Evaluating the efficiency of irrigation periods and weed control on growth and yield of maize, Baghdad 3 variety

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Abstract

A Field trials were conducted on the premises of the College of Agricultural Engineering Sciences (Station A) for planting maize (Baghdad 3 cultivar) during the fall season of 2023.to evaluate the impact of irrigation intervals and weed control on maize growth and Components of the yield. Using a The experiment applied the split-block design according to the randomized complete block design (RCBD) with three . Repeaters, as the main panels included irrigation treatments and the secondary panels included control treatments,The following treatments were applied after planting:with three replications, the study included irrigation treatments every 5, 7, and 9 days, and weed control treatments (weed-free, nicosulfuron at recommended(60 g h-1) and half concentrations(30 g h-1), rimsulfuron at recommended(120 g h-1) and half concentrations (60 g h-1),, and weedy). Results showed significant differences among treatments. The 5-day irrigation interval resulted in highest plant height (198.60 cm), greater crop growth rate (4.933 g plant^{-1} day^{-1}), and higher yield efficiency (111.34 g m^{-2}) compared to the 9-day interval. The nicosulfuron at recommended treatment produced the highest plant height (205.53 cm), highest leaf count (12.56 leaves per plant), largest leaf area (0.70 m^2), and highest crop growth rate (5.351 g plant^{-1} day^{-1}). In contrast, the weedy treatment had the lowest values in these parameters. Ear length and the number of grains per row were highest in the nicosulfuron at recommended treatment (20.44 cm and 37.11 grains per row, respectively) and lowest in the weedy treatment. The interaction of weed control and irrigation significantly affected yield efficiency, with the highest recorded in the nicosulfuron treatment (135.53 g m^{-2}). These findings underscore the importance of optimal irrigation and effective weed control for maximizing maize growth and yield.

Keywords: Irrigation Intervals, Weed Control, yield components, yield efficiency herbicide efficiency

***Part of M.Sc. thesis of 1st author**

Introduction

Maize (Zea mays L.) is a cereal crop belonging to the Poaceae family. Maize is considered one of the most important food and industrial grain crops in the world, ranking third globally in terms of cultivated area and production, after wheat and rice [10, 39]. In the Arab world, maize ranks third after wheat and barley in terms of the cultivated area, and second after wheat in terms of production. The cultivated area of maize in the Arab world reached 1,518.42 thousand hectares, producing approximately with an average yield of 5.934 megagrams per hectare [22.[

Maize is considered a summer crop that relies on surface irrigation. Irrigation is one of the environmental factors that significantly impact yield traits and quality by influencing the growth stage, the formation of plant organs, and their growth. Water plays a crucial role in enhancing the absorption availability of nutrients, cell growth and division, and the regulation of the photosynthesis process. Additionally, it acts as a solvent and a medium for transporting these substances to different parts of the plant [17, 31, 42, 54, 55]. Water also provides the necessary energy for carbon assimilation processes, which are involved in the synthesis of organic food, and helps moderate plant temperature [59.[

Water consumption is the total amount of water lost through evaporation and transpiration from the plant, including the water lost by the plant through its leaves to the external environment during the growing season, as well as the water consumed by the plant for tissue building, plus the evaporation from the soil surface [53]. Nephawe et al., [50] defined it as the depth of water required to compensate for water loss due to evapotranspiration from a healthy, growing plant in a wide field under soil conditions that do not limit growth, which includes an abundance of soil water and fertility to achieve full production under certain environmental conditions.

One of the important factors related to the productivity and growth of the crop is the irrigation intervals, which impact the field traits and, consequently, the yield and its components. Studies have shown that the duration of male and female flowering is highly sensitive to water stress due to the reduction in photosynthetic products. This affects the length and formations of the ear as part of these products are directed towards the female and male inflorescences [4]. The results of the study by Al-Aridhee, and Mahdi [6] indicated that increasing the irrigation interval (10-14 days) caused a delay in the timing of male and female flowering by an average of 4-5 days, and a reduction in plant height by 21%, leaf area by 28%, leaf area index by 32%, and grain yield by 30% compared to the interval of (5-7 days). However, the water use efficiency did not differ between the two treatments. Al-Aboudi [4] confirmed that reducing the number of irrigations for maize plants leads to a decrease in the dry weight of the vegetative parts. Ibrahim and Kandi [44] indicated that the length of the maize ear is reduced under water deficiency. Exposure of maize plants to water stress leads to a reduction in ear length [49]. Plant height is a quantitative trait that is significantly affected by environmental conditions.

Marino et al., [48] observed that water directly influences the activities of enzymes and hormones in the newly fertilized ovary, which in turn reduces the number of grains per row and consequently the number of grains per ear and the yield of maize. Plant yield is considered a complex quantitative trait, involving multiple characteristics, and thus reflects environmental conditions and genetic influences. It is the final result of both primary and secondary yield components, and it plays a significant role economically [47.[

In a study to determine the effect of irrigation intervals on the growth components and yield of the plant, Al-Roumi [16] subjected maize plants to irrigation intervals of five and ten days. The results showed that the five-day irrigation interval gave higher values in terms of the number of ears and plant yield, with (1.260 ears plant-1 and 221.11 grams plant-1) respectively, compared to the ten-day interval which resulted in lower values of (1.137 ears plant-1and 163.86 grams plant-1) respectively, with an increase of 10.81%. Xiukang et al.,

[60] indicated that increasing the interval between irrigation periods led to a significant decrease in plant height and leaf area of maize. Bahadur and Singh [24] stated that irrigation scheduling reflects the extent to which the plant benefits from the added water and is the main criterion for evaluating the yield of agricultural production systems in water-limited areas, where water poses the greatest obstacle to yield. The decrease in plant height under the influence of increased irrigation intervals may be attributed to the reduced division, expansion, and elongation of leaf and stem cells due to the decreased water potential of plant cells, which is linked to the reduced availability of soil water. This results in decreased leaf area and, consequently, reduced interception of light and efficiency in converting it to chemical energy [23]. El-Sahookie [35] indicated that moisture deficiency in the root zone reduces the cell's water content, which limits stem elongation and leaf expansion .

Taiz and Zeiger [57] noted that the reduction in relative water content of leaves diminishes their ability to swell and elongate, thereby reducing cell size and leaf area in plants. The consumption of large amounts of water by competing plants can limit the availability of this crucial environmental element to neighboring plants. Therefore, water becomes a limiting factor for growth and survival when weeds compete with crop plants, especially during water scarcity in the summer, affecting yield and productivity. The lack of proper water management has led to water wastage at a time when the region is experiencing increasing water scarcity due to excessive water use, drought, and the expansion of semi-arid areas, which hinder agricultural expansion [1]. Additionally, reduced water inflow and increased desertification [14], further exacerbate the situation.

Weeds reduce crop productivity worldwide, with losses in maize estimated at around 20 billion tons or 14.5% of the total crop. Weeds have a strong root system, competing with plants for nutrients and moisture in the soil more than cultivated plants.Therefore, the weeds are considered very dangerous plants. It has been observed that they have the property of greatly reducing the production and quality of grains due to their strong absorption of nutrients, water and light from the soil, which provides shade.And competition for cultivated plants, so different methods of control must be used, the easiest of which are herbicides. When the herbicides spread widely, one or another herbicide must be chosen to study the density of weed Turdiyeva et al [58.[

Thus, the study aims to:

.1 Study the effect of irrigation intervals on the growth and yield of maize.

.2 Determine the optimal herbicide concentration for weed control to optimize water consumption in the growth and yield of maize.

Materials and Methods

A field experiment was conducted at the fields of the College of Agricultural Engineering Sciences (Station A) to cultivate maize (Baghdad 3 cultivar) during the Autumn season of 2023. The aim was to under different herbicide concentrations and the effect of irrigation intervals on growth and Components of the yield of maize. The field was prepared by plowing, smoothing, and leveling, and then divided into three replications. Each replication contained 18

ISSN 2072-3857

experimental units, with each unit measuring 2x3 meters. Soil samples were taken for analysis table (1) . Seeds were sown in rows with spacing of 75 cm between rows and 25 cm between plants, resulting in a plant density of 53,333 plants h-1 11 of july.

The experiment was fertilized with NP fertilizer according to the recommended doses, applied in three stages: the first before planting, the second when the plants reached a height of 30 cm, and the third during the flowering stage [32]. The maize stem borer (Sesamia cretica L.) was controlled by applying granular diazinon insecticide (10% active ingredient) at a rate of 6 kg ha-1. This treatment was carried out twice: the first application 20 days after germination and the second application 15 days after the first [5]. The experiment applied the split-block design according to the randomized complete block design (RCBD) with three

Repeaters, as the main panels included irrigation treatments and the secondary panels included control treatments,

The following treatments were applied after planting :

First Factor: Irrigation Interval Treatments: After the plants reached the 8-leaf stage, the following irrigation treatments were applied:

.1 Irrigation every five days, denoted as D5.

.2 Irrigation every seven days, denoted as D7.

.3 Irrigation every nine days, denoted as D9.

• Second Factor: Weed Control Treatments

.1 Weed control using Rimsulfuron 25% at the recommended concentration (120 g h-1), produced by HELM, USA.

.2 Weed control using Rimsulfuron 25% at half the recommended concentration (60 g h-1.(

.3 Weed control using Nicosulfuron at the recommended concentration (60 g h-1), produced by SINERIA, Cyprus.

.4 Weed control using Nicosulfuron at half the recommended concentration (30 g h-1 .(

.5 Weed-free treatments.

.6 Weedy treatments.

The harvest was completed on October 29th.

Measurement Parameters

.1 Plant Height (cm): Measured from the soil surface to the highest point of the plant's stem at maturity [33.[

.2 Total Number of Leaves per Plant: The number of leaves was counted manually from the first leaf near the soil surface to the last node below the male inflorescence for three plants, and the average was calculated [30.[

.3 Leaf Area (cm^2): Calculated as the square of the length of the leaf below the main ear multiplied by 0.75 [33.[

.4 Crop Growth Rate (g $plant^{-1}$ day^{-1}): Determined by dividing the dry matter at this stage by the number of days from the first irrigation (planting irrigation) until 75% female flowering [31.[

.5 Corncob (cm): Calculated as the average length of five ears.

.6 Number of Rows per Ear: Calculated as the average number of rows in five ears per experimental unit.

.7 Number of grains per row: Calculated as the average number of grains per row in five ears per experimental unit.

.8 Yield Efficiency (g m^{-2}): Determined by dividing the grain yield by the leaf area of the plant [28.[

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Results and discussion

Effect of irrigation intervals and weed control on plant height (cm:(

The results in Table (1) show significant differences among the weed control treatments in terms of plant height. The weedy treatment resulted in the lowest plant height at 179.67 cm, whereas the weed-free treatment resulted in the highest plant height at 215.53 cm, followed by the treatment with nicosulfuron at the recommended concentration, which resulted in a plant height of 205.53 cm. The superiority of the weed-free and weed control treatments over the weedy treatment in terms of plant height is attributed to the efficiency of the herbicide in controlling weeds, allowing the crop to access more water and nutrients, thereby increasing plant height [15]. These findings are consistent with those reported by Al-Tamimi [19], Al-Ubaidi [21], and Ramesh et al. [52.[

The results also indicate significant differences in plant height based on different irrigation intervals. The nine-day irrigation interval resulted in the lowest plant height at 193.03 cm, whereas the five-day interval resulted in the highest plant height at 198.60 cm. This may be due to the prolonged lack of moisture negatively affecting cell division and elongation, as well as the absorption and transport processes, thus reducing plant height. Longer irrigation intervals lead to decreased plant height due to the reduced water potential in the stem cells, falling below the level required for cell elongation, resulting in shorter internodes and, consequently, shorter plants. These findings are in agreement with Faraj [37], Ahmed [3], Hossain et al. [43], and Hassoni [41]. The interaction between irrigation intervals and weed control treatments was not significant for this trait.

Effect of irrigation intervals and weed control on number of leaves plant^{-1}

The results in Table (1) show significant differences among the weed control treatments in terms of the number of leaves plant-1. The weedy treatment resulted in the lowest number of leaves at 9.07 leaves plant-1, whereas the weed-free treatment resulted in the highest number of leaves at 12.89 leaves plant-1, followed by the treatment with nicosulfuron at the recommended concentration, which resulted in 12.56 leaves plant-1. This may be attributed to the efficiency of the herbicide and the increased competition between weeds and crop plants for essential growth requirements, leading to reduced vegetative growth, including the number of leaves plant-1. These findings are consistent with El-Sobky [36], Al-Ubaidi [20], and Al-Tamimi [19]. No significant differences were observed between the different irrigation intervals, nor were there significant differences in the interaction between weed control treatments and irrigation intervals for this trait.

ISSN 2072-3857

Table (1): The effect of irrigation intervals and weed control on plant height, number of leaves

Weed control Treatments (C)	Plant height (cm) Irrigation intervals (D) D5	D7	D9	Mean weed control	Number of leaves plant^{-1} Irrigation intervals (D) D5	D7	D9	
C1	198.3	196.7	195.0	**196.67**	12.07	12.00	11.87	**11.98**
C2	188.3	186.7	185.0	**186.67**	10.33	10.00	9.67	**10.00**
C3	208.3	205.0	203.3	**205.53**	12.73	12.53	12.40	**12.56**
C4	195.0	191.7	188.3	**191.67**	11.73	11.20	11.00	**11.31**
C5	220.0	218.3	208.3	**215.53**	13.00	12.87	12.80	**12.89**
C6	181.7	179.0	178.3	**179.67**	9.13	9.07	9.00	**9.07**
Mean Intervals	198.6	196.23	193.03		11.50	11.28	11.12	
LSD 0.05	LSD (C) 7.79**	LSD (D) 1.06**	LSD (CD) NS		LSD (C) 0.26**	LSD (D) NS	LSD (CD) NS	

C1=Rimsulfuron (Recommended dose) C2= Rimsulfuron (½ Recommended dose) C3=Nicosulfuron(Recommended dose) C4=Nicosulfuron (½ Recommended dose) C5=weed free C6=Weedy

Effect of irrigation intervals and weed control on leaf area per plant (m²(

The results in Table (2) revealed significant differences among weed control treatments in terms of leaf area plant-1. The weedy treatment resulted in the lowest leaf area at 0.54 m², while the weed-free treatment resulted in the highest leaf area at 0.75 m², which was not significantly different from the treatment with nicosulfuron at the recommended concentration, which gave 0.70 m². This indicates the efficiency of the herbicide, as the competition between weeds and maize plants led to a decrease in vegetative growth indicators, including leaf area. The reduction in weed density and increased weed control allowed for optimal utilization of growth requirements, positively impacting leaf area. Leaf area increases with favorable growth conditions, leading to an increase in the number of cells and expansion of the leaf area, which positively affects the rate of photosynthesis and functional activities in the plant [25]. These findings are consistent with those of Al-Hiti [8], Tagour [56], Al-Rawi [15], Al-Ubaidi [21], Al-Ubaidi [20],, and Al-Tamimi [19]. No significant differences were observed between the different irrigation intervals, nor were there significant differences in the interaction between weed control treatments and irrigation intervals for this trait.

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Effect of irrigation intervals and weed control on crop growth rate (g $plant^{-1}$ day^{-1}:(

The results in Table (2) indicate significant differences among the weed control treatments in terms of crop growth rate. The weedy treatment resulted in the lowest crop growth rate at 2.094 g $plant^{-1}$ day^{-1}, while the weed-free treatment resulted in the highest crop growth rate at 6.457 g $plant^{-1}$ day^{-1}, followed by the treatment with nicosulfuron at the recommended concentration, which resulted in 5.351 g $plant^{-1}$ day^{-1}. The superiority of the weed-free and weed control treatments over the weedy treatment in terms of crop growth rate can be attributed to the effectiveness of the herbicide. The absence or reduced competition from weeds allowed the crop to grow better and meet its growth requirements without stress, thereby increasing the photosynthetic outputs, which positively affected the crop growth rate. These findings are consistent with those of Al-Jalabi and Al-Jubouri [11], Cerrudo et al. [27], and Al-Khuzai [13], who found that weed control treatments significantly increased dry matter and, consequently, the crop growth rate.

The results also indicate significant differences in crop growth rate based on different irrigation intervals. The nine-day irrigation interval resulted in the lowest crop growth rate at 3.399 g $plant^{-1}$ day^{-1}, whereas the five-day interval resulted in the highest crop growth rate at 4.933 g $plant^{-1}$ day^{-1}. The reduction in crop growth rate with less frequent irrigation may be due to the negative impact of water stress on carbon assimilation, respiration, osmotic adjustment, stomatal opening and closing, inhibition in most parts of the plant, and accelerated leaf senescence, leading to reduced metabolic production and, consequently, a lower plant growth rate [4, 45, 51, 58, 61.[

Significant differences were also observed in the interaction between weed control treatments and irrigation intervals. The interaction between the weedy treatment and the nine-day irrigation interval resulted in the lowest crop growth rate at 1.903 g $plant^{-1}$ day^{-1}, while the interaction between the treatment with nicosulfuron at the recommended concentration and the five-day irrigation interval resulted in the highest crop growth rate at 6.970 g $plant^{-1}$ day^{-1}, which was not significantly different from the weed-free treatment with a five-day irrigation interval

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ISSN 2072-3857

Table (2): The effect of irrigation intervals and weed control on leaf area (m2), and crop growth rate (g plant⁻ ¹ day⁻ ¹(

Weed control Treatments (C)	Leaf area (m^2) Irrigation intervals (D) D5	D7	D9	Mean weed control	Crop growth rate (g plant⁻ ¹ day⁻ ¹) Irrigation intervals (D) D5	D7	D9	
C1	0.62	0.64	0.63	**0.63**	5.283	3.857	3.143	**4.094**
C2	0.61	0.60	0.55	**0.59**	3.803	2.990	2.920	**3.238**
C3	0.75	0.68	0.67	**0.70**	6.970	5.257	3.827	**5.351**
C4	0.42	0.60	0.60	**0.54**	4.787	3.810	2.393	**3.663**
C5	0.78	0.77	0.69	**0.75**	6.717	6.447	6.207	**6.457**
C6	0.62	0.52	0.47	**0.54**	2.037	2.343	1.903	**2.094**
Mean Intervals	**0.63**	**0.64**	**0.60**		**4.933**	**4.117**	**3.399**	
LSD 0.05	LSD (C)	LSD (D)	LSD (CD)		LSD (C)	LSD (D)	LSD (CD)	
	0.08**	NS	NS		0.270**	0.351**	0.468**	

C1=Rimsulfuron (Recommended dose) C2= Rimsulfuron (½ Recommended dose) C3=Nicosulfuron(Recommended dose) C4=Nicosulfuron (½ Recommended dose) C5=weed free C6=Weedy

Effect of irrigation intervals and weed control on ear length (cm:(

The results in Table (3) show significant differences among the weed control treatments in terms of ear length. The weedy treatment resulted in the shortest ear length at 15.11 cm, while the weed-free treatment resulted in the longest ear length at 22.33 cm, followed by the treatment with nicosulfuron at the recommended concentration, which resulted in an ear length of 20.44 cm. This clearly demonstrates the effectiveness of the herbicides in eliminating competition from weeds, allowing the maize plants to benefit from growth requirements, thus positively impacting ear length. These findings are consistent with those of Kandil and Kordy [46], Faza et al. [38], Al-Khuzai [13], and Al-Tamimi [19.[

The results also indicate significant differences in ear length based on different irrigation intervals. The nine-day irrigation interval resulted in the shortest ear length at 16.89 cm, while the five-day interval resulted in the longest ear length at 18.89 cm. This may be due to the negative impact of prolonged moisture deficiency on cell division and elongation, absorption, and transport, which reduces ear length. Longer irrigation intervals lead to reduced ear length due to decreased water potential [9.[

Significant differences were also observed in the interaction between weed control treatments and irrigation intervals. The interaction between the weedy treatment and the nine-day irrigation interval resulted in the shortest ear length at 12.33 cm, while the interaction between the weed-free treatment and the five-day irrigation interval resulted in the longest ear length at 23.33 cm. This was not significantly different from the treatments with nicosulfuron and rimsulfuron at the

ISSN 2072-3857

recommended concentration with irrigation intervals of 5, 7, and 9 days.

Effect of irrigation intervals and weed control on number of rows per ear (rows ear⁻ ¹:(

The results in Table (3) show significant differences among the weed control treatments in terms of the number of rows ear-1. The weedy treatment resulted in the lowest number of rows at 10.33 rows, while the weed-free treatment resulted in the highest number of rows at 15.89 rows, which was not significantly different from the treatment with nicosulfuron at the recommended concentration, which resulted in 15.11 rows. This indicates that the presence of weeds competing with crop plants for growth requirements reduces the number of rows ear-1. This competition affects vegetative growth traits such as plant height and leaf area, which in turn influences the ear diameter and consequently the number of rows ear-1 [2, 15, 19, 40]. No significant differences were observed between the different irrigation intervals, nor were there significant differences in the interaction between weed control treatments and irrigation intervals for this trait.

Table (3): The effect of irrigation intervals and weed control on ear length (cm), and number of rows per ear (rows ear⁻ ¹(

Weed control Treatments (C)	**Ear length (cm)**				**number of rows per ear (rows ear⁻ ¹)**			
	Irrigation intervals (D)			**Mean weed control**	**Irrigation intervals (D)**			
	D5	**D7**	**D9**		**D5**	**D7**	**D9**	
C1	19.00	18.67	18.67	**18.78**	14.00	13.33	13.33	**13.55**
C2	14.33	14.00	13.67	**14.00**	11.67	11.33	11.00	**11.33**
C3	21.33	20.33	19.67	**20.44**	15.33	15.33	14.67	**15.11**
C4	15.33	16.00	15.33	**15.55**	12.33	12.33	11.67	**12.11**
C5	23.33	22.00	21.67	**22.33**	16.33	16.00	15.33	**15.89**
C6	20.00	13.00	12.33	**15.11**	10.67	10.33	10.00	**10.33**
Mean Intervals	**18.89**	**17.33**	**16.89**		**13.39**	**13.11**	**12.67**	
LSD 0.05	LSD (C) 1.68**	LSD (D) 1.38*	LSD (CD) 2.92**		LSD (C) 0.81**	LSD (D) N.S	LSD (CD) N.S	

C1=Rimsulfuron (Recommended dose) C2= Rimsulfuron (½ Recommended dose) C3=Nicosulfuron(Recommended dose) C4=Nicosulfuron (½ Recommended dose) C5=weed free C6=Weedy

Effect of irrigation intervals and weed control on number of grains per row (grains row⁻ ¹:(

The results in Table (4) show significant differences among the weed control treatments in terms of the number of grains row-1. The weedy treatment resulted in the lowest number of grains row-1 at 19.34 grains, while the weed-free treatment resulted in the highest number at 38.44 grains row-1, followed by the treatment with nicosulfuron, which resulted in 37.11 grains row-1. This can be attributed to

ISSN 2072-3857

the effectiveness of the herbicide in reducing weed competition, which enhances photosynthetic efficiency, increasing ear length by directing nutrients to the reproductive parts. This, combined with effective flowering and pollination under suitable environmental conditions, leads to an increase in the number of grains [2, 13, 15, 19, 29, 56 .[

The results also indicate significant differences in the number of grains row-1 based on different irrigation intervals. The nine-day irrigation interval resulted in the lowest number of grains row-1 at 29.17 grains, whereas the five-day interval resulted in the highest number at 31.78 grains row-1. The increased moisture availability promotes cell division, nutrient transport, and the formation of florets that develop into seeds. In contrast, water stress inhibits carbon assimilation and slows the transport of assimilates to the grain storage sites due to increased cell solution concentration, causing fertilized grain abortion and thus reducing the number of grains row-1 [18, 26].No significant differences were observed in the interaction between weed control treatments and irrigation intervals for this trait.

Effect of irrigation intervals and weed control on yield efficiency (g m^{-2}(

The results in Table (2) revealed significant differences among the weed control treatments in terms of yield efficiency. The weedy treatment resulted in the lowest yield efficiency at 41.52 g m^{-2}, while the treatment with nicosulfuron at the recommended concentration resulted in the highest yield efficiency at 135.53 g m^{-2}, which was not significantly different from the weed-free treatment. This increase is due to the absence of weeds, allowing the crop to fully benefit from the surrounding environmental factors and reduced competition, leading to higher efficiency in utilizing resources for yield production.

Significant differences were also observed in yield efficiency based on different irrigation intervals. The nine-day irrigation interval resulted in the lowest yield efficiency at 82.79 g m^{-2}, whereas the five-day interval resulted in the highest yield efficiency at 111.34 g m^{-2}. The increase in water stress with the nine-day interval negatively impacts the plant's efficiency in yield formation. Significant differences were also observed in the interaction between weed control treatments and irrigation intervals. The interaction between the weedy treatment and the nine-day irrigation interval resulted in the lowest yield efficiency at 34.31 g m^{-2}, while the treatment with nicosulfuron at the recommended concentration and irrigation intervals of five and seven days resulted in the highest yield efficiencies at 145.24 and 147.26 g m^{-2}, respectively, which were not significantly different from the weed-free treatment.

ISSN 2072-3857

Table (4): The effect of irrigation intervals and weed control on grains per row (grains row⁻ ¹), and yield efficiency (g m⁻ ²(

Weed control Treatments (C)	Grains per row (grains row⁻ ¹) Irrigation intervals (D) D5	D7	D9	Mean weed control	Yield efficiency (g m⁻ ²) Irrigation intervals (D) D5	D7	D9	
C1	36.00	34.00	31.33	33.78	137.15	121.86	99.67	119..56
C2	27.67	26.33	24.33	26.11	64.74	62.24	48.49	58.49
C3	37.67	37.33	36.33	37.11	145.24	147.26	114.08	135.53
C4	30.33	27.33	26.67	28.11	130.33	84.85	81.39	98.86
C5	39.33	38.33	37.67	38.44	141.04	133.35	118.77	131.05
C6	19.67	19.67	18.67	19.34	49.54	40.70	34.31	41.52
Mean Intervals	31.78	30.50	29.17		111.34	98.38	82.79	
LSD 0.05	LSD (C) 1.09**	LSD (D) 1.01**	LSD (CD) N.S		LSD (C) 6.07**	LSD (D) 5.51**	LSD (CD) 10.52**	

C1=Rimsulfuron (Recommended dose) C2= Rimsulfuron (½ Recommended dose) C3=Nicosulfuron(Recommended dose) C4=Nicosulfuron (½ Recommended dose) C5=weed free C6=Weedy

Table (5): Soil analysis

Ds m^{-1}	**0.88**	**Electrical conductivity 1:1)(**	
____	**7.33**	**Interaction levels) 1:1(**	
meq .L^{-1}	**3.8**	**Ca^{+2}**	**Ions**
meq .L^{-1}	**2.22**	**Mg^{+2}**	
meq .L^{-1}	**2.1**	**Na^{+}**	
meq .L^{-1}	**2.19**	**SO_4^{+2}**	
meq .L^{-1}	**15.3**	**Cl**	
meq .L^{-1}	**Nil**	**$C0_3^{-2}$**	
meq .L^{-1}	**1.01**	**HCO_3**	
g kg^{-1}	**11.0**	**Organic matter O.M) (**	
g kg^{-1}	**200**	**Minerals**	
Mg kg^{-1}	**30.5**	**N**	
Mg kg^{-1}	**6.20**	**P**	
Mg kg^{-1}	**1.05**	**K**	
g kg^{-1}	**332**	**sand**	**soil**
g kg^{-1}	**420**	**Alluvial**	
g kg^{-1}	**248**	**Clay**	
Loam			

ISSN 2072-3857

Conclusion

The study concludes that both irrigation intervals and weed control significantly influence the growth and yield of maize (Baghdad 3 cultivar). Optimal irrigation every 5 days and effective weed control, particularly with nicosulfuron at the recommended concentration, resulted in the highest plant height, leaf area, crop growth rate, and yield efficiency. In contrast, prolonged irrigation intervals (9 days) and the presence of weeds significantly reduced these parameters. The findings highlight the critical importance of maintaining appropriate irrigation schedules and employing effective herbicide treatments to minimize competition from weeds, thereby maximizing maize productivity.

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