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Original Research Article

The Effect of The Ground Addition of Licorice And Mycoriza On The Active Substance And Growth Of Lemon Grass

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Abstract: The research was carried out in a farmer's field in Ramadi, the center of Anbar province, for the 2020 season to study some of the physiological effects of mycoriza and licorice on lemon grass. The overlap between the addition of mycoriza and licorice to the soil had a moral impact, and the high treatment exceeded the characteristic of plant height, reaching (132 cm) the recipe for the number of leaves (140 leaves). Branch-1) recipes, leg diameter (29.47mm) and paper area (37.60cm2) where the results showed the effective effect of licorice and mycoriza mushrooms overlapping on all the vesal events of this plant.

Keywords: Ground addition, licorice, mycoriza, lemongrass

INTRODUCTION

Man has known since time immemorial that plants can be used for food and medicine, as he tried to use the surrounding plants spontaneously without treatment or filtering of the active substance as medicines for many diseases. The lemongrass plant was used by the Pharaohs to treat many diseases and this plant is still used in folk medicine In many countries of the world, including China, Brazil, Cuba, India, Egypt and others [1]. Through scientific research and studies, [2] indicated that the lemongrass plant has many medicinal uses, the most important of which is considered a pain reliever because it contains myrcener. It was also used to inhibit many dermatophytes [3] as well as for use as a repellent for intestinal worms and to relieve rheumatism, joint pain, sciatica, and to treat cases of baldness. Lemongrass Cymbopogon citratus is a commercial medicinal plant used to treat digestive and nervous disorders, as the oil fragrance is extracted from the fresh leaves of this herb and is used in chemical industries because it contains esters [4]. The field of herbal medicine due to the limitations of chemical drugs and the development of therapeutic resistance, as it was used as an anti-bacterial, anti-fungal, anti-viral and anti-toxin [5].

The lemongrass plant, Cymbopogon citratus, contains many active substances that differ in their chemical composition, such as volatile oils, the most important of which are citral, phenols, flavonoids, in addition to alcohols, aldehydes, volatile acids and aromatic compounds, in addition to ketones, oxides, and esters [6].

Mycorrhizal fungi are important symbiotic fungi that have attracted the attention of many researchers around the world for their ability to increase the production of different agricultural crops through their production of growth regulators and hormones and their inhibition of many different pathogens [7]. The interest in studying this type of fungus began in the last three decades and as a result of many previous successive studies, the importance of mycorrhizae in the field of organic agriculture emerged, as this importance began to increase depending on the results of these previous studies [8]. These fungi are generally called fungal biofertilizers, as the mycorrhizal group includes a large number of fungi that live in the rhizosphere and within the tissues of the roots of plants in a symbiotic manner, as the mycorrhizae stimulate the growth of plants and cause an increase in the number of crops with different mechanisms. The fungi that belong to this group are generally called Plant Growth Promoting Fungi, including the Mycorrhizal fungi, exogenous parasitism and endoparasitosis. Soil microbiology in the rhizosphere contributes to most of the biotic and abiotic exchange processes between soil and plant. Mycorrhizal fungi constitute the predominant part of the group of organisms present in the rhizosphere, as their abundance was estimated at more than 25% of the total number of microorganisms present [9].

Licorice extract has different effects on many higher plants [10]. The licorice plant Glycyrrhiza glabra lnnliquorice in Iraq is a bush that grows in orchards and fields, on the banks of rivers and irrigation channels. Among the most important chemical compounds found in dry licorice powder are compounds belonging to the group of Terpenoids, including Glycyrrhizic acid, Licoric acid, isoprene and glycyrrhizin [11] and compounds belonging to the group of flavonoids, including Glabrin, Glabrol, glabridin and Glabrone And Formononetin and compounds belonging to the group of Coumarins, including Glycyrin, heniarin, Liqcoumarin [12] and compounds belonging to the group of volatile oils Volatiles, and there are many of them in licorice, the most important of which is Propionic acid in addition to sugars, proteins, amino acids, minerals and vitamins. Licorice contains the hormone gibberellin by up to 0.62% (13) and glycyrrhizic acid is similar in composition to the composition of steroid hormones, and its concentration in licorice powder may reach 24% on the basis of dry weight, depending on the age of the plant and the growing season, and it is 50 percent sweeter than cane sugar. Once (2, 9 and 46). The aim of this study is to study the relationship between mycorrhizal and ground addition of licorice to lemongrass.

MATERIALS AND METHODS

The experiment was carried out in one of the farmers' fields in the city of Ramadi, the center of Anbar Governorate, for the agricultural season (2020-2021). To study some physiological effects of Mycorrhizae and licorice on lemongrass plant Cymbopogon citratus. The rhizomes of lemongrass were brought from Jordan on February 20, 2020, and the seedlings were transferred to two anvils of 12 liters (12 kg. 1) Components of the house moss and the origin of the animal product Latvia. A sample of the experiment soil was taken and the analysis was conducted in the Al-Rafidain Laboratory for Scientific and Laboratory Techniques to determine some of the physical and chemical characteristics of it in Table (2). The experiment transactions were carried out on three replicates.

Table (1): Components of house mousse

Components	%
N	2.2-2.8
P2O5	0.8-1.2
K2O	1.5 -1.8
Na	0.01
Cl	0.8
O.M	60-70
PH	5.7-6.5
Moisture	12-15
C:N	14:1-18:1

Table 2: Some physical and chemical qualities of the soil of the experiment*

Type of analysis	Value		Unit of measurement
PH	7.31		-
EC	0.881		$ds.m^{-1}$
$CACO_3$	90.09		gkg^{-1}
Virtual density	1.24		G.cm-3
Real density	2.682		G.cm-3
Total nitrogen	0.1119		(%)
Ready-made phosphorus	4.66		Mg.kg-1
Mutual potassium	32.20		Mg.kg-1
CEC	7.82		Sinti Mall $^{Kg-1}$ Soil
Melted positive ions	Mg++	5.25	$mmole1^{-1}$
	Na+	0.38	
	Ca++	3.22	
	K+	0.48	

Dissolved negative ions	$CO_3^{=}$	Nil	
	$HCO_3^{=}$	1.33	
	Cl^-	2.70	
	$SO_4^{=}$	4.80	
Soil separators	Sand	870	Be obscure. KG-1
	Silt	100	
	Clay	30	
Weaving	sand		

Seedlings were irrigated by the irrigation system according to plant need and temperature and the rate of irrigation varied according to temperature and plant need in summer every (2-3 days) either in winter (9-14 days) as well as constantly fighting the bush.

Experiment design and statistical analysis.

A two-factor experiment was carried out in a randomized complete block design (RCBD). With three replications and one rhizome for each experimental unit, so the total number of rhizomes became 27 rhizomes. The second factor included the ground addition (watering) to licorice at three levels (0,20,30 g/l-1) and its symbol (S0, S1, S2). Thus, the number of transactions in the experiment was 9, and the data were analyzed according to the statistical program Genstat, and the arithmetic averages were compared using the L.S.D test at the probability level of 0.05.

Carrying out the experiment

Five g of soil containing the mycoraiza vaccine produced in the first trial at the Faculty of Agriculture of Anbar University and the vaccine was a soil containing the Mikoriza spores of the root mushrooms G.mosseae. 30 g licorice was weighed with a precise balance to add to the soil. The second level here is the addition of 20 g of licorice. The comparison treatment did not take place in addition to the soil.

2. Studied characteristics.

1.2. Characteristics of vegetative growth.

1.2.1 plant height rate (cm)

It was measured from the soil surface to the end of the growing top.

1.2.2 Average number of leaves of a plant.

Calculating the total number of leaves at the end of the season.

1.2.3 The average Stem diameter (mm).

It was measured using the Verner foot.

1.2.4 number of the branch.

The number of clematis was counted inside the experimental unit at the stage of plant maturity.

1.2.5 leaf Area.

According to the average of five leaves of the main stems were measured using (Digimizer) program.

RESULTS AND DISCUSSION

Effect of mycorrhiza and licorice on vegetative growth characteristics

Plant height rate (branch.plant-1)

The results shown in Table No. (3) indicate the clear effect of mycorrhizal and ground addition of licorice on the height of lemongrass plant.

The addition of mycorrhizal fungus to the roots of lemongrass led to a significant increase in plant height, as the addition of 5 g. plant to the highest rate of (112.6 cm), while the lowest rate of plant height was recorded when the comparison treatment was (92.3 cm), with a significant decrease compared to the rest of the other treatments. The highest rate of plant height was recorded (118 cm) when adding 30 g of plants with a significant difference from the rest of the treatments that gave (88.3 cm, 97.3 cm).

The interaction between the two factors of the study led to a significant and clear effect on the plant height characteristic, where the highest rate of plant height in the combination (5 g mycorrhizae and 30 g licorice) was recorded (132 cm) with a significant difference from the rest of the other treatments, while a significant decrease was recorded at The comparison treatment that gave the lowest average plant height of (80 cm) when the no-added treatment.

Table No. (3) The effect of adding Mycorrhizae and licorice and the interaction between them on the rate of height of lemongrass plant (cm)

RateS	T2	T1	T0	Treatments
88.3	101	84	80	**S0**
97.3	105	97	90	**S1**
118	132	115	107	**S2**
	112.6	98.6	92.3	**RateT**
	T X S	S	T	**L.S.D 0.05**
	2.448	1.413	1.413	

Average number of leaves (leaf.plant-1)

It appears from the results shown in Table No. (4) that there are significant differences in the rate of increase in the characteristic of the number of lemongrass leaves as a result of the addition of mycorrhizae and licorice.

While it is clear in the table when adding the mecoriza mushrooms to the roots of lemon grass led to a moral increase in the number of leaves of the plant where it led to the addition of 5 grams. $^{Plant-1}$ to the highest rate (124 leaves. $^{plant-1}$) while the lowest rate of plant leaves was recorded when compared to (108.3 leaves. $^{plant-1}$) morally lower than other transactions.

The highest rate of plant leaves was recorded at (136.3 $^{leaves.plant-1}$) when adding 30 grams of licorice plant by a moral difference from the rest of the transactions that gave (95 leaves. $^{plant-1}$, 119.3 leaves. $^{plant-1}$ With regard to the overlap between the study workers, the most pronounced moral effect on the characteristic of plant height was recorded, where the highest rate of plant leaves was recorded at the combination (5 grams mycoriza and 30 grams licorice) amounted to (140 leaves. $^{plant-1}$) by a moral difference from other transactions, while a moral decrease was recorded when the comparison treatment gave the lowest rate of plant height of (80 leaves. $^{plant-1}$) when treated not to add.

Table No. (4) The effect of adding Mycorrhizae and licorice and the interaction between them on the average number of leaves of lemongrass (leaf. plant-1)

RateS	T2	T1	T0	Treatments
95	106	99	80	**S0**
119.3	126	119	113	**S1**
136.3	140	137	132	**S2**
	124	118.3	108.3	**RateT**
	TXS	S	T	**L.S.D 0.05**
	2.490	1.438	1.438	

Stem Diameter (mm)

Table (5) shows that there are significant differences caused by the addition of mycorrhizae in the average stem diameter and that the highest value recorded in T2 which amounted to 24.35 mm, which differed significantly from treatments T0 and T1 and recorded the lowest value in treatment T0 which amounted to 17.04 mm.

With regard to the addition of licorice and its effect on the leg diameter rate, the highest value transaction recorded at the S2 transaction was 26.63 mm, which differed morally from the S1transactions of 20.61 mm and the S0, which recorded the lowest value. 15.33 mm. As for the bilateral overlap between the two study factors, the T2S2 transaction recorded the highest rate of increase in leg diameter of 29.47 mm, which differed morally from the rest of the overlaps and recorded the lowest rate when adding mycoriza and licorice when the T0S0 comparison treatment. 12.55 mm

Table 5 - Effect of adding mycoriza and licorice and overlapping them in the rate of leg diameter lemon grass plant (mm)

S rate	T2	T1	T0	Transactions
15.33	18.72	14.71	12.55	**S0**
20.61	24.85	20.84	16.13	**S1**
26.63	29.47	26.27	22.45	**S2**
	24.35	20.61	17.04	**T rate**

TXS	S	T	
0.5682	0.3281	0.3281	**L.S.D 0.05**

Average number of mistakes

Table (6) shows that there are moral differences between the transactions of adding the mycoriza in the rate of the number of lemongrass mistakes and recorded the highest rate in the treatment T2 at 19.11 and has differed morally from the treatment of T1 and T0, which gave the lowest rate in the number of mistakes at 13.22.

It is also clear from the same table that there are significant differences in the rate of the number of mites caused by the addition of licorice, as the highest rate was recorded in treatment S2 and amounted to 23.57, which differed significantly from treatments S0 and S1 and the lowest rate recorded in treatment S0, which amounted to 8.78. As for the interaction between the two factors of the study, it is clear from Table (6) that treatment T2S2 gave the highest average number of fragments, as it reached 25.67, and it differed significantly from the average recorded in treatments T0S0, T0S1, T0S2, T1S0, T1S1, T1S2, T2S0, T2S1, T2S2 and the lowest recorded rate. In the treatment T0S0, it was 5.67.

Table 6- Effect of adding mycoriza and licorice and overlapping between them in the rate of the number of lemon grass

S rate	T2	T1	T0	Treatments
8.78	13.00	7.67	5.67	**S0**
14.89	18.67	15.67	10.33	**S1**
23.57	25.67	21.33	23.67	**S2**
	19.11	14.89	13.22	**T rate**
	TXS	S	T	**L.S.D 0.05**
	1.092	0.631	0.631	

Leaf area (creamy^{2}. $^{plant-1}$)

It is clear from the results shown in table (7) that there is a moral effect in the rate of paper area achieved by the addition of the mycoriza, as the highest rate in the treatment of T2 was recorded at 34.45 cream^{2}. $^{Plant-1}$, which differed morally from the transactions T1 and T0(comparison transaction) which recorded the lowest rate of 31.10$^{Creamy2.Plant-1}$. With regard to the addition of licorice, the highest rate was recorded in treatment S2 and amounted to 36.57 dm 2 plant-1, which differed significantly from treatment S1 and amounted to 33.57 dm 2. Plant-1, and it also differed from treatment S0, which gave the lowest rate as it reached 27.92 dm2. Plant-1. As for the overlap between the transactions, the highest value was recorded in the T2S2 transaction, as the average paper area was 37.60 dm2. Plant-1, which differed from T2S0, T0S2, T1S2 and T1S1, while the lowest value was recorded when the comparison treatment T0S0 reached 25.34 dm2. plant-1

Table 7- Effect of adding mycoriza and licorice and overlapping between them in the average paper area of lemon grass

S rate	T2	T1	T0	Transactions
27.92	31.32	27.12	25.34	**S0**
33.57	34.42	33.85	32.44	**S1**
36.57	37.60	36.58	35.52	**S2**
	34.45	32.52	31.10	**T rate**
	TXS	S	T	
	1.291	0.745	0.745	**L.S.D 0.05**

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