

STUDY ON THE INFLUENCE OF ENVIRONMENTAL CONDITIONS FROM GREENHOUSE ON THE ACCUMULATION OF VEGETATIVE MASS AND FRUCTIFICATION IN SOME VARIETIES OF CHERRY TOMATOES

Ovidiu Ionuț JERCA, Elena Maria DRĂGHICI, Sorin Mihai CÎMPEANU, Răzvan Ionuț TEODORESCU, Jeni ȚIU, Sorina PETRA, Liliana BĂDULESCU

University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Marasti Blvd, District 1, Bucharest, Romania

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INTRODUCTION

The preliminary study was carried out in Hortinvest greenhouses on two varieties of cherry tomatoes, Flaviola and Cheramy F. The environmental factors in the greenhouse, temperature, atmospheric humidity, CO₂ concentration inside the greenhouse during January-March were registered. Also, the obtained productions and the vegetative mass of the leaves were registered. We found that for the Flaviola variety, the temperature had a greater influence on the production compared to the Cheramy variety. We noticed that each variety reacted differently both in terms of temperature and CO₂ values. The accumulated vegetative mass was higher in Cheramy F1 compared to Flaviola, this being a genetic characteristic of the variety. The percentage of fruits obtained per plant was 54.75% and only 45.25% of the vegetative mass in Cheramy F1. For the Flaviola variety, the percentage of fruit was 60.64% and 39.36% vegetative mass. The aim of the study was to analyze the behavior of some varieties on total production.

MATERIALS AND METHODS

The study was carried out within the Hortinvest research greenhouses, which belong to the Research Center for quality control of horticultural products, Faculty of Horticulture, UASMV Bucharest. The greenhouses are modern constructions with high of 6.2 m, and which are equipped with all the facilities for monitoring and maintaining the climatic factors in the greenhouse. We used as biological material 2 cultivars of Chery Cheramy F1 (V1) type tomatoes and a Romanian variety, Flaviola (V2), created at the Buzău Vegetable Research Station. The culture was established in a soilless system, on mattresses filled with perlite with a grain size of 4 mm from SC Perlit SA, Ilfov County. The duration of the experiment was 90 days.

The parameters of vegetative growth in height, number of leaves and fruiting were followed. We determined the number of inflorescences as well as the number of fruits in the inflorescence. Fruit production per plant was weighed. We recorded throughout the experiment the values of temperature, relative humidity through sensors located at a height of 1.5 m inside the greenhouse.

Cheramy F1, is an early-maturing hybrid with undetermined growth. The fruits are of the cherry type, around 15 g/fruit. Flaviola variety, presented an indeterminate vegetative growing, with fruit cherry type, recommended to crops in protected area. The temperatures from greenhouse were recorded daily during 24 hours, day and night, for 90 days also light radiation, atmospheric humidity and CO₂ concentration. During the vegetation was recorded the total amount of vegetative mass (leaves and stem) as well as the amount of fruits harvested during the entire period under observation (1 January-30 March 2021).

The area cultivated with tomatoes in the greenhouse was 160 m². A number of 154 plants of Cheramy F1 and 101 plants of the Flaviola variety were analyzed.

The data were recorded and correlated to see the influence of environmental factors in the greenhouse on the production and accumulation of vegetative mass.

RESULTS AND DISCUSSIONS

If we analyze if there was any relationship between CO₂ values and production and calculating the correlation coefficient we found moderate negative relationships R²=0.395 (Figure 16).

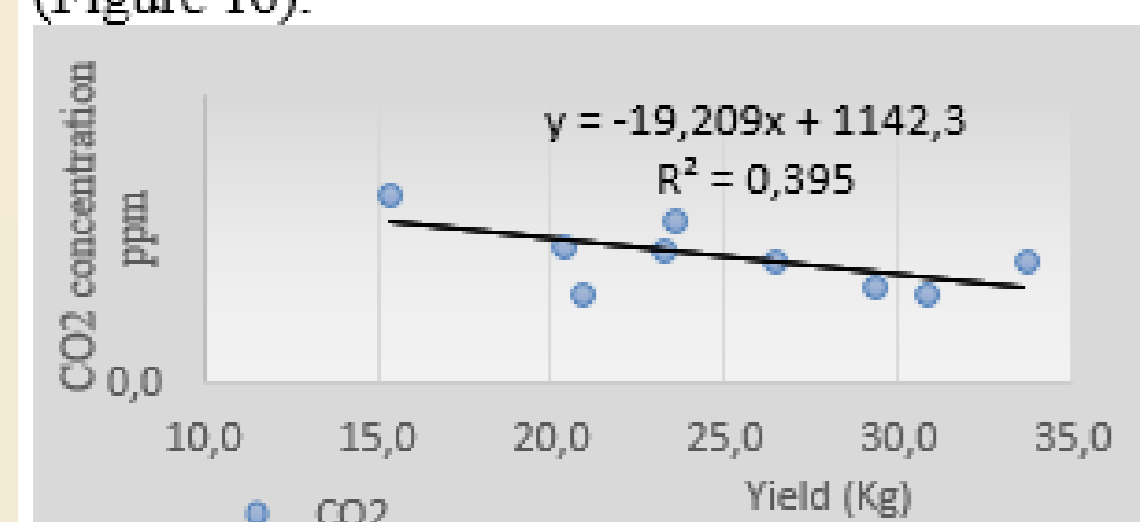


Figure 16. Relationship between the CO₂ content of the greenhouse and the production obtained for the Cheramy variety

Table 4. Pearson test on the relationships between the total production obtained in the greenhouse of the Cheramy variety, the concentration of CO₂ and the sum of the temperatures accumulated in the greenhouse.

Cheramy	Production (kg)	CO ₂ concentration (ppm)	Accumulated temperature sum (°C)
Production (kg)	1		
CO ₂ concentration (ppm)	-0,629	1	
Accumulated temperature sum (°C)	-0,540	0,033	1

The number of plants under observation was 154 plants in the Cheramy hybrid and 101 plants in the Flaviola cultivar.

The total fruit production obtained from the plants harvested from the greenhouse was 223.6 kg for Cheramy F1 and 155.6 kg for the Flaviola variety (Figure 25).

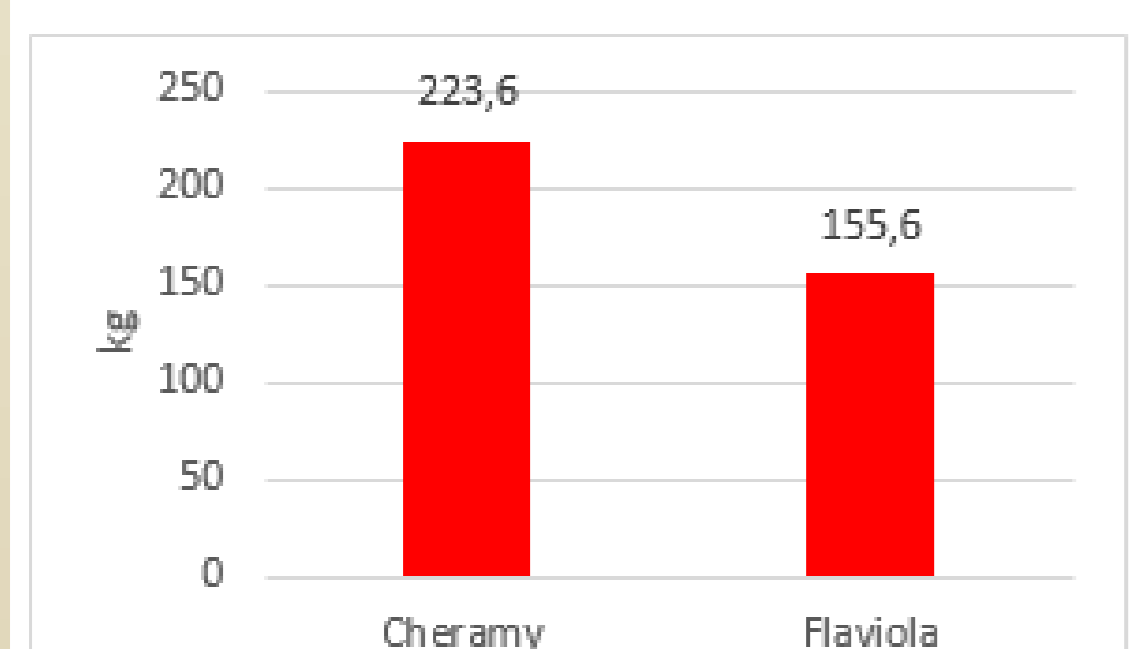


Figure 25. Total production of tomatoes obtained in the greenhouse

If we follow the relation regarding the production obtained between the analyzed varieties, we found positive relations between them R² = 0.4031 but the Pearson test clearly shows that the variety reacts differently to the temperature conditions, the influence being significant (Pearson test r = 6635), figure 26. The influence of cumulative temperatures had a significant influence (figure 27).



If we look how much the CO₂ value in the greenhouse influenced, we find that the Flaviola variety reacted less to the increase in CO₂ content, the Person relationship indicates a moderately low relationship (r = - 4117) Figure 18.

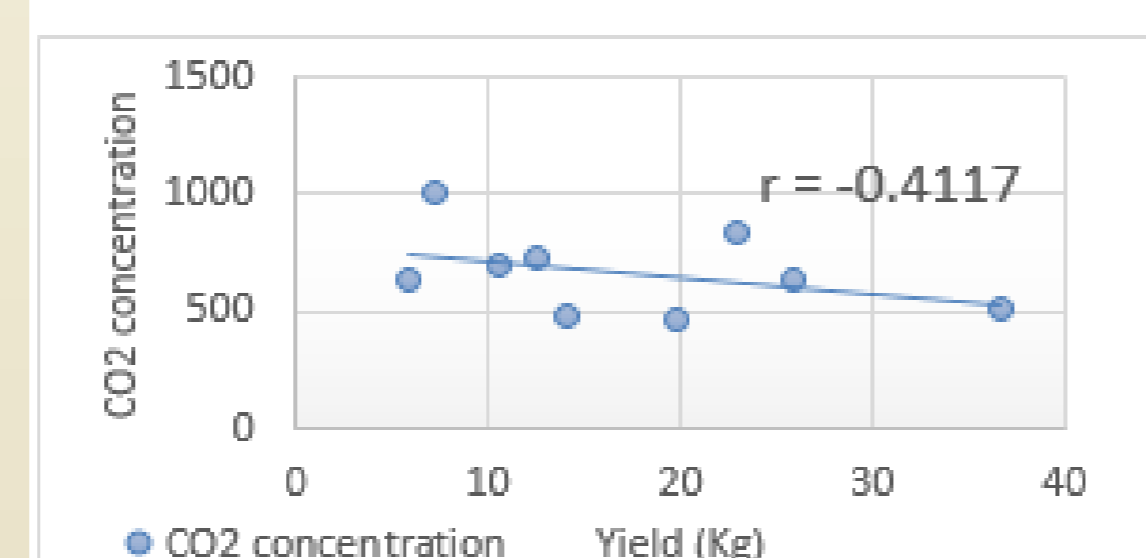


Figure 18. Influence of CO₂ on Flaviola production

All vegetative mass was recorded. We found that, at the first and second harvest, the highest amount of vegetative mass was recorded for the Flaviola variety of 11.7 kg at the first harvest and 10.6 kg at the second harvest. In this variety the vegetative mass harvested in the following stages was lower compared to the Cheramy hybrid (Figure 33).

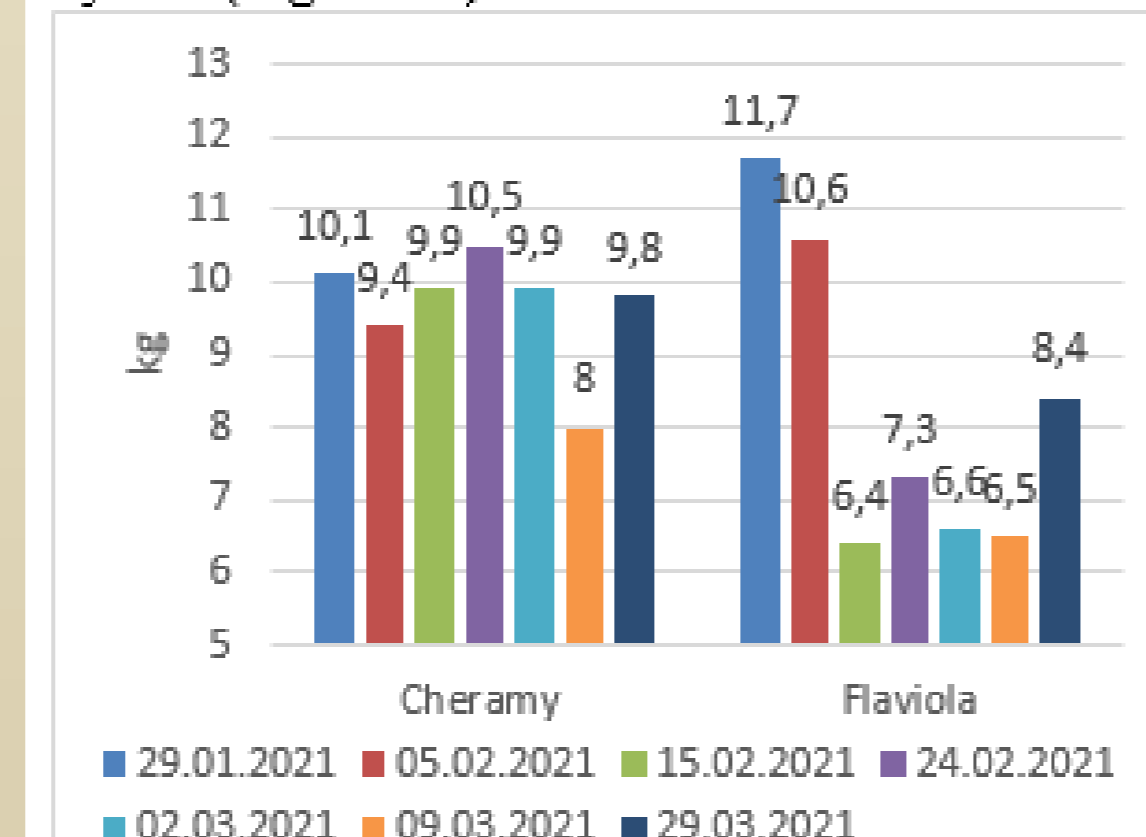


Figure 33. The total amount of leaves harvested in the greenhouse

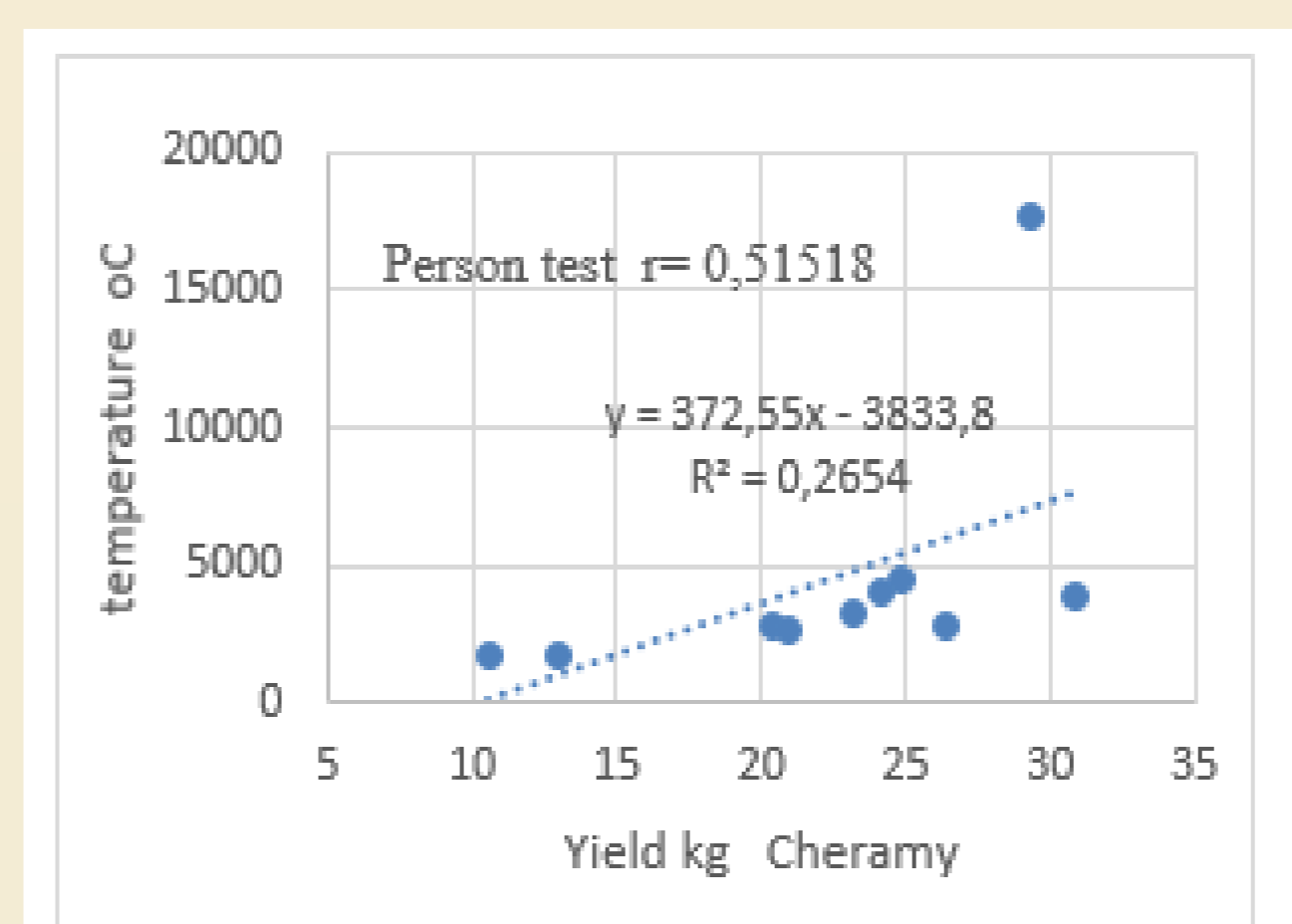


Figure 20. The influence of the accumulated temperature between harvests on the total production obtained for the Cheramy variety

The correlation made between the yields obtained and the cumulative sum of the temperatures recorded during the harvest periods indicated a weak positive influence (R² = 0.0049) between them. To see how much the temperature influenced the production level, the cumulative sum of the recorded temperatures and by the calculation performed using the Person test we found an insignificant positive relation (r = 0.0698), Figure 21.

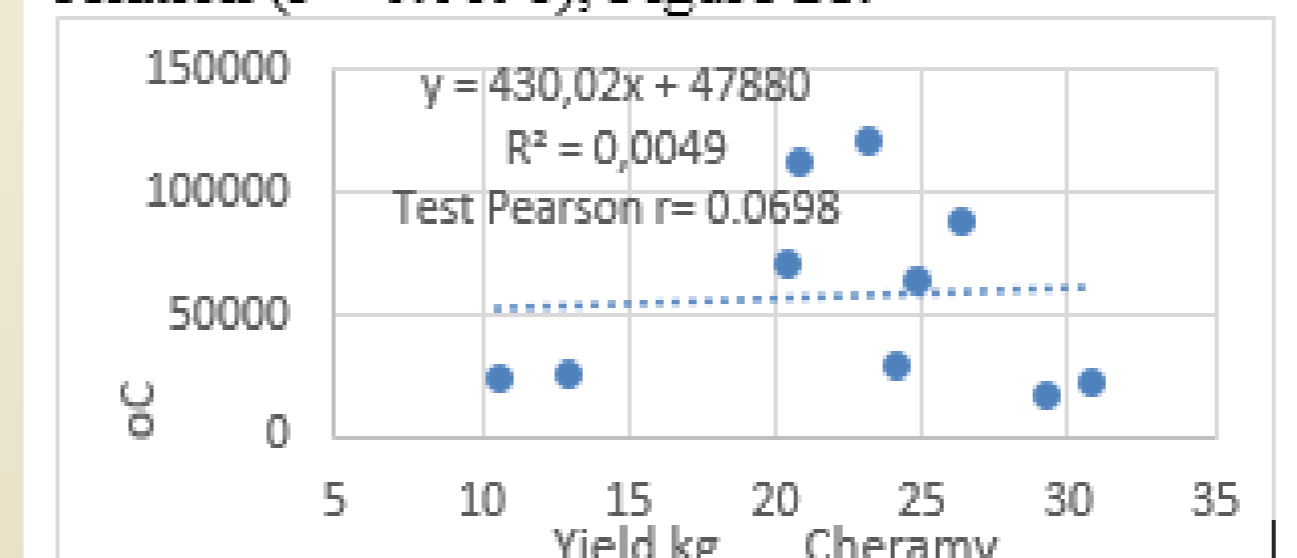


Figure 21. Influence of the sum of the cumulative temperatures between harvests on the production of the Cheramy hybrid

In the case of the Cheramy hybrid, a total of 67.6 kg was harvested per plant, with an average per plant of 0.439 kg, and for the Flaviola variety, 57.5 kg, with an average per plant of 0.569 kg (Figure 34).

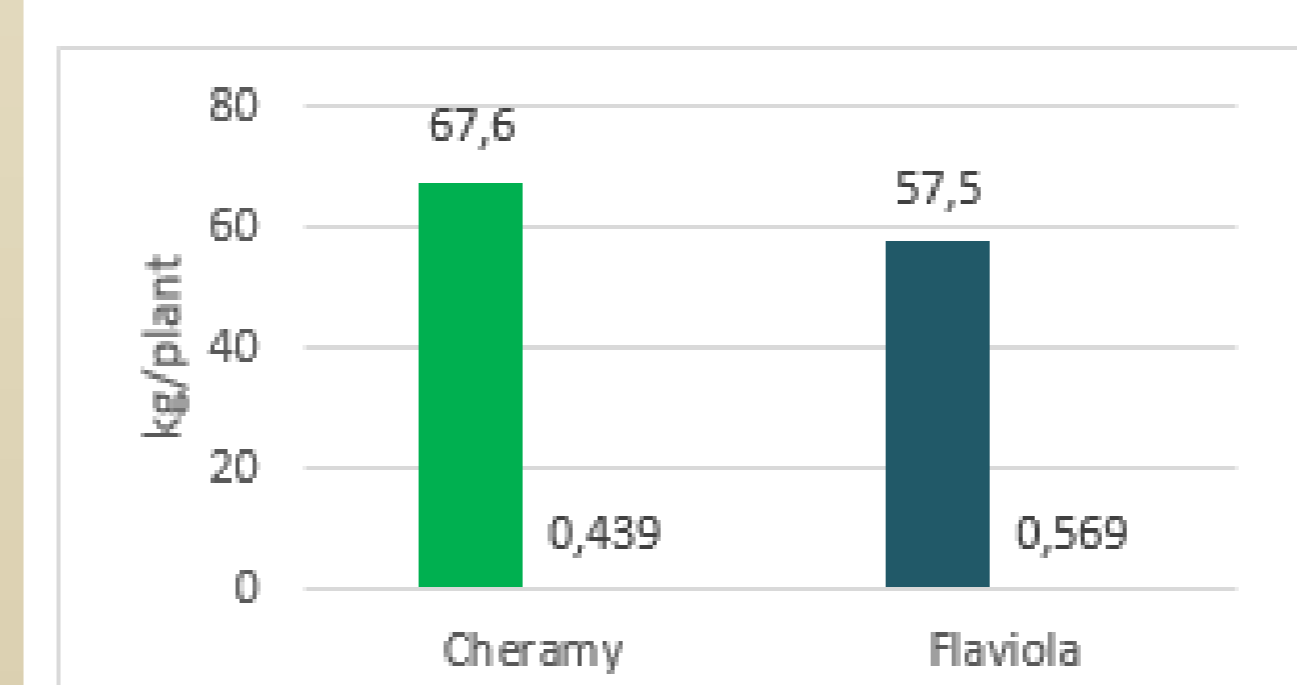


Figure 34. Total amount of leaves harvested at the analyzed cultivars and the average per plant



Figure 22. Aspect of culture

In Cheramy F1, the percentage of harvested fruit represented 54.75% of the total accumulated vegetative mass, and the mass of leaves and stems 45.25% (figure 36).

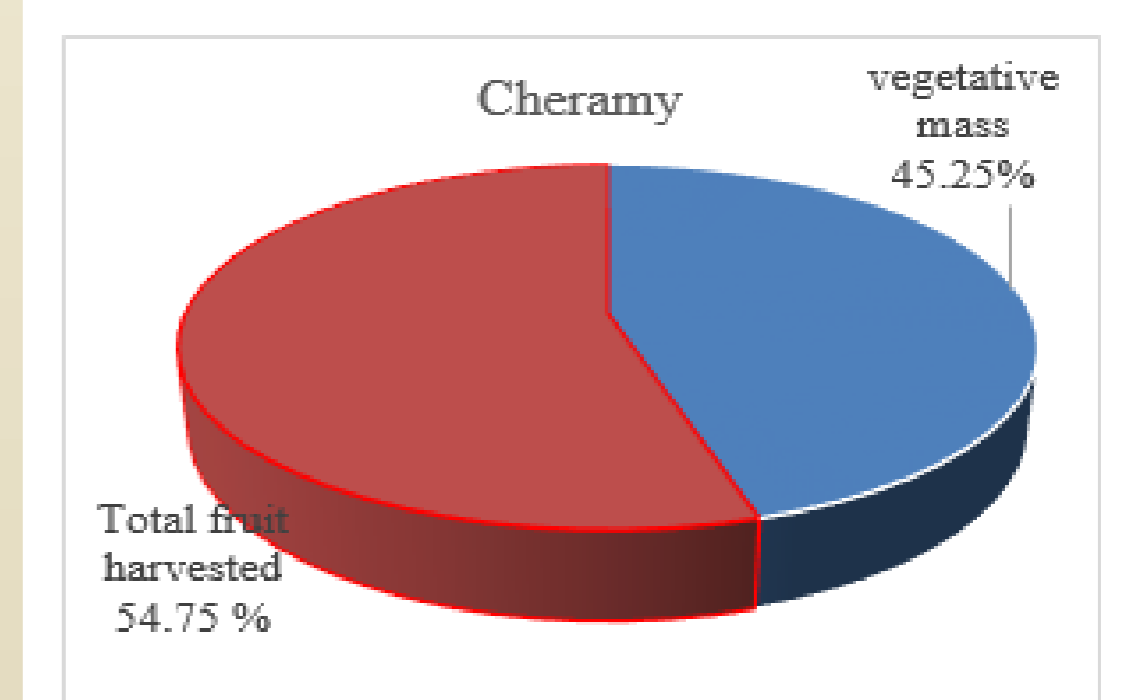


Figure 36 Percentage of vegetative mass and fruit yield in the Cheramy hybrid

In the Flaviola variety, in the analyzed period, the percentage of fruits harvested on average per plant was 60.64%, and that of leaves and stems 39.36% (Figure 37).

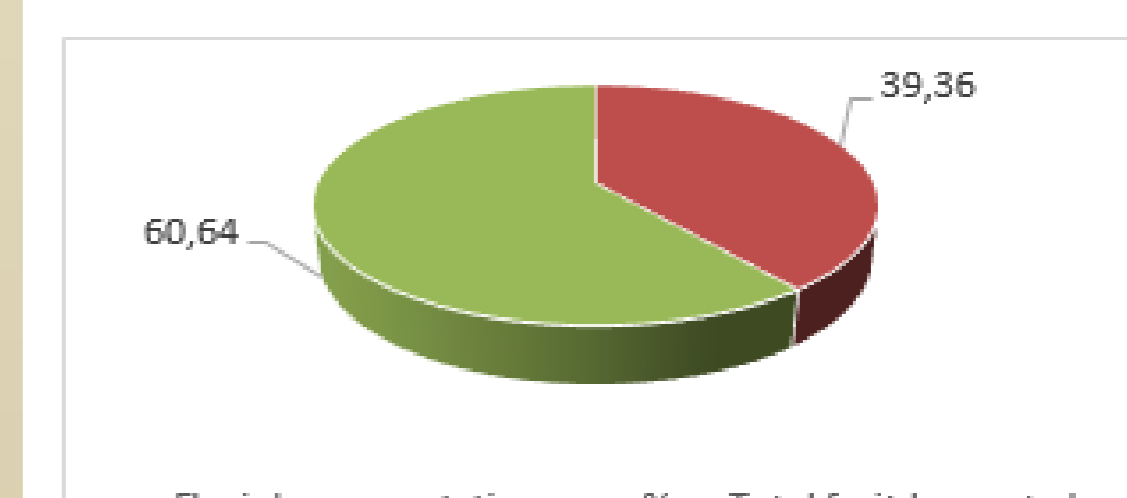


Figure 37. Percentage of vegetative mass and fruit yield in the Flaviola hybrid

CONCLUSIONS

Analyzing the temperatures recorded in the greenhouse during the period of vegetation and fruiting of tomatoes, we could see that its values were higher in February and March, which led to the acceleration of fruit ripening. In the Flaviola variety, the temperature had a greater influence on the production compared to the Cheramy variety. We noticed that each variety reacted differently both in terms of temperature and CO₂ values. The accumulated vegetative mass was higher in Cheramy F1 compared to Flaviola, this being a genetic characteristic of the cultivar. The percentage of fruits obtained per plant was 54.75% and only 45.25% vegetative mass in Cheramy F1. For the Flaviola variety, the percentage of fruits was 60.64% and 39.36% vegetative mass.

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