RESEARCH ON THE INFLUENCE OF IRRIGATION ON THE BIOCHEMICAL COMPOSITION OF FRUITS SWEET PEPPER IN THE CONDITIONS OF SANDY SOILS IN SOUTHERN OLTENIA

Mihaela Croitoru[1], Pintilie I[1].
(1) Research and Development Center for Plant Growing on Sands Dabuleni
Pfone: +40251334402, Fax: +40251334347, E-mail ccdcpndabuleni@yahoo.com; mhlcroitoru@yahoo.com

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ABSTRACT

The role of water in plant life is particularly important if it is taken into account that all biological processes can only take place in the presence of water. Using water, translocation of nutrient ions from the soil into the plant and the assimilated substances from the leaf to the fruit and the other organs of the plant takes place. Sweet pepper is a great water consumer, has higher requirements than tomatoes. This high water consumption can also be justified by the temperature requirements during vegetation, therefore it also has a greater sweat.

In order to determine the biochemical composition of the sweet pepper fruits, autochthonous varieties was studied in the conditions of thermal stress and water stress from CCDCPN Dăbuleni. The irrigation regime influences the total production of the sweet pepper varieties studied, as well as their biochemical composition.

The best results on the biochemical composition were obtained in the Amaradia variety (11.23% total dry matter, 7.8% soluble dry matter, 6.50% carbohydrates and 115.28 mg C vitamin) in the irrigated version with the minimum ceiling .

Analyzing the influence of the irrigation ceiling on the biochemical composition of the fruit, it was found that the best results were obtained at irrigation at the minimum ceiling. The greatest difference can be seen in the C vitamin content, which drops a lot in the irrigation option at the technological ceiling (from 103.85mg to 30.87mg).

The production results have highlighted the role of irrigation in obtaining productions sweet pepper economically efficient. In normal irrigation, all cultivars recorded large yields over 40.0 t / ha, the Andrada variety recording 55.09 t / ha, with a difference from the statistically insured witness

Between the amount of total dry substance in sweet pepper and production, correlations have been established depending on the irrigation variant. In the irrigated version at the minimum level, the dry matter content of the fruit increases with the increase of the production, and in the irrigated variant at the technological ceiling, the total dry substance content decreases with the increase of the production.

INTRODUCTION

Of the vegetable species cultivated in our country, sweet pepper has an important place with many uses. Because of the many varieties, sweet pepper is particularly important for improving sweet pepper is also due to the fact that it ensures high incomes for growers by capitalizing on the internal and external markets.

Sweet pepper is a great water consumer, has higher requirements than tomatoes. This high water consumption can also be justified by the temperature requirements during vegetation, therefore it also has a greater sweat. Lack of soil water determines to reduced production and quality degradation.

On the sandy soils of southern Oltenia, the researches made by Marinică Ghe., 1989, show that the best yields (33.5-35.3t / ha) were obtained at high ceilings (70% of the

active humidity range on 50cm), which can be maintained with a number of 7-11 watering, with an irrigation rate of 1400-3300 m^3/ha.

Pintilie I., et al., 2016 (unpublished) showed on sandy soils that at an irrigation rate of 5400 m^3/ha, distributed between May 23 - September 27 (27 waterings), a series of autochthonous varieties have registered high productions, over 40.0 t / ha, and variety Andrada recorded a production of 55.09 t/ha, with a difference from the statistically insured witness.

Irrigation influences both the production and the biochemical composition of the sweet pepper. Numerous research has shown the role of water in obtaining of high quality production.

Yildirim M., et al., 2012, have highlighted that the most important factor affecting the growth and yield of sweet pepper crops is the amount of irrigation water applied throughout the development of the crop.

Richard Alberto Rodríguez Padrón et al. 2015, following a study carried out in Brazil, have shown that the irrigation of the cultivation of sweet pepper protected with shading has led to increased fruit weight, lower soluble dry matter content, without sunburn of the fruits and higher production compared to an irrigated crop without shading protection.

K. Seung Lee, Adel A. Kader, 2000, have shown that the nutritional point of view fertilized horticultural products with a low nitrogen content and irrigated less contain a high content of C vitamin.

MATERIAL AND METHOD

In order to determine the biochemical composition of sweet pepper fruits were studied native sweet pepper cultivation in the conditions of thermal stress and water stress from CCDCPN Dăbuleni.

The factors under consideration:

Factor A - the irrigation system;

a_1 - irrigation with low watering standards at critical moments;

a_2- irrigation according to the specific technology for sweet pepper culture on sandy soil.

Factor B – The variety;

b_1 - Ișalnița 85 V

b_2 - Andradra

b_3 - Ișalnița Rovine

b_4 – Amaradia

The sweet pepper fruits were harvested at the stage of technical maturity and in the laboratory were conducted following determinations:

- water and total dry matter(%) - gravimetric method;
- soluble dry matter(%) - refractometric method;
- carbohydrates (%) - Fehling Soxhlet method;
- titratable acidity (g malic acid at 100g f.s.); - titrimetric method;
- C vitamin (mg/100g f.s.) - iodometric method;
- production of fruits (t/ha).

The role of water in plant life is particularly important if it is taken into account that all biological processes can only take place in the presence of water. Using water, translocation of nutrient ions from the soil into the plant and the assimilated substances from the leaf to the fruit and the other organs of the plant takes place.

Experience has been placed on the soil low in content of total nitrogen, middle and low extractable phosphorus supplied in the medium supplied to the exchangeable potassium. The obtained results reveal a non-uniformity of the soil, specific to the sandy soils. The state of the soil organic matter supply was reduced and the pH of the soil was

placed on experience, varied between 6.69 and 6.74, values that show a moderately acidic to neutral reaction.

Providing an optimal moisture range during May to September, during the growth and development of plants as well as fruits, influence the amount of water and total dry matter from the fruits, content of carbohydrates, vitamins, accumulation of minerals, etc.

Accumulation of total dry matter has been influenced by variety, irrigation system and climatic conditions in the crop area. The high temperature due to the atmospheric drought, characteristic in the summer months for sandy soils, leads to an increase in total dry matter and a decrease in the amount of water. The highest total dry matter content was determined in the Amaradia variety of 11.23% in the irrigated variant at the minimum ceiling. In all varieties studied, the total dry fruit content of the fruit was higher in the irrigated variants at the minimum ceiling compared to the recommended ceiling of the technology. Also, the soluble dry matter content and the carbohydrates content showed higher values in all varieties in the irrigated version at the minimum ceiling. At Amaradia variety the best results were determined (7.80% soluble dry substance and 6.50% carbohydrates) (Table 1).

Fruit acidity expressed in grams of malic acid per 100g of fresh substance decreases in percentage of all varieties in the irrigated version at the technological ceiling compared to the minimum ceiling.

All pepper varieties contain C vitamin in huge amounts, but green capsicum has twice as much vitamin C as citrus, and red red pepper contains 330% more C vitamin than orange. In 100 grams of pepper are 125 mg of C vitamin, that is, 100% of the recommended daily dose.

Specialty literature highlights an average content of 130 mg / 100 g of fresh substance (Gherghi A. et al., 1983).

C vitamin levels in peppers are very variable and can be affected by maturity, genotype and processing (Hallmann E., Rembiałkowska E., 2007).

C vitamin content is influenced by both temperature, light intensity and technological factors. C vitamin is degraded slightly (by oxidation) at high temperatures. Although sweet pepper is a loving plant of heat and light, at cold temperatures, the sun becomes an enemy for these plants.

The highest amounts of C vitamin were determined in all varieties studied in the irrigated variant at the minimal ceiling, and the best results were obtained at Işalniţa Rovine (130,20mg / 100g f.s.) and Amaradia (115,28mg / 100g f.s.) (Table 1). By irrigating the technological ceiling, the amount of C vitamin decreases a lot, and the two varieties decrease almost five times.

Table 1

The chemical composition of the fruits at different native sweet pepper varieties, depending on the irrigation system

Irrigation system	Variety	Total dray matter (%)	Water (%)	Soluble dry substance (%)	Titratable acidity (g malic acid at 100g f.s.)	Carbohidrates (%)	C vitamin (mg/100 g f.s.)
Irrigated at the minimum ceiling	Ișalnița 85V	6.58	93.42	5.0	0.26	4.15	79.80
	Andrada	7.28	92.72	4.6	0.28	3.82	99.12
	Ișalnița Rovine	7.40	92.60	5.0	0.22	4.18	130.20
	Amaradia	11.23	88.77	7.8	0.28	6.50	115.28

Irrigated at the technologic al ceiling	Ișalnița 85V	6.99	93.01	4.8	0.26	3.90	37.80
	Andrada	5.84	94.16	3.5	0.20	2.95	33.60
	Ișalnița Rovine	5.96	94.04	4.6	0.19	3.81	26.88
	Amaradia	6.51	93.49	4.6	0.18	3.80	25.20

The irrigation regime influenced the total production of the sweet pepper variety studied. The obtained yields were doubled in the case of the normal irrigation variant compared to the low-irrigation variant. In the low-irrigation variant, only Amaradia variety recorded the highest production of 24.29 t / ha, showing resistance to water stress. The Işalniţa 85V, Andrada and Amaradia varieties, with low irrigation conditions, have achieved a total production of over 20.0t / ha, and have an adaptation to water stress conditions. In a normal irrigation, all varieties recorded large yields over 40.0 t / ha, the Andrada variety recording 55.09 t / ha, with a difference from the statistically inspected witness (Table 2).

Table 2

Total production of sweet pepper depending on irrigation and variety

Irrigation system	Variety	Total average production		Difference ± t/ha	The significance
		t/ha	%		
Irrigated at the minimum ceiling	Ișalnița 85V	21.60	100	-	
	Andrada	20.86	96.6	-0.074	
	Ișalnița Rovine	18.03	83.5	-3.57	
	Amaradia	24.29	112.5	+2.69	
Irrigated at the technological ceiling	Ișalnița 85V	43.78	100	-	
	Andrada	55.09	125.8	+11.31	**
	Ișalnița Rovine	43.85	100.2	+0.07	
	Amaradia	41.79	95.5	-1.99	

DL 5%= 4.29t/ha DL1%=6.02t/ha DL 0.1%=8.51t/ha

Between the amount of total dry substance in fruits of sweet pepper and production, correlations have been established, depending on the irrigation variant. In the irrigated variant at the minimum ceiling, the dry matter content of the fruit increases with the increase of the production, and in the irrigated variant at the technological ceiling, the total dry substance content decreases with the increase of the production (Figure 1).

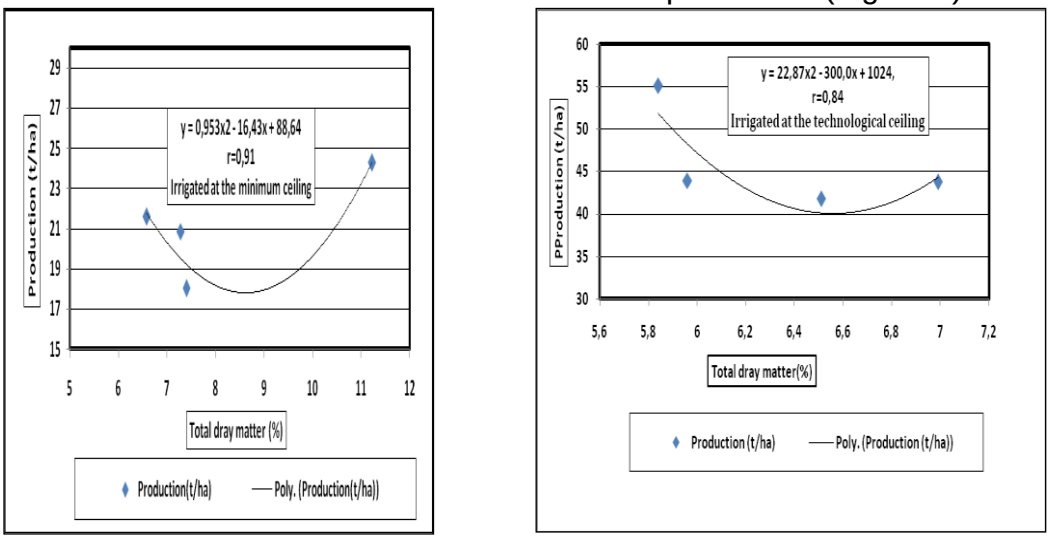

Figure 1 - The correlation between the total dry matter quantity and the sweet pepper production on the two irrigation variants

Analyzing the influence of the irrigation ceiling on the biochemical composition of the fruits, the best results were obtained at irrigation at the minimum ceiling (Table 3). The greatest difference can be seen in the vitamin C content, which drops a lot in the irrigation variant at the technological ceiling (from 103.85mg to 30.87mg). These results confirm the findings of other research, which showed that reduced irrigation of the sweet pepper culture leads to a higher content of C vitamin in the fruits (Seung K. Lee, Adel A. Kader, 2000).

Table 3

The influence of irrigation on the ceiling of the biochemical composition of fruits of sweet pepper

Irrigation system	Total dray matter (%)	Water (%)	Soluble dry substance (%)	Titratable acidity (g malic acid at 100g f.s.)	Carbohidrates (%)	C vitamin (mg/100g f.s.)
Irrigated at the minimum ceiling	8.12	91.88	5.60	0.26	4.66	103.85
Irrigated at the technological ceiling	6.33	93.67	4.38	0.21	3.62	30.87

There are no great differences between studied varieties. Have been highlighted Amaradia variety with a total dry matter content of 8.87% and Isalniţa 85V of 6.79% (Table 6). These varieties also showed a higher content of soluble dry matter and carbohydrates. C vitamin oscillated between 58.80mg at Isalnita 85V variety and 78.54mg at Işalnita Rovine.

Table 4

Influence of the variety on the biochemical composition of the sweet pepper

Varieties	Total dray matter (%)	Water (%)	Soluble dry substance (%)	Titratable acidity (g malic acid at 100g f.s.)	Carbohidrates (%)	C vitamin (mg/100g f.s.)
Ișalnița 85V	6.79	93.21	4.90	0.26	4.03	58.80
Andrada	6.56	93.44	4.05	0.24	3.39	66.36
Ișalnița Rovine	6.68	93.32	4.80	0.21	4.00	78.54
Amaradia	8.87	91.13	6.20	0.23	5.15	70.24

CONCLUSIONS

- The irrigation regime influences the total production of the sweet pepper varieties studied, as well as their biochemical composition.
- The best results on the biochemical composition were obtained in the Amaradia variety (11.23% total dry substance, 7.8% soluble dry substance, 6.50% carbohydrate and 115.28 mg C vitamin) in the irrigated variant with the ceiling minimum.
- The production results highlighted the role of irrigation in obtaining economically efficient yields of sweet pepper. In normal irrigation, all varieties recorded large yields over 40.0 t / ha, the Andrada variety recording 55.09 t / ha, with a difference from the statistically insured witness.

- Between the total dry matter content of the sweet pepper and the production, correlations have been established depending on the irrigation variant. In the irrigated variant at the minimum ceiling, the dry matter content of the fruit increases with the increase of the production, and in the irrigated variant at the technological ceiling, the dry dry matter content decreases with the increase of the production.

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