



Effect of Drip Irrigation Method on Yield and Biochemical Parameters of Melon Varieties

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Abstract: the article presents the results of a study on the effect of drip irrigation on the productivity of melon varieties and biochemical parameters of their fruits.

Keywords: melon varieties, furrow and drip irrigation, fruit number and weight, commodity yield, dry matter content, total sugar, ascorbic acid, nitrate content.

Introduction

In recent years, effective work has been carried out in our country to raise the standard of living of the population to higher levels by increasing the quantity and quality of the harvest obtained from irrigated fields based on the effective use of water resources in the cultivation of vegetable crops [6].

One of the most promising directions for the development and sustainability of agricultural production is the use of soil-protecting, resource-saving irrigation systems.

The drip irrigation method is distinguished among the irrigation methods by its high efficiency, that is, it is an irrigation method that allows obtaining a stable high and quality harvest with less water consumption in conditions of lack of water resources. Due to the high possibilities of reducing manual labor in crop cultivation and irrigation, as well as automating irrigation, the irrigation method is being applied to wider areas all over the world [3, 4].

In order to achieve the true effect of the drip irrigation method, every agronomist who applies it must have a clear knowledge of the system. System implementers can feel the benefits of the system in annual crops (vegetables-melons) in the first year. Effective use of this irrigation system allows early and simultaneous ripening of the crop, harvesting on hot days, and obtaining quality products in terms of biochemical composition. We know that in the field where the crop was harvested early, further activities are carried out without difficulty [6, 8].

Materials and Methods

Researches were carried out at the Department of "Fruit-vegetable growing and Viticulture" of Tashkent State Agrarian University. Field experiments were conducted in 2020-2022 at the "Center for Innovative Developments and Consultancy in Agriculture" DUK pilot farm.

The following observations, measurements and calculations were made in the experiments:

Harvesting was done according to the external appearance (smell, firmness, weight) of the melon fruit. The number of fruits per bush, the weight of fruits and the total yield, the total and the

marketable yield per hectare were determined by calculating the marketable and non-marketable yield [1, 2, 5].

In order to evaluate the influence of melons products on the quality indicators, the composition of the fruit was analyzed, and the following was determined: dry matter - in the refractometer device; total sugar – according to the Bertrand method (saccharometer); Vitamin C – according to Murry's method; nitrates - determined by potentiometric method using ion-selective electrodes [7].

Results and discussion

During the years of research, the influence of irrigation methods on the productivity of "Kichkintoy" and "Kok tinni 1087" varieties of melon was studied (see Table 1, Figure 1).

When analyzing the processes carried out in 2020 in the "Kichkintoy" variety, it was found that 3 fruits were formed per plant in both irrigation methods, and the weight of one fruit was on average 200 g higher when drip-irrigated compared to the control, and in the "Kok tinni 1087" variety, the fruit yield was 2 pieces. observed, it was found that the weight of one fruit was 540 g higher than the control when drip irrigation was carried out.

In the course of the research, in 2021, when the varieties were analyzed, the weight of one fruit of the "Kichkintoy" variety in the control option was 610 g on average, and on average 1170 g when drip-irrigated. It was observed that in the variety "Kok tinni 1087" the weight of one fruit was 2100 g when watered by furrow irrigation, and by 430 g when watered by drip.

Table 1Effect of irrigation methods on yield of melon varieties, 2020-2022

| Watering methods | In one plant, average | | Yield, t/ha | |
|---|--------------------------|-----------------------------|-------------|------------|
| | number of fruits, pcs | weight of each fruit, kg | total | marketable |
| 2020 year | | | | |
| <i>(var bucharika Pang.) "Kichkintoy" variety</i> | | | | |
| Furrow irrigation (control) | 3,0±1,1 | 0,60±0,04 | 19,2 | 18,3 |
| Drip irrigation | 3,0±2,2 | 0,80±0,14 | 25,7 | 24,4 |
| <i>(var ameri Pang.) "Kok tinni 1087" variety</i> | | | | |
| Furrow irrigation (control) | 2,0±1,2 | 1,76±0,21 | 22,6 | 20,3 |
| Drip irrigation | 2,0±1,7 | 2,30±0,22 | 29,5 | 28,0 |
| 2021 year | | | | |
| <i>(var bucharika Pang.) "Kichkintoy" variety</i> | | | | |
| Furrow irrigation (control) | 3,0±1,5 | 0,61±0,05 | 19,6 | 18,6 |
| Drip irrigation | 2,0±2,2 | 1,17±0,05 | 25,0 | 23,7 |
| <i>(var ameri Pang.) "Kok tinni 1087" variety</i> | | | | |
| Furrow irrigation (control) | 2,0±1,6 | 1,92±0,12 | 24,6 | 22,1 |
| Drip irrigation | 2,0±2,4 | 2,35±0,07 | 30,2 | 28,6 |
| 2022 year | | | | |
| <i>(var bucharika Pang.) "Kichkintoy" variety</i> | | | | |
| Furrow irrigation (control) | 3,0±1,4 | 0,62±0,03 | 19,9 | 17,9 |
| Drip irrigation | 2,0±2,1 | 1,15±0,02 | 24,6 | 23,3 |
| <i>(var ameri Pang.) "Kok tinni 1087" variety</i> | | | | |
| Furrow irrigation (control) | 2,0±1,3 | 1,85±0,10 | 23,7 | 21,3 |
| Drip irrigation | 2,0±2,4 | 2,28±0,09 | 29,3 | 27,8 |

When analyzing the effect of irrigation methods on the total productivity, the "Kichkintoy" early-ripening variety seedlings planted on 1 hectare in 2020 produced an average of 19.2 t/ha when furrow irrigation, and 25.7 t/ha when drip irrigation, while the early "Kok tinni 1087" variety this indicator was 22.6 t/ha in the control option, and 29.5 t/ha in drip irrigation.

It was observed that the relative result obtained in the first variety was 6.1 t/h higher than the control, and in the second melon variety it was 7.7 t/h higher. In calculating these results, special importance was paid to the fact that the advantage of drip irrigation in the study was a positive indicator of 95%.

During the observations, it was noted that the total yield in our planted area in 2021 was 5.4 t/ha different from the control with a result of 25 t/ha in the first variety and 5.6 t/ha higher than the control with an indicator of 30.2 t/ha in the second variety.

The market value of the crop is also decently 18.6 t/ha in the control version of the first variety, and 5.1 t/ha in the "Kichkintoy" variety, "Kok tinni 1087" compared to the drip irrigation in the second variety with an average of 22.1 t/ha. and it was observed that the variety gave a low yield of 6.5 t/ha. As a result of the analysis of 2022, in the early morning "Kichkintoy" variety, there were 2 fruits per plant, with an average weight of 620 g, and the total yield was 19.9 t/ha, while the marketable yield was 90% of the total yield. It was found that the total yield was 4.7 t/ha, and the total yield was 5.4 t/ha when drip irrigation was done. These indicators were also observed in the "KokTinni 1087" variety.

So, it can be concluded that the drip irrigation method is optimal for both melon varieties. In this case, due to drip irrigation, sufficient moisture was supplied to the seedlings at the right time, the moisture level in the soil was kept at a normal level, and the crop did not have a negative effect, on the contrary, the weight and quality of the crop changed in a positive direction. expansion of the absorption surface was observed due to strong branching. Also, it has been proven that drip irrigation eliminates excessive water consumption and unfavorable distribution of moisture along the soil layers for the absorbing part of the root system.

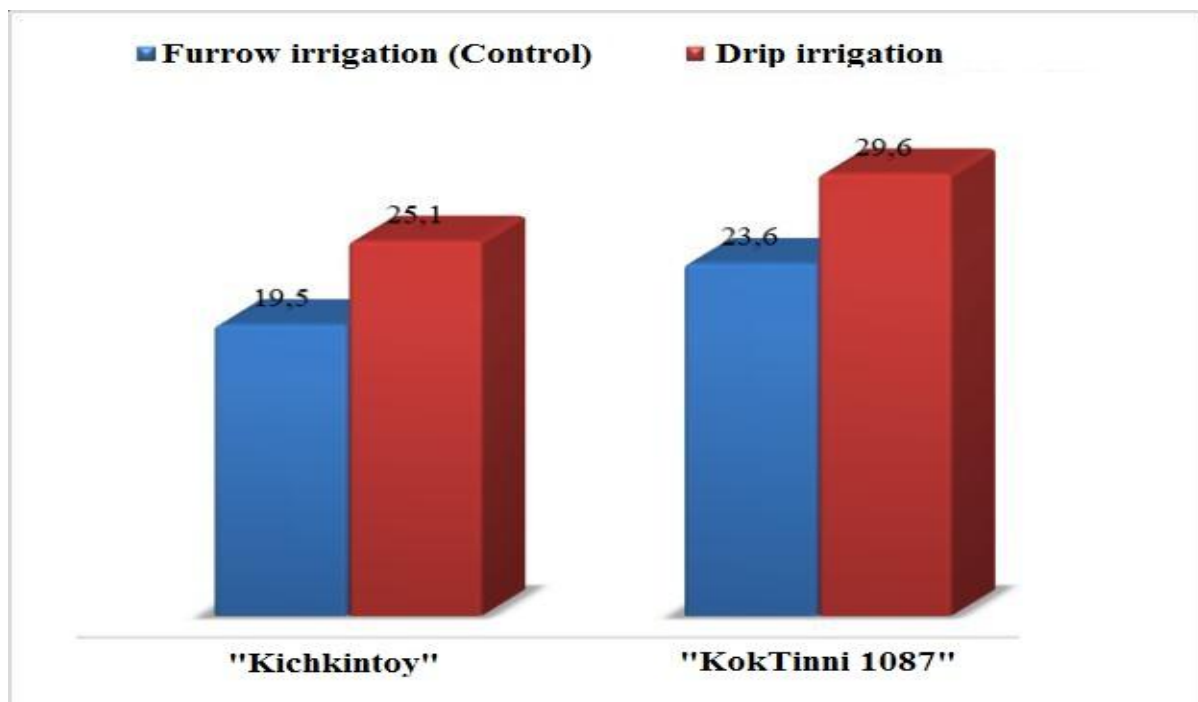


Figure 1. The effect of different irrigation methods on the total yield of melon varieties (in t/ha), 2020-2022.

Incorrect selection of irrigation methods in the cultivation of melons crops has a negative effect on the biochemical composition of the fruit. As a result, fruits crack, dry matter, sugar decrease, quality, shelf life deteriorates, etc.

We know that melon fruit is loved for its delicious taste. However, its level of sugar depends firstly on the nature of the variety and secondly on irrigation factors. The less water a melon consumes, the more sugary it becomes (see Table 2).

From this point of view, during our research conducted in 2020-2022, we analyzed the influence of the biochemical composition of melon varieties on irrigation methods.

When the results of the study were analyzed, the first "Kichkintoy" variety planted in 2020 in the drip-irrigated option had significantly higher average dry matter content, total sugar content and vitamin C than the drip-irrigated seedlings.

On the other hand, it was found that the amount of nitrates was 8.6 mg/kg higher in the furrow irrigated option.

When these studies were carried out in the same period as the original melon variety "Kok tinni 1087", it was noted that the amount of dry matter was 1.9% higher than the control, and the total sugar content and ascorbic acid were also relatively high in drip-irrigated seedlings. When the amount of nitrate was analyzed in this order, 6.1 mg/kg less than the control was observed.

Table 2 Effect of different irrigation methods on the biochemical composition of melon varieties, 2020-2022.

| Watering methods | Dry matter | Total sugar | Glucose | Fructose | Sucrose | Ascorbic acid, mg/% | Nitrate, mg/kg |
|---|------------|-------------|---------|----------|---------|---------------------|----------------|
| 2020 year | | | | | | | |
| (var <i>bucharika</i> Pang.) "Kichkintoy" variety | | | | | | | |
| Furrow irrigation (control) | 12,3 | 10,0 | 2,1 | 1,8 | 6,1 | 13,23 | 119,1 |
| Drip irrigation | 14,8 | 12,4 | 3,2 | 2,7 | 6,5 | 13,35 | 110,5 |
| (var <i>ameri</i> Pang.) "Kok tinni 1087" variety | | | | | | | |
| Furrow irrigation (control) | 13,9 | 12,2 | 3,3 | 2,4 | 6,5 | 16,31 | 112,6 |
| Drip irrigation | 15,8 | 14,4 | 3,5 | 3,1 | 7,8 | 18,26 | 106,5 |
| 2021 year | | | | | | | |
| (var <i>bucharika</i> Pang.) "Kichkintoy" variety | | | | | | | |
| Furrow irrigation (control) | 13,9 | 11,5 | 2,5 | 2,6 | 6,4 | 12,33 | 112,7 |
| Drip irrigation | 16,4 | 13,7 | 3,0 | 3,2 | 7,5 | 13,47 | 106,9 |
| (var <i>ameri</i> Pang.) "Kok tinni 1087" variety | | | | | | | |
| Furrow irrigation (control) | 14,2 | 12,6 | 2,6 | 3,1 | 6,9 | 16,41 | 110,1 |
| Drip irrigation | 17,6 | 15,2 | 3,3 | 3,7 | 8,2 | 18,25 | 102,4 |
| 2022 year | | | | | | | |
| (var <i>bucharika</i> Pang.) "Kichkintoy" variety | | | | | | | |
| Furrow irrigation (control) | 12,0 | 9,7 | 2,0 | 1,7 | 6,0 | 13,21 | 117,1 |
| Drip irrigation | 14,5 | 12,1 | 3,0 | 2,6 | 6,5 | 13,31 | 108,1 |
| (var <i>ameri</i> Pang.) "Kok tinni 1087" variety | | | | | | | |
| Furrow irrigation (control) | 13,5 | 12,0 | 3,2 | 2,3 | 6,5 | 16,29 | 112,3 |
| Drip irrigation | 16,0 | 14,6 | 3,6 | 3,2 | 7,8 | 18,23 | 105,3 |

The above experiments were carried out in 2021, respectively. When the process was analyzed, it was found that the results obtained from drip-irrigated seedlings, like the results obtained in 2020, were relatively positive in both varieties of melons, but due to the decrease in nitrate content, the difference was less when compared to the control, i.e. 5.8 and 7.7 mg/kg. It was observed that the year 2022 was relatively lower on all indicators compared to the data of the previous two years.

From the results of the research, it can be said that when the method of drip irrigation was applied to the melon varieties, the high level of water balance in the soil and its harmful effect on the root system, which is observed in the case of drip irrigation, were eliminated. As a result, it was observed that the amount of sugar in the fruit, especially sucrose, which determines the sweet taste of melon, was high, and the amount of nitrates decreased accordingly. Therefore, it was found that when the

soil is moderately moistened, the air permeability between the soil layers is normal, and as a result, positive results can be obtained in the biochemical composition without harming the roots. It was also observed that due to the relative increase in the size of the absorbing surface of the root, a normative balance was created in the products of the photosynthesis process. The reason is that the organic synthesis stage and the vegetation period of the plant will be normal as long as the root can absorb enough water and dissolved minerals from the soil.

Conclusion

The average yield of the "Kichkintoy" variety was 19.2 t/ha when furrow irrigation, and 25.7 t/ha when drip-irrigated, while this indicator was 23.6 t/ha in the control option, and 29.5 t/ha when drip-irrigated. It is achieved due to the complete elimination of the phenomenon of the crop dying under water when the fields are drip-irrigated.

During the research years, the average dry matter content (13.8 %), total sugar (12.3 %), ascorbic acid (16.3 mg/%) and nitrate content (111.7 mg/kg) when the variety "Kok tinni 1087" was furrow irrigated, respectively 16.5 when drip irrigation; 14.7; It was found to be 18.25 and 104.7. In the drip irrigation system, the supply of water and nutrients below the standards can be explained by the quality of the product, in particular, by the low content of nitrates.

References

1. Azimov B.J., Azimov B.B. "Methodology of conducting experiments in vegetable, vegetable and potato growing". National Encyclopedia of Uzbekistan, 2002 (2006). pp. 181–185.
2. Белик В.Ф. Методика опытного дела в овощеводстве и бахчеводстве. // М.: Колос, 1992 – С. 3-320.
3. Буриев Х.Ч., Нишонова А.Я. Технология возделывания бахчевых культур в Узбекистане (монография). LAP LAMBERT Academic Publishing RU. 17 Meldrum Street, Beau Bassin 71504, Mauritius. 2019. – С. 208-213.
4. Буриев Х.Ч., Нишонова А.Я.. Бахчеводство. Т.: "Навруз", 2020 г. –С. 218-239.
5. Доспехов Б.А. Методика полевого опыта. Москва. Агропромиздат. 1985. – С. 3 – 351.
6. Mamatov S.A. Drip irrigation system. Т.: "Mehridaryo", 2012, pp. 19-25.
7. «Методические указания по определению нитратов и нитритов в продукции растениеводства» Москва 1989 г. с 14-55.
8. Nishonova A.Ya., Buriev Kh.Ch. "Development of resource-saving technology of melon cultivation in the conditions of Tashkent region". Recommendation. Tashkent. 2022. – pp. 4-12.