

# Researches concerning the influention of some technological factors over the production of one assortment of lettuce cultivated in field at the Didactic Base Timișoara

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**Abstract** This scientific paper is to make evident the influence of some technological factors at the lettuce cultivated in field in April – June 2010 period. The experience, were set as the polyfactor type, the set up of the variants being achieved according to subdivided plot method with three repetitions. The lettuce assortment introduced in experience, represented the a factor and it was constitute by the next lettuce lines: AS 104, AS108, AS 6119 (Geodis) and AS 6123 (Hedonis). The b factor, represented by the biological fertilizer substances and the c factor represented by the planting densities, assured the obtain of lettuce cabbages, with a hight quantity values of the cabbage weight, over 700 grams.

## Keywords:

lettuce, fertilization substances, planting density, cabbage weight.

Lettuce (*Lactuca sativa* L.) is cultivated for for his leaves and cabbages who are consumed in fresh or prepared conditions. The alimantar value of lettuce is given by the huge concentration of vitamins, minerals salts and nutrients [2].

The alimantar value is given by the contents of carbohydrate 2 – 3.5%, protidics 1 – 1.6% , carotene 1-3 mg, vitamins B<sub>1</sub> - 0,07 mg, B<sub>2</sub> – 0,08-0,12 mg, C - 15-20 mg and mineral salts of phosphorus (1-7 mg) and potassium (260 mg), referred at 100g of fresh product [1]. The consumption of 100 g of lettuce bring in the organism 16 – 20 calories [3].

The application of a regulations substances, constitute a very efficient method, easy to use by the cultivators, in view of the delopement of the vegetable culture area.

Regarding the lettuce and the leaves vegetables, the most important object to the icrease the production and to improve the quality, are the technological measures wich have the reason to stimulate the growth and to keep the freshness of the foliar tissues over a long period after the harvesting.[5]

A very important contribution is the utilization of the bioactive substances with plants or seaweed extract. These experiments, are used over all types of culture, in intensive or superintensive system, at root or foliar fertilization.

## Material and Method

The biological material used in this study, was constitute from four lettuce lines: a<sub>1</sub> – AS 104, a<sub>2</sub> – AS 108, a<sub>3</sub> – AS 6119 (*Geodis*) and a<sub>4</sub> – AS 6123

(*Hedonis*), wich represented the first factor of the experience. The lettuce lines was included in a polyfactor type, the set up of the variants being achieved according to subdivided plot method with three repetitions.

The secondary factor, from the experience, was represented by the biological fertilization substances, with the next graduations: b<sub>1</sub> – Elrom 1,5 l/ha; b<sub>2</sub> – Bionex 1,5 l/ha; b<sub>3</sub> – Bioplasma 8,0 l/ha.

Elrom and Bionex are natural products with plants extraction and exercise a fertilizing and biostimulative role. Bioplasma is a foliar fertilizer with seaweed extract and is recomended for all culture types.

Finaly the three factor constitute the planting density with three graduations: c<sub>1</sub> – 20 x 25 cm – 20 plants/m<sup>2</sup>; c<sub>2</sub> – 25 x 25 cm – 16 plants/m<sup>2</sup>; c<sub>3</sub> – 25 x 30 cm – 12 plants/m<sup>2</sup>.

The experience was located at the Didactic Base of the Banat's University of Agricultural Siences and Veterinary Medicine Timisoara and the culture technology was achieved acording the general technology of lettuce cultivated in field.

The establishment of culture was made with seedling produced in greenhouse acording the general technology.

In this experience have been considered the climatic conditions, recorded at Timișoara Meteorological Station (Table 1), over the vegetation period, because the production and the qualitative attributes, depend by the situation of the climatic condition in optimal parametres, afferent the field lettuce culture.

Table 1

**The climatic conditions recorded at Timișoara Meteorological Station,  
on May-June 2010 period**

Month	Air temperature (°C)	Soil temperature (°C)	Rainfalls (mm)	Relative air moisture (%)	Insolation (hours)
May 2010	16,6	18,3	118,0	77	250,2
June 2010	20,5	22,5	131,3	77	217,8

Analyzing the meteorologic data in table 1, we can see, that the requirements regarding the temperature have been met, these placing in optimal parameters for the growing of lettuce cabbages. Also the rainfalls was favorable and have a positive influence over the lettuce production.

Regarding the relative air moisture, the recorded values was situated between optimal parameters wich for lettuce are between 70 and 80%.

The insolation has not influenced the premature issue of the floral strains, providing a high production value.

The seeding was efectuated at 8 March 2010 in boxes with nutritive substrate. The plants was transplanted in nutrient plots with the diameter of 5 cm, between 18 – 19 March 2010 and the caring works was efectuatet acording the general technology [6].

The aplication of the biological fertilization substances was made over the vegetation period at 10 days intervals.

The quantity determination was made at the consumer maturity, over the cabbages weight, 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], acording the subdivided plot method with three repetitions [7].

### Results and Discussions

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, acording the assurance of a culture technology in optimal parameters.

To determinate the influence of the fertilization substance and the planting density, over the weight of the cabbages at the lettuce lines experimentated in the field, were compared the lettuce lines (Table 2), the fertilization substances (Table 3), the planting density (Table 4), and the interrelations between these parameters (Table 5 and Table 6).

Table 2

**The influention of the lettuce lines over the cabbage weight**

Lettuce lines	Average weight (gr.)	Relative weight (%)	The difference (gr.)	Significance
a2-a1	567,26 – 605,63	93,66	-38,37	o
a3-a1	596,04 – 605,63	98,41	-9,59	-
a4-a1	607,56 – 605,63	100,39	1,93	-
a3-a2	596,04 – 567,26	105,07	28,78	-
a4-a2	607,56 – 567,26	107,1	40,3	*
a4-a3	607,56 – 596,04	101,93	11,52	-
<i>DL 5% - 33,09; DL 1% - 50,11; DL 0,1% - 80,49</i>				

From the experimentaly data presented in table 2 we can observe the detaching of the lettuce line AS 6123 (Hedonis), in comparation with AS 108 lettuce line, with a significant positive value.

In table 3, are presented the experimentaly results regarding the fertilization biological substances over the aspect of the cabbage weight.

Table 3

**The influention of the fertilization substance over the cabbage weight**

Fertilization substances	Average weight (gr.)	Relative weight (%)	The difference (gr.)	Significance
b2-b1	598,5 – 611,33	97,9	-12,83	-
b3-b1	572,53 – 611,33	93,65	-38,8	oo
b3-b2	572,53 – 598,5	95,66	-25,97	o
<i>DL 5% - 23,44; DL 1% - 32,29; DL 0,1% - 44,46.</i>				

Analysing the experimental results presented (Table 4), we can observe that there are not significant differences between the biological fertilization products. But we can mention the conclusion that the Elrom product had better results in comparison with Bionex and Bioplasma.

In table 4 are presented the experimental results regarding the influence of the planting density over the cabbage weight at the lettuce cultivated in field.

Table 4

**The influence of the planting density over the cabbage weight**

Planting distances	Average weight (gr.)	Relative weight (%)	The difference (gr.)	Significance
c2-c1	599,86 – 537,39	111,62	62,47	***
c3-c1	645,11 – 537,39	120,05	107,72	***
c3-c2	645,11 – 599,86	107,54	45,25	***
<i>DL 5% - 19,67; DL 1% - 26,33; DL 0,1% - 34,45</i>				

From the experimental results presented in table 4, are obtaining very significant differences between the plant density. The conclusion that can be provided is that the realization of a optimal density by 12 plants/m<sup>2</sup> determinate the realization of a lettuce cabbage with a high economic value, which can exceed 700 grams.

A planting density of a 16 plants/m<sup>2</sup>, also can provide important results over the lettuce production. In table 5 are presented the experimental data achieved on the comparison of the lettuce lines at the same graduation of the b factor.

Table 5

**The influence of the lettuce lines and fertilization substance over the cabbage weight**

Factor combination	Average weight (gr.)	Relative weight (%)	The difference (gr.)	Signif.
a2b1-a1b1	565,89 – 599,89	94,33	-34	-
a3b1-a1b1	625,78 – 599,89	104,31	25,89	-
a4b1-a1b1	653,78 – 599,89	108,98	53,89	*
a2b2-a1b2	531,78 – 618,22	86,017	-86,44	oo
a3b2-a1b2	599,44 – 618,22	96,96	-18,78	-
a4b2-a1b2	644,56 – 618,22	104,26	26,33	-
a2b3-a1b3	604,11 – 598,78	100,89	5,33	-
a3b3-a1b3	562,89 – 598,78	94	-35,89	-
a4b3-a1b3	524,33 – 598,78	87,57	-74,44	oo
a3b1-a2b1	625,78 – 565,89	110,58	59,89	*
a4b1-a2b1	653,78 – 565,89	115,53	87,89	**
a3b2-a2b2	599,44 – 531,78	112,72	67,67	*
a4b2-a2b2	644,56 – 531,78	121,21	112,78	***
a3b3-a2b3	562,89 – 604,11	93,18	-41,22	-
a4b3-a2b3	524,33 – 604,11	86,79	-79,78	oo
a4b1-a3b1	653,78 – 625,78	104,47	28	-
a4b2-a3b2	644,56 – 599,44	107,52	45,11	-
a4b3-a3b3	524,33 – 562,89	93,15	-38,56	-
<i>DL 5% - 50,28; DL 1% - 72,16; DL 0,1% - 106,21.</i>				

By the comparison of the lettuce lines, using the same fertilizing substances, we can observe that by application of Bionex product over the AS 6123 (Hedonis), are obtaining very significant values over the lettuce field production. Significantly distinct positive values, are obtaining by the application with Elrom product over the AS 6123 (Hedonis) lettuce line.

Also the AS 6119 (Geodis), presents significant production at Elrom and Bionex fertilization. From the experimental data regarding the comparison of lettuce lines at the same graduation of the c factor are presented in table 6.

Table 6

**The influention of the varieties and the planting density over the cabbage weight**

Factor combination	Average weight (gr.)	Relative weight (%)	The difference (gr.)	Signif.
a2c1-a1c1	520,67 – 513,56	101,38	7,11	-
a3c1-a1c1	552,56 – 513,56	107,59	39	-
a4c1-a1c1	562,78 – 513,56	109,58	49,22	*
a2c2-a1c2	567,67 – 630,56	90,03	-62,89	o
a3c2-a1c2	591,89 – 630,56	93,86	-38,67	-
a4c2-a1c2	609,33 – 630,56	96,63	-21,22	-
a2c3-a1c3	613,44 – 627,78	91,18	-59,33	o
a3c3-a1c3	643,67 – 627,78	95,67	-29,11	-
a4c3-a1c3	650,56 – 672,78	96,69	-22,22	-
a3c1-a2c1	552,56 – 520,67	106,12	31,89	-
a4c1-a2c1	562,78 – 520,67	108,09	42,11	-
a3c2-a2c2	591,89 – 567,67	104,26	24,22	-
a4c2-a2c2	609,33 – 567,67	107,34	41,67	-
a3c3-a2c3	643,67 – 613,44	104,93	30,22	-
a4c3-a2c3	650,56 – 613,44	106,05	37,12	-
a4c1-a3c1	562,78 – 552,56	101,85	10,22	-
a4c2-a3c2	609,33 – 591,89	102,95	17,44	-
a4c3-a3c3	650,56 – 643,67	101,07	6,89	-
<i>DL 5% - 44,98; DL 1% - 63,39; DL 0,1% - 90,81.</i>				

From the dates presented in table 6 regarding the comparison of lettuce lines at the same plants density is observing significantly differences over the lettuce cabbages weight at the AS 6123 (Hedonis) line, over the planting density.

### Conclusions

- 1.The lettuce lines used in experience have a hight potential over the capacity of the production;
- 2.Using the biological fertilization substances assure very significantly differences over the production aspect;
- 3.Using the Bionex product at the lettuce fertilization in field, can assure the forming of lettuce cabbages over 700 grams;
- 4.The assurance of a planting density of 12 plants/m<sup>2</sup>, can also provide lettuce plant with a hight level of production;
- 5.The biological fertilization products, can be an important alternative over the production in vegetable cultura area.

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