02-227,27</td>
<td>99,44</td>
<td>-1,25</td>
<td>-</td>
</tr>
<tr>
<td>a₂b₁-a₂b₂</td>
<td>293,40-287,36</td>
<td>102,09</td>
<td>6,03</td>
<td></td>
<td>a₁b₂-a₂b₂</td>
<td>204,62-245,76</td>
<td>83,25</td>
<td>-41,14</td>
<td>o</td>
</tr>
<tr>
<td>a₂b₁-a₂b₂</td>
<td>245,76-287,36</td>
<td>85,52</td>
<td>-41,60</td>
<td>o</td>
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<td>252,75-227,50</td>
<td>111,10</td>
<td>25,25</td>
<td>-</td>
</tr>
</tbody>
</table>

By the comparation of the varieties, at the utilizations with the same fertilization substance, we can observe that only by the application of a Bioplasma product at the A.S. 106 variety, are obtaining significantly distinct positive values, of the cabbage weight. At the A.S. 108 variety, is obtaining significantly positive differences, using the fertilization with Bioplasma and Elrom products.

From the experimentaly data presented in table 5, regarding the comparation of the variety cultivated at the same plant desity, is observing the significantly distinct differences of the cabbages weight in the case of A.S. 108 variety from the A.S. 107 and A.S. 104 at the density of 16 plants/m².
Conclusions

By the experimental data obtained regarding the influence of the natural fertilization substance over the weight of cabbage at the lettuce cultivated in greenhouse we can extract the next conclusions:

- the lettuce varieties used in experience have a high genetic potential over the production capacity;
- the application of a natural fertilization substances assure significantly differences over the cabbage weight;
- the assurance of a optimal space nutrition (12 plants/m²), has a critical contribution to the realization of a superior quality lettuce plants; the utilization of a Bioplasm product at plant fertilization contribute to the realization of some lettuce cabbages with the average weight over 300 grams.

References