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Studies concerning the sowing period in the arugula (*Eruca sativa* Mill) plants' development

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Abstract. The staged production and supply markets with fresh vegetables is a particular problem because a wide range of vegetables must be assured throughout the year. Arugula is a less-known plant (in our country) and the customers are provisioned with import products. The experiment was conducted in unheated greenhouse at the endowment of Vegetable Growing Department of Agricultural Sciences and Veterinary Medicine Cluj-Napoca in 2010, in spring culture. Three cultivars of arugula were studied: similar in size and growing season (30 and 55 days) but of different origin. Biometric measurements were conducted on plants to determine the capacity for growth. Production data were interpreted statistically by an analysis of the variance method.

Keywords: rocket, leafy vegetables

1 Introduction

Arugula cultivation has recently begun to be expanded in culture in Western and Central Europe. It is an edible plant, generally used in salads and cooked as vegetable sauces.

It is an annual plant with a size between 20 and 100 cm, with deeply pinnate leaves (four to ten lateral lobes, small and large terminal lobe). The flowers are 2-4 cm in diameter, arranged in a corymb: a typical *Brasicacceae* structure. The petals are white or cream with purple veins and yellow stamens. The fruit is 12-35 mm long with many seeds that are edible (1 g contains approximately 700 seeds depending on variety).

As a rustic plant, it has reduced requirements towards the vegetation factors and it is easily adapts to climate changes and different soil types. It is sensitive to soil salinity, suitable for winter cultivation, a little pretentious towards the factors of vegetation. The seeds germinate between 3 and 10 days; they prefer exposed lands to the sun but tolerate semi-shade. To obtain quality and high yields, it requires moist, well-drained and fertile soils, rich in humus.

2 Material and method

Three cultivars of arugula were studied, as follows: **Eruca sativa** cultivar with thinner leaves, lighter colour with less taste, from Intersemillas Company Spai; **Rukkola** cultivar with good productivity, large, rounded leaves, poor taste from Hungary, from Kertimag Company; **Rocket** cultivar with dark green, large, thick foliage, a hard-to-deliver flowering stem, with a high production and peppery flavour, 30–40-days vegetation period, from England, from the Suttons company.

The studied experimental variants were:

Factor A – the Cultivar a_1 = cultivar Eruca sativa
a_2 = cultivar Rocket
a_3 = cultivar Rukkola

Factor B – the Density b_1 = low density (150 plants/lm)
b_2 = high density (300 plants/lm)

During the experiments, various observations were made on the morphological features of the plants. Data were recorded on:

- plant development - average plant height (cm)
  - number of leaves
  - average plant weight (g)
- plant yield (kg/m^2)

3 Results and discussions

Analysing the cultivars from a developmental point of view, the data presented in Table 1 show that the variant Rocket (sown at high density) presents the highest values of plant height and weight after 25 days of emergence.

Plant weights ranged from 5.77 g to 12.41 g, the number of leaves per plant was between 7 and 9, and plant heights were between 8.0 and 14.70 cm.

Table 1: Degree of development of arugula plants at 25 days maturity

Variant		**Plant**	**Number of**	**Plant**
Cultivar	**Density**	**weight(g)**	**leaves/plant**	**height (cm)**
Eruca sativa	high	6.25	8	8.60
Eruca sativa	low	7.15	8	9.45
Rocket	high	10.30	9	12.10
Rocket	low	12.41	8	14.70
Rukkola	high	6.67	8	8.00
Rukkola	low	5.77	7	8.20

The data presented in Table 2 on the degree of development concerning arugula plants after 55 days of emergence show that Rocket cultivar is superior to other variants in plant weight and height. Another feature to note is that the rarely sown variants (150 plants/lm) show lower values than those that were sown densely (300 plants/lm).

Table 2: Degree of development of arugula plants at 55 days maturity

Variant		**Plant**	**Number of**	**Plant**
Cultivar	**Density**	**weight(g)**	**leaves/plant**	**height (cm)**
Eruca sativa	dense	8.25	10	35.40
Eruca sativa	rare	9.12	9	34.58
Rocket	dense	12.40	12	34.72
Rocket	rare	15.65	11	32.03
Rukkola	dense	7.20	8	33.00
Rukkola	rare	8.80	9	31.36

Taking into account the vegetation period of arugula from sowing until harvest, it appears that while the vegetation period is prolonged, there is a decrease in the plant weight of all studied variants (Fig.1).

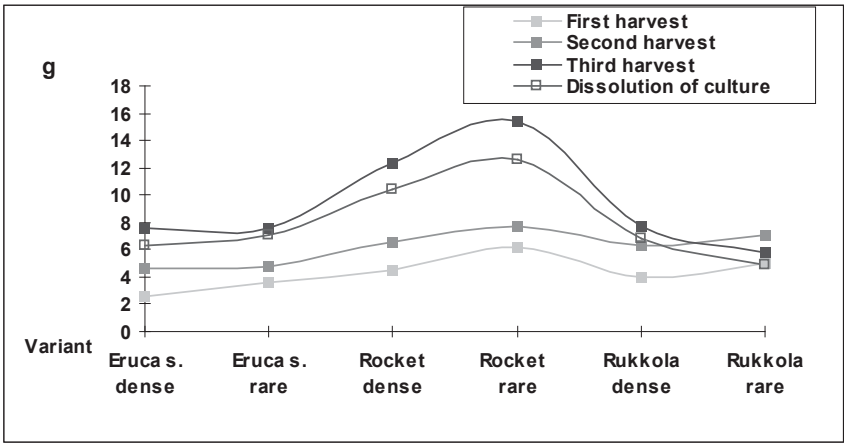

Figure 1: Weight evolution of arugula plants in 2010

It follows that the plants are mature, they lose weight and start to form flower stems; the leaves become older, with more pronounced taste and in fact, commercial quality decreases.

Table 3: Obtained yield with arugula culture (kg/m^2), first sowing period, 24.03.

Variant		**2010**	
Cultivar	**Density**	**Rep 1**	**Rep 2**
Eruca sativa	high	2.01	2.47
Rukkola	high	1.35	1.25
Rocket	high	2.64	2.76
Eruca sativa	low	1.73	1.50
Rukkola	low	1.05	0.98
Rocket	low	2.43	2.00

In terms of production – when the sowing was performed on 24.03.2010 –, it reached 2.76 kg/m^2 and Eruca sativa stood out from the control of experience variety with its high density and a relatively high production of 2.01 and 2.47 kg/m^2 (Table 3). With regard to the behaviour of variety Eruca sativa and Rukkola cultivars – rarely sowed (150 plants/lm) –, a decrease of production was observed. Rocket cultivar provided a consistent production in both densities, but a lower one than that cited in the literature (2700-6700g/m^2) [2].

Analysing the data presented in Table 4, a decrease was noted in the ob-

tained values as compared to the obtained yield of the first sowing period. The highest values were obtained with variety Eruca sativa (high density), Rocket (both densities), and Rukkola (high density) variants.

Table 4: Obtained yield with arugula culture (kg/m^2), second sowing period, 03.04.

Variant		**2010**	
Cultivar	**Density**	**Rep 1**	**Rep 2**
Eruca sativa	high	1.44	1.84
Rocket	high	1.74	2.54
Rukkola	high	1.25	1.45
Eruca sativa	low	0.75	0.95
Rocket	low	1.29	1.00
Rukkola	low	0.83	0.99

Taking into account the vegetation period of arugula culture from sowing until harvest, certain differences in the production are noted, which are determined by shortening the growing season with 10-15 days (in the second sowing period) as well as the climatic factor, the temperature (which was *higher*) Figure 2.

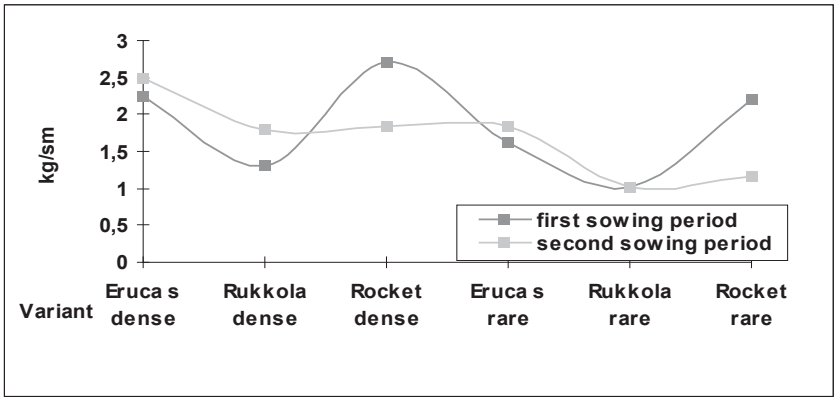

Figure 2: Yield evolution in the two sowing periods

4 Conclusions

The experiments carried out with arugula culture resulted in the following conclusions:

- Arugula plants are less demanding towards the vegetation factors.
- The establishment of arugula culture (in the climatic conditions of the Transylvanian Plateau) in protected culture (unheated greenhouse) is in the third decade of March.
- This culture is suitable for high densities (300 plants/lm).
- Considering the growing period of arugula, from sowing until harvest, there is a substantial decrease in yield in the case of sowing in the month of April.
- Regarding the behaviour of cultivars, Rocket cultivar achieved the highest production in both experiments.

References

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