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Growth regulators and curcuma

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Curcuma is a member of the Zingiberaceae family and a relative newcomer to the world of cut flowers and ornamentals. Grown from a rhizome, the plant features thick, dense roots and requires high temperatures and a day length of at least 12 hours. Features influencing the production of cut flowers are the size of the planting material and the number of buds it contains. The size of the rhizome and the number of buds determines the speed of development of the plant: The larger the rhizome and the more buds it contains the earlier the flowering and the greater the yield. Day length extension with artificial lighting encourages flowering, while short days improve the quality of the planting material. Temperatures below 18C damage flower production whereas temperatures above 35C harm crop growth. The amount of solar radiation affects both the quantity and quality of the crop. When radiation is too high, stem length and flower life is shortened. Curcuma propagating material can be stored for long periods (up to a year) at temperatures of 17C. The rhizomes may be “forced” before planting by storing them under moist conditions at 30C for three weeks.

Experiments at the Tzvi experimental station in Israel's Jordan Valley and the results implemented at Uzi Itammar's farm, Tirat Yehuda, show that growth regulators aid in production of curcuma as a pot plant. The experiments were carried out by Amir Hagiladi, Ziva Glad, Eliezer Spiegel and Issachar Ben Zur.

Experiments at Tzvi

Experiments carried out at the Research & Development Station Tzvi in the Jordan Valley studied the effects of preplant rhizome dips and growth regulator foliar sprays on curcuma height control.

Rhizomes, each with three buds, of curcuma Alismatifolia (normally used in cut flower production) were dipped in Magic (uniconazol) prior to planting. Results showed that dipping the rhizomes before planting had no influence on the number of shoots per plant, but did shorten plant height. This treatment did not influence the number of flowers or prevent the lengthening of their stems.

Research on foliar application sprays of Cultar and Magic (uniconazol) applied to curcuma Alismatifolia during their growth period showed that Cultar at 125 ppm had a small effect on plant height. However, neither spray showed any effects on the height of the actual flower.

Because both of the above experiments were carried out using the curcuma Alismatifolia, which is used for cut flower production and has a long stem, the scientists plan to conduct additional experiments on the new dwarfer variety Thai Beauty from Ben Zur Nursery.

Experiments at Moshav Netiv Hagedud

Greenhouse experiments on the influence of Magic (uniconazol) sprays on the dwarf growing curcuma VTA-29 were

conducted at Eli Yohanan's greenhouse at Moshav Netiv Hagedud. In this experiment, spray treatments that were found to be most effective in previous experiments were combined with Magic (uniconazol). Foliar application of Magic (uniconazol) reduced both the height of the plant and the stem length (Table 3) and produced a nice looking plant

In another experiment, the effects of foliar and drench applications of Magic (uniconazol) on Thai Beauty were studied. The best flowering pot plant of the variety Thai Beauty was obtained by using Magic (uniconazol) as a drench at a rate of 100 ppm (Table 4). Foliar sprays had little effect.

Using the results at Tirat Yehuda

In the last few years several types of dwarf curcuma suitable for pot plant production have been imported to Israel. The experiments at Tirat Yehuda were performed on Thai Beauty, which is suitable for flowering pot plant production. The object of the experiment was to use small, inexpensive planting material unsuitable for use in the production of cut flowers, but that with the help of suitable treatments would be suitable for the production of flowering pot plants. The experiment was carried out by Benzur Nursery on Uzi Ittamar's farm in Tirat Yehuda.

Tissue cultured rhizomes with two buds were used for the experiment. The treatments: 1) Control, three sprays of Magic (uniconazol) at 50 ppm; 2) Dipping the rhizomes in Magic (uniconazol) at 25 ppm and 3) Dipping the entire pot in a 25 ppm solution of Magic (uniconazol) on the day of planting.

The control plants did not emerge evenly because of difference in the size of the planting material, emergence began two weeks after planting. In treatment 2, emergence was a week later compared to the control, while in treatment 3 emergence was three weeks later than the control plants. In the control, the plants and foliage were oversized for the size of the pot. Plants in treatment 2 were the closest to the ideal, about 30 cm tall, while those in treatment 3 were so dwarfed that the first flower emerged under the foliage canopy at a height of only 10cm.

Conclusions

Production of flowering pots of curcuma began because of excess production of cut flowers and the consequent excess of propagating material. However, it is not possible to make quality curcuma pot plants using second grade vegetative material. Rhizomes of even size with no less than three buds must be used.

When growing Alismatifolia as a pot plant it was found that dipping the rhizomes in Magic (uniconazol) after forcing, but before planting, influenced the rate of the development of the leaves and produced compact foliage right to the end of the crop. However this treatment did not influence the stem length of the flower, which impacted negatively on the final product.

Curcuma Alismatifolia shows strong apical dominance and because of this, in the various treatments that were examined and in the control, only one flower per unit of propagating material was obtained during the same period of time.

The variety Thai Beauty develops several side shoots simultaneously and is more suitable for flowering pot plant production. The appearance of the flower in the pot can be significantly improved by a drench with Magic (uniconazol) when two and a half leaves have emerged.

In the experiment conducted on Uzi Ittamar's farm the plant production material was not pre-sorted either to size or length. As a result, emergence after forcing was erratic. Crowding of the pots caused etiolating, because of mutual shading and therefore the recommended density is now only 30 pots per running meter of table. Overhead irrigation should only be used in the early stages until the rhizomes have rooted in, after which a dripper system should be substituted.

As far as the different treatments are concerned, the optimal product was obtained by dipping the rhizome, although there was a delay of two and a half weeks in flowering. Foliar application did not produce enough dwarfing although it could well be that spray treatments at different concentrations and frequencies without overhead watering would give better results.

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Table 1: The influence on vegetative growth and flower production of a uniconazol preplant dip on curcuma

Treatment	Shoots per pot	Foliage height (cm)	Flowers per pot	Flower stem height (cm)
Control	2.2	72.6	1.0	74.8
Dipping in Magic (uniconazol)	2.05	41.5	0.7	59.7

Table 2: The influence of Cultar on the development and flowering of curcuma 43 after planting

Treatment	Plant height (cm) at treatment (9 July)	Final plant height (cm) (18 August)	Stem length (cm)
Control	29.2	72.6	74.8
Spray 125 ppm Cultar	33.4	69.6	78.4
Spray 250 ppm Cultar	31.0	67.9	75.6
Spray 50 ppm Magic (uniconazol)	30.8	56.4	78.2

Table 3: The influence of uniconazol on the development and flowering of curcuma VTA-29

Treatment	Plant height (cm) at treatment (9 July)	Final plant height (cm) (14 August)	Stems per pot	Height of flowers (cm)
Control	33.5	53.1	2.1	45.0
Spray 50 ppm Magic (uniconazol)	32.0	46.2	2.0	38.4

Table 4: The influence on the development and flowering of curcuma Thai Beauty by spraying or soaking with uniconazol 30 days after planting

Treatment	Plant height (cm) at treatment (2 August)	Final plant height (cm) (22 August)	Flowers per pot
Control	21.3	53.5	0.4
Spray 50 ppm Magic (Uniconazol)	26.0	58.3	1.08

Soaking 50 ppm Magic (Uniconazol), 50 cc/pot	23.0	35.3	0.9
Spray 100 ppm Magic (Uniconazol)	26.0	56.2	0.7
Soak 100 ppm Magic (Uniconazol), 50 cc/pot	21.7	28.2	0.3