

The effect of coconut oil and NPK on vegetative and flowering growth on *Gazania splendens* L. _

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Abstract

covered canopy of the Department of –This study was conducted in the saran Horticulture and Landscape Engineering, College of Agriculture, University of Basra agricultural season with the aim of studying the effect of 2023–during the 2022 nut liquid and spraying with coconut NPK fertilizer. nia plant casa For L. *Gazania splendens* The study was carried out as a factorial experiment with two factors . using an RCBD design The first factor represented the spraying of coconut liquid at . and the second factor was ¹ - three concentrations (0, 5, 10) mg LNPK fertilizer at Spraying at a rate of two sprays every two . ¹ - three concentrations (0, 50, 100) mg L :Its of the study can be summarized as follows weeks, and the resu

Spraying treatments with coconut liquid showed a positive effect on most of the vegetative and flowering growth indicators of cassia plants. The spraying treatment Significantly, ¹ was superior to 1- mg L 10 with coconut liquid at a concentration of with the highest rate recorded in plant height, number of leaves, flower stand height, .flower diameter, number of petals, and total chlorophyll content of leaves

Spraying treatments with - 2NPK fertilizer showed a positive effect on most of the vegetative and flowering growth indicators of cassia plants. The spraying treatment by recording the highest rate of plant ^{exceeded 1} with a concentration of 100 mg L r diameter, number of petals, and height, number of leaves, flower stand height, flowe .total chlorophyll content of leaves

The interaction treatments between the two study factors gave a positive, - 3 significant effect on most of the studied traits. The interaction treatment between the of ¹ of coconut liquid and 100 mg L ¹ mg L 10 ,two concentrations NPK fertilizer, recorded the best significant results for growth indicators in plant height, flower .diameter, podium, and flowering

As for the intervention concentration, 5 mg/L of coconut liquid and the concentration of 0 mg/L of NPK fertilizer.in terms of flower stand height results gave the best It

the also gave 1-mg L and number of petals. The treatment with a concentration of 50 . the leaves highest chlorophyll content in

the introduction

...The casagna plant belongs toL. *Gazania splendid* the To Asteraceae family , it is to South Africa. This flower is also native one of the types of flowering plants widespread in sandy areas with low elevations and in alpine meadows in South Africa, Swaziland, Mozambique, Tanzania and Angola. Casagna flowers are very ia is a large type compound flowers . Cassan form similar to chrysanthemums, as they yellow and orange. The between of flower, and the colors of this flower range Cassania flower is characterized by its great ability to tolerate drought and poor soil. plants. The talornamen These flowers are usually grown for their bright colors and as Cassania plant has about 18 different species, and they vary... These species are distinguished from each other by their bright colors that distinguish each type from n spring and the other. It is also known as a perennial herbaceous plant that blooms i summer. Its height does not exceed 15 cm. It is considered one of the soil covers. Its Sultan et al., 1991). Cassania -flowers open during the day and close in the dark (Al .By seeds and division . plants reproduce

Types of cassia

(*Gazania maritima* Cassania marine: scientific name _ (

(*Gazania othonnites*) *Gazania othonnites*: scientific name _

)*Gazania rigida* casania rigida: scientific name_ (

(*Gazania pectinata* _ *Gazania* comb

(*Gazania schenkii*) *Kzania Schenki*_

(*Gazania serrata*) *serrata* .D , *Gazania*_

(*Gazania speciosa*) Beautiful *Gazania* _

)*tenuifoli* Slender leaves

Coconut liquid contains many factors that affect cell division, including the natural cytokinin Zeatin. It also contains many free amino acids, including phenylalanine, which is considered effective in stimulating the division of various cells in plants. It also contains the compound myo-inositol, one of the vitamin B group, a compound stimulating effect, which is involved in the synthesis of with a growth phospholipids and pectin substances in cells, in addition to containing many fatty acids. Coconut sugar liquid and is colorless to light brown yellow and -liquid is considered a milky liquid contains It contains a high percentage of fatty acids and represents the 1 .(Dabli, 1997-endosperm (Al

George (1993) indicated the isolation of about fifty components of coconut fluid, the most important of which are cytokinins such as terpenoid riboside Kobayashi mentioned *et al* ut fluid constitute more that cytokinins isolated from cocon (1997) ,. than 20% of the total activity of cytokinins

In a study conducted by Ahmad and Khan to determine the effect of nitrogen (2004) fertilization on the *Caldiolus L. hortulanus Gladiolus* They classified .Wind Song and found that the high concentration of nitrogen and phosphorus in NPK fertilizer gave a significant increase in the length of the flower spikes, the height of (5:10:10) of the plant, the number of leaves, and the length of the leaves, while the equal ratio NPK led to To the early appearance of the daisies and the opening of the (5:5:5) .florets

Baswas ,Pal (2005) added that the low levels of fertilization with major elements tive and caused a deterioration in the quality of the plants, while the quality of vegetative flowering growth improved at their high levels, and that feeding with nitrogen works to regulate the work of plant hormones (auxins and cytokinins), which increases the s, and divisions of meristematic cells and this is reflected positively. On the shoot increasing the root system, which helps increase the efficiency of the plant in absorbing water and nutrients from the soil and representing them. Phosphorus plays an important role in regulating the metabolism of microorganisms in the soil and easing the efficiency of absorption of nutrients. Potassium has a role in the movement of nitrogen within the plant (Najm et al. 1997), as well as the superiority of the Semper variety Avanti treatment of narcissus plants with potassium phosphate r liter in fresh weight and plant height compared to other treatments (Al mg pe 100 Taher, 2014), in addition to the role of these fertilizer elements in improving the morphological characteristics of plants, as nitrogen works to increase vegetative Mansi et al., -ase plant height by encouraging the growth The leg (Al growth and incre .(1989

Phosphorus is of great importance in the processes of formation of flowers, fruits, seeds, and the growth and development of roots through its role in cell division .(1987 ,processes (Awad

Potassium works to strengthen the stem, increase its thickness, and increase the leaf (Younis, 1988). -Hence, the dry weight of the plant increases (Abu Dahhi and Al area Potassium also works to encourage the growth of meristematic tissues and then the formation of good vegetative and root growth, which increases the efficiency of) ter and nutrients ready in the soil absorption of waTisdale .(et al., 1985

Due to the plant's tolerance to arid lands and high temperatures, but it produces small flowers, it also cannot tolerate long irrigation periods

research The aim of the

the plant for landscaping gardens and potted plants, the Given the importance of many colors of its flowers, its tolerance to the atmosphere of Basra Governorate, and the lack of sources for it, we decided to study the plant to achieve the best vegetative :and floral growth

tain the best concentration of coconut liquid to obtain good vegetative and O - 1 .flowering growth

Obtaining the best concentration when treated with - 2NPK fertilizer to obtain a .larger size of flowers

on between the two Obtaining the best concentration from the interacti - 3 .experimental factors for good vegetative and flowering growth

:Materials and working methods

covered canopy of the Department –The experiment was carried out in the saran of Horticulture and Landscape Engineering / College of Agriculture / University of agricultural season, with the aim of affecting the effect 2023–Basra during the 2022 and 1- liquid at a concentration of 0, 5, 10 mg L of coconutNPK at a fertilizer 1- concentration of 0, 50, 100 mg L

Cassania seeds were planted on 11/1/2022 in anvils containing atomized emerged agricultural medium with peat moss at a ratio of 2:1. After the seedlings and the plant reached a height of 8 cm, the plants were sprayed at a rate of two sprays, between one spray and the next for two weeks. Plant service operations .were carried out, including irrigation, weeding, and fertilizing whenever necessary

factor factorial experiment was carried out according to a completely randomized block design with three replications. The results were analyzed using analysis of variance and the Least Significant Differences Least Test (LSD). By Rawi and Khalaf Allah, at the probability level of 0.05 (Al comparing the means (1980).

:Study transactions -

The research included a study of the following factors

It includes spraying the shoots with coconut liquid in three concentrations

(spraying with distilled water) Comparison treatment –1

(¹ Spraying with coconut liquid at a concentration of (5 mg L –2

(¹ Spraying with coconut liquid at a concentration of (10 mg L –3

Then I sprayed the plants on the leaves with a hand sprinkler until they were completely wet, at a rate of two sprays every two weeks

It included spraying the shoots of seedlings with NPK fertilizer in three concentrations

(Spraying with distilled water) Comparator treatment –1

Spraying with –2NPK fertilizer (¹ at a concentration of (50 mg L

Spraying with – 3NPK fertilizer (¹ at a concentration of (100 mg L

:Experimental measurements

All experimental measurements of vegetative growth and flowering indicators were experimental unit and included taken at the flowering stage for each

(Plant height (cm

The plant was measured using a measuring device from its point of contact with the soil to the top of the leaf, and its rate was recorded

Total number of leaves (plant⁻¹ leaf

The total number of leaves for each plant in each experimental unit was calculated

(the chlorophyll content of the leaves (mg 100 g for and a record was prepared

(¹ fresh weight

The total chlorophyll pigment in the leaves of each treatment was estimated. A 0.5 gram sample was taken and 10 ml of 80% acetone was added to it. The tissue was crushed with a ceramic mortar until the tissue was white and placed in the for the purpose of filtration. Chlorophyll was measured using a Centrifugal device spectrophotometer to measure the optical absorption of the pigment at two wavelengths (645). And 663 nanometers, then I calculated the concentration of the dye by applying the following equation

fresh paper tissu¹ dye in mg.100 g

$$\text{Total chlorophyll} = 20.2 \times D(645) + 8.02 \times D(663) \text{ (v/w} \times 1000)$$

D (663) Optical absorption reading at a wavelength of 663 nm =

D (645) Optical absorption reading at a wavelength of 645 nm =

V extract final volume of =

W weight of soft tissue in grams =

(Flower stand length (cm

Measure the length of the flower stand of each plant in the experimental unit from the point where the flower stand connects to the plant to the base of the flower .Then extract its rate .florescence using a tape measurein

(Flower diameter (cm -5-4

Take a measurement of the diameter of the paper using a measuring tool and .record its average

1st Number of petals of a flower petal–6–4

plant of the experimental unit was counted The number of leaf petals for each and an average recorded

Results and discussion

(Plant height (cm - 1

The results showed in Table (1) that there are significant differences when spraying the cassia plant with coconut liquid andNPK fertilizer The results showed that the . of coconut liquid, giving it the highest rate of plant ^{1st} concentration exceeded 10 mg L height, which reached 13.60 cm compared to the comparison treatment in which the .average plant height reached 9.72 cm

of^{1st} results of the same table also showed that the fertilizer level of 100 mg L The NPK was superior by giving it the highest rate of plant height, reaching 14.47 cm compared to the comparison treatment, which gave the least significant difference in .te of plant height, 11.69 cmthe ra

As for the effect of the interaction between the study factors, the results showed that the interaction treatment was superior between the coconut liquid treatment at a ^{and 1st} -concentration of 10 mg Lthe NPK ent at a concentration of 100 fertilizer treatm as it gave the highest rate of plant height, reaching 15.13 cm compared to the , ^{1st} mg L .comparison factor, which had the lowest rate. Plant height: 9.43 cm

Table (1) Effect of spraying with coconut liquid andNPK fertilizerat ^{1st} mg L plant height cm

Coconut extract ^{1st} mg L	NPK fertilizer ^{1st} mg L			Average effect of coconut extract ^{1st} mg L
	0	50	100	
0	9.43	9.57	10.17	9.72

5	12.00	12.07	13.67	12.80
10	12.70	13.63	15.13	13.60
Average effect of NPK fertilizer	11.69	11.97	14.47	

LSD 0.05

Coconut extract mg L	NPK fertilizer mg L	
	1	Interference
2.024	2.024	3.506

(¹ Number of leaves (leaf. plant – 2

The results in Table (2) showed that there are significant differences when spraying cassia plants with coconut liquid and NPK fertilizer. The results showed that the concentration of coconut liquid was higher, giving it the highest average concentration of 10 mg L compared to the comparison number of leaves, which reached 33.6 leaves. Plant treatment, in which the average number of leaves reached 24.2 leaves. Plant showed that the fertilizer level exceeded 100 mg L. The results of the same table also of NPK giving it the highest average number of leaves, reaching 29.90 leaves. Plant, compared to the comparison treatment, in which the lowest average number of leaves was 27.2 leaves. Plant

As for the effect of the interaction between the study factors, the results showed that the treatment was superior to the interaction between the coconut liquid treatment at a concentration of 0 mg/L and the NPK 50 mg/L fertilizer treatment at a concentration of 10 mg/L as it gave the highest average number of leaves, which amounted to 37 leaves, compared to the comparison factor, which had the lowest average number of leaves at 24 leaves. Plant

Table (2) Effect of spraying with coconut liquid and NPK fertilizer on the number of leaves. Plant

Coconut extract	NPK fertilizer mg L	Average effect of coconut extract
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1 ⁻ mg L		1 ⁻ mg L			
		0	50	100	
0		24.0	37.0	33.0	24.2
5		26.0	23.0	28.3	25.8
10		29.7	22.7	25.0	33.6
Average effect ofNPK fertilizer		27.2	27.6	29.90	

1⁻ mg L
LSD 0.05

1 ⁻ Coconut extract mg L	NPK ⁻ fertilizer mg L	Interference
5.25	5.25	9.09

1⁻ mg 100 g fresh weight The chlorophyll content of the leaves-3

The results in Table (3) showed that there are significant differences when spraying cassia plants with coconut liquid andNPK fertilizer The results showed that the . of coconut liquid by giving it the highest rate of 1⁻ concentration exceeded 10 mg L 1⁻ mg per 100 gm fresh weight orophyll content in the leaves, as it reached 9.15chl compared to the comparison treatment in which the chlorophyll content of the leaves 1⁻ mg per 100 g fresh weight reached 8.29

of 1⁻ The results of the same table also showed that the fertilizer level of 50 mg LNPK was superior by giving it the highest average leaf chlorophyll content, reaching compared to the comparison treatment, which had the 1⁻ mg 100 g fresh weight 10.79 1⁻ mg 100 g fresh weight est leaf chlorophyll content, reaching 5.50low

As for the effect of the interaction between the study factors, the results showed that the interaction treatment was superior between the coconut liquid treatment at a and 1⁻ -mg L 10 concentration ofthe NPK fertilizer treatment at a concentration of 50 as it gave the highest rate of chlorophylla content in the leaves, which , 1⁻ mg L 1⁻ mg 100 gm fresh weight amounted to 11.51

of chlorophyll content in Compared to the comparison factor, at which the lowest rate
 1^{-} mg 100 gm fresh weight the leaves was 50.0

Table (3) Effect of spraying with coconut liquid andNPK on chlorophyll
 (1^{-} concentration in leaves (mg 100 g fresh weight

Coconut extract 1^{-} mg L	NPK fertilizer 1^{-} mg L			Average effect of coconut extract 1^{-} mg L
	0	50	100	
0	5.50	9.94	9.44	8.29
5	5.37	10.91	9.72	8.60
10	5.62	11.51	10.33	9.15
Average effect ofNPK fertilizer	5.50	10.79	9.83	

LSD 0.05

1^{-} Coconut extract mg L	NPK $^{-}$ fertilizer mg L	Interference
2.895	2.895	5.015

(Height of the flower stand (cm -4

The results showed in Table (4) that there are significant differences when spraying
 the cassia plant with coconut liquid andNPK fertilizer The results showed that the
 of coconut liquid, giving it the highest rate of 1^{-} concentration exceeded 10 mg L
 flower stand height, which reached 11.19 cm compared to the comparison treatment,
 .at which the rate reached Plant height: 8.68 cm

of 1^{-} mg L (The results of the same table also showed that the fertilizer level (100NPK
 was superior by giving it the highest rate of flower stand height, reaching 12.55 cm
 compared to the comparison treatment, which had the lowest rate of flower stand
 .height of 9.83 cm

actors, the results showed that As for the effect of the interaction between the study f
 the interaction treatment was superior to the coconut liquid treatment with a

by giving it the highest average flower stand height of 1st concentration of 5 mg L west average cm compared to the comparison treatment, which had the lowest 13.03 .flower stand height of 7.23 cm

These results agreed with (Al Taher, 2016) on tulip bulbs in flower stand length when different levels of the NPK chemical fertilizer were used

Table (4) Effect of spraying with coconut liquid and NPK fertilizer per 1st mg L cm flower stand height

Coconut extract 1 st mg L	Average effect of coconut extract 1 st mg L			
	NPK ¹ fertilizer mg L			
	0	50	100	
0	7.23	11.10	12.23	8.68
5	13.03	10.50	7.83	10.46
10	8.60	7.90	12.53	11.19
Average effect of NPK fertilizer 1st mg L	9.83	9.87	12.55	
LSD 0.05				
Coconut extract 1 st mg L	NPK ¹ fertilizer mg L Interference			
2.04	2.04		3.53	

(Flower diameter (cm) -5

The results showed in Table (5) that there are significant differences when spraying the cassia plant with coconut liquid and NPK fertilizer. The results showed that the highest rate of coconut liquid, giving it the highest rate of 1st concentration exceeded 10 mg L flower diameter, which reached 9.58 cm compared to the comparison treatment, which had a higher rate of flower diameter. Plant 6.97 cm

of¹ The results of the same table also showed that the fertilizer level of 100 mg L NPK was superior highest rate of flower diameter cm, reaching 9.52 by giving it the cm compared to the comparison treatment, which had the lowest rate of flower .diameter of 7.18 cm

As for the effect of the interaction between the study factors, the results showed that the interaction treatment was superior between the coconut liquid treatment at a ^{and 1} -concentration of 10 mg L the NPK fertilizer treatment at a concentration of 100 as it gave the highest rate of flower diameter , which reached 8.30 cm ,¹ mg L compared to the comparison treatment, which had the lowest rate. The height of the and these results agree with (Al Taher, 2016) on daffodil , flower stand is 5.60 cm flower diameter when different levels of bulbs in NPK chemical fertilizer are used .

Table (5) Effect of spraying with coconut liquid and NPK fertilizer on ¹ mg L flower diameter cm

Coconut extract ¹ mg L	NPK ¹ mg L fertilizer			Average effect of coconut extract ¹ mg L
	0	50	100	
0	5.60	8.03	7.27	6.97
5	8.27	7.33	7.00	7.53
10	7.67	7.30	8.30	9.58
Average effect of NPK fertilizer ¹ mg L	7.18	7.56	9.52	
LSD 0.05				

Coconut extract ¹ mg L	NPK mg L fertilizer ¹	Interference
0.712	0.712	1.234

(¹ Number of petals (petal.flower – 6

The results in Table (6) showed that there are significant differences when spraying cassia plants with coconut liquid and NPK fertilizer The results . showed that the concentration of 10 mg/L of coconut liquid gave the highest

average number of petals, which reached 21.00 compared to the comparison treatment, at which the average number of petals reached 19.89 petals.

.¹⁻ Flower

ts of the same table also showed that the fertilizer level of 100 mg/L The result of NPK was superior giving it the highest average number of petals, reaching 23.32, compared to the comparison treatment, which had the lowest average number of petals, 20.67 petals. F

As for the effect of the interaction between the study factors, the results interaction treatment was superior between the coconut liquid showed that the and ¹⁻ treatment at a concentration of 5 mg L the NPK fertilizer treatment at a concentration of 100 mg L as it gave the highest average number of petals, 21.33 petals. Flower compared to the comparison factor, ¹⁻ which amounted to 21.33 petals. Flower which amounted to 21.33 petals. It has a minimum average number of petals ¹⁻ of 17.20 petals. Flower

Table (6) Effect of spraying with coconut liquid and NPK fertilizer per ¹⁻ mg l ¹⁻ petal number per petal. Flower

Coconut liquid ¹⁻ mg L	NPK fertilizer mg L ¹⁻			Average coconut liquid ¹⁻ mg L
	0	50	100	
0	17.20	20.22	18.67	19.89
5	21.33	20.33	21.12	20.44
10	21.00	19.33	21.10	21.00
Average effect of NPK fertilizer mg ¹⁻ L	20.67	20.33	23.32	
LSD 0.05				
Coconut extract ¹⁻ mg L	NPK fertilizer			Interference
1.595	1.595			2.762

Conclusions

gave the best Spraying with coconut liquid at a concentration of 10 mg/L results in the characteristics of vegetative and flowering growth and the .chlorophyll content of the leaves

Spraying with NPK fertilizer at a concentration of 100 mg/L gave the best growth and the results in the characteristics of vegetative and flowering .chlorophyll content of the leaves

The interactions between the two study factors were significant in most of the .studied characteristics

Recommendations

- 1- We recommend spraying with coconut liquid at a concentration of 10 mg .for the purpose of increasing all characteristics per liter
- 2- We also recommend adding NPK fertilizer at a concentration of 100 mg .per liter for the purpose of increasing all characteristics
- 3- t We recommend interfering with low concentrations of factors to give i the best flower stand, a greater number of petals in the flowers, and the chlorophyll content of the leaves. We also recommend spraying with high concentrations of coconut liquid and NPK fertilizer in order to give it the .t diameter of the flowers best plant height and the larges
- .We recommend spraying these agents on other plants -4

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