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The Result of Using Growth Regulators Paclobutrazol and Chlormequat Chloride on Reducing the Height in Pots of The Sunflower (*Helianthus annuus*) 'Vincent'

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Abstract

The result shows that all concentrations of the Paclobutrazol (applied at rates of 7.5, 15, 30 mg a.i. / 2 litre pot) can reduce the height of the sunflower variety 'Vincent' in varying degrees. For this experiment, the rate of 30 mg a.i. / 2 litre pot produced the most desirable result for reducing their height. But all concentrations of the Chlormequat Chloride (applied at rates of 0.025%, 0.05% & 0.1% / 2 litre pot) had little effect or no effect on reducing plant height of the Sunflower variety 'Vincent'.

INTRODUCTION

Helianthus annuus (Sunflower) is a highly economic global plant species known for its seed production for food & edible oil production. It is also a popular cut flower species for floristry & is becoming 'very fashionable' as a flowering pot plant for interior & exterior horticultural displays.

To meet a client request for a 12-month continuous supply of 400 – 800 mm tall, flowering Sunflowers for an interior themed display, a production template had to be developed within the company nursery facilities on Qi'ao Island to satisfy this request. From a very limited seed range of Sunflower

varieties for ornamental use available in the China market, the client selected a tall growing, cut flower variety.

Paclobutrazol is a plant growth regulator, which has the effect of delaying plant growth, inhibiting stem elongation, shortening internodes, promoting plant tillering, increasing plant stress resistance and increasing yield. The Paclobutrazol to be used is a 15% a.i. wettable powder formulation commercially available under the GG (Guoguang) brand from mainland China.

Chlormequat Chloride is a growth regulator. It inhibits the plant cell elongation, but not cell division, can shorten the plant, make the stem coarsening. The Chlormequat Chloride to be used is a 50% a.i. liquid formulation product commercially available under the QH (Qinghua) brand from mainland China.

MATERIALS AND METHODS

As per the customer request for a dense, multi flowering pot of sunflowers, we direct sowed the sunflowers at the rate of 6 seeds per.pot, thinning to the 'strongest' three (3) plants per pot. The pots used were a decorative round polypropylene pot with a media volume of 2 litres. The media used was 3 parts coir peat, 2 parts pine bark (0-10mm chip size) & 1 part coarse bedding sand, Nutrition was: 5 kg/m³ Controlled Release fertilizer (Semacote® 501 5-6 month), 3 kg/m³ Organic fertilizer & 1.5 kg/m³ Dolomite.

The pots were also top dressed with an inorganic compound fertilizer (Yara® 15-15-15) 2 weeks after transplanting. They were grown in an open full sun position with daily irrigation of 25mm.

The average open-air temperature was 15 - 22°C at night and 18-27°C through the day time in this location during February – March 2019.

The following treatments were applied:

1. Setup an untreated control of 10 replications.
2. Drench 10 replications with Paclobutrazol 7 days, 14 days and 21 days after the sunflower has two true leaves. Treatments using a 250ml drench / pot were applied. (at rates of 7.5, 15 & 30 mg a.i ./ pot).
3. Drench 3 replications with Chlormequat Chloride 7 days, 14 days and 21 days after the sunflower has two true leaves. Treatments using 100ml drench / pot were applied. (at concentration rates of 0.025%, 0.05% & 0.1%. a.i. / pot).

RESULTS

Paclobutrazol

All concentrations of the Paclobutrazol (250 ml/pot drench at rates of 7.5, 15, & 30 mg a.i. / pot) had a significant effect on reducing the height of this sunflower variety (Fig. 1).

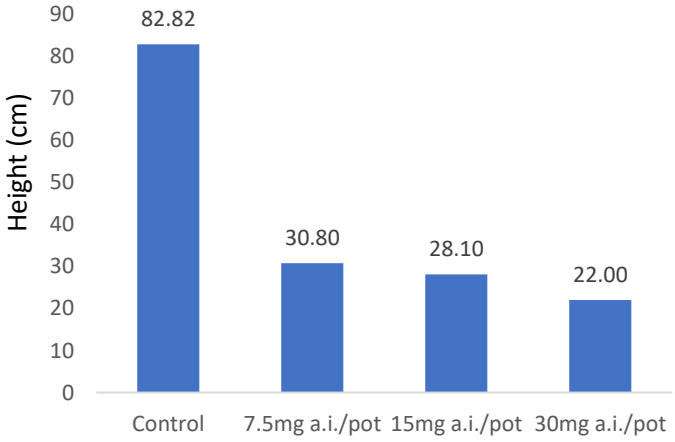

Figure 1. The reduction in Vincent sunflower after Paclobutrazol drench.

From previous initial research experimentation undertaken in May – June 2018 when the air temperatures in this Qi'ao Island location are 20-26℃(16 - 22℃) at night and 24-32℃(19-27℃) through the day time (Fig 2a). Due to higher temperatures at this time of the year, all the treated plants grew significantly taller than the Feb – March 2019 trial. Observations from that trial showed that the dwarfing effect of 7.5mg a.i./pot treatment was not as effective. The plant height was taller at approx. 900mm. The dwarfing height of the 30 mg a.i./pot treatment was perfect but at this rate we observed a visually unacceptable, leaf deformation problem at the higher temperatures.

It was observed that all concentrations of the Chlormequat Chloride (apply as 100ml drench / pot at rates of 0.025%, 0.05% & 0.1%.) had a visually insignificant effect of reducing the height of this sunflower variety (Fig 2b).

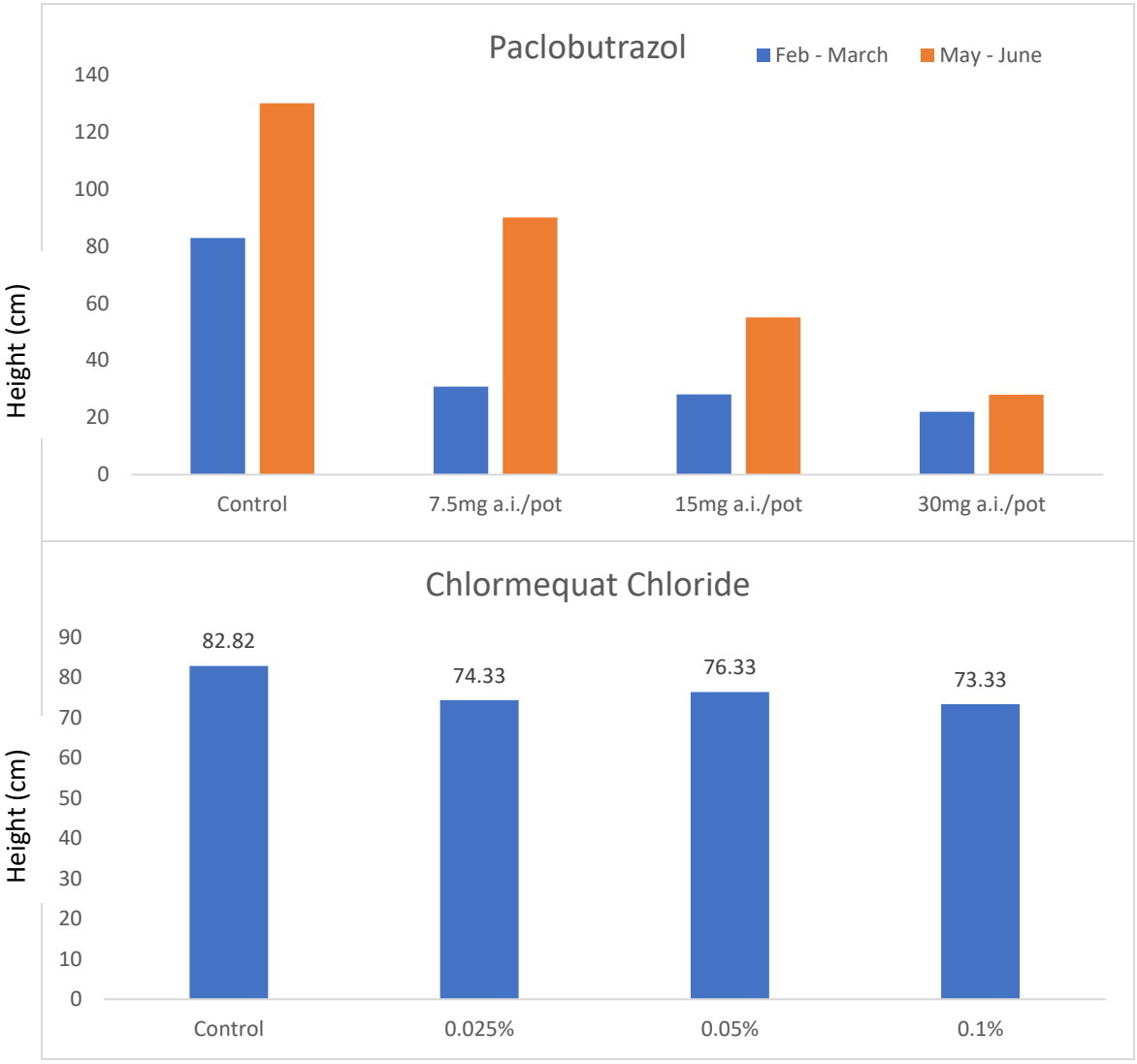

Figure 2. The reduction in Vincent sunflower after Paclobutrazol and Chlormequat Chloride.

The production time from sowing to a flowering product ready for installation into an interior themed display was 59 days in the February – March 2019 period.

Figure 3. Comparison for height reduction in Vincent sunflower after Paclobutrazol and Chlormequat Chloride.

Literature Cited

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