

Production

Growing Of Hibiscus As A Pot Plant

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Hibiscus belongs to the Malvaceae family. The genus is considered to have about 85 species, most of which are native to Central America and northern South America. The species most frequently grown as a pot plant, *Hibiscus rosa-sinensis*, originated from eastern Asia and southern China.

Of the more than 1500 varieties cultivated today only about 20 are grown as pot plants. New hibiscus varieties are introduced almost every year, as breeders select to obtain improved flower longevity. Mutations often occur in cultivation. The best known breeding locations are Monrovia Nursery, USA and Wageningen, Holland.

Growing hibiscus as a pot plant in Sweden is insignificant. During 1981, 30,000 plants were grown but over 300,000 plants were imported from Denmark.

Species and Cultivars Used in Commercial Growing

Cultivars derived from the most important species, *H. rosa-sinensis*, have flowers with longer life than the species they originated from. Tetraploid varieties with very large flowers and long life are the result of irradiation. Sometimes the cultivar 'Lateritia' is considered as a special species since it has leaves with deeper lobes than *H. rosa-sinensis*. Cultivars in Sweden include:

'Apricot' (from Nielsen) - apricot colored, single flowers with a darker middle.

'Anneli' - similar to 'Apricot' but with partially double flowers.

'Cooperi' - comparatively small, scarlet-red flowers, with weak growth and narrow, marbled leaves.

'Flamenco' - very large, double, yellow flowers with vigorous growth.

'Friesdorf' and 'Hamburg' - red, single flowers, vigorous growth.

'Holiday' - large, deep red flowers (probably tetraploid). Introduced into cultivation during 1978-79. One of the best cultivars.

'Lagos' - yellow to orange with a red middle. Single, large flowers. Smooth, dark green leaves.

'Lateritia' - orange, single, medium-large flowers. A cultivar with early flowering and comparatively weak growth.

'Lateritia Moesiana' - orange to red, single flowers. Vigorous growing mutation with much branching. The cultivar is one of the most rich flowering cultivars in cultivation. Early flowering. New variety 1977.

'Miami' - shining crimson-pink, single, very large flowers. Vigorous growth with comparatively few flowers.

'Moonlight' - tetraploid variety with very large, double, long keeping, yellow flowers. The growth is somewhat branching. Round, heavy leaves. Slow growth with comparatively few flowers.

'Weekend' - apricot colored, very large, single flowers. Relatively slow growing with few flowers.

'Yellow Koniger' - double, yellow flowers with light pink petals in the middle. More vigorous growing and easier flowering than 'Moonlight.'

Planning

Hibiscus is best grown as a 'year round' crop with planned marketing during Feb.-June and August-November. The highest demand is in the spring (See cultivation program).

Propagation of the crop can be by: 1) producing cuttings from stock plants, 2) taking cuttings by pinching from a growing crop, or 3) buying cuttings from propagators.

If cuttings are taken from the growing crop, development is delayed 2-3 weeks depending on the time of year.

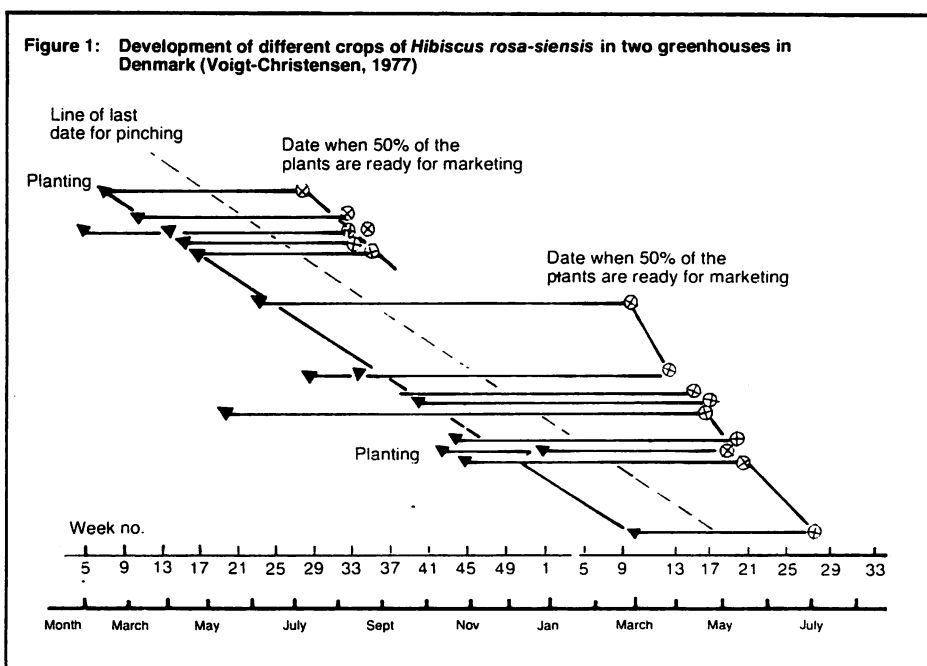
Stock Plants and Propagation

Stock Plants — Stock plants can be planted in a ground bed (preferably with bottom heat) or in 10" pots containing 8-10 liters of medium. Different types of peat media are suitable. Stock plants can produce cuttings for 6-10 years, if cut back at regular intervals. Only profuse flowering and vigorous growing plants should be selected from the growing crop as stock plants.

Propagation — Terminal cuttings, 8-10 cm (3-4") long, are stuck directly in the final pot. Usually 11 cm (4-5") pots are used with 2 cuttings placed in each pot. To get a good plant the cuttings should be spaced 3-4 cm apart in the pot.

The pots are placed close to each other on a bench and covered with a plastic tent (white plastic during summer, transparent during winter). The plastic should fit tight to the bench to prevent ventilation. Before the cuttings are stuck, water the pots with a fungicide to control *Rhizoctonia* and *Phythium*; after planting, the cuttings are sprayed with Benlate.

No ventilation is required until the cuttings are rooted, which usually takes 35-40 days depending on the time of year. The plastic tent is ventilated by opening a 10 cm (4") crack at the top. Some days later this crack is widened.



The effect of the growth regulator Chlormequat (CCC) on hibiscus (double flowers); Criley, 1980

Treatment No.	Method of Treatment	Concentration in mg/l (ppm)	No. of Treatments	Plant Height (cm)	Shoot Length (cm)	No. of Flowers and Buds
1	spray	75	1	52	28.7	13
2	spray	75	2	43.3	22.3	14.8
3	spray	75	3	39.9	20.8	13.2
4	drench	75mg/pot	1	27.2	12.4	9.6
5	drench & spray	75 mg/pot 37.5 mg/l	1 1	27.6	15.8	11.2
6	drench & spray	75 mg/pot 37.5 mg/l	1 2	25.3	10.4	7.2
7	control	-	-	53.7	29.7	11.4

All the plastic is taken away when the cuttings are acclimated.

Production of cuttings for sale is done by planting two cuttings per pot in 6-7 cm net pots, Jiffy-pots or Wefi-pots.

Rooting Hormones — In Denmark and Sweden no rooting hormones are used. In Holland, **Rhizopon** 0.1%, (e.g., Hormodin No. 1) is recommended, especially for the cultivars 'Moonlight,' 'Fullmoon,' 'Lagos' and 'Miami.'

Planting Times

Planting is usually conducted at two different times of the year. Late winter-spring (mid-Feb. till early May) planting gives summer and fall flowering while a summer-fall (July to October) planting gives late winter and spring flowering. To obtain early flowering plants (March-April) of slow growing, tetraploid cultivars, like 'Moonlight,' 'Flamenco' and 'Week-end,' planting must occur in early August. Fall flowering plants of these cultivars have to be planted in April.

Growing Media and Nutrition

Hibiscus grow well in peat-like mixes with a normal nutrition level. Spaghnum peat seems to give the best results. The crop easily develops chlorosis and micronutrition deficiencies, so it is especially important to supply iron and manganese in the medium.

No fertilizer experiments have been conducted on hibiscus. From experience, it appears the demand for nitrogen is very high during the fast growing, summer period, and plants easily become chlorotic. The fertilizer solution should contain micronutrients. As soon as the plants start to grow well after pinching, they can be fertilized every week, with a solution containing:

Nitrogen	140-160 ppm
Phosphorus	25- 30 ppm
Potassium	120-140 ppm
Magnesium	50- 60 ppm

Temperature

Medium temperature during propagation should be 22-23°C (72-74°F). During cultivation, temperatures should be as follows:

March-Sept. night 20-21°C (68-70°F)
ventilation 26°C (79°F)
day 22-24°C (72-75°F)

Oct.-Feb. night 18°C (65°F)
day 20°C (68°F)

If the spring crop has to be "forced," the temperature can be raised in Feb. - night 20°C (68°F) - day 22-23°C (72 - 74°F).

Pinching

A hard pinch (to get cuttings) delays flowering 2-3 weeks. If a soft pinch is used, not all shoots have to be pinched; the plants are just evened up.

There is no value in pinching during late fall. A late pinch only gives poor return shoots. It is better to wait and start pinching around Jan. 15. Plants for late May should be pinched by the end of week no. 4 (end of January).

Plants for flowering during late summer-fall should be pinched by the end of week no. 24 (June 15).

Control of Height

Many experiments to control the height of hibiscus have been conducted. The results from all experiments done at the University of Hawaii (campus Manau) are shown above.

Plants were potted on 6/30/78, transplanted to 15 cm pots on 8/7 and pinched on 8/18. At the first treatment with CCC (8/29), the shoots were 2-4 cm long. Additional applications in treatments 2-3 and 5-6 were applied at 3 week intervals.

At the beginning of flowering (11/17), the plant height and number of buds larger than 1 cm were recorded.

The experiment shows that one drench with CCC has a greater effect than spraying 3 times. Therefore, only one application is needed when drenching. The drench also had a much longer retarding effect than spraying. Further, high concentrations of CCC decreases the number of flowers.

According to results from experiments and experience, the following method is recommended to control height of hibiscus with CCC:

- 1) The first spray is applied after pinching when shoots are 3-5 cm long.
- 2) Further spraying is done 3-4 times at 8-10 day intervals (summer period).
- 3) During winter 2-3 sprayings are recommended at 3 week interval.
- 4) Concentration: 0.02 - 0.03% (200-300 ppm) active ingredient CCC. Experience shows that it is better to spray 2 times with low concentration than to spray once with a high concentration. Growth of hibiscus can be completely stopped if they are sprayed or drenched with too high a concentration of CCC.

Growing Time

In general, it takes 5-6 weeks to get a cutting rooted and ready for transplanting, if planted in a small pot. Today most of the cuttings are stuck directly into the final pot.

The development time for the tetraploid variety 'Moonlight,' from planting until 50% of the plants were ready to sell, varied in Denmark (Voigt Christensen, 1977) from 23 to 30 weeks for cuttings planted in Jan.-April and 31 to 46 weeks for planting during late summer-fall. For a common red flowering diploid variety, the development time from planting to 50% of the plants were ready to be sold, varied from 18 to 27 weeks for cuttings planted in Jan.-April and from 28 to 40 weeks for cuttings planted during late summer or fall. Actual experimental results are presented in Figure 1.

Figure 2: Schematic growing program for *Hibiscus rosa-sinensis* (diploid variety of 'Moesiana' type).

Month	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec															
Week No.	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54
Crop round: Summer and fall flowering	1	Planting		Pinching				Flowering																			
	2	Planting		Pinching				Flowering																			
	3	Planting		Pinching				Flowering																			
Spring flowering	4	Flowering		Planting		Pinching		Flowering																			
	5	Flowering		Planting		Pinching		Flowering																			
	6	Flowering		Planting		Pinching		Flowering																			
MEDIA	NUTRITION		TEMPERATURE		PROPAGATION		PEST AND DISEASE CONTROL																				
Commonly bought mixtures of soil. Mainly containing peat or pure peat media. Sphagnum peat seems to be best. "Normal" nutrition level with micro-nutrition. pH 6.0-6.5	Watering with fertilizer during April-Aug. with a nutrition solution containing: Nitrogen 120-140 ppm Phosphorus 25-30 ppm Potassium 120-140 ppm		Propagation media 22-23°C Further cropping time March-Sept night 20-21° day 22-24° Oct-Feb night 18° day 20° When pushing in Feb night 18° day 22-23°		Stem tip cuttings 2 cuttings per 10 or 11 cm pot "soft pinch" GROWTH REGULATION 200-300 ppm Cycocel every 8-10 days from 5 cm shoot length		To control soilborne fungi during propagation drench with fungicides for Pythium and Rhizoctonia. Against Botrytis, use Benlate. Remark: Aphids are a difficult pest. Spray regularly.																				

In the first greenhouse (crops 1-10), plants were grown in 5.5 cm net pots and then transplanted to 10 cm clay pots or 11 cm plastic pots. In the second greenhouse (crops 11-14), cuttings were planted directly in 10 cm clay pots. In all the different crops, stem tip cuttings were used.

Commercial growing experience has shown the time of development from planting until marketing stage for diploid varieties like 'Lateritia Hoesiana' and similar varieties to be:

- 1) 16 to 20 weeks for Feb-May plantings. Flowering occurs during June-Sept. Time from planting to pinching is 6-8 weeks and from pinching to flowering, 10-12 weeks.
- 2) 26 to 30 weeks for July-Oct plantings. Flowering occurs during March-May. Time from planting to pinching is 6-8 weeks on July-Aug. plantings and 12-14 weeks on Sept.-Oct. plantings. Plants potted in the middle of July can flower in March.

See Fig. 2 for year-round growing sequences.

Planting Spacing

During propagation, plants can be placed pot-to-pot. During the summer, final space 8-9 weeks after planting; for late summer or fall plantings, two spacings are usually done. Late planting spacing is not required until Jan-Feb.

In general, 25 to 32 plants per m² (2.3 to 3 plants per ft²) is considered final spacing. Beginners should not have more than 25 plants per m² until they know how to control height at

different seasons. The plants must be treated with CCC at the correct time to insure proper height control. During winter, plant spacing should be greater than during the summer.

Disease and Pest Control

To prevent attacks from soil-borne fungi during propagation, the soil should be sterile

prior to sticking the cuttings. Fungicide drenches may be necessary if *Pythium* or *Rhizoctonia* are a problem.

Application of a Benlate spray to the cuttings may be necessary to prevent Botrytis. Aphids and spider mites are the major problems; regular control preventative should be exercised.

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