

## ENHANCING FLOWERING OF JASMINUM SAMBAC L PLANTS BY SPRAYING MAGNESIUM AND BORON

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**ABSTRACT:** *Growth, flowering, nutrients (N, P & K content) and plant pigments of Jasminum sambac L plants in response to spraying magnesium sulphate at 0.05 to 0.1 % and/ or boric acid at 0.025 to 0.05 % three times were investigated during 2007 and 2008 seasons.*

*Single or combined application of magnesium sulphate at 0.05 to 0.1 % and boric acid at 0.025 to 0.05 % was very effective in enhancing growth aspects, flowering, N, P & K contents in the leaves and plant pigments in relative to the check treatment. Magnesium sulphate was superior than boric acid in improving growth and flowering aspects. Combined application of magnesium sulphate and boric acid surpassed the application of each fertilizer alone in this connection. Average fresh weight of single flower tended to reduce with magnesium sulphate and boric acid treatments in relative to the control treatment.*

*Carrying out three sprays of a mixture containing magnesium sulphate at 0.05 % plus boric acid at 0.025 % was accompanied with maximizing growth and flowering aspects of Jasminum sambac L plants.*

**Key words:** *Jasminum sambac L, magnesium, boron*

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### INTRODUCTION

Jasminum sambac L is considered one of the most desirable and showy small evergreen flowering shrubs in Egypt. It is used as cut flowers, since plants bear large double white flowers with two nice smelling blooming in spring, summer and Fall and very attractive. Oil extracted from flowers is used in local and foreign markets for preparing high quality perfume and cosmetics.

Nutrients especially magnesium and boron were responsible for enhancing the biosynthesis and transportation of sugars (Nijjar, 1985). Their positive action on promoting flowering at the expense of growth encouraged the workers to apply such two nutrients especially for cut flowers when the needs of forming higher number of larger flowers is necessary (Yagodin, 1990).

Previous studies showed that supplying horticultural crops with their requirements from magnesium and boron was accompanied with enhancing growth and flowering aspects (Coetzer *et al.*, 1994; Abd El- Wahab, 1999; Khan, 2001; Abdou, 2002;

El- Sadek *et al.*, 2004; El- Sayed- Esraa, 2007 and 2010; Ibrahim *et al.*, 2007; Abd El- Latif, 2008).

The objective of this study was examining the impact of spraying magnesium and/ or boron on growth and flowering of Jasminum sambac L plants.

### MATERIALS AND METHODS

This study was conducted at the experimental Farm of King Abdulaziz Univ. at Hoda Al- Sham that located about 120 km northeast of Jaddah, Saudi Arabia during 2007 and 2008 seasons on one year old Jasminum sambac L plants. The plants were pruned to equal height (35 cm) and planted on sandy soil with 90 × 90 cm between plants and rows. Seedlings were planted on the first week of March during both seasons. The management practices like N, P and K fertilization, irrigation and weeding were the same for all treatments during the entire period of study.

This study involved the following seven treatments of spraying magnesium sulphate (9.6 % Mg) and/ or boric acid (17 % B):-

- 1- Control (untreated plants).
- 2- Spraying magnesium sulphate (9.6 % Mg) at 0.05 %.
- 3- Spraying magnesium sulphate at 0.1 %.
- 4- Spraying boric acid (17 % B) at 0.025 %.
- 5- Spraying boric acid at 0.05 %.
- 6- Spraying both fertilizers at the first concentration.
- 7- Spraying both fertilizers at the second concentration.

Each treatment was replicated three times, ten plants each. Spraying such two fertilizers was done three times 30, 45 and 60 days after planting. Triton B as a wetting agent at 0.05 % was added to all nutrient solutions and the plant sprayed till runoff. The control plants sprayed with water containing Triton B wetting agent.

Plants were allowed to grow and the following data on different growth and flowering indices of *Jasminum* was collected after three months (1st week of June) by adopting standard procedures.

- 1- Plant height (cm.).
- 2- Number of leaves per plant.
- 3- Leaf area (cm<sup>2</sup>) by using planimeter.
- 4- Total surface area/ plant (m<sup>2</sup>).
- 5- Number of flowers per plant.
- 6- Fresh weight of flowers per plant.
- 7- Average fresh weight of single flower (g.)
- 8- Percentages of N, P & K in the leaves (according to Wilde et al., 1985).
- 9- Plant pigments namely chlorophylls a & b, total carotenoids and total chlorophylls (as mg/ 1.0 F.W) were determined according to Moran (1982).

All the obtained data were statistically analyzed and means were compared using new L.S.D at 5 % (Mead et al., 1993).

## **RESULTS AND DISCUSSION**

### **1- Growth characters:**

Data in Table (1) obviously reveal that single or combined foliar application of magnesium sulphate at 0.05 to 0.1 % and boric acid at 0.025 to 0.05 % significantly was accompanied with stimulating all

growth characters namely plant height, number of leaves per plant, leaf area and total surface area per plant in relative to the check treatment. Spraying magnesium sulphate significantly surpassed the application of boric acid in this respect. Using both fertilizers together was superior than using each fertilizer alone in this connection. Meaningless stimulation on these growth parameters was observed with increasing concentrations of magnesium sulphate from 0.05 to 0.1 % and boric acid from 0.025 to 0.05 %. Carrying out three sprays of solution containing 0.05 % magnesium sulphate plus 0.025 % boric acid was responsible for maximizing growth characters. Unfertilization with magnesium and boron gave the lowest values. These results were true during both seasons.

The promoting effect of magnesium and boron on cell division, the biosynthesis and translocation of sugars and plant pigments and water absorption could explain the present results (Nijjar, 1985 and Yagodin, 1990).

These results are in agreement with those obtained by El- Sadek *et al.*, (2004) and El- Sayed- Esraa (2007) and (2010).

### **2- Flowering aspects:**

As shown in Table (1) the two flowering aspects namely number of flowers per plant and fresh weight of flowers per plant were significantly increased by spraying magnesium sulphate and/ or boric acid in relative to the check treatment. Spraying magnesium sulphate was significantly preferable than using boric acid in enhancing these flowering characters. Magnesium sulphate and boric acid treatments had significant reduction on the fresh weight of flower comparing with the control treatment. Unsignificant promotion on the number of flowers per plant and fresh weight of flowers per plant was observed with increasing concentrations of magnesium sulphate from 0.05 to 0.1 % and boric acid from 0.025 to 0.05 %. Combined application of both fertilizers surpassed the application of each fertilizer alone in improving flowering aspects. Three sprays of magnesium sulphate at 0.05% in

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Table 1

combined with boric acid at 0.025% resulted in the maximum number of flowers and fresh weight of flowers per plant. The untreated plants produced the minimum values of such two flowering aspects. These results were true during both seasons.

The beneficial effect of Mg and B on enhancing the biosynthesis and translocation of carbohydrates as well as plant pigments surely reflected in enhancing flowering aspects (Nijjar, 1985).

These results are in concordance with those obtained by Khan (2001); Abdou (2002) and Abd El- Latif (2008).

### **3- Leaf chemical composition:**

One can state from the obtained data in Table (2) that single and combined application of magnesium sulphate at 0.05 to 0.1 % and boric acid at 0.025 to 0.05 % were significantly responsible for enhancing N %, P %, K %, chlorophylls a & b, total chlorophylls and carotenoids in the leaves in relative to the check treatment. Application of magnesium sulphate was superior to using boric acid in enhancing these chemical traits. Using the two fertilizers together gave the maximum values when compared with using each fertilizer alone in improving these chemical traits. Increasing concentrations of magnesium sulphate from 0.05 to 0.1 % and boric from 0.025 to 0.05 % caused insignificant promotion on these chemical parameters. The maximum values were recorded with using both the two fertilizers together at the high concentrations. Untreated plant gave the lowest values in this respect. These results were true during both seasons.

The promoting effect of Mg and B on enhancing the uptake of nutrients as well as the higher content of chlorophylls from Mg could explain the present study.

These results are in concordance with those obtained by Khan (2001); Abdou (2002) and Abd El- Latif (2008).

As a conclusion, treating *Jasminum sambac* plants with magnesium sulphate at 0.05 % in combination with boric acid at 0.025 % three times gave the best results

with regard to growth and flowering aspects.

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### **REFERENCES**

- Abd El- Latif, M. Z. M. (2008). Effect of planting density, biofertilizers and micronutrients on *Nigella sativa*, L. plants. Ph. D. Thesis Fac. of Agric., Minia Univ. Egypt.
- Abd El- Wahab, A. Y. (1999). Studies on effect on foliar spraying with magnesium, boron and some vitamins on some vegetative and fruiting characters of Washington Navel oranges (*Citrus sinensis*). M. Sc. These Fac. of Agric. Minia Univ. Egypt.
- Abdou, M. A. H. (2002). Influence of NPK and micronutrients on growth, flowering and chemical constituents of *Borago officinalis*, L. plants grown in sandy soil. Proc. of Minia 1st Conf. Agric. and Environ. Sci. 25 – 28 Mar. 22 (20): 1659 – 1672.
- Coetzer, A. L., P. J. Robbertse, R. O. Barnard, E. Tomer and M. F. Smith (1994). The effect of boron on the growth of mango seedlings. Year Book South African Mango Growers Association 14: 14 – 17.
- El- Sadek, A. N. A., M. A. Ashob, A. M. Abo-Shetaia and M. I. Hegab (2004). Response of sunflower yield and its attributes to sowing dates, boron foliar application and nitrogen fertilization under El- Wadi El- Gadeed conditions. Zagazig J. Agric. Res., 31 (4A): 1257 – 1277.
- El- Sayed- Esraa, M. H. (2007). Response of Ewaise mango trees to foliar application of boron. M. Sc. Thesis Fac. of Agric. Minia Univ. Egypt.
- El- Sayed- Esraa, M. H. (2010). Behaviour of Ewaise mango trees to foliar application of some nutrients and seaweed extract Ph. D. Thesis Fac. of Agric. Minia Univ. Egypt.

Table 2

- Ibrahim, H. I. M., A. Y. Mohamed and F. F. Ahmed (2007). Relation of fruiting in Hindy Bisinnara mango to foliar nutrition with Mg, B and Zn and some antioxidants. African Crop Sci. Conf. Proc. 8 : 411 – 415.
- Khan, M. A. (2001). Prospects of floriculture industry in South Asia. Report of APO Seminar on Strategies for Development of Commercial Floriculture in Asia and the Pacific. Asian productivity organization, Tokyo. Pp 61 – 74.
- Mead, R., R. N. Curnow and A. M. Harted (1993). Statistical Methods in Agricultural and Experimental Biology. Second Ed. rs Moscow pp. 278 – 281.
- Chapman & Hall London. pp 10 - 44.
- Moran, R. (1982). Formula determination of chlorophylls pigments extracted with N-N-dimethyl-Formamide. Plant Physiol., 69: 1376 – 1381.
- Nijjar, G.S. (1985). Nutrition of Fruit Trees. Mrs Usha Raj Kumar, Kilyani, New Delhi India pp. 80 - 119.
- Wilde, S. A., R. B. Corey, J. G. Layer and G. K. Voigt (1985). Soils and Plant Analysis for Tree Culture. Oxford and IBH publishing Co., New Delhi, India.
- Yagodin, B.A. (1990). Agricultural chemistry. Mir. Publisher.
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## "تحسين الأزهار في نباتات الفل عن طريق الرش بالماغنيسيوم والبورون"

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### الملخص العربي

تم دراسة درجة استجابة النمو والأزهار والعناصر الغذائية (النيتروجين والفوسفور والبوتاسيوم) والصبغات النباتية لنباتات الفل المجوز لرش كبريتات الماغنيسيوم بتركيز 0.05 إلى 0.1 % ، حامض البوريك بتركيز ما بين 0.025 إلى 0.05 % إما بصورة فردية أو مشتركة ثلاثة مرات وذلك خلال موسمي 2007، 2008. كان الرش الفردي أو المشترك لكبريتات الماغنيسيوم بتركيز ما بين 0.05 إلى 0.1 % وحامض البوريك بتركيز ما بين 0.025 إلى 0.05 % فعالا جدا في تحسين صفات النمو الخضري، الأزهار ، النيتروجين والفوسفور والبوتاسيوم في الأوراق والصبغات النباتية وذلك مقارنة بمعاملة الكونترول ولقد تفوق استخدام كبريتات الماغنيسيوم عن استخدام حامض البوريك في تحسين صفات النمو والأزهار وتفوق استخدام كبريتات الماغنيسيوم جنبا إلى جنب مع حامض البوريك عن استخدام أي سماد بمفرده في هذا الصدد. وكان الوزن الطازج للزهرة يميل إلى الإنخفاض بمعاملات كبريتات الماغنيسيوم وحامض البوريك وذلك بالمقارنة بعدم استخدام هذين السمادين. إن رش كبريتات الماغنيسيوم بتركيز 0.05 % جنبا إلى جنب مع رش حامض البوريك بتركيز 0.025 % ثلاثة مرات يكون مفيدا في تعظيم صفات النمو والأزهار لنباتات الفل المجوز.







**Table (1): Effect of spraying magnesium and/ or boron at different concentrations on growth and flowering aspects of *Jasminum sambac* L plants during 2007 and 2008 seasons.**

Treatments	Plant height (cm.)		Number of leaves/ plant		Leaf area (cm <sup>2</sup> )		Total surface area/ plant (m <sup>2</sup> )		Number of flowers per plant		Fresh weight of flowers per plant (g.)		Average fresh weight of flower (g.)	
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
Control (untreated plant)	38.1	39.1	31.0	31.0	21.0	21.0	0.07	0.07	21.0	22.0	9.1	9.6	0.43	0.44
Spraying magnesium sulphate at 0.05%	46.0	47.0	43.0	44.0	26.0	26.5	0.11	0.12	35.0	36.0	10.8	11.3	0.31	0.31
Spraying magnesium sulphate at 0.1%	46.3	47.4	43.6	44.0	26.3	26.8	0.11	0.12	35.6	36.7	11.0	11.5	0.31	0.31
Spraying boric acid at 0.025 %	41.7	42.8	36.0	37.0	23.0	23.5	0.08	0.09	28.0	29.0	9.9	10.5	0.35	0.36
Spraying boric acid at 0.050 %	42.0	43.0	36.6	38.0	23.3	23.8	0.09	0.09	28.3	29.4	10.0	10.5	0.35	0.36
Spraying both at the first conc.	51.0	52.0	51.0	52.0	31.0	31.5	0.16	0.16	41.0	42.0	12.6	13.1	0.31	0.31
Spraying both at the second conc.	51.6	52.6	51.6	52.3	31.6	32.0	0.16	0.17	42.7	42.7	13.0	13.3	0.31	0.31
New L.S.D at 5 %	2.9	3.1	4.0	4.0	1.3	1.4	0.03	0.03	5.0	5.1	0.7	0.7	0.07	0.07





