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Influence of irrigation and fertigation on pomological characteristics of white strawberry fruits

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Abstract

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This paper aims to present the effects of the applied regimes of fertilization and irrigation on the pomological characteristics of white strawberry fruits. A two-factor experiment was conducted during 2023 and 2024 in an unheated greenhouse in the Chelopechene experimental field, Sofia, Bulgaria with drip irrigated and fertigated strawberry cultivar (*Fragaria × ananassa* Snow White). The irrigation and the fertilization factors were applied in two rates: I1 – 75% (ETc) I2 – 50% (ETc), F1: optimal fertilization $N_{8.09}P_{12.76}K_{15.62}$; F2 – suboptimal fertilization – 75% (F1). Five treatments were tested: control: I0F0:100% (ETc) without fertigation; I1F1; I1F2; I2F1; I2F2. The reduction of the fruit diameter between the highest (I1F1) and the lowest (I2F2) values was 14%. The highest mean fruit weight was obtained from I1F1 treatment – 5.39 g in 2023 and 5.02 g in 2024. The reduction of the fruit weight between the highest (I1F1) and the lowest (I2F2) values was 44%.

Keywords: white strawberry; pomological characteristics; irrigation; fertigation; Bulgaria

Introduction

Strawberries (*Fragaria × ananassa*) are a globally cherished fruit, notable for their appealing flavor, vibrant red color, and significant nutritional benefits. Morphologically, strawberries are complex fruits characterized by their trifoliate leaves with serrated edges and white flowers with five petals. The fruit itself is classified as an aggregate accessory fruit, meaning it forms from multiple ovaries of a single flower and includes additional floral parts, particularly the receptacle, which becomes fleshy and red as the fruit ripens (Sharma, 2002; Skupień & Oszmiański, 2004). The fruit size and weight of strawberries can vary widely based on cultivar and environmental conditions. Strawberries fruit length and width range from 10 to 50 mm (Cekic et al., 2018; Antonova & Petrova-Branicheva, 2023). Fruit weigh range between 1 to 25 g (Simkova et al., 2023). These variations are influenced by genetic factors, cultivation practices, and environmental conditions (Dung et al., 2023; Hummer et al., 2023; Menzel, 2021; Brym et al., 2022). Studies have shown that certain cultivars can produce larger fruits, while others are bred for smaller, more intensely flavored berries (Sharma, 2008; Sharma et al., 2009). For instance, certain cultivars evaluated in Himachal Pradesh demonstrated a significant range in yield and quality characters (Sharma & Thakur, 2008). Additionally, Skupień & Oszmiański (2004) found notable differences in fruit size and weight among six strawberry cultivars grown in northwest Poland.

Strawberries with white fruits have long history of cultivation no shorter then red varieties. White strawberry has cultivated for hundreds of years in Chile and has grown in two botanical forms – wild *Fragaria chiloensis* ssp. *chiloensis* f. *patagonica* and cultivated *Fragaria chiloensis* ssp. *chiloensis* f. *chiloensis* (Grez et al., 2020). It was brought to Europe in the 18th century. Snow White cultivar has been selected in 2010 out from *Fragaria x ananassa* Weisse Ananas and *Fragaria chiloensis* f. *Chiloensis* (Olbricht et al., 2013). White strawberries are distinguished by their white or pale pink flesh and unique pineapple-like flavor.

Research on white strawberries is still limited, with current studies focusing on their genetic diversity (Lu et al., 2021), cultivation requirements (Whitaker, 2023), potential health benefits (Lin et al., 2018), sugar content (Seki et al., 2023), chemical composition and biological activities (Fierascu et al., 2020; Klopotek et al., 2005). This indicates that there is substantial scope for further research in this area, particularly in irrigation and fertigation influence on pomological characteristics.

This research investigates the effects of drip irrigation and fertigation on strawberries' growth, yield attributes, and yield on a young plantation of white strawberries.

Materials and Methods

A two years two-factor experiment was conducted on drip irrigated strawberry plants in a tunnel greenhouse in 2023 and 2024 in the Chelopechene experimental field (latitude 42°44′22.8″N, longitude 23°28′3.7″E and altitude 550 m above sea level) of the Institute of Soil Science, Agrotechnologies and Plant Protection "Nikola Poushkarov" in Sofia, Bulgaria. Sofia field falls into temperate continental climate subzone. The greenhouse was unheated with area 420 m^2 (7.9 m × 53 m) covered with a five-layer UV + EVA+ IR + AD + dif – 150 µm polyethylene film. The soil could be defined as moderate to strong water-permeable with an average filtration capacity. The soil was *Chromic Luvisol* with bulk density 1.47 g cm^{-3}, field capacity 22% and wilting point 10% for 0–50 cm layer. Pre-planting physico-chemical characteristics of the soil (0-20 cm) at the experimental plot were pH 6.5, organic carbon 2.87% and available nitrogen (N) 19.30 mg kg^{-1}, phosphorus (P_2O_5) – 4.35 mg kg^{-1} and potassium (K_2O) – 2.79 mg kg^{-1}. To further reduce water losses, mulching with silver-black UV polyethylene mulch with a thickness of 30 µm was applied.

The object of the study was white strawberry cultivar (*Fragaria × ananassa* Snow White). The experimental treatments were arranged according to the method of long plots with three replications. Each plot has 23.2 m^2 area and consisted of twin rows of strawberries. Healthy bare-root frigo plants were planted in scheme of 90 + 30/30 cm on 22 March 2023. According to the white strawberries cultivation technology in each of the experimental plots were provided the appropriate amount of red fruit plants (4: 1 ratio) to ensure better pollination. The irrigation factor was applied in two rates: I1 – deficit irrigation – 75% (ETc); I2 – deficit irrigation – 50% (ETc). The fertilization factor was applied in two rates: F1: optimal fertilization $N_{8.09}P_{12.76}K_{15.62}$; F2 – suboptimal fertilization – 75% (F1) – $N_{6.07}P_{9.57}K_{11.94}$. Optimal fertilization was developed according to Haifa nutrition recommendations (Haifa Group, 2021) as follows: Haifa MAP – 25–45 kg ha^{-1}, Multi K – 80 kg ha^{-1}, Haifa MKP – 25 kg ha^{-1}, Haifa Cal – 30 kg ha^{-1}, Maguisal – 10 kg ha^{-1}, Poly-feed – 25–40 kg ha^{-1}. Five treatments were tested: control treatment I0F0: 100% (ETc) – full irrigation and without fertigation; I1F1; I1F2; I2F1; I2F2. Irrigation was applied trough drip system include NMC Junior controller for precise irrigation rate application, FertiKit Nutrigation system for precise fertigation rate application, pressure-compensated pipelines UniRam AS with 14.6 mm inside diameter, 1.2 mm wall thickness, built-in trough 20 cm drippers and flow rate 1.6 l h^{-1}.

The microclimate data (air temperature, relative humidity, solar radiation, sunshine duration and wind speed) in the greenhouse was measured at every 30 min using an automatic meteorological station located in the center of experimental area and recorded in data logger (HOBO USB Micro Data Logger, USA). FAO Penman-Monteith Equation (Allen et al., 2006a) was used for determining daily reference evapotranspiration and irrigation scheduling. Crop coefficient was 0.30, 0.80 and 0.70 respectively in initial, middle and end growing stage (Allen et al., 2006b). Fruit mass was determined through weighing with a electronic precision balance Vedia FR-H (±0.01 g). Fruit width and length was measured with a digital calliper (±0.01 mm). All the observations were carried out of 5 consecutive plants in three replications.

The obtained data were statistically analyzed using ANOVA software, as well as Microsoft Excel and STATISTICA 8.0. Duncan's Multiple Range tests at a significance level ($p < 0.05$) to measure specific differences between pairs of means was used.

Results and Discussion

The average fruit yield per plant in 2023 and 2024 during fruiting stage is showed in Figure 1. The strawberry fruiting stage continued 50 days (from 25 May to 14 July) in 2023 and 61 days (from 17 April to 17 June) in 2024 for whole experiment area. In relation to the observed plants, the period was shorter both in 2023 and 2024. The fruiting stage for I1F1 treatment continued 47 days (from 29 May to 14 July) in 2023 and 47 days (from 24 April to 10 June) in 2024. The maximum average fruit yield per plant in 2023 was on 17th day (30.12 g/plant), while in 2024 was on 8th day (174.83 g/plant).

The fruiting stage for I1F2 treatment continued 47 days (from 29 May to 14 July) in 2023 and 47 days (from 24 April to 10 June) in 2024. The maximum average fruit yield per

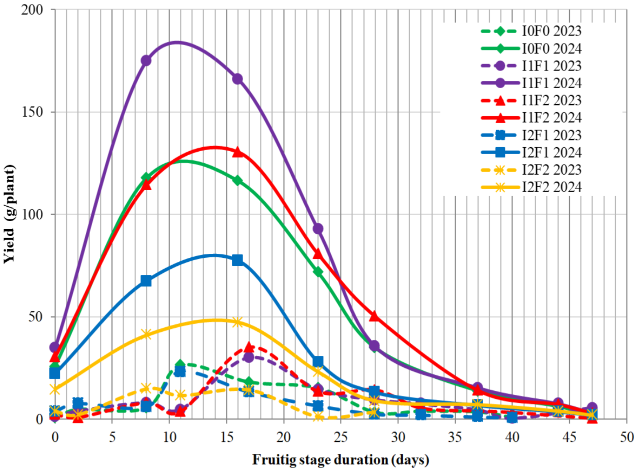


Fig. 1. Fruit yield per plant

plant in 2023 was on 17th day (35.14 g/plant) while in 2024 was on 16th day (130.49 g/plant). The fruiting stage for I0F0 (control) treatment continued 40 days (from 29 May to 7 July) in 2023 and 47 days (from 24 April to 10 June) in 2024. The maximum average fruit yield per plant in 2023 was on 11th day (26.35 g/plant) while in 2024 was on 8th day (117.74 g/plant). The fruiting stage for I2F1 treatment continued 40 days (from 29 May to 7 July) in 2023 and 47 days (from 24 April to 10 June) in 2024. The maximum average fruit yield per plant in 2023 was on 11th day (23.25 g/plant) while in 2024 was on 17th day (77.46 g/plant). The fruiting stage for I2F2 treatment continued 28 days (from 29 May to 26 June) in 2023 and 47 days (from 24 April to 10 June) in 2024. The maximum average fruit yield per plant in 2023 was on 8th day (14.75 g/plant) while in 2024 was on 17th day (47.35 g/plant). In the first year of the study, the fruit yield per plant was substantially more than the fruit yield per plant in the second year.

Similar results have been reported by Ayas (2023), Soppelsa et al. (2023) for red variety. It is evident that in the second year of cultivation, the yield per root increases almost 6 times, with the quantity of harvested fruits maintaining clear trends regarding the harvesting period. It can be seen that the variants I1F1 and I0F0 reach their maximum harvest yield around the 10th day, while the other three variants reach it on the 15th day after the first harvest. This can serve as a basis for optimally planning the harvesting schedules. In the second year, when the influence of the two factors becomes more pronounced, at the same level of irrigation (75% ETc), the maximum quantity of fruits harvested per root at maximum yield is more than twice as high with 100% fertilization. The same ratio is observed with 75% fertilization under 50% irrigation, but with significantly lower yield.

The theoretical trendline between average fruit diameter and fruiting stage duration for I1F1 treatment (Figure 2) shows quite strong influence in 2023 (coefficient of regression 0.48) and strong influence ($R^2 = 0.95$) in 2024. The equation $y = -0.128x + 24.31$ describe theoretical trendline between average fruit diameter and fruiting stage duration in 2023. The equation $y = -0.225x + 26.06$ describe theoretical trendline between average fruit diameter and fruiting stage duration in 2024. In the first year of the study, the mean fruit diameter fluctuated substantially more than the mean fruit diameter in the second year. Similar results have been reported by Yuan et al. (2004) for red variety. The mean fruit diameter decrease at the beginning of the fruiting stage. Similar results have been reported by Nowakowski et al. (2019) for red variety.

The theoretical trendline between average fruit diameter and fruiting stage duration for I1F2 treatment (Figure 3) shows strong influence both in 2023 ($R^2 = 0.78$) and 2024 ($R^2 = 0.96$). The equation $y = -0.262x + 29.07$ describe theoretical trendline between average fruit diameter and fruiting stage duration in 2023. The equation $y = -0.203x + 25.39$ describe theoretical trendline between average fruit diameter and fruiting stage duration in 2024.

The graphs in Figures 2–5 show the trend of decreasing fruit diameter towards the end of the harvesting period. This

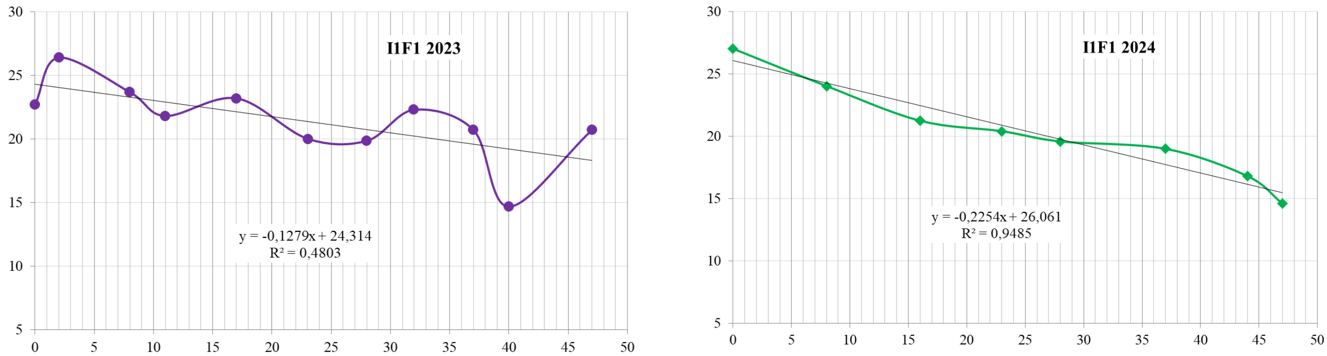
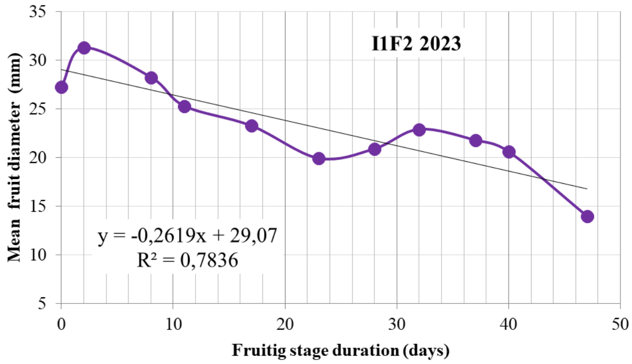


Fig. 2. Regression between mean fruit diameter and fruiting stage duration for I1F1



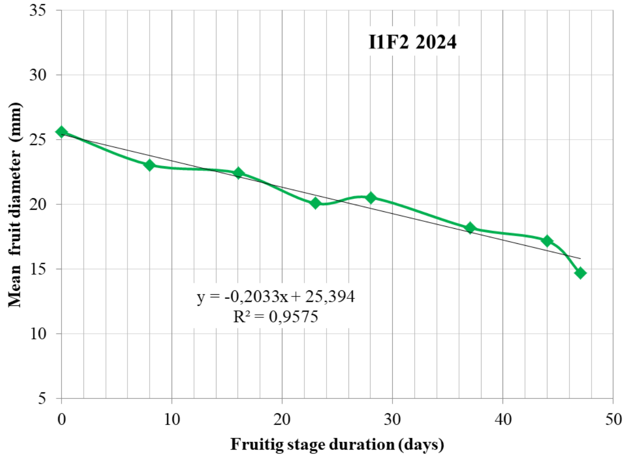


Fig. 3. Regression between mean fruit diameter and fruiting stage duration for I1F2

decrease in the second year is much smoother compared to the first year of fruiting. In the first year, there is a much greater fluctuation in the diameter of the fruits during the harvesting period. With the exception of the variant I1F1, the diameters of fruits harvested during the first harvest of the first year are approximately 15% larger. The last harvests are realized at approximately the same diameters for these variants. This suggests a steeper trend in the decrease of fruit diameter in the first year. This is due to the fact that in the first year, the first fruits are not only fewer in number but also larger in size (Figures 7–11).

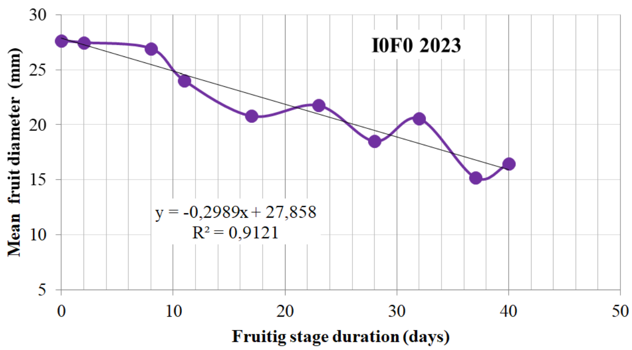
The observed trend indicates that with the increase in the age of the plantation, regardless of the technological regime, the regression of size reduction will have an increasing and higher coefficient of determination when approximated with a straight line.

The theoretical trendline between average fruit diameter and fruiting stage duration for I0F0 treatment (Figure 4) shows strong influence both in 2023 (R^2 = 0.91) and 2024 (R^2 = 0.90). The equation y = -0.299x + 27.86 describe theoretical trendline between average fruit diameter and fruiting stage duration in 2023. The equation y = -0.212x + 25.48 describe theoretical trendline between average fruit diameter and fruiting stage duration in 2024.

The theoretical trendline between average fruit diameter and fruiting stage duration for I2F1 treatment (Figure 5) shows strong influence both in 2023 (R^2 = 0.86) and 2024 (R^2 = 0.90). The equation y = -0.358x+28.15 describe theoretical trendline between average fruit diameter and fruiting stage duration in 2023. The equation y = -0.194x + 24.35 describe theoretical trendline between average fruit diameter and fruiting stage duration in 2024.

The theoretical trendline between average fruit diameter and fruiting stage duration for I2F2 treatment (Figure 6) shows strong influence both in 2023 (R^2 = 0.76) and 2024 (R^2 = 0.95). The equation y = -0.255x + 24.911 describe theoretical trendline between average fruit diameter and fruiting stage duration in 2023. The equation y = -0.172x + 22.059 describe theoretical trendline between average fruit diameter and fruiting stage duration in 2024.

The results (Table 1) showed that the highest fruit mean diameter was obtained from I1F2 treatment – 22.23 mm in



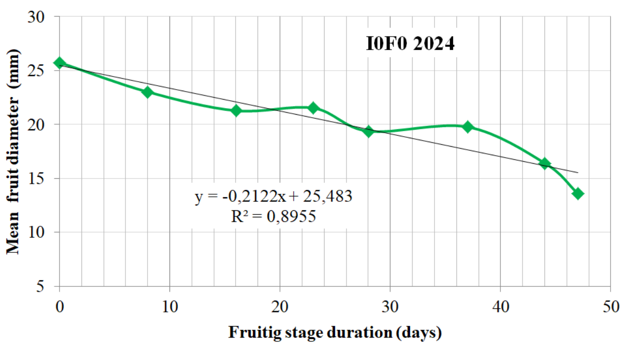


Fig. 4. Regression between mean fruit diameter and fruiting stage duration for I0F0

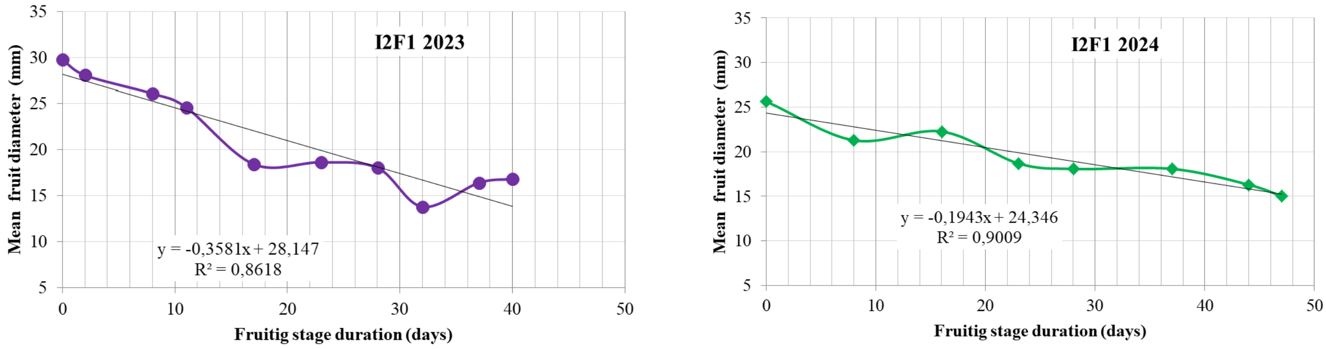


Fig. 5. Regression between mean fruit diameter and fruiting stage duration for I2F1

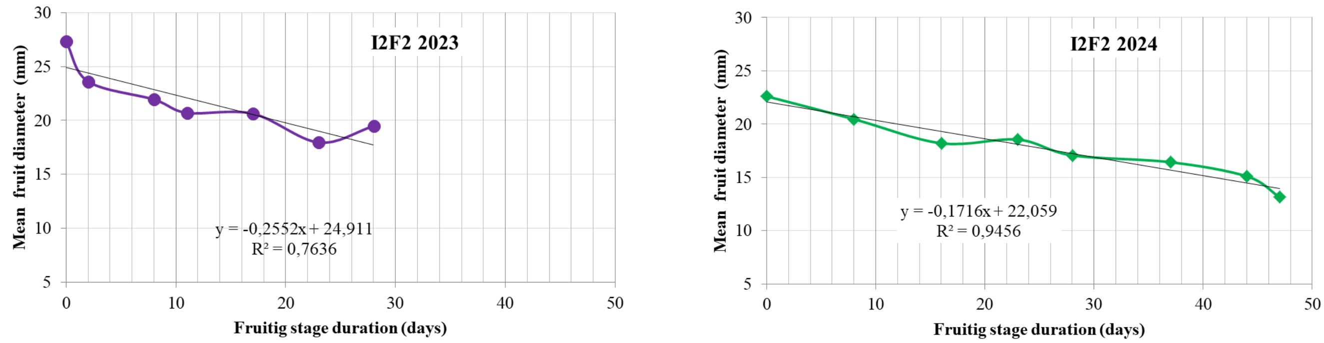


Fig. 6. Regression between mean fruit diameter and fruiting stage duration for I2F2

2023 and 21.55 mm from I1F1 in 2024. Expected, with the decrease of irrigation and fertigation rate, the fruit diameter also decease. Reduction of the fruit diameter between the highest (I1F1) and the lowest (I2F2) values was 14%. Results of Duncan's Multiple Range test show that there was no significant difference between the varietal means of I0F0, I1F1 and I1F2 treatment. Also, there was no significant difference between the varietal means of I0F0,I2F1 and I2F2.

Between other pairs differences were significant at $p = 0.05$. The results show that the highest average fruit diameter was achieved under optimal irrigation and fertigation conditions. The reduction of these factors leads to a substantial reduction in fruit size, with the difference between the highest and lowest diameter values being significant. Duncan's test confirmed that, however, not all differences between the different conditions were statistically significant, suggesting the possible presence of tolerance to variations in irrigation and fertigation conditions in some of the variants. With the decrease of irrigation rate and fertigation rate, the mean fruit diameter also decreases. Similar results have been reported by Bibi et al. (2016) for red variety.

Table 1. Mean fruit diameter by treatment

Treatment	2023			2024			Mean 2023–2024		
	Mean d, mm	Std. Dev.	Std. Err.	Mean d, mm	Std. Dev.	Std. Err.	Mean d, mm	Std. Dev.	Std. Err.
I1F1	22.21[a]	4.882	0.308	21.55[a]	3.574	0.090	21.64[a]	3.785	0.088
I1F2	22.23[ab]	4.154	0.258	21.41[a]	3.468	0.096	21.55[ab]	3.602	0.091
I0F0	21.82[abc]	4.749	0.310	21.40[a]	3.352	0.096	21.47[ab]	3.615	0.095
I2F1	21.14[c]	6.098	0.440	20.67	3.445	0.124	20.76	4.116	0.133
I2F2	21.18[c]	3.744	0.292	18.53	3.321	0.127	19.04	3.562	0.122
F	3.23			111.8			88.1		
p	0.012			0.000			0.000		

Values with same lowercase letter for the same parameter were not statistically different. NS = not significant

Table 2. Mean transversal (x) fruit size by treatment

Treatment	2023			2024			Mean 2023–2024		
	Mean x, mm	Std. Dev.	Std. Err.	Mean x, mm	Std. Dev.	Std. Err.	Mean x, mm	Std. Dev.	Std. Err.
I1F1	23.71[a]	5.438	0.343	22.35[a]	3.862	0.097	22.54[a]	4.139	0.097
I1F2	23.69[a]	4.579	0.285	22.17[a]	3.724	0.103	22.42[ab]	3.917	0.099
I0F0	23.16[a]	5.168	0.338	22.13[a]	3.561	0.102	22.29[ab]	3.882	0.102
I2F1	22.66[a]	6.635	0.479	21.14	3.617	0.131	21.44	4.429	0.143
I2F2	22.73[a]	4.409	0.344	19.04	3.477	0.133	19.76	3.951	0.136
F	2.27			119.1			90.5		
p	n.s.			0.000			0.000		

Values with same lowercase letter for the same parameter were not statistically different. NS = not significant

Table 3. Mean longitudinal (y) fruit size by treatment

Treatment	2023			2024			Mean 2023–2024		
	Mean y, mm	Std. Dev.	Std. Err.	Mean y, mm	Std. Dev.	Std. Err.	Mean y, mm	Std. Dev.	Std. Err.
I1F1	20.71[a]	4.647	0.293	20.75[a]	3.484	0.088	20.74[a]	3.664	0.086
I1F2	20.77[ab]	4.101	0.255	20.66[a]	3.441	0.095	20.68[ab]	3.557	0.090
I0F0	20.47[abc]	4.631	0.303	20.67[a]	3.356	0.096	20.64[ab]	3.591	0.094
I2F1	19.61[cd]	5.724	0.413	20.19	3.528	0.127	20.08	4.067	0.131
I2F2	19.63[d]	3.470	0.271	18.01	3.353	0.128	18.32	3.434	0.118
F	4.19			92.5			75.8		
p	0.002			0.000			0.000		

Values with same lowercase letter for the same parameter were not statistically different. NS = not significant

The transversal (x) fruit sizes (Table 2) results of Duncan's Multiple Range test show that there was no significant difference between the varietal means of treatments in 2023 and between I0F0, I1F1 and I1F2 in 2024. Also, there was no significant difference between the varietal means of I0F0, I1F1 and I1F2 in two years period 2023–2024. Between other pairs differences were significant at p = 0.05. These results suggest that certain fruit cultivars do not show significant differences in their transverse dimensions under different irrigation and fertigation conditions within two years. However, differences between other pairs of variants were significant, suggesting that some combinations of irrigation and fertigation may have a greater influence on fruit size.

The longitudinal (y) fruit sizes (Table 3) results of Duncan's Multiple Range test show that there was significant difference between the varietal means of I2F1, I1F1 and I1F2 treatment in 2023. Also, there was significant difference between the varietal means of I2F1, I2F2 and I0F0, I1F1 and I1F2 in 2024 and for two years period. Between other pairs differences were significant at p = 0.05. The results of longitudinal (y) fruit sizes (Table 3) from Duncan's multiple range test indicated that there was a significant difference between cultivar means of I2F1, I1F1 and I1F2 treatments in 2023. There was also a significant difference between cultivar means values of I2F1, I2F2 and I0F0, I1F1 and I1F2 in 2024 and for a period of two years. Between other pairs, differences are significant at p = 0.05. These results show that fruit longitudinal dimensions are strongly influenced by different combinations of irrigation and fertigation. The size differences were particularly significant in the I2F1, I1F1 and I1F2 treatment conditions in both 2023 and 2024, suggesting that these combinations had a greater effect on fruit growth in the longitudinal direction. Differences between other pairs of variants were also significant, highlighting the importance of optimal conditions for maximum fruit growth.

The theoretical trendline between average fruit weight and fruiting stage duration for I1F1 treatment (Figure 7) shows strong influence both in 2023 (coefficient of regression 0.62) and ($R^2 = 0.94$) in 2024. The equation $y = -0.106x + 8.308$ describe theoretical trendline between average fruit weight and fruiting stage duration in 2023. The equation $y = -0.128x + 7.68$ describe theoretical trendline between average fruit diameter and fruiting stage duration in 2024. Logically, the mass of the fruits is related to their size and exhibits a similar pattern, as shown in Figures 7–11. Here too, during the first harvests, the mass of the fruits is greater in the first year. In the first year, both the dispersion and the error are larger (Tables 3 and 4).

The theoretical trendline between average weight diameter and fruiting stage duration for I1F2 treatment (Figure 8)

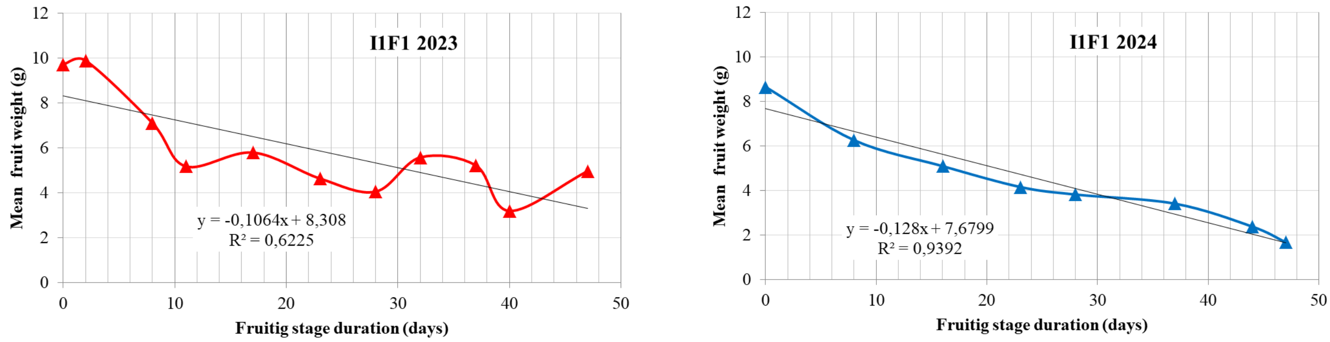


Fig. 7. Regression between mean fruit weight and fruiting stage duration for I1F1

Table 4. Mean fruit weight by treatment

Treatment	2023			2024			Mean 2023–2024		
	Mean fruit weight, g	Std. Dev.	Std. Err.	Mean fruit weight, g	Std. Dev.	Std. Err.	Mean fruit weight, g	Std. Dev.	Std. Err.
I1F1	5.39[a]	2.365	0.149	5.02[a]	2.181	0.055	5.07[a]	2.210	0.052
I1F2	5.23[a]	2.348	0.146	4.90[ab]	2.150	0.059	4.96[ab]	2.187	0.055
I0F0	5.26[a]	2.425	0.158	4.80[b]	1.947	0.056	4.88[b]	2.037	0.053
I2F1	5.17[a]	2.968	0.214	4.32	2.000	0.072	4.49	2.252	0.073
I2F2	4.69	2.103	0.164	3.25	1.560	0.060	3.53	1.772	0.061
F	2.77			108.81			92.11		
p	0.026			0.000			0.000		

Values with same lowercase letter for the same parameter were not statistically different. NS = not significant

shows strong influence both in 2023 (R^2 = 0.74) and 2024 (R^2 = 0.95). The equation y = -0.1645x + 9.867 describe theoretical trendline between average fruit weight and fruiting stage duration in 2023. The equation y = -0.113x + 7.2 describe theoretical trendline between average fruit diameter and fruiting stage duration in 2024.

The theoretical trendline between average fruit weight and fruiting stage duration for I0F0 treatment (Figure 9) shows strong influence both in 2023 (R^2 = 0.84) and 2024 (R^2 = 0.91). The equation y = -0.145x + 8.501 describe theoretical trendline between average fruit weight and fruiting stage duration in 2023. The equation y = -0.108x + 7.004 describe theoretical trendline between average fruit diameter and fruiting stage duration in 2024.

The theoretical trendline between average fruit weight and fruiting stage duration for I2F1 treatment (Figure 10) shows strong influence both in 2023 (R^2 = 0.86) and 2024 (R^2 = 0.84). The equation y = -0.206x + 9.317 describe theoretical trendline between average fruit weight and fruiting stage duration in 2023. The equation y = -0.103x + 6.39 de-

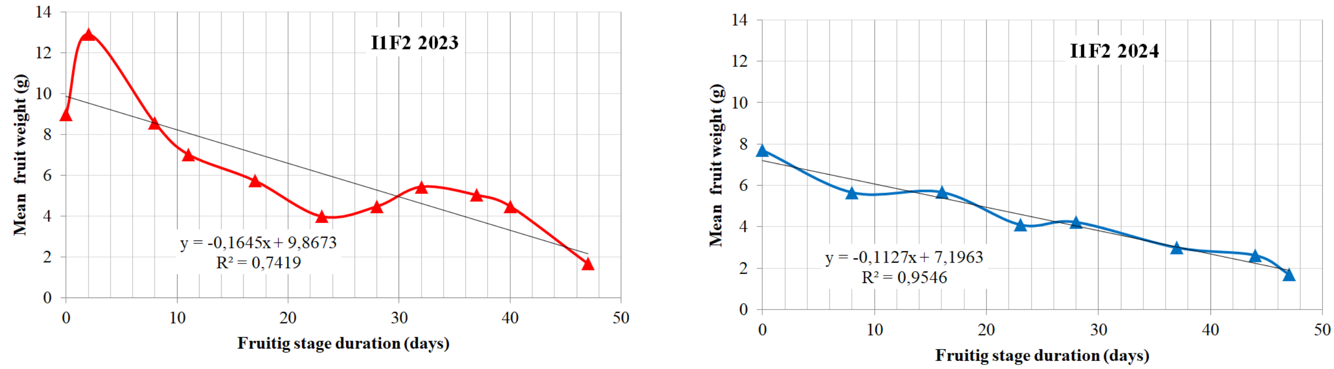


Fig. 8. Regression between mean fruit weight and fruiting stage duration for I1F2

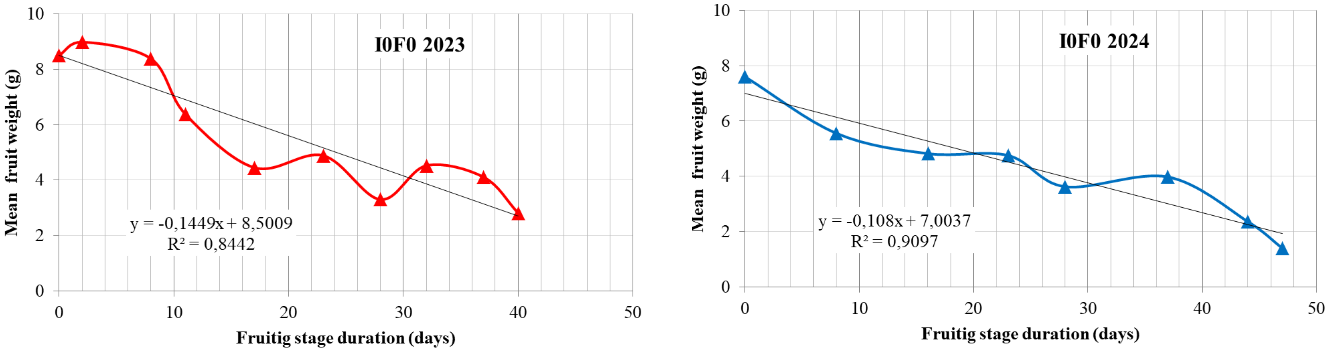


Fig. 9. Regression between mean fruit weight and fruiting stage duration for I0F0

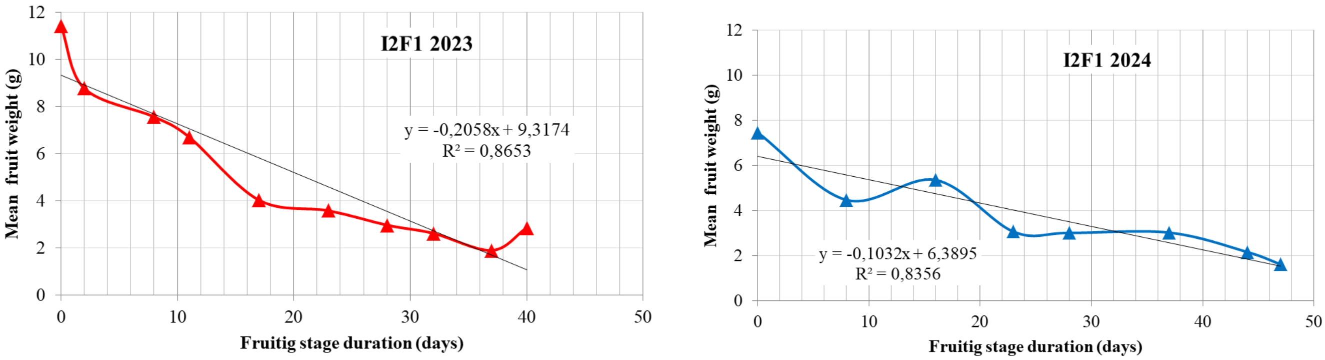


Fig. 10. Regression between mean fruit weight and fruiting stage duration for I2F1

scribe theoretical trendline between average fruit diameter and fruiting stage duration in 2024.

The theoretical trendline between average fruit diameter and fruiting stage duration for I2F2 treatment (Figure 11) shows strong influence both in 2023 ($R^2 = 0.57$) and 2024 ($R^2 = 0.95$). The equation $y = -0.129x + 6.489$ describe theoretical trendline between average fruit diameter and fruiting stage duration in 2023. The equation $y = -0.071x + 4.7415$ describe theoretical trendline between average fruit diameter and fruiting stage duration in 2024.

The results (Table 4) showed that the highest mean fruit weight was obtained from I1F1 treatment – 5.39 g in 2023 and 5.02 g in 2024. Expected, with the decrease of irrigation and fertigation rate, the fruit weight also decease. Reduction of the fruit weight between the highest (I1F1) and the lowest (I2F2) values was 44%. Results of Duncan's Multiple Range test show that there was no significant difference between the varietal means of I1F1 and I1F2 treatment and between I1F2 and I0F0 for two years period 2023–2024. Between other pairs differences were significant at $p = 0.05$. These results

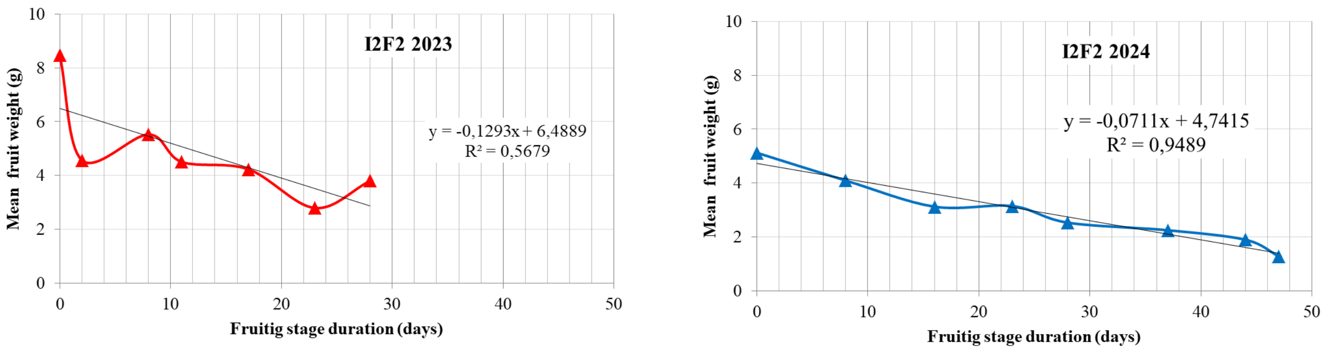


Fig. 11. Regression between mean fruit weight and fruiting stage duration for I2F2

suggest that optimal irrigation and fertigation conditions lead to significantly higher fruit weight. However, there was no significant difference in weight between certain combinations of irrigation and fertigation, such as I1F1 and I1F2, and between I1F2 and I0F0, indicating that some combinations are interchangeable in the context of achieving high fruit weight. The significant differences between other pairs of variants highlight the importance of proper management of irrigation and fertigation to optimize yield. With the decrease of irrigation rate and fertigation rate, the mean fruit weight also decreases. Similar results have been reported by Kang et al. (2018) and Kachwaya et al. (2015) for red variety.

Conclusions

Water and nutrient regimes are the main factors, which affect yield, berry size and others features of strawberry development.

The applied technological regime (irrigation and fertilization) influences the time to reach the highest harvest yield but not the duration of the harvesting period. The yield curves according to the harvesting period essentially reflect the intensity of fruit ripening and provide a basis for rationally planning the harvesting schedules according to the applied technology.

The highest yield per root is obtained with the I1F1 variant. Following it, with almost the same pattern of change, are the I0F0 and I1F2 variants. The fruits picked during the first harvest of the first year are up to 15% larger in size.

In the second year of cultivation, the regression of fruit size and their mass shows a higher coefficient of determination, closer to a straight line, depending on the harvesting period. The significant influence of the factors of irrigation and fertilization on the biometrics and yield of the white strawberry after the first two years of cultivation is a basis for modeling the process and optimizing it after obtaining more results.

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