THE INFLUENCE OF FERTILIZATION REGIME ON PERRENIAL WALL-ROCKET CROP IN OPEN FIELD

INFLUENŢA FERTILIZĂRII DIFERENȚIATE LA O CULTURĂ DE RUCOLA PERENĂ ÎN CÂMP DESCHIS

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Abstract. *Perennial wall-rocket (Diplotaxis tenuifolia L.) is a less studied species in Romania. It belongs to the Brassicaceae family, being cultivated for its fresh leaves used in the preparation of salads. In this context, the objective of this study was to evaluate the effects of different type of fertilizers application on productivity indicators of perennial wall-rocket, cultivated in open field. The monofactorial experience was located in the didactic and experimental field of the Vegetables Discipline within the Faculty of Horticulture, U.S.V. Iasi. The experimental variants were represented by the application of different types of fertilizers, as follows: V1= organic (fertilization with vermicompost), V2= chemical (fertilization with Complex 16:16:16), V3= organic (fertilization with Orgevit), V4= microorganisms (Micoseeds MB) and V5= unfertilized. The best results for all the investigated parameters were obtained in the case of the variant treated with chemical fertilizers, followed, in descending order, by the variants fertilized with vermicompost, Orgevit and Micoseeds MB.*

Key words: *Diplotaxis tenuifolia* L., fertilization, yields.

Rezumat. *Rucola perenă (Diplotaxis tenuifolia L.) este o specie mai puțin cunoscută în literatura de specialitate din țara noastră. Aceasta aparține familiei Brassicaceae, fiind cultivată, conform literaturii internaționale de specialitate, pentru frunzele sale proaspete utilizate în prepararea salatelor. În acest context, scopul acestei lucrări este de a evalua efectele aplicării diferitelor tipuri de îngrășăminte asupra unor indicatori ce determină productivitatea speciei Diplotaxis tenuifolia, cultivată în câmp deschis. Experiența de tip monofactorial a fost amplasată în câmpul didactic și experimental al Disciplinei de Legumicultură din cadrul Facultății de Horticultură, U.S.V. Iași. Variantele experimentale au fost reprezentate de aplicarea diferitelor tipuri de îngrășăminte, astfel: V_1=fertilizare organică cu vermicompost, V_2=fertilizare chimică cu Complex 16:16:16, V_3=fertilizare organică cu Orgevit, V_4=aplicare de microorganisme (Micoseeds MB) și V_5=nefertilizat. Cele mai bune rezultate au fost obținute în cazul variantei fertilizate cu îngrășăminte chimice, urmată, în ordine descrescătoare de variantele fertilizate cu vermicompost, Orgevit și Micoseeds MB.*

Cuvinte cheie: *Diplotaxis tenuifolia* L., fertilizare, producții.

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INTRODUCTION

Diplotaxis tenuifolia (L.) D.C. is a species that belongs to the *Brassicaceae* (*Cruciferae*) family (Warwick and Sauder, 2005). The specific common name "perennial wall-rocket" is currently preferred for differentiating it from other species of the *Diplotaxis* genus (Caruso *et al*., 2018). The extension of the areas cultivated with perennial wall-rocket in the last two decades is due to its fine and succulent leaves that correspond to the consumers' preferences (Bell and Wagstaff, 2019), the leaves of this species being rich in mineral elements and antioxidants (Caruso *et al*., 2019a).

The economic interest in growing perennial wall-rocket has increased as a consequence of the progressive diffusion of ready-to-use salads, the so-called 'fourth generation vegetables', which is a commercialization pattern effective in preserving the freshness and typical scent of the leaves, thus extending their shelf life and market availability (Bonasia *et al*., 2017).

The perennial wall-rocket is a species with high ecological plasticity (Hurka *et al*., 2003; Acar *et al*., 2019), that regenerates easily after harvesting by cutting the leaves 3-5 cm above the cotyledons (Hall *et al*., 2012).

In Romania, preliminary research on this species was carried out by Teliban *et al.* (2020). In this context, the objective of this study was to evaluate the effects of different type of fertilizers on productivity indicators of perennial wall-rocket cultivated in the open field, in the pedo-climatic conditions of Iasi County. The results obtained in this study will constitute the basis for the inclusion of this species in the local vegetable culture.

MATERIALS AND METHOD

The research on the perennial wall-rocket was carried out in 2021, in open field, at the Vegetable Didactic Station of V. Adamachi Horticultural Farm, "Ion Ionescu de la Brad" Iasi University of Life Sciences. The soil was anthropic cambic chernozem with the following physico-chemical characteristics: organic matter 2.86%, pH 7.2; N 2.8 g·kg^{-1}, P 32 mg·kg^{-1} and K 218 mg·kg^{-1}.

The experimental protocol

A monofactorial experiment with three repetitions was established (Jitareanu, 1999; Leonte and Simioniuc, 2018). The experimental variants were represented by the application of different types of fertilizers: V_1 - organic fertilization with vermicompost at a rate of 10000 kg·ha^{-1}, V_2 - chemical fertilization with Complex 16:16:16 at a rate of 300 kg·ha^{-1}, V_3 - organic fertilization with Orgevit at a rate of 1200 kg·ha^{-1}, V_4 - application of microorganisms (Micoseeds MB) at a rate of 120 kg·ha^{-1} and V_5 - unfertilized.

Production indicators

The investigated production indicators were: the leaves area nest^{-1}, the number of leaves nests^{-1}, the weight of leaves nest^{-1}, the weight of leaves, the length of leaves, and the width of leaves.

The leaf area index (LAI) was determined using the Li-3100 Area Meter, produced by LICOR, inc. Lincoln, Nebraska, USA, and was expressed in cm^2·nest^{-1}.

The fresh weight was measured with a Kern analytical balance with an error of 0.01 g (Caruso *et al.*, 2019b; Teliban *et al*., 2021).

Culture establishment

The seeds of perennial wall-rocket were sown on March 19th, in alveolar trays with a volume of 31.3 cm^3. The planting of the 30-day seedlings was performed on April 19th, at distances of 20 cm by 20 cm between plants, and 80 cm between beds. The density was 14.3 nests per square meter (Caruso *et al*., 2019b). The fertilization with the experimental fertilizers was performed at the planting time. During the vegetation period, the maintenance works applied according to the specialized literature (Caruso *et al*., 2018) were: weed control was performed by two weeding and one hoeing works, while watering was performed by drip irrigation. Leaf harvesting was performed by cutting 3-5 cm above the cotyledons to allow efficient regeneration of the vegetative apex (Schiattone *et al*., 2018). The harvesting moment was achieved when the first leaves forming the rosette reached the maximum size.

Data are presented as mean values with standard errors. The statistical significance of the differences between the experimental variants was tested with the Tukey test ($p<0.05$) (Caruso *et al*., 2019b).

RESULTS AND DISCUSSIONS

The first analyzed parameter was represented by the leaf area index per nest (fig. 1). This varied from 1157.3 $cm^2 \cdot nest^{-1}$, in the case of the unfertilized version, to 1760.5 $cm^2 \cdot nest^{-1}$, in the case of the version fertilized with chemical fertilizers. The organically fertilized variants, with vermicompost or Orgevit, recorded leaf are values of 1567.3 $cm^2 \cdot nest^{-1}$, and 1477.6 $cm^2 \cdot nest^{-1}$, respectively, with significant differences compared to the other variants.

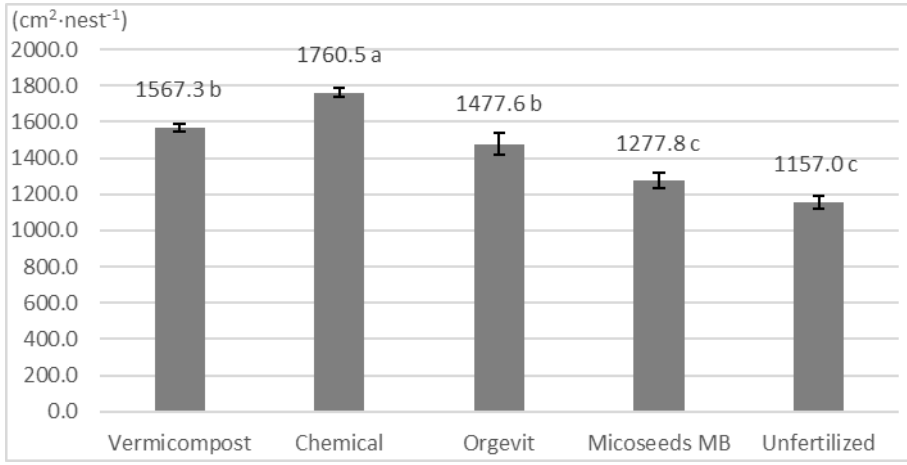

Fig. 1 Leaf area index of *Diplotaxis tenuifolia* L.

In the case of the number of leaves per nest (fig. 2), the best result was obtained in the case of the variant chemically fertilized with Complex 16:16:16 (145.4 leaves·$nest^{-1}$), closely followed by the variant organically fertilized with

vermicompost (131.1 leaves·nest^{-1}), the difference between the two variants being however statistically insignificant. The variant organically fertilized with Orgevit ranked third (119.6 leaves·nest^{-1}), with significant differences compared to the chemically fertilized variant, but with insignificant differences compared to the variants fertilized with vermicompost and Micoseeds MB.

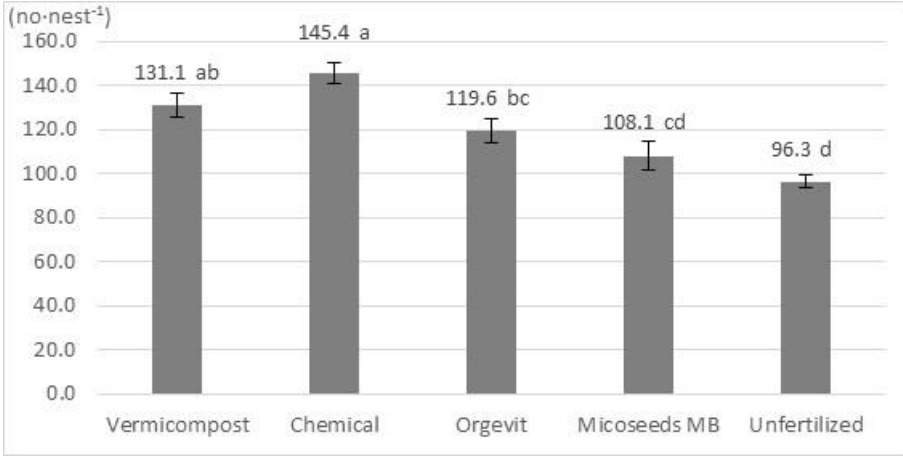

Fig. 2 Number of leaves per nest

The weight of the leaves per nest varied between 69.1 g·nest^{-1}, in the case of the unfertilized variant, and 123.9 g·nest^{-1} following the application of chemical fertilizers (fig. 3). High values were also recorded by the variants fertilized with Vermicompost (106.2 g·nest^{-1}), and Orgevit (100.6 g·nest^{-1}), the differences between these two variants being however insignificant, but registering a statistical significance compared to the unfertilized variant.

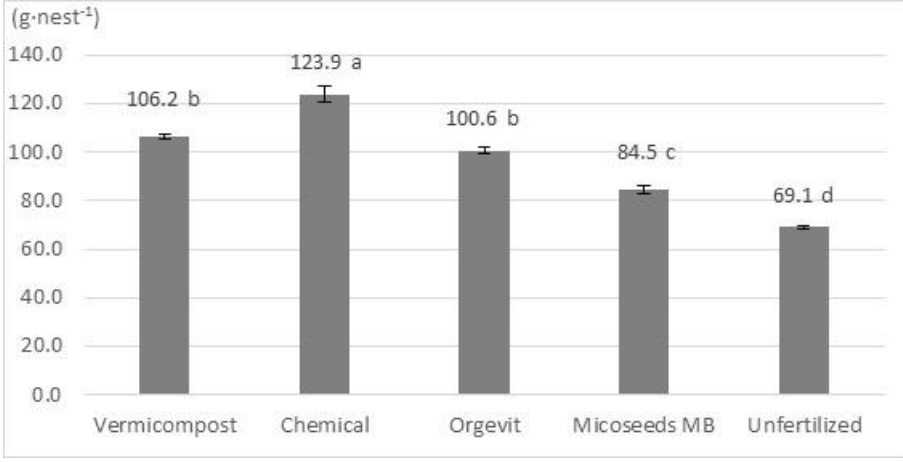

Fig. 3 The weight of leaves per nest

According to the graph below (fig. 4), the weight of one leaf did not vary widely, being between 0.72 g (the unfertilized variant) and 0.85 g, value recorded by both the chemically fertilized variant and the one to which Orgevit was applied. The obtained results did not reveal statistically significant differences between the studied experimental variants.

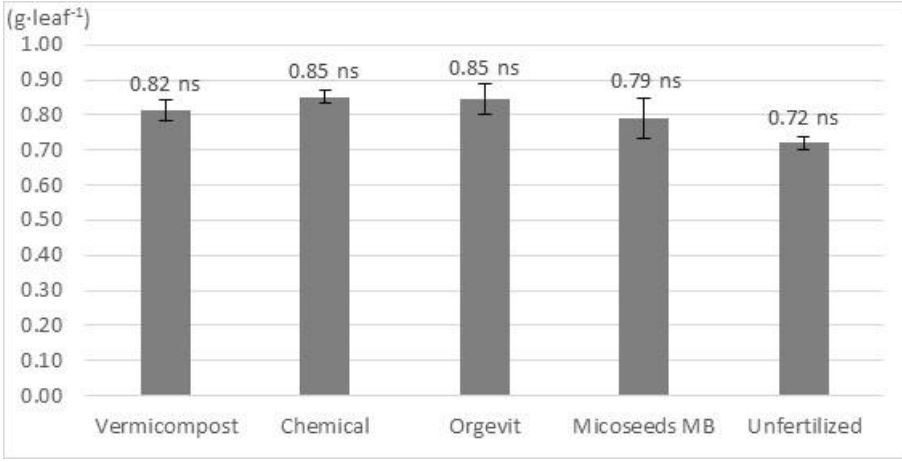

Fig. 4 The weight of leaves

Regarding the length of leaves, the parameter did not show very large variations, being between 16.75 cm for the unfertilized version and 17.28 cm, a value obtained after the application of the complex fertilizer 16:16:16, according to figure 5. The width of leaves recorded, also, the lowest value in the case of the unfertilized variant (3.66 cm), while the highest value, of 4.85 cm, was determined following the application of Orgevit (fig. 5). Both studied parameters revealed differences that were not significant.

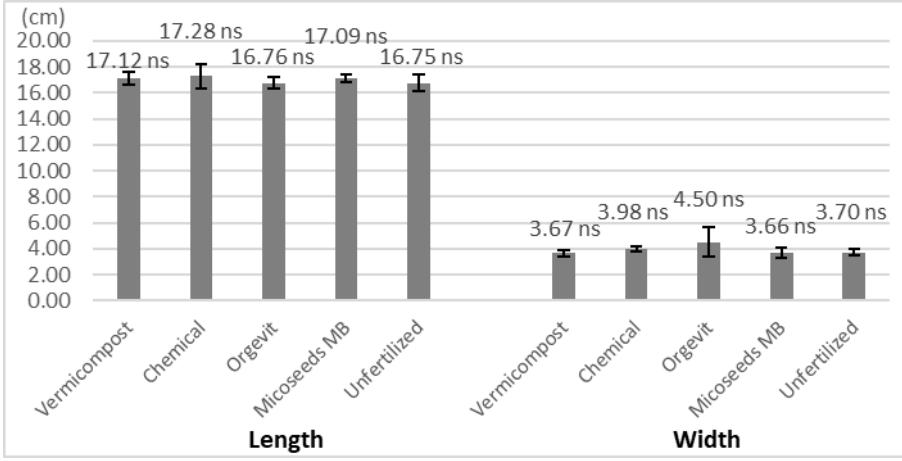

Fig. 5 The length and width of the leaves

CONCLUSIONS

1. The best results on the productivity parameters of perennial wall-rocket (leaf area index, weight of leaves / nest, number of leaves / nests and weight of leaves), with statistically significant differences, were obtained at the chemical fertilized variant (Complex 16 :16:16).

2. The crop of perennial wall-rocket adapted to the local pedoclimatic conditions and reacted very well to organic fertilization (vermicompost and Orgevit), with values close to those chemically fertilized.

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