

## RESULTS CONCERNING OBTAINING OF LETTUCE ON PERLITE SUBSTRATE

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### Abstract

*Some results regarding the obtaining of lettuce (*Lactuca sativa*) on perlite substrate are in this study. Lettuce is a popular vegetable in Romania. Among the aims of lettuce culture are yield and quality. Lettuce culture results depend on the quality of the seedlings. The experience of this paper aimed at identifying of a technological sequence for obtaining of lettuce in unconventional system, on perlite substrate. The research has been carried out in the Hortinvest greenhouses, within the Research Center for the Quality of Horticultural Products at the University of Agronomic Sciences and Veterinary Medicine of Bucharest, in (October–November) 2016 and (March–April) 2017 years, on a variety of lettuce („Alanis” from the Seminis company). Perlite (2 mm and 4 mm) has been the unconventional substrate used in the lettuce production. Fertilization has been done in several variants: chemical and with different products (Formulex, Iguana and Vermiplant). The lettuce seedling variant obtained on perlite with a 4 mm grain size and treated with Vermiplant has had the best average result (3.65 leaves). The variant of lettuce grown on a 4 mm granulated perlite mattress and treated with Vermiplant has had the best result after 25 days from planting (22.55 leaves). The unconventional soilless lettuce culture system, on perlite substrate, has optimal results and it is also recommended in Romania.*

*Keywords: Alanis, Lactuca sativa, soilless culture, unconventional system*

### 1. INTRODUCTION

Lettuce is a popular vegetable in Romania.

In the absence of an optimally structured and well-supplied soil, it is successfully recommended the establish of lettuce crops in different soilless systems, hydroculture (water culture), on different nutrient substrates.

Among the aims of lettuce culture are yield and quality. The culture technology of lettuce in unconventional soilless system is under development because the production obtained is superior from quality and quantity point of view compared to those ones obtained in conventional. Al-kinani et al. (2021) have experienced the soilless culture to certain lettuce varieties, respectively in NFT, Ebb and Flow (ebb and flow or through flooding) systems. They have had obtained good results regarding the earliness and production of lettuce.

The researchers, Bradley and Marulanda (2001); Sheikh (2006) say that the soilless culture system are superiors to production system on field; and Bradley and Marulanda (2001) adds that this technology reduces the requirements of terrain for the cultures over 75% and for water with 90%,

the nutriment are recycled and salt wastes do not reach in environment, there are not used the herbicide, and other necessary pesticides are in the form of natural barriers for plants.

The experience of this paper aimed the identifying of a technological sequence for obtaining of lettuce in unconventional system, on perlite substrate.

## 2. MATERIALS AND METHODS

The experience of this paper aimed the identifying of a technological sequence for obtaining of lettuce in unconventional system, on perlite substrate. The research has been carried out in the Hortinvest greenhouses, within the Research Center for the Quality of Horticultural Products at the University of Agronomic Sciences and Veterinary Medicine of Bucharest, in (October–November) 2016 and (March–April) 2017 years, on a variety of lettuce („Alanis” from the Seminis company). Perlite (2 mm and 4 mm) has been the unconventional substrate used in the lettuce production. Fertilization has been done in several variants: chemical and with different products (Formulex, Iguana and Vermiplant).

### *Biological material*

The study has been conducted on ‘Alanis’ lettuce (*Lactuca sativa*).

„Alanis” is a green lettuce with dark green leaves and large size (figure 1).

### *Culture substrate*

The seedling has been produced in Jiffy pots with peat. Mattresses filled with perlite in two variants of perlite (2 mm and 4 mm diameter) have been the culture substrate.



Figure 1. „Alanis” lettuce



Figure 2. Jiffy pots (a) and mattresses with perlite (b)

### *Nutrition conditions*

Fertilization has been done in several variants: chemical (green universal 23+06+10+2,7MgO+microelements) and with different products (Formulex, Iguana and Vermiplant).

Formulex has azote (N) 2,40; nitrate azote 2,19; ammoniacal azote 0,21; phosphorus pentoxide (P<sub>2</sub>O<sub>5</sub>) (P) 0,85 (0,37); potassium oxide (K<sub>2</sub>O) (K) 3,36 (2,78); calcium oxide (CaO) (Ca) 1,85 (1,32); boron (B) 0,0108, cobalt (Co) 0,0006; copper (Cu) chelate EDTA 0,0025; iron (Fe) chelate EDTA 0,0526; manganese (Mn) chelate EDTA 0,0131; molybdenum (Mo) 0,0012; zinc (Zn) chelate EDTA 0,0036.

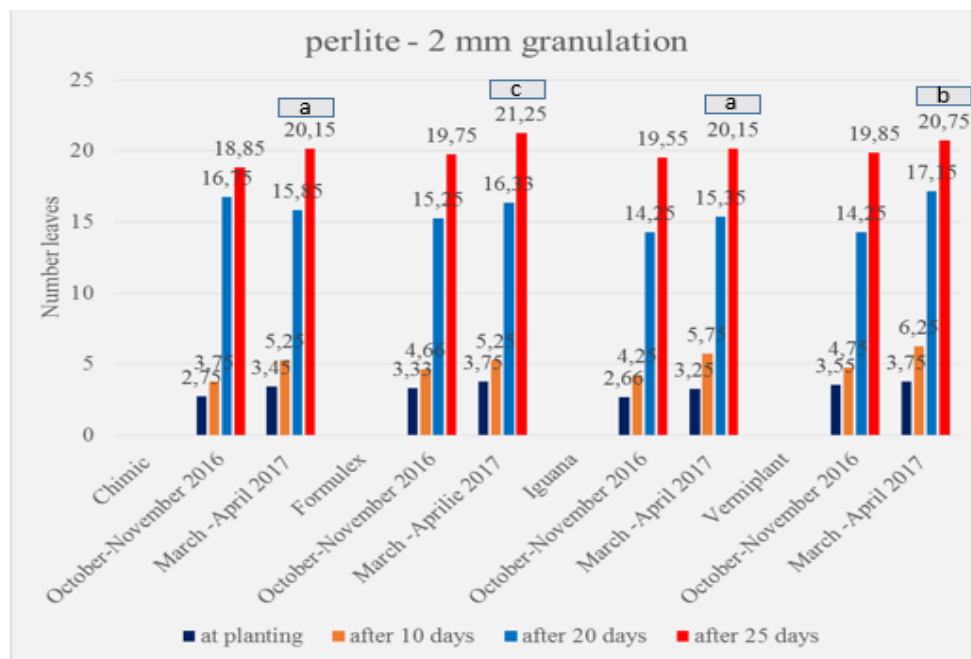
Iguana is an organic product, certified, which contains NO<sub>3</sub> 3,00%, P<sub>2</sub>O<sub>5</sub> 1,00%, K<sub>2</sub>O 3,00%. Liquid Vermiplant is obtained by the red earthworms aid from California, through by composting manure from cattle, sheep, pig and horses in a ratio of almost 100%.

*Statistical analysis*

Statistical analysis of results have been by the Duncan test (0.05 significance level).

**3. RESULTS AND DISCUSSIONS**

The number evolution of lettuce leaves cultivated on substrate perlite in condition of culture on perlite substrate (2 mm) is presented in figure 3.



**Figure 3. The dynamics of the formation of lettuce leaves cultivated on 2mm perlite mattresses and signification (Duncan test)**

The seedlings planted on mattresses filled with 2 mm, fertilized in different variants (chemical, Formulex, Iguana and Vermiplant) and monitored in culture, had in 2016 an average number of leaves between 2.66 leaves (the variant fertilized with Iguana) and 3.75 leaves (the variant fertilized with Formulex, respectively with Vermiplant). At the variants planted on 4 mm diameter mattresses, the seedlings have had a number of leaves between 2.75 leaves (chemically fertilized variant) and 3.25 leaves (variants fertilized with Formulex and Vermiplant, respectively). In 2017, the lettuce seedling planted on 2 mm perlite mattresses has had a number of leaves between 3.25 leaves (the variant fertilized with Iguana) and 3.75 leaves (the variant fertilized with Formulex and Vermiplant). In the case of the seedling planted on 4 mm perlite mattresses, the seedling showed in

2017 between 3.45 leaves (chemically fertilized seedling variant) and 3.75 leaves for the other variants.

At the end of the crop in 2016, the lowest number of leaves was recorded in plants cultivated on perlite mattresses with a grain size of 2 mm, these being 18.85 leaves in the variant with chemically fertilized seedlings and 19.85 leaves in the variant fertilized with Vermiplant.

In 2017, on mattresses with 2 mm perlite were obtained plants with a number of 20.15 leaves for the chemically fertilized variant and Iguana and 21.25 leaves for those ones fertilized with Formulex, respectively 20.75 leaves for those fertilized with Vermiplant.

The number evolution of lettuce leaves cultivated on substrate perlite in condition of culture on perlite substrate (4 mm) is presented in figure 4.

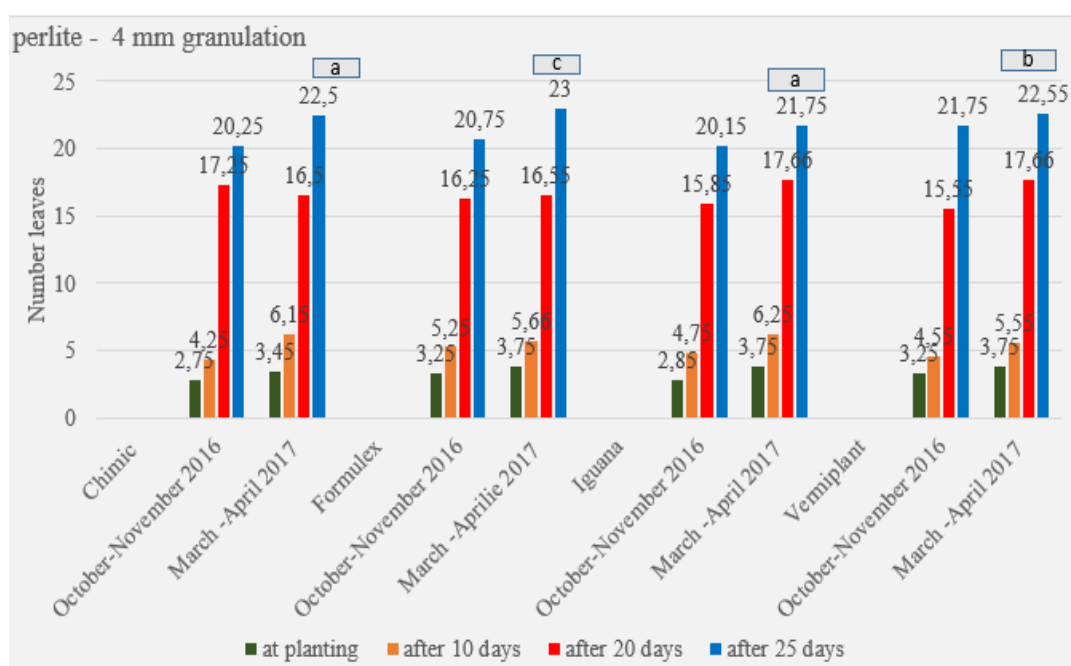


Figure 4. The dynamics of the formation of lettuce leaves cultivated on 4mm perlite mattresses and signification (Duncan test)

In the case of variants planted on perlite mattresses with a diameter of 4 mm, the number of leaves formed on plant has been higher compared to 2016. There were between 20.25 leaves (2016) and 22.5 leaves (2017), with an average of 21.38 leaves in the chemically fertilized variant. The variant fertilized with Vermiplant showed values between 21.75 leaves (2016) and 22.55 leaves (2017) and on average 22.15 leaves (2016-2017).

#### 4. CONCLUSIONS

The experience of this paper has identified a technological sequence of obtaining the lettuce in an unconventional system, on perlite substrate and different fertilization variants.

Experimental variants cultivated on 2 mm and 4 mm perlite have shown a different number evolution of leaves in lettuce depending on the nutritional conditions. The variant fertilized with Vermiplant has presented the most important values; they ranged from 21.75 leaves (2016) to 22.55 leaves (2017) and averaged 22.15 leaves (2016-2017).

„Alanis” lettuce grown on perlite substrate and fertilized in different variants (chemical, Iguana, Formulex, Vermiplant) is recommended for cultivation in greenhouse conditions in Romania.

## 5. ACKNOWLEDGEMENTS

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## 6. REFERENCES

- Al-kinani, H.A.A., Jerca, O.I., Bobuțac, V., Drăghici, E.M. (2021). Comparative study on lettuce growing in NFT and Ebb and Flow system. *Scientific Papers. Series B, Horticulture, LXV (1)*, 361-368.
- Bradley, P., Marulanda, C. (2001). Simplified hydroponics to reduce global hunger. *Acta Hortic.*, 554, 289-296. 10.17660/ActaHortic.2001.554.31
- Fraile-Robayo, R.D., Javier, G.Á.H., Andrea J.R.M., Omar, F.Á.-H., Fraile-Robayo, A.L. (2017). Evaluation of the growth and quality of lettuce (*Lactuca sativa* L.) in a closed recirculating hydroponic system. *Agronomía Colombiana*, vol. 35(2), 216-222.
- Frasetya, B., Harisman, K., Ramdaniah, N.A.H. (2021). The effect of hydroponics systems on the growth of lettuce. *IOP. Conf. Ser.: Mater. Sci. Eng.* 1098, 1-6.
- Sheikh, B.A. (2006). Hydroponics: Key to Sustain Agriculture in Water Stressed and Urban Environment. *Pakistan Journal of Agriculture, Agricultural Engineering and Veterinary Sciences*, 22, 53-57.