*Journal of Agricultural Science and Technology (2025) Vol. 27 (1): 233-246*

# Sustainability of Rain-Fed Fig Production (*Ficus carica*) under Supplemental Irrigation in Semi-Arid Regions

Amir Eslami[1], Moslem Jafari[2], and Maryam Khozaei[3]*

## ABSTRACT

**In arid and semi-arid regions, inadequate rainfall necessitates supplemental irrigation to meet crop water requirements. Selecting the appropriate method is crucial for success. A two-years field experiment was conducted in Kharameh Region, Iran, to investigate the effect of different supplemental irrigation methods on fig tree yield, physiological response, and water productivity. Three irrigation methods including flood irrigation, subsurface drip irrigation, micro jet irrigation, and no supplemental irrigation (control) were applied as four treatments in five replications. Results showed that subsurface and micro jet irrigation significantly increased leaves width by 18.2%, shoot length by 27%, and shoot diameter by 13%. Micro jet irrigation also increased the amounts of chlorophyll in fig leaves by 14%, the average of total fruit numbers by 134%, and the average of total fruit weight by 54% as compared to the average of other treatments treatments. Furthermore, the highest level of water productivity were in micro jet irrigation techniques, while it dropped by 40% with subsurface drip irrigation. The practical implications of this study involve boosting fig yield, refining water management strategies, increasing drought resistance, analyzing economic feasibility, gauging sustainability, and supporting the sharing of knowledge and skills for fig cultivation in semi-arid areas.**

**Keywords:** Fig fruit quality, Kharameh region, Micro jet irrigation, Subsurface irrigation, Water scarcity, Water productivity.

## INTRODUCTION

Water scarcity challenges in both quantity and quality are major problems for agricultural production in Iran (Amiri and Eslamian, 2010; Amiri *et al*., 2015). Supplemental irrigation methods are necessary for the sustainability of agricultural systems, particularly for rain-fed crops (Khozaei *et al*., 2020). Rain-fed fig orchards are common in arid and semi-arid regions of Iran, producing a country level of approximately 75,910 tons of dry figs annually (Abdolahipour *et al*., 2019). Despite fig plants' tolerance to water stress, prolonged drought conditions can cause significant loss of yield (Abdolahipour *et al*., 2018; Karimi *et al*., 2012).

The prolonged drought condition led to soil salinity, which has an adverse effect on quality and quantity of rain fed fig (Abdolahipour *et al*., 2023). Severe drought causes leaf loss and reduces fruit quality and quantity (Tehrani *et al*. 2016). Previous studies suggest that supplemental irrigation and drought-resistant cultivars can improve water productivity in plant production (Honar *et al*., 2020; Abdolahipour *et al*., 2019). Supplemental irrigation effectively maintains soil

[1] Agricultural Engineering Research Department, Fars Agricultural and Natural Resources Research and Education Center, AREEO, Shiraz, Islamic Republic of Iran.
[2] Fig Research Station, Fars Agricultural and Natural Resources Research and Education Center, AREEO, Estahban, Islamic Republic of Iran
[3] Department of Water Engineering, School of Agriculture, Shiraz University, Shiraz, Islamic Republic of Iran.
* Corresponding author; e-mail: Khozaei61@yahoo.com





[ DOI: 10.22034/JAST.27.1.233 ]

moisture in the root zone, mitigating water deficit effects on crop yield in arid regions (Moradi *et al*., 2023). Using the supplemental irrigation in fig orchards has increased in semi-arid regions (Kamyab, 2015; Sharifzadeh *et al*., 2012). Some studies show that supplemental irrigation improves yield and physiological traits of rain-fed fig trees during drought (Honar and Sepaskhah, 2015; Kamgar Haghighi and Sepaskhah, 2015). Bagheri and Sepaskhah (2014) recommend March supplemental irrigation for fig trees in low rainfall years. Tapia *et al*. (2003) found that supplementing 220 mm of water in arid regions results in economically viable fig yields. Al-Desouki *et al*. (2009) report increased yield and growth of fig trees with supplemental irrigation. Khozaei *et al*. (2020) observed increased grapevine yield with supplemental irrigation in May. Choosing the right supplemental irrigation method affects rain-fed fig tree yield and morphology (Bouman *et al*., 2007). Flood irrigation increases apple tree chlorophyll compared to drip and sprinkler irrigation (Chen *et al*., 2018). Different irrigation methods affect root growth, soil enzyme activity, nutrient uptake, and fruit quality (Wang *et al*., 2017). Furrow and trickle irrigation methods significantly influence squash fruit and seed yields (Amer *et al*., 2011).

Although there are some investigations on the effect of different supplemental irrigation amounts on rain fed fig trees, limited researches can be found on the effects of supplemental irrigation methods on the quality and quantity of fig fruit and physiological parameters of rain-fed fig trees. Therefore, this study aimed to evaluate the impact of various supplemental irrigation methods (flood, subsurface drip, micro jet, and no supplemental irrigation) on soil moisture profile, fruit quality and quantity, and growth and physiological parameters of fig trees (Sabz cultivar) in an arid region.

## MATERIALS AND MTHODS

### Experimental Site

To investigate the effects of different supplemental irrigation methods on fig trees (Sabz cultivar), two years of field experiments were conducted in 2017 and 2018, in Kharameh City, Fars Province, Iran. The area is located on 29º 32″ N, 53º 19″ E, 1,500 m above the sea level and has an arid climate with an average annual rainfall of 200 mm and mean annual temperature of 20°C. The experimental site's soil properties are shown in Table 1.

Growing rain-fed figs require a warm climate with long hot summers and mild winters, preferably in Mediterranean or semi-arid regions. Figs thrive in well-drained soils with good fertility and a pH level between 6.0 and 6.5 (Jafari and Eslami, 2022). Regular pruning, soil-based fertilization, and pest management are essential for healthy growth and fruit production. The Sabz fig variety used in this study is Iran's most important and expensive dried fig, known for its unique traits, including drought tolerance, extensive roots, and adaptability to different soils. Rain-fed fig orchards need three years of regular irrigation with rooted seedlings. After three years, if rainfall exceeds 200 mm annually, irrigation can be stopped. However, in areas with lower rainfall, supplementary irrigation may be needed for profitable crop production. This combination of high price and low water consumption has led to a shift in regions like Kharamah, Iran, to fig production (Jafari and Eslami, 2022).

### Experimental Design and Field Studies

The experimental design consisted of four treatments: (1) Flood irrigation using a $10000 m^3$ tanker for each tree, (2) Subsurface drip irrigation using drip tape at 1m distance from the trunk and 50 cm depth, (3) Micro jet irrigation with one sprinkler per tree and





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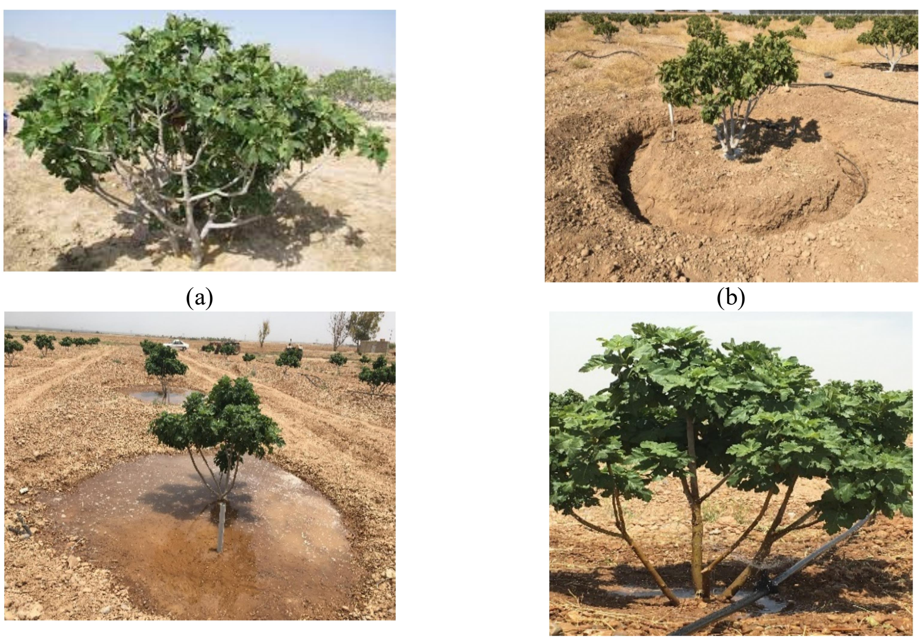
**Table 1.** The soil properties of the experimental site.

| Soil texture | Depth | pH | Clay | Silt | Sand | Organic carbon | $CaCO_3$ | EC |
|---|---|---|---|---|---|---|---|---|
| | (Cm) | | (%) | (%) | (%) | (%) | (%) | (dS $m^{-1}$) |
| Loam | 0-30 | 8 | 21.2 | 30 | 49.2 | 0.49 | 21 | 1.18 |
| Sandy clay loam | 30-60 | 8.2 | 21.2 | 25.3 | 53.5 | 0.30 | 41 | 0.65 |
| Sandy clay loam | 60-90 | 8.4 | 21.2 | 24.4 | 54.4 | 0.23 | 41 | 0.56 |
| Sandy loam | 90-120 | 8.4 | 19.3 | 19.6 | 61.1 | 0.21 | 40 | 0.54 |

1.5 m spraying radius, and (4) No supplemental irrigation (control), with five replications. Figure 1 shows the irrigation methods used. Measurements were taken on 5 trees with the same condition in each row. The trees were 3 years old and planted 8m×8m apart. Figure 2 shows the experimental treatments. Soil water content was monitored at depths of 0.3, 0.6, 0.9, and 1.2 m using a Trime Hygrometer at a distance of 1m from each tree trunk, from January to July each year. Based on Honar and Sepaskhah (2015), each tree received a total of 1,500 L of supplemental irrigation in three applications (March, May, and August) with 500 L each time. The irrigation water properties are listed in Table 2.

## Fig Orchard Properties

Different fig cultivars are planted in Kharameh region, with 'Sabz' being the most common commercial variety (Jafari and Eslami, 2022). Fig shoot growth occurs from mid-April to mid-May, with maximum leaf area observed in May. Flowering and fruiting of fig trees happen from April to July, with fruit maturation starting in August and ending in early October. After this, fig leaves fall and the trees enter dormancy until the next growth period in late October.



(a) (b) (c) (d)

**Figure 1.** Irrigation treatments: Control (a), subsurface drip (b), flood (c), and micro jet irrigation (d).





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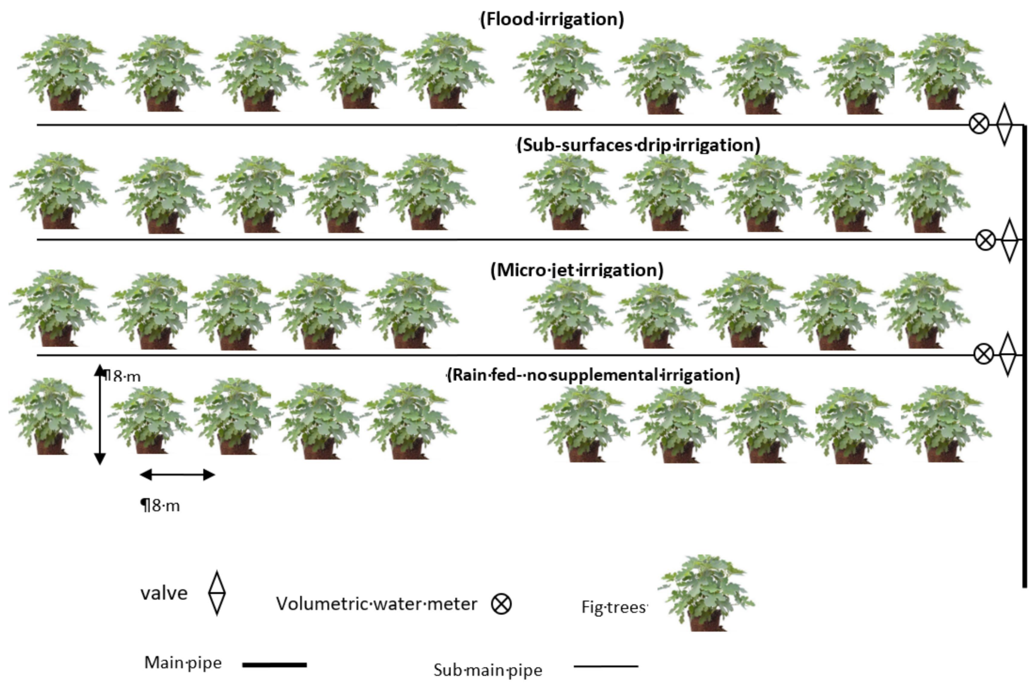


**Figure 2**. The schematic map of the experimental treatments.

**Table 2.** Irrigation water properties in the experimental site.

| EC ($dS\ m^{-1}$) | PH | HCO ($meq\ L^{-1}$) | CL ($meq\ L^{-1}$) | $SO4^{2-}$ ($meq\ L^{-1}$) | Ca ($meq\ L^{-1}$) | Mg ($meq\ L^{-1}$) | Na ($meq\ L^{-1}$) |
|---|---|---|---|---|---|---|---|
| 1.2 | 7 | 4.6 | 120 | 1 | 31 | 43 | 51.9 |

### Measurements and Calculations

Growth parameters (shoot length, shoot diameter, node number, internode length, leaf width) were measured in July for two years. Fig fruit number, weight, size, and color were determined at harvest. Fruit size (diameter) was categorized as AA (> 22 mm), A (17-22 mm), and B (< 17 mm). Fruit color was categorized as light yellow (best), brown (medium), and dark brown (worst).

The irrigation Water Productivity (WP), as the total crop yield divided by the total volume of irrigation water, was determined for each treatment as follow, Fernández *et al.* (2020):

$$WP = \frac{Y}{I}$$

Where, Y is the fruit Yield ($kg\ ha^{-1}$), and I is the Irrigation depth ($m^3\ ha^{-1}$).

The content of total chlorophyll, chlorophyll (a), and chlorophyll (b) of the leaves were measured using dimethyl sulfoxide (Hickox and Israelstam 1979) in the middle of August. Fresh and fully matured leaves were collected from the tree at a fixed height and placed in plastic bags, before the laboratory analysis. A number of 100 mg of leaf pieces (without veins) were placed in an Erlenmeyer flask and 7 mL of Dimethyl Sulfoxide (DMSO) was poured on it and kept in an incubator at 65°C for 60 minutes. Then, its volume was increased to 10 mL with DMSO and the absorbance of the extract was read at 645 and 663 nono meter wavelengths.





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## RESULTS AND DISCUSSION

### Soil Moisture

Availability of water is a significant factor that can limit the growth and productivity of plants (Liu *et al*., 2021). Soil moisture at different depths and irrigation methods during the growing season are shown in Figure 3. Control treatment had lower moisture percentage than other treatments in all soil layers. The micro jet irrigation method-maintained soil moisture at high levels in the 0-30 and 30-60 cm soil layers, where the highest density of fig roots were found (Abdolahipour *et al*., 2021), facilitating water absorption at these depths (Figures 3-a and -b). Also, the most significant moisture change, with a 5.4% increase, was observed at the 0-30 cm depth, primarily due to evaporation and water movement (Figure 3-a). The highest soil moisture in 60-90 and 90-120 cm depths were observed in subsurface drip irrigation and flood irrigation, respectively.

### Fig Trees Growth and Physiological Parameters

Table 3 shows that the highest amounts of chlorophyll (a) w observed in the micro jet irrigation treatments (1.645 mg $g^{-1}$) followed by sub surface (1.582 mg $g^{-1}$), flood (1.302 mg $g^{-1}$) and control (1.251 mg $g^{-1}$). Supplementary irrigation had no significant effect on the amount of chlorophyll (b) in the leaves of fig trees. The amounts of total chlorophyll in the leaves of fig trees were affected significantly by supplementary irrigation, and the highest amounts were observed in the micro jet irrigation method (2.201 mg $g^{-1}$) followed by subsurface, control and flood irrigation treatments (Table 3). These results indicate the effect of water stress and types of irrigation system on water relations parameters such as leaf chlorophyll (a), leaf chlorophyll (b), leaf proline, leaf cell sap osmotic pressure,

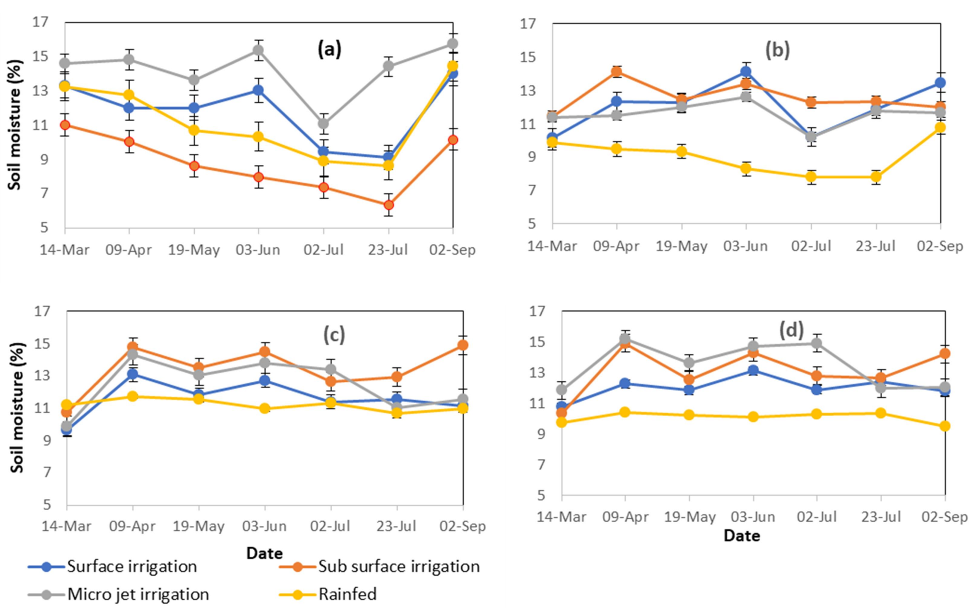


**Figure 3.** The average of volumetric soil moisture (%) in different supplemental irrigation methods at different soil depths: 0-30 (a), 30-60 (b), 60-90 (c) and 90-120 cm (d) during the growing seasons (2018 and 2019).





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opened stomata percentage, and leaf bound water content. Generally, leaf chlorophyll (a), leaf chlorophyll (b), as well as opened stomata percentage parameters were increased when water amount increased (Trigueros *et al*., 2021). Anjum *et al*. (2011) and Shirbani *et al*. (2013) indicated that chlorophyll content was positively related to the rate of photosynthesis. Therefore, the decrease in chlorophyll content under drought stress conditions, as a common sign of oxidative stress, may be due to the photo-oxidation of pigments and chlorophyll decomposition. Ammar *et al*. (2020) found that the deficit irrigation decreased the chlorophyll content and increased the proline in fig plant leaves. Halo *et al*. (2020) observed higher chlorophyll content in crops resistant to oxidative stress and Chlorophyll (a) decreased more significantly than chlorophyll (b) under drought stress.

Table 4 shows that supplemental irrigation significantly affected fig trees' growth parameters. As the results show, the highest amounts of leaf width were obtained in micro jet irrigation (12.81 cm) with no significant difference by sub surface drip irrigation and decreased in average by about 12% in flood (11.71 cm) and control (10.82 cm) treatments. In this case, Chen *et al*. (2018) found that drip irrigation increased leaf width and weight in apple trees.

Maximum shoot length was observed in flood irrigation (16.3 cm), with no significant difference by micro jet (15.48 cm) and sub-surface drip irrigation (15.14 cm), while the minimum one was observed in the control treatment (12.3 cm). Leonel and Tecchio (2010) also showed supplemental irrigation increased shoot diameter and length in fig trees. Increasing irrigation rate caused increases in many characteristics, which led to an increment in both vegetative growth and fruiting and, finally, profitable yield in orange trees (Panigrahi, 2023).

Sub-surface drip irrigation had the maximum shoot diameter (8.75 cm) with no significant difference by flooding (8.66 cm) and micro jet irrigation (8.58 cm), while the control treatment had the minimum shoot diameter (7.68 cm). The maximum number of nodes and internode length were observed in micro jet irrigation followed by flooding and subsurface drip irrigation and the minimum were observed in the control treatment. These results demonstrate the importance of supplemental irrigation especially micro jet irrigation in improving fig trees' morphological conditions. Most studies show that supplemental irrigation improves vegetative growth compared to non-irrigated rain-fed plants (Varol *et al*., 2023). Andrade *et al*. (2014) found significant effects of supplemental irrigation on fig tree node number. Wang *et al*. (2017) reported significant effects of supplemental irrigation on root development and physiological parameters of trees. Abd-El-Rahman *et al*. (2017) found significant increases in vegetative growth and fig yield with supplemental irrigation. Moura *et al*. (2023) reported larger diameter, more branches, and longer internodes in irrigated

**Table 3.** Effect of supplemental irrigation on the two-year mean of some physiological traits of fig (*F. carica* cv. Sabz) in 2018 and 2019.[a]

| Supplemental Irrigation treatments | Chlorophyll-a | Chlorophyll-b | Total chlorophyll |
|---|---|---|---|
| | (mg $g^{-1}$) | (mg $g^{-1}$) | (mg $g^{-1}$) |
| Flood | 1.302 b | 0.438 a | 1.740 b |
| Sub-surface Drip | 1.582 a | 0.480 a | 2.062 ab |
| Micro jet | 1.654 a | 0.547 a | 2.201 a |
| Control (Rain-fed) | 1.251 b | 0.525 a | 1.776 b |

[a] Means with the same letters in each column are not significantly different using the Duncan test at P≤ 0.05.





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fig trees. The findings of this study align with Wang *et al*. (2017), and Abd-El-Rhman *et al*. (2017).

## Fig Fruits Quality and Quantity

Fig physiology and growth were affected by different irrigation methods. Quality and quantity of fig fruits can be affected by irrigation management for sustainable production (Si *et al.*, 2023). As shown in Table 5, fig fruit numbers were affected by supplemental irrigation. The number of light yellow fig fruit increased by 102, 52, and 247% in micro jet irrigation as compared to flooding, sub-surface drip, and the control treatments, respectively. Important polyphenolic compounds in fig fruit are epicatechin, catechin, and chlorogenic acid, reaching peak levels during ripening. Polyphenol oxidase enzyme darkens fig skin by breaking down phenolic substances. Drought stress increases enzyme activity, darkening the fruit at ripening, while sufficient moisture brightens fruit skin (Sedaghat, 2018).

The number of grade AA fig fruit increased by 455 and 317% in micro jet compared to flooding and sub-surface drip irrigation, respectively, while the control treatment had no grade AA fig fruit (Table 5).

Grade A fig fruit was the highest in the control treatment, followed by micro jet irrigation, and the lowest number was found in flooding irrigation, with no significant difference with sub-surface drip irrigation. The highest number of grade B fig fruit was obtained in the control treatment and decreased by 31, 26, and 22% in flooding irrigation, micro jet irrigation, and sub-surface drip irrigation, respectively (Table 5). According to Andrade *et al*. (2014),

**Table 4.** The average of growth parameters of fig trees under different supplemental irrigation treatments.[a]

| Supplemental irrigation treatments | Nod number | Internode length (cm) | Shoot length (cm) | Shoot diameter (cm) | Leaf width (cm) |
|---|---|---|---|---|---|
| Flood | 10.59 a | 6.12 a | 16.3 a | 8.66 ab | 11.71 b |
| Sub-surface drip | 10.49 a | 5.93 a | 15.14 ab | 8.75 a | 12.79 a |
| Micro jet | 10.65 a | 6.64 a | 15.48 ab | 8.58 ab | 12.81 a |
| Control (Rain-fed) | 9.00 b | 4.76 b | 12.3 b | 7.68 b | 10.82 b |

[a] The means with the same letters in each column are not significantly different using the Duncan test at P≤ 0.05.

**Table 5.** Effect of supplemental irrigation on the average number of fig fruits (*F. carica* cv. Sabz), in 2018 and 2019.[a]

| Supplemental irrigation treatments | Grade AA (Size more than 23 mm) | Grade A (Size 17–23 mm) | Grade B (Size less than 17 mm) | Light yellow | Brown | Dark brown |
|---|---|---|---|---|---|---|
| Flooding | 1.8 b | 15.4 c | 84.4 c | 29.2 b | 42.3 c | 29. 4 a |
| Sub-surface drip | 2.4 b | 16.6 c | 100.8 b | 38.8 ab | 65.8 b | 37.4 a |
| Micro jet | 10 a | 25 b | 97 b | 59 a | 44 c | 33.4 a |
| Control (Rain-fed) | 0 b | 35 a | 123 a | 17 c | 79 a | 37.25 a |

[a] The means with the same letters in each column are not significantly different using the Duncan test at P≤ 0.05.





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different supplemental irrigation methods significantly increased fig fruit numbers by about 27 to 47% as compared to control treatment. Sharifzadeh *et al.* (2022) indicate that the supplemental irrigation leads to improved fig fruit yield and quality such as fruit size and color in Estahban City. Gunduz *et al*. (2011) found that supplemental irrigation increased peach fruit size and quality. Abdolahipour *et al*. (2019) reported that applying 2000 liters of supplemental irrigation per tree increased fig shoot growth and fruit number. The color and size of fig fruit depend on light intensity, temperature, pollination, fig formation, and soil moisture (Gunduz *et al*., 2011). Flashman (2016) states that soil moisture and drought stress affect fig cell division, cell size, growth rate, and cracking. Micro-sprinkler supplemental irrigation increased apple fruit red color, anthocyanin content, firmness, size, and soluble solids concentration (Iglesias *et al*., 2002). Al-Desouki *et al*. (2009) observed increased nutrient absorption and improved photosynthetic capacity in rain-fed fig with supplemental irrigation.

According to Table 6, supplemental irrigation significantly affected fig fruit weight. Light yellow fruits had the highest weight in micro jet irrigation, but decreased significantly by about 53, 35, and 75% compared to flooding, sub-surface drip, and the control treatments, respectively. Brown fig fruit weight increased in average by about 55% in subsurface drip and control treatments as compared to micro jet and flooding treatments, while there was no significant difference in the weight of dark brown fruits among all irrigation methods (Table 6). Grade AA fig fruit weight was significantly increased in micro jet irrigation by about 78 and 75% compared to flooding and sub-surface drip irrigation, respectively. There were no grade AA fig fruits in the control treatment, highlighting the importance of supplemental irrigation in improving fig fruit quality. Micro jet irrigation also significantly increased grade A fruit weight by about 53 and 56% compared to sub-surface drip and the control, with no significant difference compared to flooding irrigation. The control and sub-surface drip treatments had the highest weight for grade B fruits, while micro jet irrigation had the lowest one. These results demonstrate the effectiveness of micro jet irrigation in increasing both the quantity and quality of fig fruits. Honar *et al*. (2021) found that supplemental irrigation improved rain-fed fig yield in Estahban, Iran. Ntshidi *et al*. (2023) reported that water-saving irrigation methods like drip and micro jet are popular in orchards for abundant high-quality fruit. The finding of this study aligns with the results of Ntshidi *et al*. (2023).

### Water Productivity

The micro jet irrigation method demonstrated the highest water productivity compared to flood irrigation, with no significant difference observed between the

**Table 6.** Effect of supplemental irrigation on weight (g) of fig fruits (*F. carica* cv. Sabz), in 2018 and 2019.[a]

| Supplemental irrigation treatments | Grade AA (Size more than 23 mm) | Grade A (Size 17–23 mm) | Grade B (Size less than 17 mm) | Light yellow | Brown | Dark brown |
|---|---|---|---|---|---|---|
| Flood | 11.5 b | 70.78 a | 341.28 b | 122.2 b | 171.34 b | 96.02 a |
| Sub-surface drip | 13.26 b | 39.22 b | 492.94 a | 168.6 b | 284.2 a | 117.88 a |
| Micro jet | 53.28 a | 83.84 a | 320.62 b | 257.8 a | 181.34 b | 109.26 a |
| Control (Rain-fed) | 0 b | 36.1 b | 492.67 a | 64.25 c | 260.9 a | 109.92 a |

[a] The means with the same letters in each column are not significantly different using the Duncan test at P≤ 0.05.





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two methods. Subsurface drip irrigation, on the other hand, showed a decrease in water productivity due to lower fig yield. However, this decrease may be compensated in future years as the roots can potentially reach the water source in sub surface irrigation more effectively. Further studies are needed to explore this potential for improved water productivity with subsurface drip irrigation over time.

Moursy *et al*. (2023) found that sprinkler and drip irrigation improved crop water productivity. Cavalcante *et al*. (2022) and Sigua *et al*. (2020) reported the significant role of supplemental irrigation in increasing yield and water productivity of rain-fed fig trees in semi-arid regions. Allam *et al*. (2007) found a positive effect of supplemental irrigation on fig tree yield and water productivity in Egypt. Supplemental irrigation provides benefits like higher water productivity, lower crop failure risk, and stable yields (Filintas *et al*., 2021; Wang *et al*., 2021). Zegbe and Servín-Palestina (2021) showed that supplemental irrigation maintains fruit yield, dry mass, and marketable size at the same level as full irrigation, while improving water use efficiency and productivity (Figure 4).

## CONCLUSIONS

Two years of field experiments in rain-fed fig orchards in the semi-arid Kharameh Region showed the effect of different supplemental irrigation methods on fig trees. The results demonstrated that supplemental irrigation greatly affects the quality and quantity of fig fruit. The highest amounts of total chlorophyll, leaf width, and internode length were observed in micro jet irrigation, which promotes photosynthesis, leading to a significant increase in the number and weight of high quality fig fruits (light yellow and grade AA fig fruit) compared to the other irrigation treatments. As the results showed, micro jet irrigation resulted in the highest quality, marketability, and water productivity, making it an effective supplemental irrigation method for compensating rainfall deficiency in rain-fed fig orchards. Future research should focus on determining optimal irrigation levels and schedules for different crops and soils in arid and semi-arid regions. Assessing the economic aspects of supplemental irrigation can warn policymakers and agricultural practitioners about the potential benefits and trade-offs. These findings can facilitate the development of effective water

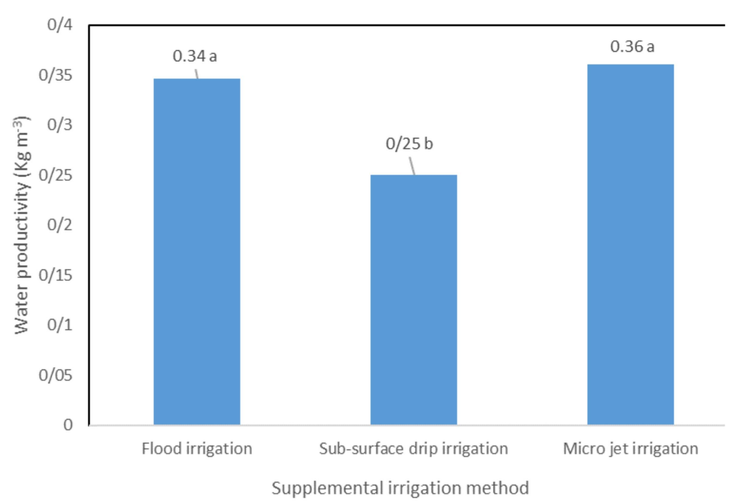


**Figure 4.** Water productivity in different supplemental irrigation methods.





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management, agricultural planning, and investment strategies in regions with insufficient rainfall for rain-fed agriculture

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## پایداری تولید انجیر دیم (*Ficus carica*) تحت آبیاری تکمیلی در مناطق نیمه خشک

**امیر اسلامی، مسلم جعفری، و مریم خزاعی**

## چکیده

در مناطق خشک و نیمه خشک، بارندگی ناکافی نیاز به آبیاری تکمیلی برای برآوردن نیاز آبی محصول دارد. انتخاب روش مناسب برای موفقیت بسیار مهم است. یک آزمایش مزرعه ای دو ساله در منطقه خرامه ایران به منظور بررسی تأثیر روش های مختلف آبیاری تکمیلی بر عملکرد درخت انجیر، پاسخ فیزیولوژیکی و بهره وری آب انجام شد. سه روش آبیاری غرقابی، آبیاری قطره ای زیرسطحی، آبیاری میکرو جت و بدون آبیاری تکمیلی (شاهد) به عنوان چهار تیمار در پنج تکرار اعمال شد. نتایج نشان داد که آبیاری زیرسطحی و





[ DOI: 10.22034/JAST.27.1.233 ]

میکرو جت به طور معنی‌داری باعث افزایش ۱۸.۲ درصدی عرض برگ، ۲۷ درصدی طول شاخساره و ۱۳ درصدی قطر شاخساره شد. همچنین آبیاری میکرو جت باعث افزایش ۱٤ درصدی کلروفیل برگ انجیر، ۱۳٤ درصد میانگین تعداد میوه و ٥٤ درصد میانگین وزن کل میوه نسبت به میانگین سایر تیمارها شد. علاوه بر این، بالاترین سطوح راندمان آب در روش‌های آبیاری میکرو جت مشاهده شد، در حالی که با آبیاری قطره‌ای زیرسطحی ٤۰ درصد کاهش یافت. پیامدهای عملی این مطالعه شامل افزایش عملکرد انجیر، پالایش استراتژی‌های مدیریت آب، تقویت مقاومت به خشکی، تجزیه و تحلیل امکان‌سنجی اقتصادی، سنجش پایداری، و حمایت از اشتراک دانش و مهارت‌ها برای کشت انجیر در مناطق نیمه‌خشک است.