



# World Scientific News

An International Scientific Journal

WSN 133 (2019) 34-44

EISSN 2392-2192

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## Effect of flurprimidol on growth and flowering of Chilean ornamental geophyte *Leucocoryne coquimbensis* F.Phil. ex Phil.

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### ABSTRACT

*Leucocoryne coquimbensis* F.Phil. ex Phil. is an attractive bulb plant which naturally occurs in Chile. It has ornamental blue or violet fragrant flowers. No information has been available on the use of plant growth retardants in the cultivation of *L. coquimbensis* as potted plant. The objectives of this study were to determine the effect of flurprimidol on plant growth and flowering of *L. coquimbensis* grown in pots in the greenhouse. In summary, it can be concluded that *L. coquimbensis* can be cultivated as an attractive pot plant. The use of flurprimidol modifies the appearance of *L. coquimbensis*, the flowering time and the quality of flowers. We recommend for producing potted plants the application of Topflor 0.1% as foliar spray when the plants was 3 cm tall.

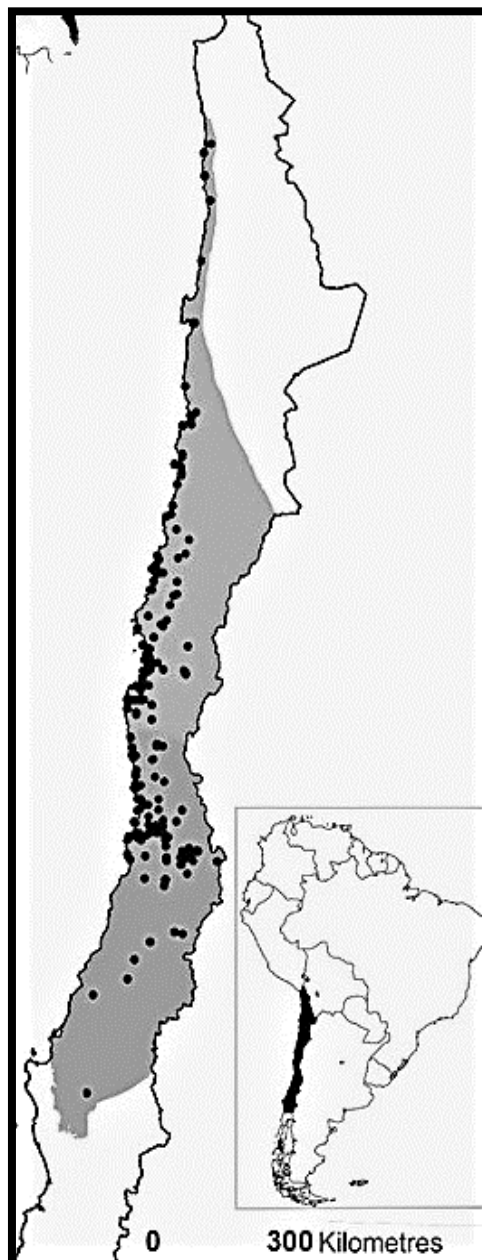
**Keywords:** geophytes, *Leucocoryne*, plant growth retardants, pot plants, Topflor

### 1. INTRODUCTION

A assortment of ornamental geophytes offered as pot plants in the summer period is limited and requirements to be enriched with new species [1, 2]. The genus *Leucocoryne* Lindl. from Amaryllidaceae family (Allioideae), comprising 11-15 species [3], is a valuable group of bulbous ornamental plants [4], which should be permanently included in the market offer

[5-8]. Of particular interest is endemic species *Leucocoryne coquimbensis* F.Phil. ex Phil. O., naturally occurring in Chile (**Figure 1**) [9-13].

*L. coquimbensis* has blue or violet fragrant flowers (**Figure 2**) with a greenish white center and yellow conical staminodes and slightly undulating tepals, grouped in inflorescences set on long, leafless stalks. Inflorescences are characterized by a long post-harvest life and are a sought-after commodity on the cut flower market [14]. So far, no scientific studies have been published on the cultivation of *L. coquimbensis* as a pot plant.

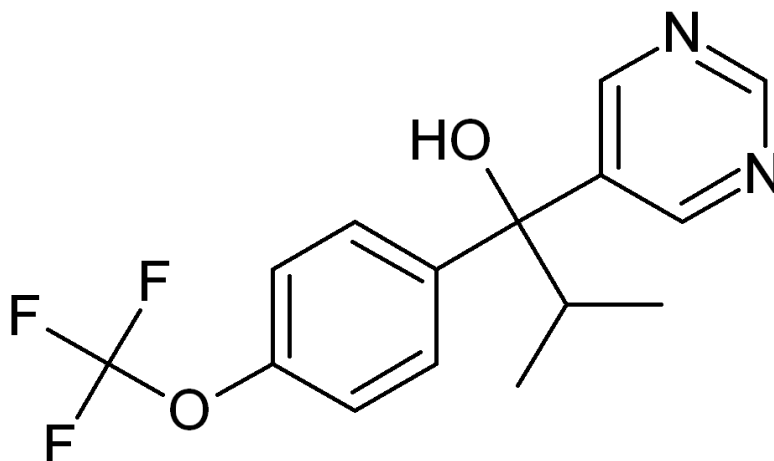


**Figure 1.** The distribution of *Leucocoryne* in Chile according to Jara-Arancio et al. [1]  
(Source: <http://wileyonlinelibrary.com/journal/jbi> 2013 John Wiley & Sons Ltd, doi:10.1111/jbi.12186)



**Figure 2.** *Leucocoryne coquimbensis* F.Phil. ex Phil.  
(Source: <http://www.srgc.org.uk/wisley/2008/110408/log.html>)

The use of plant growth retardants is a possible way of reducing the unwanted plant growth [15-17]. The use of plant growth retardants allows for continuous broadening of the pot plant assortment to include new species [18-20]. Flurprimidol ( $C_{15}H_{15}F_3N_2O_2$  IUPAC: 2-methyl-1-pyrimidin-5-yl-1-[4-(trifluoromethoxy)phenyl]propan-1-ol, molecular weight 312.292 g/mol) (**Figure 3**) is used to reduce unwanted plant growth [21-23]. It should also be noted that the action of flurprimidol depends to a large extent on the genotype, concentration, method of application, as well as the interaction of many external factors, such as temperature and irradiance [17, 21, 23].



**Figure 3.** Flurprimidol, plant growth regulator.

There are no data on the use of plant growth retardants in the cultivation of *L. coquimbensis*. Therefore, the aim of the study was to investigate the effects of flurprimidol (Topflor as donor) on the growth and flowering and of *L. coquimbensis* grown in pots.

## 2. MATERIALS AND METHODS

The studies were carried out at the Department of Horticulture West Pomeranian University of Technology in Szczecin (53° 25' N, 14° 32' E). *Leucocoryne coquimbensis* bulbs were planted singly on 15 November in pots with a circumference of 12 cm filled with a medium consisting of a peat substrate with a pH of 6.2 with the addition of Hydrocomplex fertiliser (5% N-NO<sub>3</sub>, 7% N-NH<sub>4</sub>, 11% P<sub>2</sub>O<sub>5</sub>, 18% K<sub>2</sub>O, 2.7% MgO, 8% S, 0.015% B, 0.2% Fe, 0.02% Mn, and 0.02% Zn) at a dose of 2 g·dm<sup>-3</sup>. The plants were grown in a greenhouse under natural photoperiod conditions with temperatures at 18-22 °C during the day and 16-18 °C at night with a relative humidity of 65-80%. The Topflor 015 SL preparation (SePRO Corporation, USA) contained 1.5% of flurprimidol was used in the experiment. Retardant was applied at the concentration 0.1 or 0.2% as a foliar spray when the plants was about 3 cm or 10 cm tall. Control plants were not treated with the retardants. Total plant height (measured from the soil line to the uppermost part of the inflorescences), number of leaves, leaf length and width, number of flowers in inflorescence, flower diameter, weight of flower and inflorescence were determined were recorded at flowering stage. The experiment was conducted as a one-factor experiment with a full randomisation system with four replications of 15 plants each. The results of the measurements were verified using a variance analysis model and the TIBCO Statistica™ software. The confidence semi-intervals were calculated on the basis of Tukey's test at a significance level of  $p \leq 0.05$ .

## 3. RESULTS AND DISCUSSION

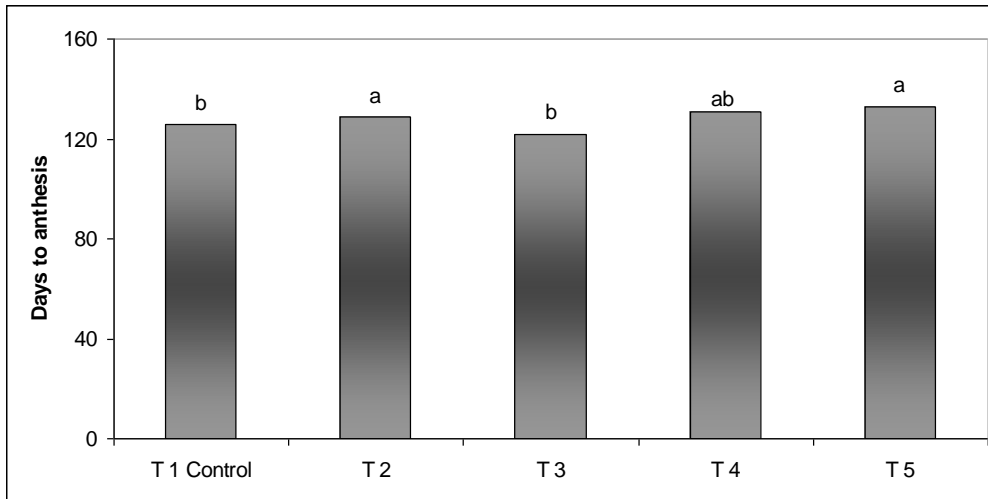
The number of days from planting the *Leucocoryne coquimbensis* bulbs to the beginning of flowering was affected by flurprimidol treatment (**Figure 4**). The plants sprayed with the solution of Topflor 015 SL a concentration of 0.1% when the plants was 3 cm tall were delayed of flowering by 3 days. Delayed flowering after a flurprimidol application was also observed in other ornamental geophytes such as *Eucomis autumnalis* [18], *Lachenalia* [19] or *Ornithogalum saundersiae* [23].

The use of flurprimidol did not significantly ( $p \leq 0.05$ ) affect width and length of leaves and the number of leaves per plant (**Figure 5**, **Figure 6**, **Figure 7**).

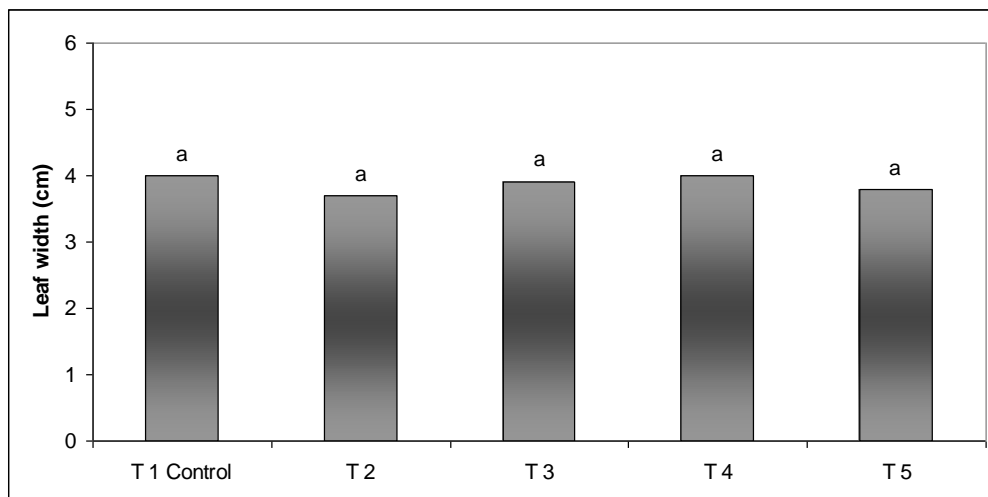
The study showed that flurprimidol reduced length of inflorescence (**Figure 8**). Topflor 015 SL applied as a foliar spray at a concentration of 0.2% when the plants was 3 cm inhibited plant growth most effectively. The results are consistent with the data presented by other authors [18, 19, 23], who obtained lower plants by using Topflor 015 SL as a donor of flurprimidol. Flurprimidol treatment influenced the number of flowers in inflorescence (**Figure 9**). Plants sprayed with Topflor 015 SL when the plants was 3 cm tall produced significantly ( $p \leq 0.05$ ) fewer flowers per inflorescence as compared with the control ones.

In this research, it was shown that Topflor 015 SL application (T 4) improved significantly ( $p \leq 0.05$ ) fresh weight of flowers (**Figure 10**). Moreover, the fresh weight of

flower stalk of the plants sprayed with flurprimidol (T 2 and T 4) was significantly ( $p \leq 0.05$ ) greater than in control (**Figure 11**). The flower diameter of *L. coquimbensis* was significantly ( $p \leq 0.05$ ) increased after the application of Topflor 015 SL at concentration of 0.1% when the plants was 3 cm tall (**Figure 12**).

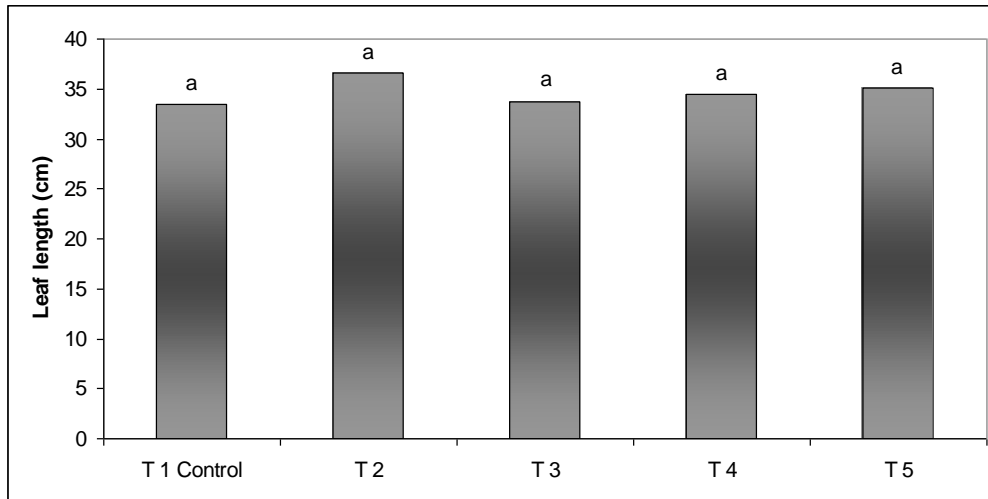


**Figure 4.** Effect of flurprimidol on days to anthesis of *Leucocoryne coquimbensis* grown in pots in the greenhouse. Symbols: T1 (control plants were not treated), T 2 (Topflor 0.1% foliar spray when the plants was 3 cm tall), T 3 (Topflor 0.1% foliar spray when the plants was 10 cm), T 4 (Topflor 0.2% foliar spray when the plants was 3 cm), T 5 (Topflor 0.2% foliar spray when the plants was 10 cm). Data are means of 4 replicates. Different letters on the columns indicate significant differences at  $P < 0.05$  by Tukey’s Multiple Range test.

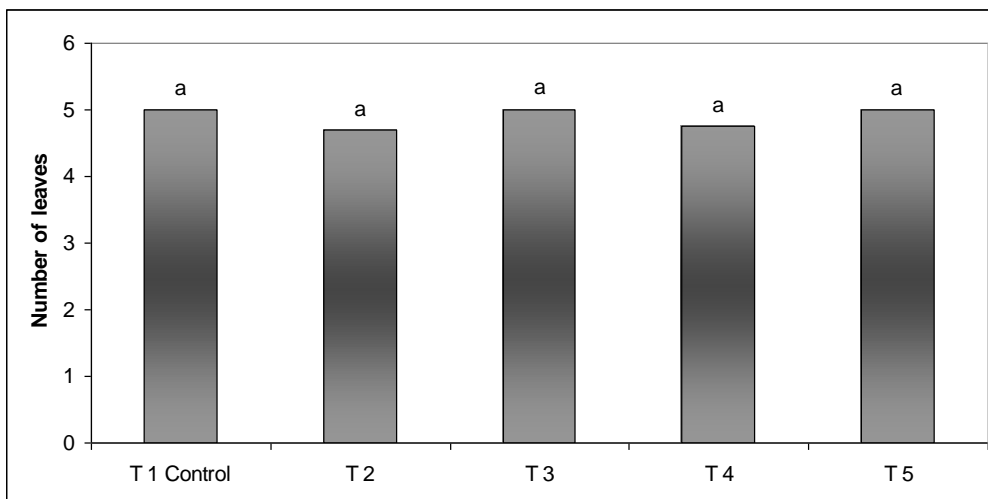


**Figure 5.** Effect of flurprimidol on leaf width (cm) of *Leucocoryne coquimbensis* grown in pots in the greenhouse. Symbols: T1 (control plants), T 2 (Topflor 0.1% foliar spray when the plants was 3 cm tall), T 3 (Topflor 0.1% foliar spray when the plants was 10 cm), T 4 (Topflor 0.2%

foliar spray when the plants was 3 cm), T 5 (Topflor 0.2% foliar spray when the plants was 10 cm). Date are means of 4 replicates. Different letters on the columns indicate significant differences at  $P < 0.05$  by Tukey's Multiple Range test.

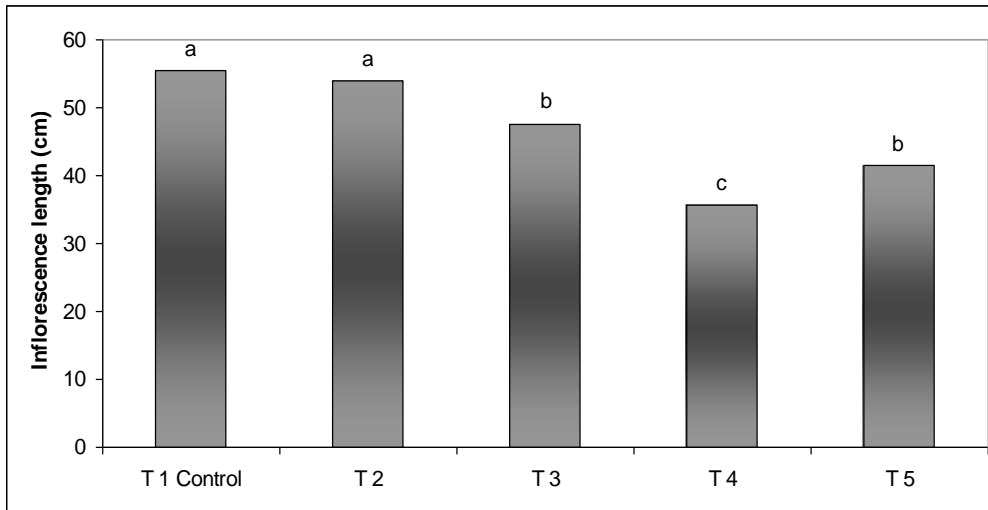


**Figure 6.** Effect of flurprimidol on leaf length of *Leucocoryne coquimbensis* grown in pots in the greenhouse. Symbols: T1 (control plants), T 2 (Topflor 0.1% foliar spray when the plants was 3 cm tall), T 3 (Topflor 0.1% foliar spray when the plants was 10 cm), T 4 (Topflor 0.2% foliar spray when the plants was 3 cm), T 5 (Topflor 0.2% foliar spray when the plants was 10 cm). Date are means of 4 replicates. Different letters on the columns indicate significant differences at  $P < 0.05$  by Tukey's Multiple Range test.

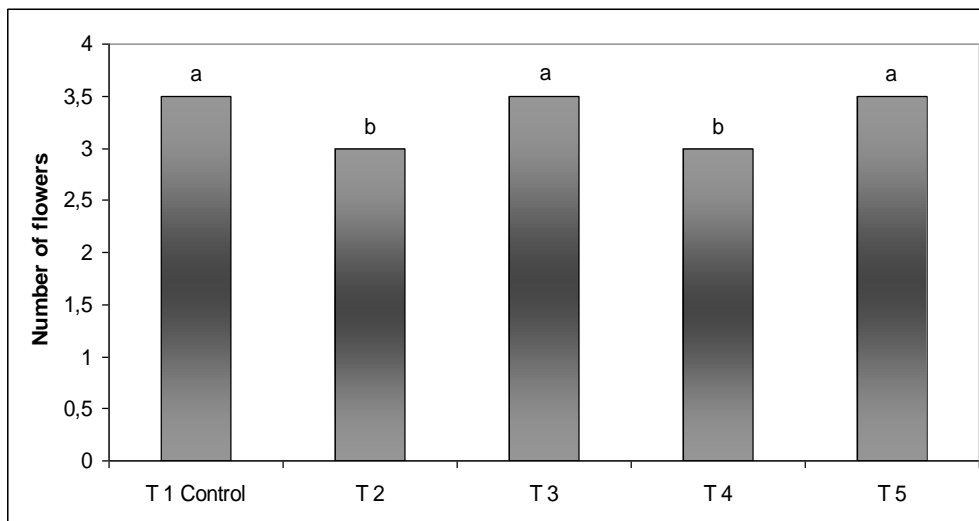


**Figure 7.** Effect of flurprimidol on the number of leaves per plant of *Leucocoryne coquimbensis* grown in pots in the greenhouse. Symbols: T1 (control plants), T 2 (Topflor 0.1% foliar spray when the plants was 3 cm tall), T 3 (Topflor 0.1% foliar spray when the plants was 10 cm),

T 4 (Topflor 0.2% foliar spray when the plants was 3 cm), T 5 (Topflor 0.2% foliar spray when the plants was 10 cm). Data are means of 4 replicates. Different letters on the columns indicate significant differences at  $P < 0.05$  by Tukey's Multiple Range test.

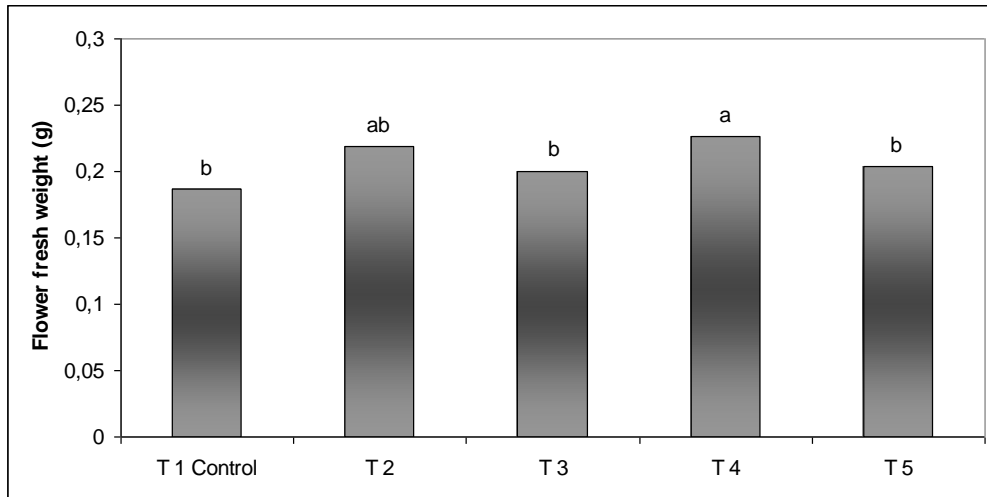


**Figure 8.** Effect of flurprimidol on inflorescence length of *Leucocoryne coquimbensis* grown in pots in the greenhouse. Symbols: T1 (control plants), T 2 (Topflor 0.1% foliar spray when the plants was 3 cm tall), T 3 (Topflor 0.1% foliar spray when the plants was 10 cm), T 4 (Topflor 0.2% foliar spray when the plants was 3 cm), T 5 (Topflor 0.2% foliar spray when the plants was 10 cm). Data are means of 4 replicates. Different letters on the columns indicate significant differences at  $P < 0.05$  by Tukey's Multiple Range test.

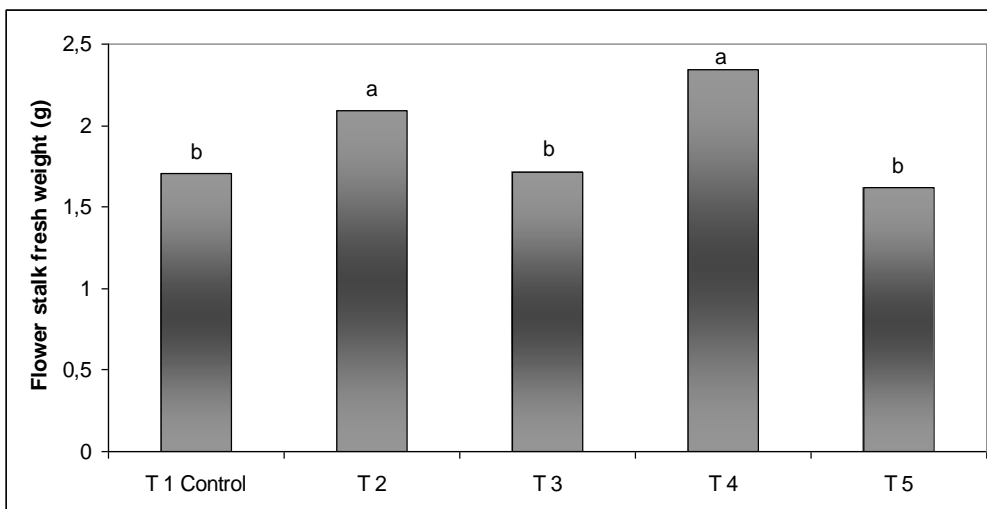


**Figure 9.** Effect of flurprimidol on the number of flowers per inflorescence of *Leucocoryne coquimbensis* grown in pots in the greenhouse. Symbols: T1 (control plants), T 2 (Topflor 0.1% foliar spray when the plants was 3 cm tall), T 3 (Topflor 0.1% foliar spray when the plants was

10 cm), T 4 (Topflor 0.2% foliar spray when the plants was 3 cm), T 5 (Topflor 0.2% foliar spray when the plants was 10 cm). Date are means of 4 replicates. Different letters on the columns indicate significant differences at  $P < 0.05$  by Tukey's Multiple Range test.



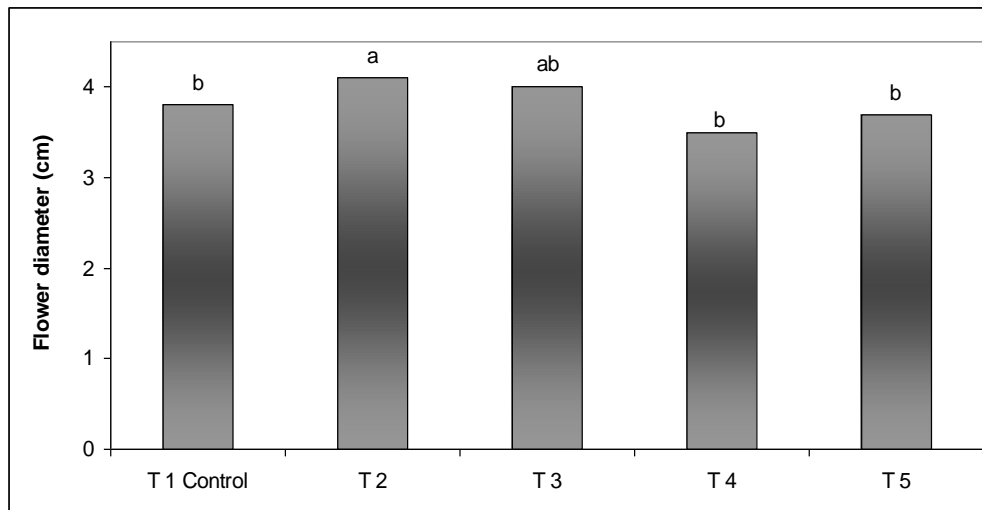
**Figure 10.** Effect of flurprimidol on flower fresh weight of *Leucocoryne coquimbensis* grown in pots in the greenhouse. Symbols: T1 (control plants), T 2 (Topflor 0.1% foliar spray when the plants was 3 cm tall), T 3 (Topflor 0.1% foliar spray when the plants was 10 cm), T 4 (Topflor 0.2% foliar spray when the plants was 3 cm), T 5 (Topflor 0.2% foliar spray when the plants was 10 cm). Date are means of 4 replicates. Different letters on the columns indicate significant differences at  $P < 0.05$  by Tukey's Multiple Range test.



**Figure 11.** Effect of flurprimidol on flower stalk fresh weight (g) of *Leucocoryne coquimbensis* grown in pots in the greenhouse. Symbols: T1 (control plants), T 2 (Topflor 0.1% foliar spray when the plants was 3 cm tall), T 3 (Topflor 0.1% foliar spray when the plants was 10 cm),



T 4 (Topflor 0.2% foliar spray when the plants was 3 cm), T 5 (Topflor 0.2% foliar spray when the plants was 10 cm). Data are means of 4 replicates. Different letters on the columns indicate significant differences at  $P < 0.05$  by Tukey's Multiple Range test.



**Figure 12.** Effect of flurprimidol on flower diameter of *Leucocoryne coquimbensis* grown in pots in the greenhouse. Symbols: T1 (control plants), T 2 (Topflor 0.1% foliar spray when the plants was 3 cm tall), T 3 (Topflor 0.1% foliar spray when the plants was 10 cm), T 4 (Topflor 0.2% foliar spray when the plants was 3 cm), T 5 (Topflor 0.2% foliar spray when the plants was 10 cm). Data are means of 4 replicates. Different letters on the columns indicate significant differences at  $P < 0.05$  by Tukey's Multiple Range test.

#### 4. CONCLUSION

In summary, it can be concluded that *Leucocoryne coquimbensis* can be cultivated as an attractive pot plant. The use of flurprimidol does not only modifies the appearance of *L. coquimbensis* but it also influences the flowering time and the quality of flowers. We recommend for producing potted plants of *L. coquimbensis* the application of Topflor 0.1% as foliar spray when the plants was 3 cm tall.

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