

## PARTIAL RESULTS REGARDING THE TYPES OF SUBSTRATES USED FOR OBTAINING MICROGREENS VEGETABLE PRODUCTS

### REZULTATE PARTIALE PRIVIND TIPURILE DE SUBSTRATURI FOLOSITE PENTRU OBȚINEREA CULTURILOR LEGUMICOLE DE TIP MICROGREENS

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**Abstract.** *The paper addresses research on the use of four types of substrates (coconut substrate, 80% peat + 20% coconut waste, 80% peat + 20% sand and 80% peat + 20% perlite) to obtain the products microgreens type vegetables, in order to establish the best substrate variant. The best results were obtained on the coconut waste substrate.*

**Key words:** substrate, coconut waste, peat, microgreens

**Rezumat.** *Lucrarea abordează cercetări privind folosirea a patru tipuri de substraturi (substrat pe bază de nucleu de cocos, 80% turbă +20% deșeu de nucleu de cocos, 80% turbă + 20% nisip și 80% turbă+20% perlit) pentru obținerea produselor legumicole de tip microgreens, în vederea stabilirii celei mai bune variante de substrat. Cele mai bune rezultate au fost obținute pe substratul ce a avut la bază fibra de nucleu de cocos.*

**Cuvinte cheie:** substrat, nucleu de cocos, turbă, microgreens

## INTRODUCTION

Microgreens or as they are called "confetti vegetables", are a new class of products, which refers to species in the category of vegetables, which are produced from vegetable seeds, herbs, including wild species (Franks and Richardson, 2009; Di Gioia and Santamaria, 2015).

Their popularity is due to the bright colors, delicate textures, unique flavor enhancement properties, such as garnishes (salad, soups, desserts, etc.), but also the high content of phytonutrients and their bioactive potential. Microgreens can be distributed as fresh vegetables, but they can also be harvested by the final consumers, by delivering the product with the nutritious substrate, harvesting when needed. The most common species of microgreens belong to the following botanical families: *Brassicaceae*, *Asteraceae*, *Chenopodiaceae*, *Lamiaceae*, *Curcubitaceae*, *Apiaceae* (Delian et al., 2015; Maftai et al., 2018a).

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Microgreens represent a newer category of food products, different from germs and baby products, with a height of 3 to 10 cm, with a short duration of vegetation and with a unique appearance (Kyriacou *et al.*, 2016).

The choice of the growth substrate for the production of vegetable plants of microgreens type, plays a fundamental role in determining the productivity and quality of the plants. The purpose of this paper is to establish the best type of substrate used for the production of vegetable microgreens, in order to optimize the crop. Objectives In order to achieve the proposed purpose, the following objectives were established: establishing the duration for seed germination, establishing the days needed for growth and development, establishing the average harvesting duration and assessing the uniformity of the crops.

## MATERIAL AND METHOD

The research was carried out in the Phytotron greenhouse of the Vegetable discipline, within the farm "Vasile Adamachi" Iasi in 8- 22 October 2018.

Biometric observation and determination were used as a research method. The biological material used is represented by seven vegetable species namely: Pears - *Pisum sativum*, Red moon radish - *Raphanus sativus*, White summer radish - *Raphanus sativus*, Early cabbage - *Brassica oleracea*, Red cabbage - *Brassica oleracea*, Red basil cousin. violaceum, Green basil - *Ocimum basilicum* var. *viridis*. The technical material is represented by the four types of substrates: Coconut (coconut waste); Peat 80 % with 20 % coconut waste; Peat 80 % with 20 % perlite; Peat 80 % with 20 % sand.

Beginning with seed germination, the management of microclimate factors will be based on species requirements (Ipătioaie *et al.*, 2016; Lobiuc *et al.*, 2017; Voicu *et al.*, 2017; Cărbune *et al.*, 2018; Maftei *et al.*, 2018b).

## RESULTS AND DISCUSSIONS

### 1. Results obtained on average days for seed germination

Results obtained regarding the number of average days for seed germination are presented in table 1 and indicate that, the best type of substrate is the one based on coconut, followed by the one based on peat with coconut, and the most poor results, being obtained on the substrate based on perlite and peat.

Table 1

Results obtained on average days for seed germination

Species	Nr. days											
	1	2	3	4	5	6	7	8	9	10	11	12
Pears - <i>Pisum sativum</i>												
Red moon radish - <i>Raphanus sativus</i>												

White summer radish - <i>Raphanus sativus</i>														
Early cabbage - <i>Brassica oleracea</i>														
Red cabbage - <i>Brassica oleracea</i>														
Red basil cousin. <i>violaceum</i>														
Green basil - <i>Ocimum basilicum</i> var. <i>viridis</i>														

**Legend:**

Coconut (coconut waste) 100%

Peat 80 % with 20 % coconut waste

Peat 80 % with 20 % perlite

Peat 80 % with 20 % sand

## 2. Results regarding the establishment of the average days of growth and development

The results regarding the establishment of the average days of plant growth and development are presented in table 2. These results highlight that for the coconut substrate, the pea needs 4-7 days average for the development of plants, early cabbage of 4-8 days, and basil for 5-9 days. Not the same can be said about the peat and pearl substrate, where the values increase by 2-3 days ie: for red cabbage a number of 7-10 days is required for the development of plants, 4-8 days for radishes and 8-12 days for basil.

Table 2

### Results regarding the establishment of the average days of growth and development

Species	Nr. days													
	1	2	3	4	5	6	7	8	9	10	11	12		
Pears - <i>Pisum sativum</i>														
Red moon radish - <i>Raphanus sativus</i>														

White summer radish - <i>Raphanus sativus</i>															
Early cabbage - <i>Brassica oleracea</i>															
Red cabbage - <i>Brassica oleracea</i>															
Red basil cousin. <i>violaceum</i>															
Green basil - <i>Ocimum basilicum var. viridis</i>															

<b>Legend</b>
Coconut (coconut waste) 100%
Peat 80 % with 20 % coconut waste
Peat 80 % with 20 % perlite
Peat 80 % with 20 % sand

### 3. Results regarding the establishment of the average harvest days

Table 3 contains results regarding the establishment of the average harvest days, which presents us as well as the other studies on the coconut substrate the best results, followed by the substrate consisting of peat and coconut and peat and sand, and the weakest results are obtained for peat and pearl substrate.

Table 3

Results regarding the establishment of the average harvest days

Species	Nr. days													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Pears - <i>Pisum sativum</i>														
Red moon radish - <i>Raphanus sativus</i>														
White summer radish - <i>Raphanus sativus</i>														

Early cabbage - <i>Brassica oleracea</i>																							
Red cabbage - <i>Brassica oleracea</i>																							
Red basil cousin. <i>violaceum</i>																							
Green basil - <i>Ocimum basilicum</i> var. <i>viridis</i>																							

**Legend**

Coconut (coconut waste) 100%

Peat 80 % with 20 % coconut waste

Peat 80 % with 20 % perlite

Peat 80 % with 20 % sand

**CONCLUSIONS**

1. The best type of substrate used for growing vegetables microgreens is the one based on coconut waste, followed by 80% peat + 20% walnut waste cock.
2. The weakest type of substrate used for type culture microgreens is the 80% peat and 20% perlite.
3. All seven species studied in the microgreens system are suitable for cultivation in this system.
4. Radish is the species that has the fastest development until harvest, followed by the opposite pole of basil, which needs the most days of growth and development.

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