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EFFECT OF BIOTIC FACTORS AND CORM SIZE ON THE CORM YIELD OF *FREESIA HYBRID* L

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Abstract:

The experiment was conducted in the plastic house of the Department of Horticulture and Landscape Engineering at the College of Agriculture and Forestry/ University of Mosul in the agricultural season 2021-2022 to demonstrate the effect of corms size, aloe vera gel and biological fertilizers on the root characteristics of freesia plants. On 10/27/2021, corms (large and small) were planted in pots 22 cm in diameter in a sterilized soil with 5% formalin, consisting of sandy, mixed soil and peat moss at a ratio of 1:2:1. The experiment was carried out using a randomized complete block design (RCBD) with three factors with a study of their interactions. The biological factors were represented by the four concentrations of aloe vera gel (0-25-50-100)% ml .L , and the addition of biological fertilizers represented by the fungal bio fertilizer (T-22) *Trichoderma hirzianum*, which was loaded on millet, the soil was contaminated with an average of 5 g. pot as well as soil watering at a rate of 20 ml. A pot in addition to the bio-health fertilizer. The other pots were left without any treatment (comparison plants) for two types of large and small corms. The data was analyzed statistically using the SAS program, and the results were tested according to Dunkin's multinomial test under the level of probability 5%.

The results showed a significant superiority of the size of the large corms in most of the root traits, namely the diameter of the corms and their wet and dry weight at a rate of 17.62 mm, 5.02 gm and 1.72 gm, respectively. The wet ones had a dry weight of 1.15 corms, 18.69 mm, 4.79 gm, and 1.71 gm, respectively, and from the use of bio-fertilizers, the significant superiority of the treatment with bio health fertilizer was evident in the number of corms, their diameter and their wet weight were 1.13 corms, 19.29 mm, and 6.18 gm, respectively. During the bilateral and triple interactions, the positive superiority is noted in the large size of the corms and the fourth concentration of 100% aloe vera gel with compost bio health in general and for all root traits. To identify the settlement capacity and the number of Trichoderma fungus in the center of the growing cultivation in which the corms are used, using two methods of soil contamination and watering, and for two readings at the beginning and end of the experiment, where the experiment was carried out in the laboratory of the Plant Protection Department / College of Agriculture and Forestry, and a positive moral superiority is noted For the size of the large corms compared to the size of the small corms with a difference of 2.07 Cfu / g x 106, as well as the significant superiority of the T-22 treatment as polluting and for the two readings, and the second reading achieved the significant superiority of the large corms of the fungal bio fertilizer treatment (T-22) in the number of fungal cells at a rate of 8.12 Cfu / 106 gm

Keywords: freesia plant, biological fertilizers, aloe vera gel, corm size

INTRODUCTION:

Freesia hybrid L. belongs to the Iridaceae family, which includes more than 50 genera. It is a monocotyledonous winter perennial plant, native to the mountainous regions of South Africa. Its value for coordination is cut flowers, being of different colors and attractive appearance, suitable for arranging floral bouquets. Flowers as a symbol of friendship and innocence. It is grown as flowering potted plants. It ranks seventh in the world among ornamental flowers. The plant is characterized by flat, sharp green striped leaves and flowers. The flowers are located in a comb holder inclined at a right angle of 90 °C. Between 4-10 and varied colors between red, white, orange, yellow, blue and cream [1] [2] [3] [4] [5]. Aloe vera is a perennial succulent plant with adaptive tissues to store water in drought-resistant leaves, especially in dry regions with little rainfall. The leaves are 30-50 cm long and 10 cm wide at the base. The flowers are bright yellow, tubular 25-35 cm long. Aloe vera plant multiplies by cuttings, seeds and leaves. The importance of aloe vera gel for plant growth is that it contains plant hormones such as IAA and gibberellin, which has an important role in promoting stem growth and cell elongation. It is considered a vital stimulant for the plant and a source of hormones instead of synthetic growth regulators. The direct effect of aloe vera gel in increasing the permeability of the membrane Cells affecting plant nutrient uptake and dry matter intake. The importance of aloe vera gel in plant growth is that it contains plant hormones, organic compounds, vitamins, and amino acids, and its effect on protein synthesis and increasing cell expansion and division. It activates plant enzymes, ion transfer, respiration, photosynthesis, oxygen absorption, root elongation, and its effects on the various growth factors in the plant. It is an excellent source For phytonutrients such as iron, calcium, zinc, magnesium, and potassium [6] [7] [8] [9] [10] [11] [12] [13] [14] [15]. Bio fertilizers are one of the important technologies that entered the agricultural field to increase production and improve quality characteristics and are sustainable, effective and environmentally friendly. Therefore, bio fertilizers containing microorganisms such as fungi, bacteria and algae are used as agriculturally applicable means because they also preserve the soil structure and are free from environmental pollutants. The beneficial microorganisms in bio fertilizers are to improve the chemical and physical properties and to maintain the ecological and biological system for the soil, supporting plant health and increasing productivity, on the other hand, the lack of awareness about the use of bio-fertilizers and the lack of a network of promotion and publicity among users and farmers caused restrictions in the use of bio-fertilizers. [16] [17] [18].

In view of the importance of the freesia plant as a potted plant, in addition to the fact that it is a cut and ornamental flower, we decided to do this study, which includes the axes

1 -Studying the effect of corms size, biological factors, aloe vera gel and bio fertilizers on corms yield

2-Studying the effect of fungal bio fertilizer *Trichoderma harzinum* by polluting and watering method on the number of fungi in the soil.

MATERIALS AND WORKING METHODS:

The experiment was conducted in the plastic house of the Department of Horticulture and Landscape Engineering at the College of Agriculture and Forestry / University of Mosul in the agricultural season 2021-2022 to demonstrate the effect of corms size, aloe vera gel and bio fertilizers on the root characteristics of freesia plants in plastic pots with a diameter of 22 cm in a soil consisting of sandy and mixed soil and peat moss. In proportions of 1:2:1. The experiment was carried out using a randomized complete block design with three factors, with a study of their interactions, which is the cultivation of freesia corms in two sizes, large and small, and treatment with three concentrations of aloe vera gel (0-25-50-100)% ml .L , in addition to the comparison treatment, where the corms were immersed in distilled water. And biological fertilization after planting (without treatment - Bio health - polluting the soil at a rate of 5 g. A pot of Trichoderma loaded on millet - treated with Trichoderma watering) and the data were analyzed statistically using the SAS program and the results were tested according to Dunkin's multiple test under the probability level of 5%. At the end of the experiment, on 22/7/2022, the following growth indicators were measured:

First: the indicators of root growth:

1 -The number of corms (Corm. Plant)

2 -Corm diameter (mm)

3 -The wet weight of the corms (gm)

4 -Dry weight of corms (gm)

Second: Estimating the number of fungi in the cultivation medium: The nutrient medium was prepared from Potato Dextrise Agar (PDA) extract, by dissolving 39.5 g. A liter of distilled water that was sterilized in an Autoclave at a temperature of 121 °C and a pressure of 1.5 kg. cm2 for 20 minutes and added 16 and the second reading on 12/7/2022 and placed in test tubes and 9 ml of sterile distilled water was added to them. Dilutions 10-1-10-7 were prepared by transferring 1 ml of the first solution to a series of sterile tubes containing sterile distilled water and using a precise mechanical pipette Sterile, then

transfer 1 ml of the sixth and seventh dilutions to the dishes containing the medium, moving the dish with a simple movement. The dishes were incubated at a temperature of ±25 °C for a period of four days, and then the number of fungal cells growing in the culture media [19] was calculated as follows:

number of fungal cells. g of original sample = number of colonies in the dish × reciprocal of sample dilution

RESULTS AND DISCUSSION:

First: the characteristics of root growth The results of the statistical analysis showed in Figure (1) the positive effect of the size of the corms on the characteristics of root growth, as the value of the diameter of the corms, their wet weight and their dry weight increased when using large corms of 17.62 mm, 5.02 gm and 1.72 gm, respectively, while it did not Significant differences appear in the case of the number of corms, this may be due to the high content of carbohydrates in the corms of large size and their important physiological maturity in plant growth [20] [21] [22], on the other hand, the results of the individual effect of aloe vera gel were shown in Figures (2). And 5, 8 and 11) the high concentration exceeded 100% and for all root characteristics the number of corms, their diameter, wet weight and dry weight were 1.15 corms, 18.69 mm, 4.79 gm and 1.71 gm, respectively. The reason for this is that aloe vera gel contains plant hormones such as IAA and GA3, micronutrients and carbohydrates. The plant is a good source of nutrients and amino acids, and its positive role is reflected in the growth of ornamental plants and plant species [23] [11], also evident from figures (3, 6 and 9) and in the effect Bio-fertilizers The significant superiority of the treatment with bio health fertilizer in the number of corms, their diameter and wet weight 1.13 corms, 19.29 mm and 6.18 gm, respectively, is due to the effectiveness of the bio health fertilizer components represented by water, Trichoderma fungi, humic acid, bacillus bacteria and seaweed. In its effect on the characteristics of the plant, as it has a role in increasing the rate of plant growth and stimulating its root growth and the plants' tolerance to unfavorable environmental conditions and stress conditions in the soil as well. Plant and protection from pathogens [24] [25] [26] [27] [28] 29]. In the case of bilateral interactions between the size of the corms and the concentrations of aloe vera gel in each of the tables (4, 7, 10 and 13), it is clear that the large size of the corms treated with 100% gel concentration was superior, as well as in the interaction of biological fertilizers and the size of the corms. From the common interaction between the concentrations of the gel and the bio-fertilizers, the significant superiority of the high concentration of aloe vera gel and bio-health fertilizer was observed in general and for all the root traits. With regard to the triple interaction of the experimental factors, it is clear that the large corms treated with the fourth concentration of 100% and bio-health fertilizer were the best positive interactions in the values of the studied traits. General . Second: Estimating the number of mushrooms (CFu / g x 106). The results of the statistical analysis showed Table (14) of the effect of the size of the corms and the two methods of using fungal bio fertilizer (T-22) polluting and watering the soil. From the effect of the size of the corms, we note the significant superiority of the corms size with a significant difference (0.42 and 0 .57) Cfu / gm x 106, respectively, and also from the same table, it is clear that there is a significant difference between the two methods of polluting and watering the soil in their effect on the number of fungal cells, and the significant superiority of the method of contamination with (T-22) and for both readings, may be because Contamination with fertilizer (T-22) and in contact with the corms, which is a suitable environment for it for the purpose of growth and reproduction, especially with the size of the large corms, while watering the soil with fertilizer (T-22) was not suitable for the growth and reproduction of the fungus *Trichoderma hirzianum*

Figure(1)Effect of corms size on corms number, diameter, wet weight and dry weight of Freesia hybrid L.

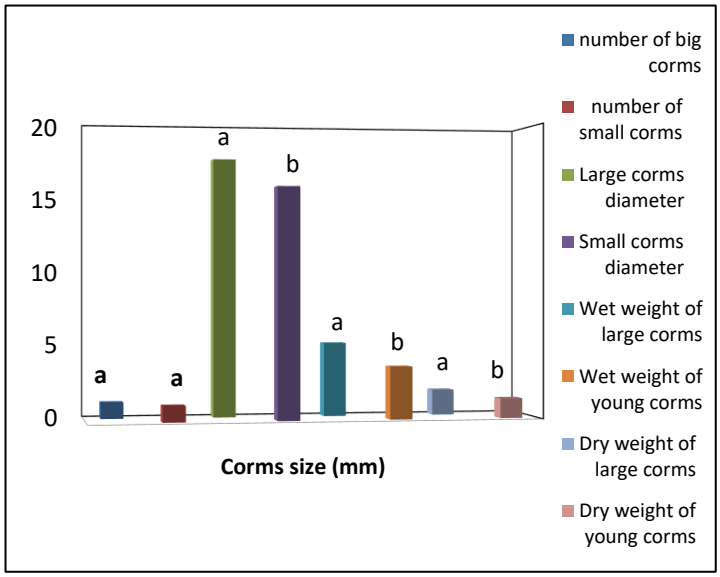

Figure (2) Effect of gel concentrations on the number of corms of *Freesia hybrid L.*

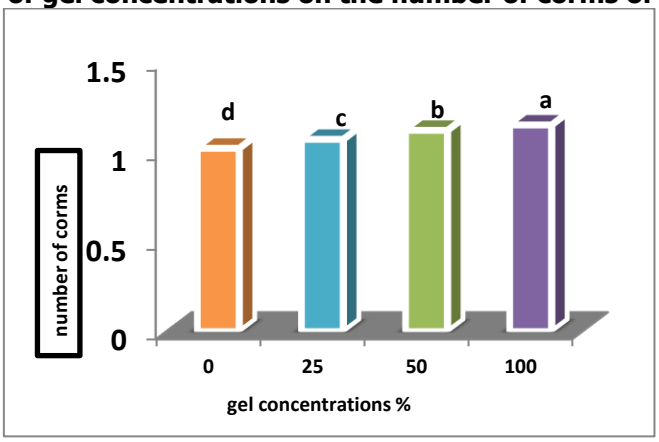

Figure 3: The effect of bio fertilizers on the number of corms of *Freesia hybrid L.*

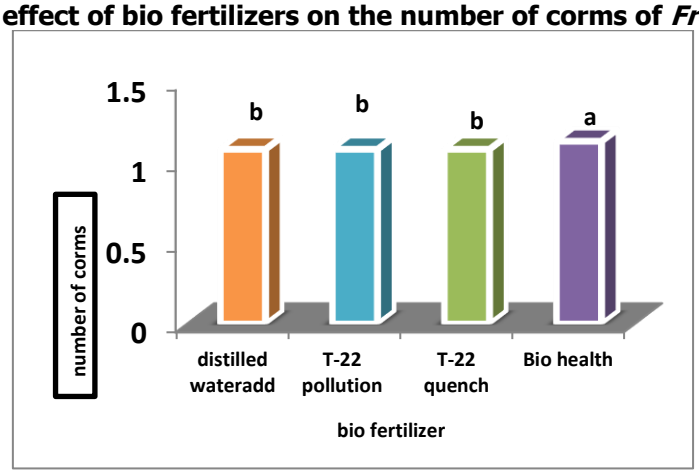

Table (4) Effect of bio fertilizers, aloe vera gel and corm size on the number of corms of *Freesia hybrid L.*

Corms size × gel concentration	bio fertilizer				gel concentrations %	Corms size
	Bio heal	.T-22 quench	.T-22 pollution	distille d water		
1.02d	1.06 c-f	1.02 e f	1.02 e f	1.00 f	**0**	**big**
1.07 c	1.11 b-e	1.05 c-f	1.08 b-f	1.05 c- f	**25**	
1.13 a b	1.18 a b	1.12 b-e	1.12 b-e	1.10 b-f	**50**	
1.16 a	1.23 a	1.15 a-c	1.13 b d	1.15 a-c	**100**	
1.02 d	1.03 d f	1.03 d-f	1.02 e f	1.00 f	**0**	**small**
1.07 c	1.10 b-f	1.05 c-f	1.07 c-f	1.05 c-f	**25**	
1.11 b c	1.12 b-e	1.10 b-f	1.12 b-e	1.10 b-f	**50**	
1.15 a	1.18 a b	1.12 b-e	1.13 a-d	1.15 a-	**100**	
	1.14 a	1.08 b	1.09 b	1.08 b	**big**	**Corms size × bio fertilizer**
	1.11 a b	1.08 b	1.08 b	1.08 b	**small**	
	1.05 e-g	1.03 f g	1.02 f g	1.00 g	**0**	**gel concentration bio fertilizer ×**
	1.11 b-e	1.05 d-g	1.08 c-f	1.05 d-f	**25**	
	1.15 a b	1.11 b-e	1.12 b-d	1.10 b-e	**50**	
	1.20 a	1.13 b-c	1.13 b e	1.15 a b	**100**	

* Values with similar letters for each factor or its interactions individually do not differ significantly according to Dunkin's multiple range test under the 5% probability level.

Figure (5): The effect of gel concentrations on corm diameter of *Freesia hybrid L.*

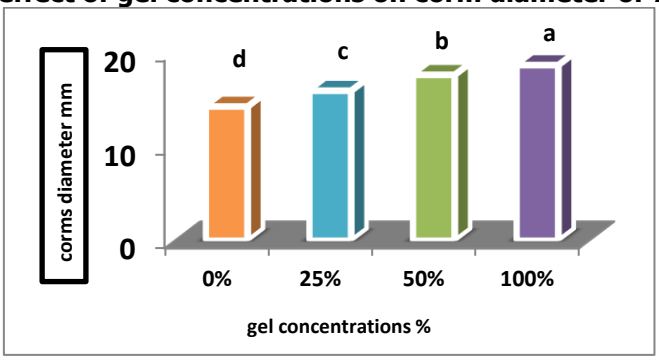

Figure (6) Effect of bio fertilizers on corm diameter of *Freesia hybrid L.*

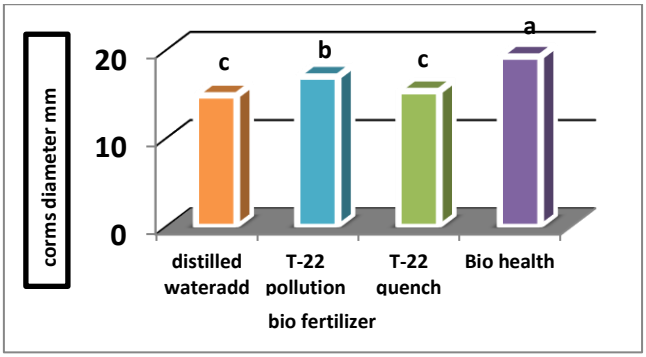

Table (7) Effect of bio fertilizers, aloe vera gel and corm size on corm diameter (mm) of Freesia hybrid L.

Corms size × gel concentration	bio fertilizer				gel concentrations %	Corms size
	Bio healt	.T-22 quench	.T-22 pollution	distilled water		
14.88 d	19.20 b-	13.72 j k	15.66 f-j	10.93 L	**0**	**big**
16.89 b	19.16 b-	15.63 f-j	17.49 d-h	15.26 g-k	**25**	
18.84 a	21.80 a l	17.90 d-g	20.08 b-d	15.60 f-j	**50**	
19.88 a	23.20 a	17.09 e-i	18.23 d-f	21.02 a-d	**100**	
13.67 d	15.62 f-	13.46 j k	14.93 h-k	10.66 L	**0**	**small**
15.03 c	16.95 e-	14.55 i-k	15.99 f-j	12.63 k L	**25**	
16.46 b	18.41 c-	15.72 f-j	17.80 d-g	13.90 j k	**50**	
17.50 b	19.97 b-	14.86 h-k	16.02 f-j	19.14 b-e	**100**	
	20.84 a	16.09 c	17.86 b	15.70 c d	**big**	**Corms size × bio fertilizer**
	17.74 b	14.65 d e	16.18 c	14.08 e	**small**	
	17.41 c-e	13.59 i	15.29 g-i	10.79 j	**0**	**gel concentration bio fertilizer ×**
	18.06 c d	15.09 g-i	16.74 d-g	13.95 i	**25**	
	20.10 a b	16.81 d-g	18.94 b c	14.75 h i	**50**	
	21.58 a	15.97 e-h	17.12 c-f	20.08 a b	**100**	

*** Values with similar letters for each factor or its interactions individually do not differ significantly according to Dunkin's multiple range test under the 5% probability level.**

Figure (8) Effect of gel concentrations on the wet weight of corms of *Freesia hybrid L.*

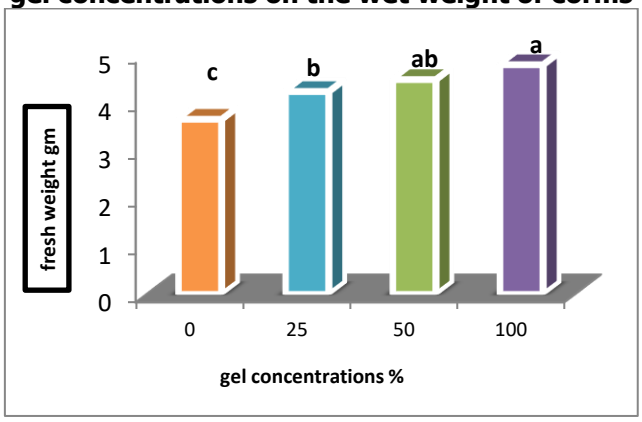

Figure (9) Effect of bio fertilizers on corms wet weight of *Freesia hybrid L.*

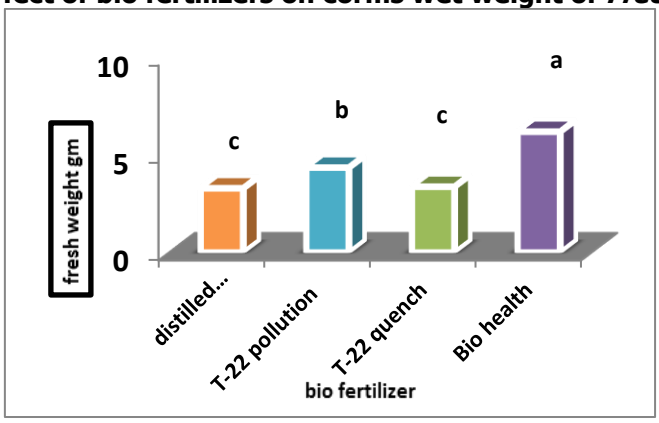

Table (10) Effect of bio fertilizers, aloe vera gel, and corm size on the fresh weight (g) of corms of Freesia hybrid L.

Corms size × gel concentration	bio fertilizer				gel concentrations %	Corms size
	Bio heal	.T-22 quench	.T-22 pollution	distilled water		
4.19 c	6.43 b c	3.00 L-n	4.65 e-h	2.68 m-o	**0**	**big**
5.01 b	7.28 a b	4.03 h-k	5.28 f-d	3.44 m-j	**25**	
5.27 a b	7.69 a	4.22 g-j	5.44 d-e	3.70 h-L	**50**	
5.63 a	7.99 a	4.23 g-j	4.58 e-i	5.73 c d	**100**	
3.12 f	4.42 f-j	2.58 m-o	3.55 e-m	1.91 o	**0**	**small**
3.45 e f	5.06 d-g	2.66 m-o	3.91 h-L	2.18 n o	**25**	
3.70 d e	5.27 d-f	3.15 k-n	4.06 g-k	2.32 n o	**50**	
3.94 c d	5.30 d-f	3.01 L-n	3.20 k-n	4.26 g-j	**100**	
	7.35 a	3.87 c	4.99 b	3.89 c	**big**	**Corms size × bio fertilizer**
	5.01 b	2.85 d	3.68 c	2.67 d	**small**	
	5.42 b	2.79 h i	4.10 d e	2.30 i	**0**	**gel concentration bio fertilizer ×**
	6.17 a	3.35 f-h	4.59 d e	2.81 h i	**25**	
	6.48 a	3.69 e f	4.75 c d	3.01 g h	**50**	
	6.64 a	3.62 e-g	3.89 e f	5.00 b c	**100**	

*** Values with similar letters for each factor or its interactions individually do not differ significantly according to Dunkin's multiple range test under the 5% probability level.**

Figure (11) Effect of gel concentrations on the dry weight of corms of *Freesia hybrid L.*

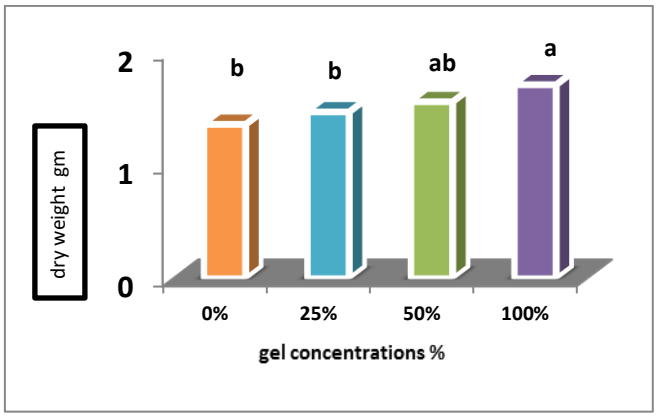

Figure (12) Effect of bio fertilizers on corms dry weight of *Freesia hybrid L.*

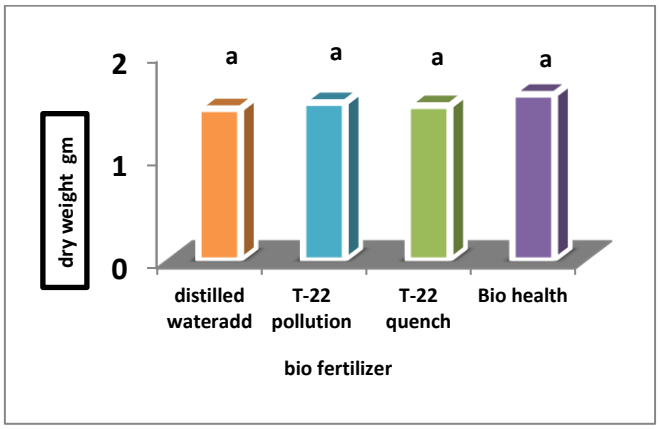

Table (13) Effect of bio fertilizers, aloe vera gel and corm size on dry weight (g) of corms of *Freesia hybrid L.*

Corms size × gel concentration	bio fertilizer				gel concentrations %	Corms size
	Bio heal	.T-22 quench	.T-22 pollution	distilled water		
1.55 b c	1.56 b c	1.55 b c	1.56 b c	1.52 b c	**0**	**big**
1.63 a-c	1.66 a-c	1.63 a-c	1.63 a-c	1.60 a-c	**25**	
1.75 a b	1.81 a b	1.71 a-c	1.78 a b	1.68 a-c	**50**	
1.95 a	2.34 a	1.82 b	1.82 a b	1.83 a b	**100**	
1.17 d	1.29 b c	1.13 b c	1.29 b c	0.96 c	**0**	**small**
1.32 c d	1.34 b c	1.33 b c	1.32 b c	1.29 b c	**25**	
1.38 c d	1.43 b c	1.37 b c	1.39 b c	1.35 b c	**50**	
1.47 b-d	1.49 b c	1.47 b c	1.44 b c	1.48 b c	**100**	
	a 1.84	1.68 a b	1.70 a b	1.66 a-c	**big**	**bio Corms size × fertilizer**
	1.39 b-d	1.32 b-d	1.36 b-d	1.27 b	**small**	
	1.42 a b	1.34 b	1.42 a b	1.24 b	**0**	**gel concentration bio fertilizer ×**
	1.50 ab	1.48 a b	1.48 a b	1.44 a b	**25**	
	1.62 a b	1.54 a b	1.58 a b	1.52 a b	**50**	
	1.92 a	1.65 a b	1.63 a b	1.66 a b	**100**	

*** Values with similar letters for each factor or its interactions individually do not differ significantly according to Dunkin's multiple range test under the 5% probability level.**

Table (14): Effect of corm size and method of using fungal bio fertilizer ((T-22) on the preparation of spores of the fungus *Trichoderma harzinum* (CFu /g X 106).

first reading			
Effect of corms size	**Method of use**		**Corms size mm**
	T-22. quench	**T-22. pollution**	
5.10 a	4.13 a	6.07 a	**big**
4.68 b	3.76 b	5.60 a	**small**
	3.95 b	5.83 a	**Effect of the method of use**
second reading			
7.17 a	6.21 c	8.12 a	**big**
6.60 b	5.68 d	7.53 b	**small**
	5.94 b	7.83 a	**Effect of the method of use**

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