Evaluation of the efficiency of spraying with sugar alcohols, salicylic acid and soil quality Fragaria ananassa Duch

N. I. Kh. Al-Zubaidi Kh. A. S. Al-Hamdani
Department of Biology, College of Education, University of Samarra,Iraq;nora.a@uosamarra.edu.iq
Faculty of Agriculture, Samarra University , Iraq;: Khalid.a.s@uosamarraa.edu.iq

Abstract

The experiment was carried out in the plastic house of the Department of Horticulture and Garden Engineering - Faculty of Agriculture - Samarra University - for the season 2023-2024 to study the response of the Strawberry plant Fragaria ananassa Duch to spraying with sugar alcohols and salicylic acid grown under environmental stress. Strawberry seedlings were prepared from a private nursery in Sulaymaniyah Governorate. The study included three factors where the factors of the study were as follows : The first factor sugar alcohols and three levels of treatment of the coupler (water only) (T0) and sugar alcohols in a concentration of 3 ml .L-1 (T2) and 6 mL.L-1 (T3). The second factor was represented by salicylic acid with three levels of comparison treatment (water only) (C0) and salicylic acid with a concentration of 20 mg.L-1 (C1) and 40 mg.L-1(C2. (

.The third factor is (soil type) : gypsum soil and its symbol S 1, mixed soil and its symbol S2.As for the other workers, the additives are included in the paper spray, and they were added by two times 1/10 , 22/10, and at a rate of two sprays, and the period between one spray and another was twenty-one days.

sprayed with sugar alcohols, especially at the level of 6 ml.L-1 to a significant increase in the rate of increase in the number of leaves, stem diameter, stem length, fruit diameter, fruit weight and per plant yield, reaching 33.44 leaves.seedling -1, 0.31 mm, 33.44 cm, plant-1, 33.05 mm , 19.02 g, 390.1 g, while the comparison treatment gave the lowest rate of the aforementioned qualities.

He also Spraying with salicylic acid, especially concentration, is 40 mg .The liter -1 (C) led to a significant increase in the studied qualities, represented in the rate of increase in the number of leaves, the diameter of the stem, the length of the stem, the diameter of the fruit, the weight of the fruit and the yield of one plant, as it reached 32.00 leaves. Sapling -1, 5.92 mm , 3.39 mm , 31.86 mm , 19.18 g 372.6 g for the aforementioned qualities. Bilateral and triangular interactions between soil types, salicylic acid and sugar alcohols showed significant differences in all the qualities studied

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Keywords: Strawberry, soil type, foliar spraying sugar alcohols , salicylic acid

)It is not necessary that the keywords are taken from the title (

Introduction

Fragaria ananassa Duch belongs to strawberries. To the Rosaceae family, which is one of the most important crops with small fruits and early fruits in production and their ability to grow and adapt in different environmental conditions and be widespread in different regions of the world [22] .Shalek is one of the fruits with a sweet taste that contains acidity and high nutritional value, as well as being rich in many vitamins, sugars, organic acids and many mineral elements [20]. . Plant growth regulators are organic chemical

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compounds that are manufactured naturally or artificially. They are considered non-food and are added in low doses and absorbed by the tissues of plants and then bind to the receptors of (Receptor) after moving to the sites of their effectiveness. After that, a secondary transmission system is activated to activate or inhibit the effectiveness of the cell. Their effectiveness depends on the physiological processes that take place within the tissues of the plant, depending on the type of plants, phase .Its growth , the type of regulator used , the concentrations used, the method of addition , in addition to the controlling environmental conditions during the transaction [1] Paper feeding is a very economical option, as it reduces the need for large amounts of nutrients, especially large amounts of them. In addition, rapid response is a prominent feature of leaf feeding, , where nutrients can be added according to the needs of the plant and its stages of growth quickly and effectively, which contributes to the balanced growth and development of the plant [5]. Salicylic acid has important effects on the physiological processes related to the growth and development of plants under normal conditions (without stress), including controlling the absorption and transfer of cellular ions, accelerating the formation of chlorophyll and carotene pigments, accelerating the process of carbon construction and permeability of membranes, and increasing the activity of some important enzymes[9]. indicate [8] When used for four concentrations of salicylic acid in the growth of the bazoon eye plant (.Catharathus roseus L), where he noticed a significant increase in the characteristics of vegetative growth at a concentration of 100 mg L-1, especially the height of the plant and the dry weight and the number of branche, as well as the total concentration of chlorophyll and the nitrogen percentage in the leaves, potassium and phosphorus compared to other concentrations 0, 25 and 50 mg . The researchers explained[21] that there are significant differences between the concentrations of salicylic acid spraying 0, 100, 200 and 300 mgL-1 on the basil plant Ocimum basilicum, where the highest nitrogen content of the leaves gave the concentration(300 mg L-1), which reached 2.33% , while the comparison treatment without spraying gave the lowest content of 2.20% . As shown by the results of a study between them[10] There are significant differences between the concentrations of salicylic spraying 0, 2, 4 and 6 mg L-1 on the sweet seed plant, where the concentration of 6 mg L-1 recorded the highest average seed yield of 1070.5 kg E-1, while the comparison treatment without spraying gave the lowest average of 968.2 kg E-1. Sugar alcohols are simple organic compounds that are naturally manufactured within the plant. They are one of the most important products of photosynthesis, as sugars are hydrogenated carbohydrates in which the aldehyde group (CHO) is reduced to the hydroxyl group (CH2OH). These sugars have the ability to move freely and easily within the plant [15] . [13] confirmed the study of the effect of diabetic alcohol mannitol on the cauliflower plant Brassica oleracea L. at concentrations of 400,200,0 (mg L-1), which led to a significant increase in the height of the plant, the content of the leaves of chlorophyll and the dry weight of the vegetative total, as well as the mineral content of the proportion of nutrients NPK in the leaves. In general, biotic and abiotic pressures adversely affect crop production and cause a significant reduction in annual crop yields, any quality and quantity [10]. Gypsum soil is one

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of the types of soil where gypsum is one of the soluble salts found in the soil, which can cause damage to the soil, where the soil that contains gypsum is called gypsum soil (Soil Gypsiferous). [4]. Gypsum soils are spread in a number of countries of the world and soils containing quantities of gypsum are classified (CaSO4. 2 H2O) that it is gypsum if it contains a gypsum horizon with a thickness of not less than 15 cm located within the first meter of the soil muqadd, and with a gypsum content that exceeds the next horizon by at least 5% [14]. ,The mixed soil affects the plant with its physical, chemical and biological properties. Its content of mineral elements, organic materials and tissue structure arefactors that play an essential role in plant nutrition, and the soil serves as a reservoir of nutrients for the plant and the development of roots is related to the availability of these materials [6 .[

Material and Methods

Prepare samples:

The experiment was carried out in the plastic huse of the Department of Horticulture and Garden Engineering - Faculty of Agriculture - Samarra University - for the season 2023-2024 to study the response of the Strawberry plant (Fragaria ananassa Duch) to spraying with sugar alcohols and salicylic acid growing under environmental stress. The Strawberry seedlings were prepared histologically abundant, which was obtained from a nursery in Sulaymaniyah Governorate, where it was planted in plastic dishes that were transported to the soil and then irrigated. Samples of the field soil were taken from different places with a depth of 0-30 cm in order to conduct chemical and physical analyses of the soil

Table (1) Some physical and chemical characteristics of the soil used in the experiment

Title	Value	Value	Unit
Soil weave	Lomay Sand	Gypsum	--
Sand	60.4	73.2	%
Alluvial	9.52	7.2	%
Clay	30.08	19.6	%
PH	7.12	7.31	--
EC	2.32	4.7	M^{-1}
Organic matter	2.9	1.4	kg
Nitrogen (N)	11.25	1.06	mg/kg
phosphorous (P)	14.4	19.4	mg/kg
Potassium - K	1635	2145	mg/kg
Magnesium, Mg	15.96	17.33	mg/kg
Chlorine Cl	9.5	5.49	mg/kg
Nitrate (NO_3)	141	163, 2.	mg/kg
Phosphate (PO_4)	63.4	89.9	mg/kg
$CaCO_3$		17%	

*Soil was analyzed in the laboratories of the Department of Environment and Water at the Ministry of Science and Technology

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Experimental Design

The experiment was conducted according to a Completely Randomized Block Design (R.C.B.D), with three replications. The land was divided into three rows, with the bottom row 60 cm wide and the upper rows 40 cm wide, all 30 cm high, and each row was 25 meters long. Each experimental unit consisted of 18 subunits, with 4 seedlings planted in each subunit. The distance between each plant was 25 cm, and there was a 1-meter gap between the rows. Irrigation was performed using a drip irrigation system..

The study included the following transactions :

-1The first factor: sugar alcohols with three levels (6.3.0) ml. L-1 (T0, T1, T2) sequentially . I prepared the concentrations of sugar alcohols by adding them in 2 liters of distilled water with the addition of a number of drops of (Tween20) as a diffuser of sugar alcohols during spraying by mixing them well with the prepared solution in a 2-liter spray to reduce the surface tension of the spray solution and increase the paper area for higher absorbability. The spraying process was carried out at a rate of two sprayers, where the first spray was done on 2/10/2023 and the duration was between one spray and another twenty-one days

-2The second factor: Salicylic acid growth regulator with three levels (40,20,0) mg. L-1 (C0, C1, C2) sequentially . The concentrations of the growth regulator prepared salicylic acid by dissolving it in 2 liters of distilled water after measuring the concentrations with a four-tier sensitive balance with the addition of a number of drops of (Tween20) as a diffuser of salicylic acid during spraying by mixing it well with the prepared solution in a 2-liter spray to reduce the surface tension of the spraying solution and to increase the paper area for higher absorbability. The spraying process was carried out at a rate of two sprayers, where the first spray was done on 1/10/2023 and the duration was between one spray and another twenty-one , and when spraying, an interval must be observed between the target treatment and other transactions to prevent the transfer of different concentrations between experimental units and to ensure complete wetness of the leaves

-3The third factor:. the quality of the soil, where two types of soil were used to know the treatment of stress, which is

Gypsum soil with symbol S1, mixed soil (Sand ,Clay,Silt) with symbol S2

The qualities of vegetative and quotient growth studied

-1Number of leaves (leaf-1) : The number of leaves for the plant was calculated for each experimental unit and then the rate was taken.

-2Stem Diameter (mm): The stem diameter of the plants for each experimental unit was measured by the electronic service device (virnier) and the stem diameter rate was extracted for each transaction.

-3Stem length (cm plant-1): The average height of plants for each transaction was extracted at the end of the experiment after measuring their height using the measuring tape starting from the surface of the soil to the top of the growing plants.

-4Fruit diameter (mm): The diameter of 5 fruits was measured from the width of the fruit area for each experimental unit using the Vernier.

-5Fruit weight (g): The total weight of the fruits of the experimental unit was calculated and then divided by the total number of fruits according to the following equation

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fruit weight = the total weight of fruits in the experimental unit ÷ the total number of fruits in the experimental unit

-6One plant Yield (g): The plant quotient was found by dividing the total sum of the five plants marked in each experimental unit by five

Results and Discussion

Number of papers

The results of Table (2) indicate that there are no significant differences in the number of papers as a result of the impact

of soil types.As for the impact of the treatment of spraying with sugar alcohols, the treatment of spraying T2 with a concentration of 6 ml -1 excels morally, giving the highest rate of 33.44 sheets .Sapling -1compared to the comparison treatment, which gave the lowest average of 24.94 sheets .1 As for the effect of salicylic acid (C), treatment C2 exceeded the concentration 40 mg L-1 morally, giving the highest rate of 32.00 mm compared to the comparison treatment, which gave the lowest rate of 27.94 sheets .(1)As for the impact of the bilateral overlap between the types of soil and sugar alcohols T×S, the results of Table (2) showed that there are significant differences, as the transaction S1T2 was superior, as it recorded the highest value of 34.00 sheets .seedling -1,compared to other interference coefficients. As for the overlap between soil types and salicylic acid, the transaction S2C2 was superior, which recorded the highest value of 32.89 sheets .seedling -1, while the transaction S2C0 gave the lowest rate of 25.56 sheets .As for the overlap between sugar alcohols and salicylic acid, the treatment of T2C2, which gave the highest value of 35.50 mm , outperformed the treatment of T0C0, which gave the lowest value of 21.67 sheets .Sapling -1.As for the effect of triple interference between soil types, sugar alcohols and salicylic acid C×T×S, the transaction S2T2C2 was superior, which gave the highest value of 36.00 sheets .seedling -1, while the transaction S1T0C0 gave the lowest value of 20.00 sheets

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Table (2) The impact of soil types and spraying with sugar alcohols and salicylic acid and the overlap between them in the number of leaves (paper .Sapling $^{-1}$) for *Fragaria ananassa Duch*

'ypes of TSE Soil (S)	Sugary alcohols T	Salicylic acid C))			S × T
		C_0	C_1	C_2	
S_1	T_0	20.00	25.33	27.67	**24.33**
	T_1	34.00	30.67	33.33	**32.67**
	T_2	32.67	34.33	35.00	**34.00**
S_2	T_0	23.33	25.00	28.33	**25.56**
	T_1	27.00	30.33	31.67	**29.76**
	T_2	30.67	32.00	36.00	**32.89**
Soil Types Rate (S)					
S×C	S_1	28.89	30.11	32.00	**30.33**
	S_2	25.56	29.67	32.89	**29.37**
Glucose Alcohol Rate (T)					

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T×C	T_0	21.67	25.17	28.00	**24.94**
	T_1	30.50	30.50	32.50	**31.17**
	T_2	31.67	33.17	35.50	**33.44**
Effect of salicylic acid (C)		**27.94**	**29.61**	**32.00**	

L.S.D % 5

C× T× S	C×T	C×S	T×S	C	T	S
4.30	**3.04**	**2.49**	**2.49**	**1.76**	**1.76**	**N.S**

diameter of the stem

The results of Table (3) indicate that there are significant differences in the diameter of the stem as a result of the impact of soil types, as the mixed soil S2 gave the highest rate of the number of leaves at 0.30 mm, while the gypsum soil S1 gave the lowest rate of 0.25 mm. As for the impact of the treatment of spraying with sugary alcohols, the treatment of spraying T2 with a concentration of 6 ml l -1 was significantly superior, as it gave the highest rate of 0.31 mm compared to the comparison treatment, which gave the lowest rate of 0.23 mm . As for the effect of salicylic acid (C), treatment C2 exceeded the concentration of 40 mg L-1 significantly, giving the highest rate of 0.30 mm compared to the comparison treatment, which gave the lowest rate of 0.25 mm .As for the impact of the bilateral overlap between the types of soil and sugar alcohols T×S, the results of Table (3) showed that there are significant differences, as the transaction S2T2 was superior, as it recorded the highest value of 0.34 mm compared to other overlap coefficients. As for the overlap between soil types and salicylic acid, the transaction S2C2 was superior, which recorded the highest value of 0.32 mm , while the transaction S1C0 gave the lowest rate of 0.22 mm. As for the overlap between sugar alcohols and salicylic acid, the transaction T2C2 was superior, which gave the highest value of 0.35 mm , while the transaction T0 C0 gave the lowest value of 0.19 mm .As for the effect of the triple interference between the types of soil, sugar alcohols and salicylic acid C×T × S, the transaction S2T2C2 was superior, which gave the highest value of 0.36 mm , while the transaction S1T0C0 gave the lowest value of 0.19 mm

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Table (3) The effect of soil types and spraying with sugar alcohols and salicylic acid and the overlap between them in the stem diameter (mm) of *Fragaria ananassa Duch*

ypes oil (S)	ugary cohols	alicylic acid (C)			× T
		0	1	2	
	0	0.19	0.21	0.24	**21**
	1	0.25	0.25	0.28	**26**
	2	0.23	0.29	0.34	**29**
	0	0.19	0.30	0.27	**25**
	1	0.32	0.31	0.32	**32**
	2	0.33	0.33	0.36	**34**
oil Types Rate (S)					
×C	1	22	0.25	0.28	**25**
	2	0.28	0.31	0.32	**30**
lucose Alcohol Rate (T)					
×C	0	0.19	0.25	0.25	**23**
	1	0.29	0.28	0.30	**29**
	2	0.28	0.31	0.35	**31**
ffect of salicylic acid (C)		**0.25**	**0.28**	**0.30**	

L.S.D % 5

× T× S	×T	×S	×S			
10	**07**	**05**	**05**	**04**	**04**	**03**

Leg rest Length

The results of Table (4) indicate that there are significant differences in the length of the leg as a result of the impact of soil types, as the mixed soil S2 gave the highest average leg length of 3.26 cm , while the gypsum soil S1 gave the lowest average of 2.81 mm. As for the impact of the treatment of spraying with sugar alcohols, the treatment of spraying T2 with a concentration of 6 ml -1 excels morally, giving the highest average of 33.44 cm compared to the comparison treatment that gave the lowest average of 2.50cm . As for the effect of salicylic acid (C), treatment C2 exceeded the concentration 40 mg L-1 morally, giving the highest rate of 3.39 cm compared to the comparison treatment, which gave the lowest rate of 2.72 cm .As for the impact of the bilateral overlap between the types of soil and sugar alcohols T×S, the results of Table (4) showed that there are significant differences, as the transaction S2T2 was superior, recording the highest value of 3.78 cm , while the transaction S1T0 gave the lowest average of 2.33 cm . As for

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the overlap between soil types and salicylic acid, the transaction S2C2 was superior, which recorded the highest value of 3.67 cm , while the transaction S1C0 gave the lowest rate of 2.56 cm. As for the effect of the overlap between sugar alcohols and salicylic acid, the transaction T2C2 was superior, which gave the highest value of 3.83 mm , while the transaction T0 C0 gave the lowest value of 2.17 cm.As for the effect of the triple interference between the types of soil, sugar alcohols and salicylic acid C×T × S, the transaction S2T2C2 was superior, which gave the highest value of 4.33 cm , while the transaction S1T0C0 gave the lowest value of 2.00 cm

Table (4) The effect of soil types and spraying with sugar alcohols and salicylic acid and the overlap between them in the length of the stem (cm) of Fragaria ananassa Duch

ypes oil (S)	ugary cohols	alicylic acid (C)			× T
		0	1	2	
1	0	2.00	2.33	2.67	**33**
	1	2.67	3.00	3.33	**00**
	2	3.00	3.00	3.33	**11**
2	0	2.33	2.67	3.00	**67**
	1	3.00	3.33	3.67	**33**
	2	3.33	3.67	4.33	**78**
oil Types Rate (S)					
×C	1	2.56	2.78	3.11	**81**
	2	2.89	3.22	3.67	**26**
lucose Alcohol Rate (T)					
×C	0	2.17	2.50	2.83	**50**
	1	2.83	3.17	3.50	**17**
	2	3.17	3.33	3.83	**44**
ffect of salicylic acid (C)		**2.72**	**3.00**	**3.39**	

L.S.D % 5

× T× S	**×T**	**×S**	**×S**			
23	**87**	**71**	**71**	**50**	**50**	**41**

Fruit Diameter Range (mm(

The results of Table (5) indicate that there are significant differences in the average diameter of the fruit as a result of the impact of soil types, as the mixed soil S2 gave the highest average diameter of the fruit at 32.27 mm, while the gypsum soil S1 gave the lowest average of 28.61 mm . As for the impact of the treatment of spraying with sugar alcohols, the treatment of spraying T2 with a concentration of 6 ml -1 excels morally, giving the highest rate of 33.05 mm compared to the comparison treatment, which gave the lowest rate of 27.24 mm . As for the effect of salicylic acid (C), treatment C2 exceeded the concentration of 40 mg L-1 morally, giving the highest rate of 31.86 mm compared to the comparison

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treatment, which gave the lowest rate of 29.01 mm .As for the effect of bilateral interference between soil types and sugar alcohols T×S, the results of Table (5) indicated the superiority of the treatment S2T2, which recorded the highest value of 34.89 mm compared to other interference coefficients.As for the overlap between soil types and salicylic acid, the transaction S2C2 was superior, which recorded the highest value of 33.64 mm , while the transaction S1C0 gave the lowest rate of 27.09 mm. As for the overlap between sugar alcohols and salicylic acid, the transaction T2C2 was superior, which gave the highest value of 35.02 mm , while the transaction T0 C0 gave the lowest value of 25.38 mm .As for the effect of the triple interference between the types of soil, sugar alcohols and salicylic acid C×T × S, the transaction S2T2C2 was superior, which gave the highest value of 37.33 mm , while the transaction S1T0C0 gave the lowest value of 22.00 mm

Table (5) The impact of soil types and spraying with sugar alcohols and salicylic acid and the overlap between them in the diameter of the fruit (mm) . Fragaria ananassa Duch

types Soil (S)	Sugary alcohols T	Salicylic acid (C)			S × T
		C_0	C1	C2	
S_1	T_0	22.00	24.4	27.00	**24.35**
	T_1	29.28	31.00	30.50	**30.26**
	T_2	30.00	30.94	32.70	**31.21**
S_2	T_0	28.76	30.06	31.60	**30.14**
	T_1	31.00	32.33	32.00	**31.78**
	T_2	33.00	34.33	37.33	**34.89**
Soil Types Rate (S)					
S×C	S_1	27.09	28.66	30.07	**28.61**
	S_2	30.92	32.24	33.64	**32.27**
Glucose Alcohol Rate (T)					
T×C	T_0	25.38	27.05	29.30	**27.24**
	T_1	30.14	31.67	31.25	**31.02**
	T_2	31.50	32.63	35.02	**33.05**
alicylic Acid Modifier(C)		**29.01**	**30.45**	**31.86**	

L.S.D % 5

× T× S	×T	×S	×S			
64	**57**	**10**	**10**	**49**	**49**	**55**

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Average fruit weight (g(

The results of Table (6) indicate that there are significant differences in the rate of fruit weight as a result of the impact of soil types, as the mixed soil S2 gave the highest average fruit weight of 17.89 g, while the gypsum soil S1 gave the lowest rate of 16.59 g . As for the impact of the treatment of spraying with sugar alcohols, the treatment of spraying T2 with a concentration of 6 ml liters -1 was morally superior, as it gave the highest rate of 19.02 g compared to the comparison treatment, which gave the lowest rate of 15.62 g. As for the effect of salicylic acid (C), treatment C2 exceeded the concentration 40 mg L-1 morally, giving the highest rate of 19.18 g compared to the comparison treatment, which gave the lowest rate of 15.48 g .As for the effect of bilateral interference between soil types and sugar alcohols T×S, the results of Table (6) indicated the superiority of the treatment S2T2, which recorded the highest value of 20.43 g compared to other interference coefficients.As for the overlap between soil types and salicylic acid, the transaction S2C2 was superior, which recorded the highest value of 19.61 g , while the transaction S1C0 gave the lowest rate of 14.89 g. As for the overlap between sugar alcohols and salicylic acid, the transaction T2C2 was superior, which gave the highest value of 21.59 g , while the transaction T0 C0 gave the lowest value of 13.20 g . As for the effect of the triple interference between the types of soil, sugar alcohols and salicylic acid C×T × S, the transaction S2T2C2 was superior, which gave the highest value of 23.00 g , while the transaction S1T0C0 gave the lowest value of 12.47 g

Table (6) The impact of soil types and spraying with sugar alcohols and salicylic acid and the overlap between them in the weight of the fruit (g) . Fragaria ananassa Duch

Types Soil (S)	Sugary alcohols T	Salicylic acid (C)			S × T
		C_0	C1	C2	
S_1	T_0	12.47	15.37	19.07	**15.63**
	T_1	16.48	16.14	17.00	**16.45**
	T_2	15.72	16.92	20.18	**17.60**
S_2	T_0	13.93	15.61	17.26	**15.60**
	T_1	16.00	18.33	18.57	**17.64**
	T_2	18.30	20.00	23.00	**19.61**
Soil Types Rate (S)					
S×C	S_1	14.89	16.14	18.75	**16.59**
	S_2	16.08	17.98	19.61	**17.89**
Glucose Alcohol Rate (T)					
T×C	T_0	13.20	15.49	18.16	**15.62**
	T_1	16.24	17.24	17.79	**17.09**
	T_2	17.01	18.46	21.59	**19.02**
Effect of salicylic acid (C)		**15.48**	**17.06**	**19.18**	

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L.S.D % 5

× T× S	**×T**	**×S**	**×S**			
23	**57**	**28**	**28**	**91**	**91**	**74**

Plant yield per plant

The results of Table (7) indicate that there are significant differences in the yield of one plant as a result of the impact of soil types, as the mixed soil S2 gave the highest rate of per plant yield of 329.0 g, while the gypsum soil S1 gave the lowest rate of 298.8 g . As for the impact of the treatment of spraying with sugar alcohols, the treatment of spraying T2 with a concentration of 6 ml liters -1 has a significant superiority, as it gave the highest rate of 390.1 g compared to the comparison treatment, which gave the lowest rate of 228.4 g. As for the effect of salicylic acid (C), treatment C2 exceeded the concentration 40 mg L-1 morally, giving the highest rate of 372.6 g compared to the comparison treatment, which gave the lowest rate of 258.8 g .As for the effect of bilateral interference between soil types and sugar alcohols T×S, the results of Table (7) indicated the superiority of the treatment S2T2, which recorded the highest value of 421.6 g compared to other interference coefficients. As for the overlap between soil types and salicylic acid, the transaction S2C2 was superior, which recorded the highest value of 396.6 g , while the transaction S1C0 gave the lowest rate of 251.6 g. As for the overlap between sugar alcohols and salicylic acid, the transaction T2C2 was superior, which gave the highest value of 476.1 g , while the transaction T0 C0 gave the lowest value of 134.3 g . As for the effect of the triple interference between the types of soil, sugar alcohols and salicylic acid C×T × S, the transaction S2T2C2 was superior, which gave the highest value of 423.9 g , while the transaction S1T0C0 gave the lowest value of 115.7g

Table (7) The impact of soils and spraying with sugar alcohols and salicylic acid and the overlap between them in the yield of one plant (g) . Fragaria ananassa Duch

ypes oil (S)	**ugary cohols**	**alicylic acid C))**			**× T**
		0	**1**	**2**	
	0	115.7	251.0	311.7	**26.2**
		324.7	300.0	310.3	**11.7**
	2	314.3	337.7	423.9	**58.6**
2	**0**	152.9	200.0	338.9	**30.6**
		309.7	372.7	322.5	**34.9**
	2	335.4	401.0	528.4	**21.6**
oil Types Rate (S)					
×C		51.6	296.2	348.6	**98.8**
	2	266.0	324.6	396.6	**29.0**

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lucose Alcohol Rate (T)					
×C	0	134.3	225.5	325.3	**28.4**
	1	317.2	336.4	316.4	**23.3**
	2	324.9	369.3	476.1	**00.1**
ffect of salicylic acid (C)		**258. 8**	**310.4**	**372.6**	

L.S.D % 5

× T× S	**×T**	**×S**	**×S**			
3.67	**3.55**	**0.64**	**0.64**	**3.03**	**3.03**	**2.9**

Conclusion

Through the results obtained from our study, we note that there are clear moral differences and a rise in the values of the studied qualities as a result of the impact of soil types in the tables (3,4,5,6,7). The reason may be due to the impact of direct or indirect study factors on metabolic processes and the growth of seedlings. The soil type factor had a clear superiority over the studied qualities. The reason for the superiority of the mixed soil may be due to its physical and chemical properties, where its texture and nutrient content are better than the gypsum soil [2]. Spraying with a silicone growth regulator also achieved a significant increase in these qualities. Spraying with sugar alcohols also confirmed the moral impact of these qualities

It is noticeable in the results of tables (2,3,4) represented by the increase in vegetative growth qualities, the reason may be due to the increase in the efficiency of photosynthesis and the accumulation of carbohydrates, which contributed to improving the nutritional status of seedling growth, which positively reflected the increase in the number of leaves , as well as the secretion of plant hormones that have an important role in improving vegetative growth through cell division and an increase in the length of branches , as well as the swelling and doubling of cells by increasing the plant's ability to absorb water and nutrients, all of which leads to an improvement in the growth qualities of plants [16]. The increase in vegetative growth qualities resulting from salicylic acid spraying may be attributed to its role in stimulating growth and increasing the level of plant hormones such as oxines and cytokines that affect the process of cell division and elongation[20], which is reflected positively in the increase in the number of leaves.Salicylic acid increases the efficiency of the carbonation process as a result of increased CO2 uptake in plastids [11], which leads to the provision of materials to build new tissues and increase vegetative growth or to the accumulation of nutrients, which stimulates the plant to increase the number of formed leaves and thus increase the vegetative growth qualities [19]. The reason for the increase in vegetative indicators when spraying with sugar alcohols may be attributed to its important role of transporting macro and micro nutrients through the bark and facilitating the transfer and movement of photosynthetic products from the leaves to the growth-active areas. The transfer of nutrients from the source to the downstream improves physiological processes and increases the photosynthesis process as well as increasing

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the oxine content through the activity of the enzyme IAA-oxidase, [12 .[

Diabetic alcohol has a great and effective role in its impact on the traits and fruit traits through its important role of transporting macro and micro nutrients through the bark and facilitating the movement and transfer of photosynthetic products from leaves to areas effective in growth, flowering and fruits, [3]. Alcohol sugars work in the future for hydrogen, increasing the activity of enzymes that play an important role in interacting with phospholipids in the composition of cell membranes. These compounds work as carriers to transport nutrients from outside the cell to inside it, which increases its permeability to cell membranes, and then absorbs water and nutrients, which in turn improves the weight of the fruit, which is reflected positively on the yield of one plant [18 .[

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