

THE EFFECT OF THE IRRIGATION REGIME ON SOME MORPHOLOGICAL PARAMETERS IN SOME TOMATO CULTIVARS

EFFECTUL REGIMULUI DE IRIGARE ASUPRA UNOR PARAMETRI MORFOLOGICI LA UNELE CULTIVARE DE TOMATE

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Abstract. Among the vegetable species, tomatoes rank first because of their food importance, from a scientific point of view, being one of the most studied species, from breeding to the most standardized cultivation techniques. The aim of the work was to evaluate some morphological parameters (plant height, number of fruits per plant, fruit mass) in four tomato cultivars irrigated with two different irrigation norms. Tomato plant height ranged from 160 cm for the hybrid Minaret F₁ irrigated with 300 m³/ha to 235 cm for the cultivar HTP F₁ irrigated with 300 m³/ha. The number of fruits per plant ranged from 19 in the case of the cultivar Inima de bou, irrigated with 300 m³/ha, to 27 in the case of the hybrid Siriana, irrigated with 400 m³/ha. Fruit mass varied between 149-173 g.

Key words: *Lycopersicum esculentum*, irrigation rate, plant height

Rezumat. Dintre speciile legumicole, tomatele ocupă primul loc datorită importanței lor alimentare, din punct de vedere științific, fiind una din cele mai studiate specii, începând de la ameliorare, până la cele mai standardizate tehnici de cultură. Scopului lucrării a fost de a evalua unii parametrii morfologici la patru cultivare de tomate (înălțimea plantei, numărul de fructe pe planta, masa fructelor) irigate cu doua norme diferite de udare. Înălțimea plantelor de tomate a variat de la 160 cm, în cazul hibridului Minaret F₁ irigat cu norma de 300 m³/ha, până la 235 cm, în cazul cultivarului HTP F₁, irigat cu norma de 300 m³/ha. Numărul de fructe pe plantă a variat de la 19, în cazul soiului Inimă de bou, irigat cu norma de udare de 300 m³/ha, până la 27, în cazul hibridului Siriana, irigat cu 400 m³/ha. Masa fructelor a variat între 149-173 g.

Cuvinte cheie: *Lycopersicum esculentum*, normă de udare, înălțimea plantelor

INTRODUCTION

Originating from South America and brought to Europe in the 15th century, tomato have long been considered poisonous and were cultivated for decorative ornamental purposes. Today, they are cultivated almost worldwide as an essential

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vegetable in gastronomy (Munteanu, 2003). Tomato fruits are consumed at physiological maturity, fresh, in simple or assorted salads, in culinary preparations, but also preserved (juice or paste) or at technological maturity for preservation (Vinatoru *et al.*, 2015).

The energy value is low, one kg of fresh tomatoes = 190 kcal (Musat *et al.*, 2019; Popescu *et al.*, 2000), but their fruits have an essential role in human nutrition due to the particularly favorable influence on the human body (Stoleru *et al.*, 2019). The dry matter content is 4 - 9 %, with significant values of sugars ranging from 2.5-4.5 %, crude protein, hemicellulose, cellulose, lipids, and vitamins. Organoleptic properties are different by the cultivar (Stan and Munteanu, 2003).

Tomatoes also have remarkable therapeutic value due to their content of potassium, vitamins C and E, lycopene, beta-carotene and dietary fiber, and are recommended in the prevention and treatment of some vascular diseases, stimulation of gastric secretion (Stoleru *et al.*, 2019; Munteanu, 2003).

Tomato lend themselves well to field and protected, intensive, industrial, sustainable and home-grown systems for early or late harvest. They use sunny, fertile and irrigated land (Vinatoru *et al.*, 2015). In this way, the study aimed to evaluate productivity parameters under two irrigation norms in four cultivars.

MATERIALS AND METHOD

The experiment was located in a 400 m² solar in the didactic vegetable field of the farm "V. Adamachi" Iasi.

The establishment of the tomato crop in the plot took place in the third decade of April 2022, with harvests taking place weekly between 30.06 - 30.10.

Factors that were studied in the conduct of the experiment: Factor A - The cultivar had four graduations (Siriana F1, Minaret F1, HTP F1 and Inima de bou) and factor B - The irrigation norm of the crop had two graduations (irrigation with 300 m³/ha and irrigation with 400 m³/ha). The height of the tomato plants was measured immediately after the last harvest (30.10.2022). The number of fruits per plant and the fruit mass were evaluated at each harvest, and averages are presented in the results.

The results we obtained were processed by statistical-mathematical methods, using analysis of variance (ANOVA) for 95% confidence and Tukey test to determine the significance of differences with SPSS version 21 software.

RESULTS AND DISCUSSIONS

Table 1 presents the results on the influence of cultivar on some morphological characteristics, in this case plant height, fruit number and fruit mass. The data from the table show statistically significant differences in the influence of cultivar on plant height. Cultivar HTP F1 has the highest mean plant height (228.05 cm), followed by cultivar Siriana F1 (217.87 cm), Inima de Bou (194.20 cm) and Minaret F1 (160.35 cm). Statistically significant differences in the influence of cultivars on height indicate that biological material is important for crop success. Lower values of the cultivar Minaret are genetically determined.

Table 1

Results of the cultivar influence on tomato morphological characteristics

Crt. No.	Cultivar	Plant height (cm)	Number of fruit	Fruit mass (g)
1.	Siriana F1	217.87±14.54c	24.99±1.68d	152.00±0.01ns
2.	Minaret F1	160.35±11.96a	22.81±1.21a	161.00±0.01ns
3.	HTP F1	228.05±15.22d	24.08±1.57c	168.50±0.01ns
4.	Inima de Bou	194.20±13.16b	23.44±1.36b	163.50±0.01ns

*Values represent mean ± standard error. Lowercase letters represent Tukey test results for $p \leq 0.05$ (a - represents the lowest value and ns - not significant)

Table 2 shows the results on the influence of irrigation norms on some morphological characteristics. Average plant height is higher for the 300 m³/ha irrigation norm compared to the 400 m³/ha norm. The average number of fruits per plant is higher under the 400 m³/ha irrigation norm. At the same time, the average fruit mass was also higher under the 400 m³/ha norm. From a statistical point of view, the irrigation norm has a significant influence on plant height and fruit number, and an insignificant influence on fruit mass.

Table 2

Results of the influence of irrigation norm on tomato morphological characteristics

Crt. No.	Interaction	Plant height (cm)	Number of fruit	Fruit mass (g)
1.	WQ ₁	211.25±14.02b	21.70±1.44a	158.5±0.01ns
2.	WQ ₂	207.94±13.47a	24.46±1.71b	164.0±0.01ns

*Values represent mean ± standard error. Lowercase letters represent Tukey test results for $p \leq 0.05$ (a - represents the lowest value and ns - not significant; WQ₁ – irrigation with 300 m³/ha; WQ₂ – irrigation with 400 m³/ha).

The results presented in table 3 provide information about the combined influence of the studied factors on some morphological characteristics of the plants.

Comparing these results, we can see significant differences from a statistical point of view in terms of the average height of the plants and the number of fruits per plant depending on the cultivar and the irrigation rate used. The results are statistically insignificant according to the Tukey test regarding the influence of the cultivar and the irrigation rate on the tomato fruit mass. The hybrid Siriana F1 irrigated with the rate of 400 m³/ha has a higher average number of fruit than the other combinations (27 fruits/plant).

Table 3

Results regarding the influence of factors on tomato morphological characteristics

No. Crt.	Interaction	Plant height (cm)	Number of fruit (pieces)	Fruit mass (g)
1.	S x WQ ₁	215.83±15.38bcd	22.56±1.6abc	149.00±0.01ns
2.	S x WQ ₂	219.90±15.67bcd	27.41±1.93c	155.00±0.01ns
3.	M x WQ ₁	159.84±11.41a	21.14±1.51abc	160.00±0.01ns
4.	M x WQ ₂	160.86±11.48abcd	24.47±1.73bc	162.00±0.01ns
5.	H x WQ ₁	235.17±16.76d	23.97±1.7bc	171.00±0.01ns
6.	H x WQ ₂	220.92±15.74bcd	24.19±1.71bc	166.00±0.01ns
7.	IB x WQ ₁	234.15±16.68cd	19.14±1.37a	154.00±0.01ns
8.	IB x WQ ₂	230.08±16.39bcd	21.78±1.55abc	173.00±0.01ns

*Values represent mean ± standard error. Lowercase letters represent Tukey test results for $p \leq 0.05$ (a - represents the lowest value and ns - not significant; S - Siriana F1; M - Minaret F1; H - HTP F1; IB - Inima de bou; WQ1 - irrigation with 300 m³/ha; WQ2 - irrigation with 400 m³/ha).

CONCLUSIONS

At the end of the vegetation period, the HTP cultivar obtained the highest plant height (228 cm) and the highest weight of the fruits (168.5 g).

The irrigation rate significantly influenced the height and number of fruits per plant.

The number of fruits on the plant varied from 19, in the case of the Inima de bou variety irrigated with 300 m³/ha, to 27, in the case of the Siriana F1 hybrid, irrigated with 400 m³/ha.

Fruit mass was not significantly influenced by irrigation regime regardless of cultivars.

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