



**ORIGINAL ARTICLE**

## EFFECT OF ORGANIC AND CHEMICAL FERTILIZERS ON THE GROWTH AND FLOWERING OF FREESIA PLANT

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**Abstract:** Plants need an optimum nutrition range as well as a least necessary limit. Below this minimum level, plants start to present nutrient deficiency signs. Extreme nutrient uptake can also cause weak growth because of toxicity. Therefore, the proper quantity of application and the position of nutrients are important, so the study was conducted at the College of Agriculture and Forestry, University of Mosul, Iraq, for the season 2017-2018 to study the effect of some organic fertilizers (Fito alga max) and NPK fertilizer on the features of vegetative, flowering growth of Freesia Double Red cultivar. The Fito alga max fertilizer (2 ml l<sup>-1</sup>) application produced an increase in all vegetative, flowering and characteristics, plant height 37.18 cm, leaf area 98.90 cm<sup>2</sup>, number of leaves 8.50 leave plant<sup>-1</sup>, length of flower stalk 32.68 cm, fresh weight of flower stalk, and the diameter of the flower stalk 0.91 cm, the duration of the flowers on the plant 18.56 days, vase life 74.35 days and the percentage of nitrogen and phosphorus, Potassium and sugars 1.75, 0.33, 2.3 and 4.67%, sequentially.

**Key words:** Organic fertilization, Nutrition, Cut flower, Freesia.

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## 1. Introduction

*Freesia hybrida* L. is one of the famous flowers in the world [Imanishi (1993)]. It belongs to the Iridaceae family which has more than 50 genera. The freesia is characterized by aromatic smell as well as they are mainly planted for the product of potted plants or cut flowers [Bhiah and AL- Zurfi (2020)].

Fertilization is one of the necessary management which influences the growth, development and product of plants, the importance of these ingredients is nitrogen whose importance emanates from being entered into the structure of most biological substances in the plant so as proteins, enzymes, amino acids and plant hormones [Al-Juthery *et al.* (2018), Al-Juthery *et al.* (2020), Al-Bakkar *et al.* (2021)]. Experts in the agriculture field have used organic fertilizers as an option instead of mineral fertilizers, for improving plant growth and later getting strong healthy plants [Manea *et al.* (2019), Hussein *et al.* (2021)].

The ionic balance in the soil is essential necessities of plant nutrients during the growth also decreases the intensive requirements of mineral fertilizers, reduce the lack of nutrient forms, particularly in the drought conditions, also improves the strength of the root growth and enhances it by enhancing the dry weight with developing lateral roots growth, as well as improving the plant's protein contents and increasing the microorganisms in the soil [Al-Khafajy *et al.* (2020), Hussein *et al.* (2021)].

The experiment aims to study the effect of organic and chemical fertilizers on the growth and flowering of freesia plant.

## 2. Materials and Methods

The bulbs had been grown in plastic pots with diameter of 20 cm, the pots media loamy, sand in a ratio of 2: 1, physical and chemical properties were estimated (Table 1). The pots had been distributed

**Table 1:** Physical and chemical traits of the soil.

Traits	Unit	Value
Sand	g k <sup>-1</sup>	46.55
Salt	g k <sup>-1</sup>	30.55
Clay	g k <sup>-1</sup>	22.90
pH	-	7.11
Organic matter	g k <sup>-1</sup>	4.30
Soil texture	-	Loamy

according to the experiment design, there were nine treatments, including control.

All agronomic services such as irrigation and hoeing were done for all treatments in a similar way. The experiment was conducted in randomized complete block design with three replications, 3 plants per experimental units.

**The studied characteristics:** Emergence percentage (%), plant height (cm), number of leaves, leaves area (cm<sup>2</sup>).

**The flower stalk height (cm):** Flower stalk diameter (cm), flowering duration (day), fresh flower

stalk and flower weight (g), vase life (day), N.P.K. contents in leaves.

### 3. Results and Discussion

The rate of emergence after 45 and 60 days was 85.77 and 100%. Table 2 pointed that the Folly Zartal treatment at a level of 2 ml l<sup>-1</sup> was excelled to the other treatments and produced the highest mean for features, plant height 37.18 cm. The number of leaves 8.50 leaves.plant<sup>-1</sup> and Leaves area 98.90 cm<sup>2</sup>, compared to the control which hold the lowest proportion for features of plant height 17.42 cm, the number of leaves 6.00 leaves plant<sup>-1</sup> and leaves area 70.53 cm<sup>2</sup>. The rise may be due to the effect of the nitrogen in plant growth, which is involved in synthesis of amino acids, amongst them the tryptophan, which is the source of the Auxin indole acetic acid, which it is necessary for cell division and elongation or the gain may be due to the macronutrients in the Folly artal fertilizer, such as N.P.K., which animate plant growth and development through its effect on physiological processes such as photosynthesis and hence reflected on the qualities of

**Table 2:** Effect of different organic and chemical fertilizers on plant height, number of leaves and leaf area.

Treatments	Plant height (cm)	Number of leaves plant <sup>-1</sup>	Leaves area (cm <sup>2</sup> )
Control	17.42d	6.00c	70.53c
(2 ml l <sup>-1</sup> ) Fito alga	27.73b	7.0 bc	79.97bc
Fito alga (1 ml l <sup>-1</sup> )	21.57cd	6.56 bc	75.37c
NPK (2 ml l <sup>-1</sup> )	25.83bc	7.37b	79.60bc
NPK (1 ml l <sup>-1</sup> )	22.00cd	7.00 bc	75.67c
Folly artal (2 ml l <sup>-1</sup> )	37.18a	8.50a	98.90a
Folly artal (1 ml l <sup>-1</sup> )	32.54a	7.45b	89.44ab
Humi max (2 ml l <sup>-1</sup> )	27.35b	7.02 bc	77.81c
Humi max (1 ml l <sup>-1</sup> )	25.49bc	6.76bc	75.53c

\*The Means followed by different letters in column indicate significant differences Duncan Polynomial Test (p = 0.05).

**Table 3:** Effect of different concentrations of organic and chemical fertilizers on the length of flower stalk, the diameter of flower stalk, duration of flowers for freesia double red cultivar.

Treatments	The length of flower stalk cm	The diameter of flower stalk cm	The Duration of Flower day
Control	14.44 d	0.65 d	89.35 bc
(2 ml l <sup>-1</sup> ) Fito alga	22.54 bc	0.78 bc	83.78 cd
Fito alga (1 ml l <sup>-1</sup> )	18.99 cd	0.74 c	89.1 bc
NPK (2 ml l <sup>-1</sup> )	20.00 c	0.72 c	88.70 bc
NPK (1 ml l <sup>-1</sup> )	17.66 cd	0.74 c	93.80 ab
Folly artal (2 ml l <sup>-1</sup> )	32.68 a	0.91 a	74.35 e
Folly artal (1 ml l <sup>-1</sup> )	26.44 b	0.81 b	81.10 d
Humi max (2 ml l <sup>-1</sup> )	22.66 bc	0.74 b	92.93 ab
Humi max (1 ml l <sup>-1</sup> )	20.18 c	0.72 c	91.60 ab

\*The Means followed by different letters in column indicate significant differences Duncan Polynomial Test (p = 0.05).

vegetative growth positively [Hegab *et al.* (2005), Redef *et al.* (2021)].

Table 3 showed that the Folly Zartal treatment at a concentration of 2 ml l<sup>-1</sup> was significantly excelled to the other treatments and recorded the best means of length of flower stalk 32.68 cm, diameter of flower stalk 0.91 cm and Duration of flowers 74.35 day, compared to the control which gave the recorded lowest average of length of flower stalk 14.44 cm, diameter of flower stalk 0.65 cm and flowering duration 89.35 day. The increase of flower stalk may be due to the role of elements and their effect on biological processes and the functions of the elements and the growth regulators particularly at the sensitive stages in the plant life in which it needs sufficient amount of nutrition to improve the biological processes and increased photosynthesis manufacturing, thus improving the flower characteristics [Mohammad *et al.* (2014)].

Table 4 showed that the Folly Zartal treatment at a concentration of 2 ml l<sup>-1</sup> was significantly excelled to the other treatments and gave the highest average for traits Fresh weight of stalk and flower 14.85g. The duration of the flowers on the plant 18.56 day and Vase life 14.63 day, compared to the control treatments which gave the lowest average for traits Fresh weight of stalk and flower 10.73g, diameter of flower stalk 8.28 cm and Vase life 5.60 day. The increase in the fresh weight may be due to the integration of the elements in their effect and their role in organizing the biological processes and the interaction of the functions of the elements and the growth regulators, especially at the sensitive stages in the life of the plant in which it needs an adequate amount of food to complete the biological processes and increased food manufacturing, thereby increasing the fresh weight of inflorescence [Hopkins (2006)].

Table 5 showed that the Folly Zartal treatment at a concentration of 2 ml l<sup>-1</sup> was significantly excelled to the other treatments and gave the highest average for traits nitrogen, Phosphorus, Potassium, Sugars 1.75, 0.33, 2.3, 4.67%, compared to the control treatments which gave the lowest average for traits nitrogen, Phosphorus, Potassium and Sugars (0.77, 0.13, 1.4 and 0.90 %, respectively). The effect of organic fertilizer on giving plants high concentrations of nitrogen, phosphorus and potassium elements in the leaves may be due to the effect of the components contained in the organic fertilizer, where the total amino acids constitute

a high percentage and the nitrogen included in the composition of the amino acids is ready for absorption directly by the plant [Al-Sahaf (1989)] which leads to increased plant efficiency in absorbing and accumulating other elements, including phosphorus, potassium and carbohydrates.

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