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INFLUENCE OF IRRIGATION WATER TYPE, DAP AND MAX-GRO ON VEGETATIVE GROWTH AND LEAF NUTRIENT CONTENT OF PLUM TREES (*PRUNUS SPP.*) CV. SAMARRA

HAKAR **A**. **K**HALIL and **S**HUKRI **H**AJI **S**ALIH **B**ANI
Dept. of Horticulture, College of Agricultural Engineering Science, University of Duhok, Kurdistan Region-Iraq

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ABSTRACT

This research was conducted in the growing season at an orchard at the Faculty of Agricultural Engineering Sciences in the Summel district of the Duhok governorate (Kurdistan region- Iraq) (2022) to examine the effects of basin irrigation, DAP supply, and Max-Gro foliar spray, and fish basin irrigation on the vegetative development and leaf nutritional content of three-year-old plum trees cv.Samarra. The experiment included three factors, the first one is type of water (fish basin water and Tap water), the second factor is soil supply with DAP fertilizer (N 18% and P 46%) (0, 50 and 100 g/tree) and the third factor is trees spray with three concentrations of organic liquid fertilizer (0, 2 and 4 ml. L^{-1}). The experimental units were set up as a split-split plots experiment using a factorial experiment (2*3*3) in a Randomized Complete Block Design (RCBD). Here is a summary of the findings: The features of vegetative development were enhanced by irrigation (Single Leaf area (cm2 /plant),Increment in stem diameter (cm), Increment in number of secondary branches ,Number of leaves per branch, Leaf dry matter (%),of plum trees with fish water. The application of DAP plum trees significantly increased all studied parameters (increased leaf area, shoot number, shoot length, stem diameter, number of secondary branches, and number of leaves per branch) as well as the nutrients concentrations in leaves foliar applications of Maxi-Gro.

KEYWORDS: Plum cv. 'Samarra' , water type, DAP, Maxi-Grow.

INTRODUCTION

The Rosaceae family contains the vast and commercially significant genus Prunus, which includes the peach/nectarine, almond, apricot, cherry, and plum. Prunus is also known as Prunus domestica. One of the first fruits that humans may have tamed was fruit, but the size and extended generation time of these tree crops have hindered progress through traditional breeding and long-term selection procedures.. Prunus salicina, Prunus simonii, and has been linked to East European and Caucasian highlands, whereas three of the most often grown species are only found near human settlements. Together with olives, grapes, and figs, plum remnants have also been discovered at Neolithic-era archaeological sites. According to (**Albala, 2011)** Iran is where plums first appeared. They were transported from Asia to Britain River water provides the majority of the people with their main supply of drinking water and is the foundation of the industrial and agricultural sectors. The best possible use of water resources is fundamentally important due to the world's rapid population expansion, quick economic development, pollution, and environmental deterioration. As a result, water availability is diminishing in the countries. In this context, exploring robust solutions to some aspects of this problem is necessary. For instance, desalinating brackish water, reusing low-quality water produced by agricultural areas and fish farms, and using water in agriculture more effectively earlier research shown the value of reusing drainage water from fish farming systems to address the issue of water scarcity. For instance, **(Abdelraouf *et al*., 2014)** found that the reuse of fish farming systems' drainage water is seen as an alternative and a step toward resolving the issue of water shortage. According to **Porrello *et al*., (2005),** feeding air-breathing fish results in the accumulation of fecal, feed, and excretory

effluents in the water of fish basins. These effluents are rich in nutrients and other elements that are crucial for crop growth and can be a reliable source of fertilizer for agricultural crops. According to **(Lin and Yi's findings from 2003),** using catfish waste water to irrigate fields has been shown to be one of the most affordable options for treating effluent. **(Wood *et al.* 2001)** evaluated the feasibility of using fish pond drainage water to irrigate wheat and noted that the fish pond drainage water can increase wheat output while reducing the quantity of fertilizers needed for wheat cultivation. **(Okasha *et al.* 2016)** examined the impact of water type (canal water and drainage water of fish farming systems), nitrogen rate, and soybean production under sprinkler irrigation system and found drainage water to be the most important factor compared to fresh canal water, of fish farms produced better soybean production and water productivity. **(Sikawas and Yakupitiyage 2010)** When the possibilities of using fish pond drainage water to grow lettuce was examined, it was discovered that filtering the drainage water is an efficient application for hydroponically growing lettuce. **(Attafy and Elsbaay 2017)** employed fish effluents to drip irrigation lettuce crops at various nitrogen fertilization levels and discovered that the nitrogen productivity of fish drainage water was greater than that of canal fresh water.

When ammonium phosphate fertilizers first became accessible in the 1960s, DAP quickly rose to the top of the market. It is created by the controlled reaction of phosphoric acid and ammonia, followed by the cooling, granulating, and sieving of the hot slurry. DAP is easily handled and stored. Because of the relatively high standard nutritional grade of DAP (18-46-0), fertilizer products with lesser nutrient contents may not bear the DAP name. The most popular phosphorus fertilizer in use worldwide is diammonium phosphate (DAP). Its relatively high nutritional content and great physical qualities make it a popular option in farming and other sectors. It is created from two typical components in the fertilizer business. An effective source of P and nitrogen (N) for plant nutrition is DAP fertilizer. Due to its high solubility, it dissolves fast in soil and releases phosphate and ammonium that are useful to plants. The alkaline pH that forms surrounding the dissolving granule is a prominent feature of DAP. The seedlings and plant roots closest to the volatile ammonia might be injured when the dissolving DAP grains release ammonium. When the soil pH is higher than 7, which is a state that frequently obtains surrounding the dissolving DAP granule, this possible harm more frequently takes place users should avoid using excessive quantities of DAP close to seeds that are germination in order to prevent this harm. An good source of nitrogen, the ammonium in DAP is progressively transformed to nitrate by soil microorganisms causing the pH to further decrease. As a result, the increase in soil pH caused by DAP granules is only a passing phenomenon. The micro-site interactions of phosphate and soil organic matter may be impacted by this early elevation in soil pH near DAP. IPSNI (2014), International Plant Nutrition Institute. **(AL-Shujairy and Al-Hadethi 2021)** examined the impact of spraying plant extracts (turmeric and ginger) and liquid organic fertilizer (vit -org) on the growth and leaf mineral and hormonal content of "Hollywood" plum trees. There were three levels (0, 30 and 60) of providing liquid organic fertilizer to trees, two levels (10 and 20) of spraying plant extracts onto each tree, and a control treatment. The findings demonstrated a substantial impact of the addition of liquid organic fertilizer (vit-org) on vegetative development characteristics, particularly given that the treatment (60 ml. $Tree^{-1}$) considerably outperformed the control in the majority of the attributes examined. Spraying with plant extracts (turmeric and ginger) increased the examined features significantly. The spraying treatment (20 g. L^{-1}) performed better in terms of shoot nitrogen content and leaf area than it did in terms of leaf dry weight, chlorophyll content, and zinc content**.**

MATERIAL AND METHOD

This study was conducted in College of Agricultural Engineering Sciences orchard located in Summel district, Duhok governorate, Kurdistan region, Iraq, during growing season (2022) to investigate the influence of irrigation with fish basin water, DAP soil supply and Max-Gro foliar spray on vegetative growth and leaf nutrient content of three years old plum trees cv. Samarra.

The experiment included three variables: the type of water (fish basin water and tap water), the amount of DAP fertilizer applied to the soil (N 18% and P 46%) at three different times (beginning of growth started, and repeated twice

more as one-month periods (1/3, 1/4, and 1/5/2022), and the amount of organic liquid fertilizer sprayed on the trees at three different concentrations (0, 2 and 4 ml. L-1). With one Tap for each tree, the irrigation system uses drip irrigation and is padlocked. The cultural separation is 4 × 4 meters. The "Samarra" cultivar trees came from a nursery in Malta and were uniform in size, vigor, and growth. Tree height, branch count, and diameter were all measured. all studied parameters (increased leaf area, shoot number, shoot length, stem diameter, number of secondary branches, and number of leaves per branch) according to Duncan's multiple range test at 5% level.(SAS.2007).

RESULTS

1 -Leaf Area (cm^2)

Table (1) results show that watering of plum trees with fish water led to a considerable increase in leaf area, reaching (55.51 cm^2) as compared to the tap water. The effect of DAP plum trees with concentration 100g $tree^{-1}$ was significant increase the leaf area(55.48cm^2) as compared with concentration 50g tree-1and control. Foliar spraying of Maxi-Grow at concentration 4 mg. L^{-1} significantly surpassed in enhancing the leaf area which gives the highest value (55.72 cm^2) as compared to the control.

Table (1): Effect of Fish water, DAP, Maxi-Grow and their interactions on leaf area (cm^2) of plum trees cv. Sammera.

Type of water	DAP(g/tree)	Maxi-Grow(Ml/L)			Water*DAP	Effect of Water
		0	2	4		
Tap Water	0	48.02 fg	48.52 efg	50.37 c-g	48.97 c	52.04 b
	50	52.94 b-f	51.59 b-g	59.47 ab	54.67 ab	
	100	51.81 b-g	49.55 d-g	56.08 a-e	52.48 bc	
Fish Water	0	45.06 g	58.40 ab	53.26 a-f	52.24 bc	55.51 a
	50	55.05 a-f	58.13 abc	54.22 a-f	55.80 a	
	100	57.88 abc	56.67 a-d	60.91 a	58.48 a	
Water*Maxi-Grow	Tap Water	50.92 c	49.88 c	55.31 ab	Effect of DAP	
	Fish Water	52.66 bc	57.73 a	56.13 ab		
DAP*Maxi-Grow	0	46.54 c	53.46 ab	51.81 b	50.60 b	
	50	54 ab	54.86 ab	56.84 ab	55.23 a	
	100	54.84 ab	53.113 ab	58.5 a	55.48 a	
Effect of Maxi-Grow		51.79 b	53.81 ab	55.72 a		

Means of each factor and their interactions followed by the same or shared letters are not significantly different from each other according to Duncan's multiple range test at 5% level.

Table (1) shows the considerable impact of the interaction between fish water and DAP on the leaf area and the maximum leaf area. (58.48 cm^2) was gotten from the interaction between fish water + 100 g DAP $tree^{-1}$. The combination of fish water with Max-grow had a substantial effect on the leaf area. Furthermore, the highest leaf area (57.73 cm^2) was created by combining fish water with concentration L^{-1} Maxi-Grow 2ml. was produced by the interaction of 2ml L^{-1} Maxi-Grow and fish water. On the leaf area of plum trees, the interaction between DAP and Maxi-Grow had a substantial impact.

The interaction between fish water + 100 g DAP $tree^{-1}$ + 4 ml was found as a result of the interaction between fish water, DAP, and Maxi-Grow L^{-1} Maxi-Grow was the most significant effective interaction because it produced the highest value of the leaf area (60.91 cm^2), whereas Fish Water + 0g DAP tree $^{-1}$+ 0ml produced the lowest value (45.06 cm^2). Maxi-Grow L^{-1}.

2 Stem Diameter (mm)

Results in Table (2) demonstrate that there was no discernible difference between watering plum plants with fish water and tap water.

Nevertheless, the addition of DAP concentrations significantly increased the concentrations of stem diameter, particularly at concentrations (100g DAP tree $^{-1}$) increase Stem Diameter (18.59 cm). Maxi-Grow While concentrations did not have a substantial impact when sprayed on plum trees.

Table (2): Effect of Water, DAP,Maxi-Grow and their interactions on Increase Stem Diameter (mm)of plum trees cv. Sammera.

Type of water	DAP(g/tree)	Maxi-Grow(ml/L)			Water*DAP	Effect of Water
		0	2	4		
Tap Water	0	12.80 b	14.19 ab	15.43 ab	14.14 c	16.64 a
	50	17.45 ab	17.44 ab	18.79 ab	17.89 ab	
	100	20.53 a	16.61 ab	16.57 ab	17.90 ab	
Fish Water	0	15.49 ab	16.18 ab	15.93 ab	15.87 abc	16.56 a
	50	14.52 ab	15.33 ab	13.74 b	14.53 bc	
	100	20.39 a	18.93 ab	18.53 ab	19.28 a	
Water*Maxi-Grow	Tap Water	16.93 a	16.08 a	16.93 a	Effect of DAP	
	Fish Water	16.80 a	16.81 a	16.06 a		
DAP*Maxi-Grow	0	14.15 b	15.18 b	15.68 b	15.00 b	
	50	15.99 b	16.38 ab	16.26 ab	16.21 b	
	100	20.46 a	17.77 ab	17.55 ab	18.59 a	
Effect of Maxi-Grow		16.86 a	16.44 a	16.50 a		

It is clear from Table (2) interaction between fish water and DAP that the stem diameter was significantly impacted, where the highest value (19.28 mm) was obtained at 100 g tree^{-1} DAP and fish water . It is clear that the interaction of the spray Maxi-Grow and tap water had no appreciable impact on the growth in stem diameter.

The combination of DAP and Maxi-Grow showed that there was a considerable impact on the growth in stem diameter, but the greatest rise in stem diameter occurred when the two treatments were used separately (20.46 mm) was obtained at 100 g tree^{-1} DAP + 0ml /L^{-1} Maxi-Grow combination .

The triple combination of the kind of Water, DAP, and Maxi-Grow had a considerable impact on the growth of stem diameter. The ideal formula for increasing stem diameter (20.39 mm) was fish water + 100 g tree^{-1} DAP + 0ml /L^{-1} Maxi-Grow The lowest

increase in stem diameter, , (12.80 mm) was observed in the combination between tap water +0ml L^{-1} Maxi-Grow + 0 g tree^{-1} DAP .

3 Number of secondary branches

It is clear from Table (3) that watering of plum trees with fish water and tap water had no appreciable impact on the growth in the number of secondary branches. That the presence of DAP in plum trees, particularly at concentrations

of 100 g DAP tree^{-1} compared to 50 g tree^{-1} and control, significantly increased the number of secondary branches. the number of secondary branches significantly increases when Maxi-Grow concentrations are sprayed on plum trees, especially at higher doses (8.57). (4ml L^{-1}Maxi-Grow) .

Table (6): Effect of Fish water, DAP and Maxi-Grow, their Increment in number of secondary branches of plum trees cv. Sammera.

Type of water	DAP(g/tree)	Maxi-Grow(Ml/L)			Water*DAP	Effect of Water
		0	2	4		
Tap Water	0	6.86 bc	6.9 bc	8.1 abc	7.28 b	7.94 a
	50	6.33 c	8.36 abc	8.16 abc	7.62 b	
	100	8.86 ab	8.06 abc	9.8 a	8.91 a	
Fish Water	0	6.86 bc	6.86 bc	8.3 abc	7.34 b	7.74 a
	50	7.93 abc	7.66 abc	7.26 bc	7.62 b	
	100	7.1 bc	7.93 abc	9.8 a	8.27 ab	
Water*Maxi-Grow	Tap Water	7.35 b	7.77 ab	8.68 a	Effect of	
	Fish Water	7.3 b	7.48 b	8.45 ab	DAP	
DAP*Maxi-Grow	0	6.86 b	6.88 b	8.2 b	7.31 b	
	50	7.13 b	8.01 b	7.71 b	7.62 b	
	100	7.98 b	8 b	9.8 a	8.59 a	
Effect of Maxi-Grow		7.32 b	7.63 b	8.57 a		

The two-way interaction between fish water and DAP demonstrated that the number of secondary branches was significantly impacted, with the maximum number of secondary branches (8.91) was obtained at the interaction of Tap Water with 100g tree^{-1} DAP . Also, the combination of fish water and Maxi-Grow significantly increased the number of secondary branches necessary at the combination of tap water and Maxi-Grow + 4 mg L^{-1} Maxi-Grow in which the maximum number of secondary branches (8.68). The results in Table (3) revealed that DAP and Maxi-Grow had a substantial interaction on the number of secondary branches, with the most effective interaction being 100g tree^{-1} DAP + 4 mg L^{-1} Maxi-Grow, which produced the most secondary branches (9.8).

The results of the triple interaction between type of water, DAP and Maxi-Grow indicated that the most significant effective interaction was Fish Water + 100g tree^{-1} DAP + 4 mg L^{-1} Maxi-Grow as it gave the highest number of secondary branches (9.8) .

4 Leaves per branch^{-1}.

Significantly, the findings in Table (4) demonstrate that there was no discernible difference in the number of leaves per branch^{-1} between plum trees treated with tap water and fish water over the research season on the treatment's impact on the quantity of leaves per shoot, DAP (100g tree^{-1}) gave the highest value which was (44.97 leaves.shoot^{-1}). However, the lowest value obtained from (0g tree^{-1}) which was (35.80 leaves.shoot^{-1}).

in Table (4) demonstrate that spraying plum plants with Maxi-Grow concentrations had a noticeable impact. (2 mg L^{-1} and 4 mg L^{-1}) on number of leaves per branch^{-1} ,as compared with control.

Table (7): Effect of Fish water, DAP and Maxi-Grow, their Increment in Number of leaves per branch of plum trees cv. Sammera

Type of water	DAP(g/tree)	Maxi-Grow(Ml/L)			Water*DAP	Effect of Water
		0	2	4		
Tap Water	**0**	**31.16 g**	**31.5 g**	**38.66 d-f**	**33.77 d**	**39.85 a**
	50	**36.83 efg**	**44.5 bcd**	**44.83 a-d**	**42.05 b**	
	100	**44 bcd**	**45.66 abc**	**41.5 b-e**	**43.72 ab**	
Fish Water	**0**	**33.33 fg**	**34.66 fg**	**45.5 abc**	**37.83 c**	**39.85 a**
	50	**35 efg**	**37.33 efg**	**34.16 fg**	**35.5 cd**	
	100	**39.33 c-f**	**51.33 a**	**48 ab**	**46.22 a**	
Water*Maxi-Grow	**Tap Water**	**37.33 bc**	**40.55 ab**	**41.66 a**	**Effect of DAP**	
	Fish Water	**35.88 c**	**41.11 a**	**42.55 a**		
DAP*Maxi-Grow	**0**	**32.25 e**	**33.08 e**	**42.08 bc**	**35.80 c**	
	50	**35.91 de**	**40.91 bc**	**39.5 cd**	**38.77 b**	
	100	**41.66 bc**	**48.5 a**	**44.75 ab**	**44.97 a**	
Effect of Maxi-Grow		**36.61 b**	**40.83 a**	**42.11 a**		

It is clear from the table (4) showed that the number of leaves per branch of plum trees was considerably impacted by the interactions between type of water and DAP; the greatest value was achieved with fish water + (100g tree^{-1}) of DAP which was (46.22) leaves.shoot^{-1} compared with most interaction treatments.

The highest significant number of leaves.shoot^{-1}(42.55) was recorded from interaction of fish water + 4 mg. L^{-1} Maxi-Grow. While the lowest number of leaves(35.88) obtained from fish water + 0 mg. L^{-1} Maxi-Grow interaction.

The most significant amount of leaves per shoot determined by the interactions and effects of 100g tree^{-1} DAP + 2 mg. L^{-1} Maxi-Grow which was (48.5) leaves.shoot^{-1}. While the lowest number of leaves was obtained with control (31.25)leaves.shoot^{-1}.

The interactions of the three factors under study on the number of leaves, the interaction treatment of the three factors, and (Fish water 100g tree^{-1} DAP and 2 mg. L^{-1} Maxi-Grow. study season gave the heights on number of leaves (51.33). The trees that produced the fewest leaves throughout the study season were untreated (31.16).

5 Leaf Dry Matter (%)

The Table(5) shows that irrigation with fish water results in considerably higher leaf dry weights than control. The highest leaf dry weight measurement was made during irrigation fish water., (46.90 %). While the lowest value with Tap Water(45.23%).

The highest value of leaf dry matter percentage—a record 47.52%—was obtained after applying DAP. Nonetheless, the minimum value was reported to (50g tree^{-1} DAP) and control .

It was a noteworthy outcome of the Maxi-Grow plum foliar spray at 4 mg. L^{-1} concentration on the Leaf Dry Matter percentage as compared to 2 mg. L^{-1} and the control .

Table (8): Effect Fish water, DAP and Maxi-Grow and their Increment in the leaf dry matter percentage (%)of plum trees cv. Sammera

Type of water	DAP(g/tree)	Maxi-Grow(Ml/L)			Water*DAP	Effect of Water
		0	2	4		
Tap Water	**0**	**41.07 c**	**44.44 bc**	**46.32 ab**	**43.94 c**	**45.23 b**
	50	**44.37 bc**	**44.30 bc**	**47.23 ab**	**45.30 bc**	
	100	**46.45 ab**	**45.61 ab**	**47.26 ab**	**46.44 b**	
Fish Water	**0**	**46.25 ab**	**46.52 ab**	**48.23 ab**	**47.00 ab**	**46.90 a**
	50	**45.96 ab**	**44.67 bc**	**44.68 bc**	**45.10 bc**	
	100	**49.26 a**	**47.77 ab**	**48.76 a**	**48.59 a**	
Water*Maxi-Grow	**Tap Water**	**43.96 c**	**44.78 bc**	**46.93 a**	**Effect of DAP**	
	Fish Water	**47.15 a**	**46.32 ab**	**47.22 a**		
DAP*Maxi-Grow	**0**	**43.66 d**	**45.48a-d**	**47.27 ab**	**45.47 b**	
	50	**45.16 bcd**	**44.49 cd**	**45.95 a-d**	**45.20 b**	
	100	**47.85 a**	**46.69 abc**	**48.01 a**	**47.52 a**	
Effect of Maxi-Grow		**45.56 b**	**45.55 b**	**47.08 a**		

The percentage of leaf dry weight was shown to be significantly impacted by the interaction between fish water and DAP. Moreover, the highest proportion of dry leaf weight (48.59%) was found in the fish water + 100g tree^{-1} DAP interaction Table(5).

The revealed a strong interaction between fish water and Maxi-Grow on leaf dry weight percentage, with fish water being the most powerful interaction+ 4 mg. L^{-1} Maxi-Grow which gave the highest percentage (47.22 %), were indicated that the interaction 100g tree^{-1} DAP + 4 mg. L^{-1} Maxi-Grow Given that it produced the largest proportion of leaves with a dry weight of (48.01%), it seemed to be the most successful treatment.

The most important and effective interaction, according to the findings of the triple interaction between type water, DAP, and Maxi-Grow, was fish water + 100g tree^{-1} DAP + 0 mg. L^{-1} Maxi-Grow as it gave the highest leaf dry weight percentage (49.26 %) .

DISCUSSION

1-effect of fish water:

It is evident from the data in Tables 1, 2, 3, 4, and 5 that Irrigation plum trees with fish water improved the vegetative development characteristics(the vegetative growth features (increase leaf area, shoot number, shoot length, stem diameter, number of secondary branches and number of leaves per branch) and the levels of nutrients in leaves) were affected significantly by irrigation plum trees with fish water . were considerably impacted by the irrigation of fish water on plum trees. Evidence supporting this conclusion has been cited by **(Al-Bitar et al., 2023), (Ellyzatul, et al., 2018), (Silva, et al., 2018), (Ojobor and Tobih, 2015),(Isitekhale and Adamu, 2016), (Selim, and Shams, 2019),..** and reason of increasing this parameter is that the fish and dairy farm effluents were abundant in nitrogen (N), **(Ellyzatul, et al., 2018) .**

2-Effect of DAP:

Add DAP to soil 3 times during growing season were improved the vegetative development characteristics (the vegetative growth features (increase leaf area, shoot number, shoot length, stem diameter, number of secondary branches and number of leaves per branch) and the levels of nutrients in leaves) were affected significantly by DAP this result similar **to (Al-Bitar et al., 2023)** and reason of increasing this parameter is the rules of DAP It is made by carefully combining phosphoric acid and ammonia, chilling the resulting hot slurry, granulating it, and sifting it DAP is quite easy to handle and store. Although the normal grade of DAP is 18-46-0, fertilizer products with lower nutrient concentrations may not be categorized as DAP. DAP fertilizer is a reliable supply of P and nitrogen (N) for plant nutrition. It quickly breaks down in soil and releases phosphate and ammonium that are beneficial to plants because

of its high solubility. The alkaline pH that develops surrounding the granule that is dissolving is one of the most notable features of DAP (en.wikipedia.org/wiki/Diammonium_phosphate) .

3-Effect of Max-Gro:

The foliar application of plum trees with Maxi-Grow especially concentration 4 mg increase in all studied parameters . (the vegetative growth features (increase leaf area, shoot number, shoot length, stem diameter, number of secondary branches and number of leaves per branch) and the levels of nutrients in leaves) the similar results is sited by **(Saini and Saini 2019).** And reasons of this increasing is micronutrient needs are partially satisfied by the soil, chemical fertilizers, and other sources. These mineral nutrients control several bodily and metabolic processes.

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پوختە

ئەڤ ڤەکۆلینە هاتیە ئەنجام دان ل ئێك ژ بیستانێن کولیژا زانستێن ئەندازیاریا چاندنێ کودکەفیتە دەڤەرا سێمێل ،باژێرێ دهوك، هەرێما کوردستانێ ،عیراق،ل وەرزێ کەشەکرنا سالا(2022) بودیارکرنا کارتێکرنا ئاڤدانێ ب ئاڤا برکا ماسیا ،وبدانا فوسفاتێ ئەمونیومێ دوانی ،ورشاندنا ماکس _کرویێ بەلکی ل سەرشینکاتیا کەشە و پێکهاتا بەلکی ژتوخمێن خارنێ ییێن دارا حولیکێ ژیێ وێ(۳) سێ سال جورێ (.cv) سامراو. ڤەکولین پێکهاتیە ژ ۳ فاکتەران ،یائیکێ جورێ ئاڤێ(ئاڤا برکا ماسیا و ئاڤا حەنەفیێ) وفاکتەرێ دووێ دانا ئاخێ ب زبلی (پەنێ) P46% DAP و 50) (N18%و100گرام دار) سێ جارا (دەسپێکا کەشەکرنێ، دوبارکرنا دوجارینە دئێک هەیڤدا) (۲۰۲۲/۳/۱، ۲۰۲۲/٤/۱، ۲۰۲۲/٥/۱) و فاکتەرێ سیێ رەشاندنا دارا ژ سێ(۳) تیراتیان ژیەنیێ کژوکیایێ روون (0,2,4 مل/لتر) کریارا رەشاندنێ هاتیە ئەنجامدان دەدەسپێکا مەها نیسانێ و هاتیە دووبارە کرن دووجارێن دی دهەر نیڤ هەیفەکێ دا (۱٥روژان) (۲۰۲۲/٥/٤،۱/٤،۱٥/۱) سیستە مێ ئاڤدانێ ، ئاڤدانا چپکێ دلۆپ بو (کارئنانا قفلا) دکەل هەر دلوپ دلوپەکێ بو هەر دارەکێ. دیراتیا چاندنێ ٤*٤م.جورێ سامراو هاتیە ب دەستفە ئینان ل نەمامکەها مالگایێ.پێکفە کونجای دکەسکاتیێ و تیرە و کەشێ دا.

هاتیە ڕێز بەنکرن ئەف یەکەێن ڤەکولینێ وەک ڤەکولینەکا فرەهوکار (3*3*2)((factorial) ب نەخشێ کەرێنەی بەرەلایی یاتمام (RCBD) وەک ئەزمونەکا جودا (ژێک ڤەکری).

—دەر ئەنجام هاتیە کورت کرن ڤی شێوێ خارێ:

۱-ئاڤدانا دارێن حلیکێ ب ئاڤا ماسیا بو ئەکەرێ باشکرنا تایبەتمەندییێن (ساخلەتێن) کەشەکرنا کەسکاتی یێ (روبەرێ بەلکی)کەرەستێ هشکێ بەلکی و تیراتێن خارنێ دبەلکادا(کلوروفیل تمام،پێکهاتێ پروتینی یێ بەلکی) کارتێکرنەکا بەرچاف هەبو دئاڤدانا دار حلیکێ ب ئاڤا ماسیا.

۲ـکریارا دانا DAP ب ئاخێ دا بو دار حلیکێ ، تایبەت بتیراتیا (۱۰۰ کرام /لتر) زێدەکرنەکا بەرچاڤ دیارکر دهەمی ساخلەتێن هاتینە ڤەکولین.ژبلی زێدهی یا مەکنسیومی بەلگی٪،کاربوهیدراتێ تمام،تیراتیا قەدی).

۳ـ کریازا رەشاندنا دار حلیکێ ب ماکسی_گرو تایبەت تیراتیا ٤ملیکرام هەمی ساخلەتێن هاتینە ڤەکولین زێدەکرن.

٤ـ گریارا جورێ ئاڤێ و DAP روبەرێ بەلکی ،تیرەیا قەدی،ژمارەیا تاگێت رەخی ژمارا بەلکا بوهەر تاکەکێ ،ڕێژەیا کێشا بەلکێ یاهشک، درێژیا تاکی،پێهاتیێ کلوروفیلێ بەلکی، ریژەیا مەکنسیومێ بەلکی،تیراتیا ئاسنێ بەلکی،بلنترین پکهاتێ پروتینێ بەلکی، ریژەیا نایتروجنێ بەلکی ب شێوەیەکێ بەرچاڤ زێدەکر.

٥- تێکەلکرنا پەینێ ژ جورێ ئاڤێ و ماکسی -گرو بشێوەیەکێ بەرچاف کارتێکرن ل سەرزێدەکرنا هەرێک ژ روبەرێ بەلکی ، کەرەستێ هشکێ بەلکی،درێژیا تاکی،تاکێن رەخی،ژمارا بەلکا،بلنداهیا نەماما،کلوروفیلێ تمام دبەلکاندا، پێکهاتێ پروتینێ بەلکی، ریژەیا نایتروجنێ بەلکی، ریژەیا فسفورێ بەلکی، ریژەیا پوتاسیومێ بەلکی، تیراتیا ئاسنێ بەلکی، تیراتیا زنکێ بەلکی.

٦- تێکەلکرنا پەینا DAP و ماکسی_گرو دیاربو کو کارتێکرنەکا بەرچاڤ ل سەر زێدەکرنا هەمی ساخلەتێن هاتینە ڤەکولین کرن.

۷- تێکەلکرنا هەرسێ فاکتەرێن هاتینە ڤەکولین سەرەدەریا تێکەلکرنا (چورێ ئاڤێ ، DAP , ماکسی ـ گرو) بلنترین بهایێ بەرچاڤ وەرکرت ژهەمی ساخلەتێن هاتینە ڤەکولین.

الخلاصة

أجريت هذه الدراسة في بستان كلية علوم الهندسة الزراعية الواقع في منطقة سيميل ، محافظة دهوك ، إقليم كردستان ، العراق ، خلال موسم النمو (2022) للتحقق من تأثير الري بمياه حوض السمك ، وإمداد فوسفات الأمونيوم الثنائي ، ورذاذ ماكس-جرو الورقي على النباتات. النمو ومحتوى الأوراق من العناصر الغذائية لأشجار البرقوق عمرها ثلاث سنوات صنف. سامراء. اشتملت التجربة على ثلاثة عوامل ، الأول هو نوع الماء (مياه حوض السمك ومياه الصنبور) ، والعامل الثاني هو إمداد التربة بسماد DAP (N 18 ٪ و P 46٪0) (، 50 ، 100جم / شجرة). ثلاث مرات (بداية النمو ، وتكرر مرتين أخريين كل شهر) (3/1 ، 4/1 و 2022/5/1) والعامل الثالث هو رش الأشجار بثلاث تركيزات من السماد العضوي السائل (0 ، 2 و 4 مل-L 1)تتم عملية الرش في بداية أبريل وسوف تتكرر مرتين أخريين كل نصف شهر (4/1 ، 4/15 و 2022/5/1). نظام الري هو الري بالتنقيط (باستخدام أقفال) مع قطارة واحدة لكل شجرة. مسافة الثقافة 4 * 4 م. تم الحصول على أشجار الصنف "سامراء" من مشتل مالطا ، متجانسة في النمو والقطر والنشاط.

تم ترتيب الوحدات التجريبية كتجربة عاملية (2 * 3 * 3) في تصميم القطاعات العشوائية الكاملة (RCBD) كتجربة قطع منفصلة. تم تلخيص النتائج على النحو التالي: ري أشجار البرقوق بماء السمك أدى إلى تحسين خصائص النمو الخضري ، كما أدى تطبيق أشجار البرقوق DAP إلى زيادة معنوية في جميع العوامل المدروسة (زيادة مساحة الورقة ، عدد الفروع ، طول الساق ، قطر الساق ، عدد الأفرع الثانوية وعدد الأفرع. عدد الأوراق لكل فرع) وتركيزات العناصر الغذائية في الأوراق (إجمالي الكربوهيدرات ، نسبة النيتروجين في الأوراق ، نسبة الفوسفور في الأوراق ، ونسبة البوتاسيوم في الأوراق ، نسبة المغنيسيوم في الأوراق ، تركيز الحديد الورقي وتركيز أوراق الشجر) ، التطبيق الورقي لأشجار البرقوق مع Maxi-Grow أيضا زيادة معنوية في جميع المتغيرات المدروسة.