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Investigation and Standardization of Vegetative Propagation Methods in *Hibiscus rosa-sinensis* cv. Hawaiian

¹Raham Sher, ²Muhammad Zubair, ³Noor Rehman and ²Ghafoor Nawaz
¹National Agricultural Research Centre, Islamabad, Pakistan
²Department of Horticulture, Agricultural University Peshawar, Pakistan
³Agricultural Research Institute, Tarnab, Peshawar, Pakistan

Abstract: The effect of different propagation methods (side-grafting and T-budding) and propagation times (1st and 15th June and 1st July, 1999) on the growth of *Hibiscus rosa-sinensis* cv. Hawaiian was studied. Statistical analysis of the data indicated that minimum days (15.33) to sprouting were taken by plants side-grafted on 15th June, while maximum days (73.00) were taken by plants T-budded on 1st June, 1999. Highest shoot length (9.19 cm), shoot diameter (3.2 mm), number of shoots per plant (3.00) and number of leaves per plant (18.33) were recorded in plants side-grafted on 1st July, 1999, while least shoot length (2.64 cm), shoot diameter (1.26 mm), number of shoots per plant (1.00) and number of leaves per plant (7.33) were noted in plants T-budded on 1st June, 1999. The best propagation method found for *Hibiscus rosa-sinensis* cv. Hawaiian is side-grafting in early July, or T-budding in mid June.

Key words: Propagation methods, side-grafting, T-budding, *Hibiscus rosa-sinensis* cv. Hawaiian

Introduction

Hibiscus is the largest genus in family Malvaceae comprising more than 200 species of herbs and shrubs of showy flowers, which are widely distributed in the tropical and sub-tropical areas of the world, but only few are of ornamental importance (Li, 1959). According to Wyman (1903), the common and well-known species of *Hibiscus* are *H. syriacus*, *H. cannabinus*, *H. manihot*, *H. abelmoschus*, *H. speciosus*, *H. grandiflorus* and *H. rosa-sinensis*. Rendle (1975) described *Hibiscus rosa-sinensis* as a summer flowering hardy shrub generally cultivated as a garden flower and is also called Chinese Hibiscus or rose of China. It is 1–3m high flowering plant, but sometimes reaches to 8 or 9 m in the subtropical regions and becoming tree like *Hibiscus rosa-sinensis* has many colorful varieties and is becoming popular as a specimen plant in all kinds of decorations. Besides its ornamental value, it has also medicinal value. The flower buds of *Hibiscus rosa-sinensis* can be used in oriental medicine as a demulcent agent and to treat diarrhoea (Tomoda and Ichikawa, 1987). Similarly the flower buds can also be used for making anti-diabetic medicines (Alam *et al.*, 1990).

Hibiscus rosa-sinensis cv. Hawaiian has the highest economic value for the nurserymen. The price per plant ranges from Rs. 80 to 300. Its flowers are more attractive and handsome and are larger. The leaves are large, almost round and slightly serrated and its growth is slower comparatively. *Hibiscus rosa-sinensis* is commonly propagated by air layering and stem cuttings, but the cuttings of cultivar Hawaiian are hardy to root and can not be propagated by cuttings.

Therefore, this research was done to find the successful propagation method and time for *Hibiscus rosa-sinensis* cv. Hawaiian.

Materials and Methods

To study the effect of different propagation techniques and propagation time on the growth of *Hibiscus rosa-sinensis* cv. Hawaiian, a research project was carried out at Agricultural Research Institute, Tarnab, Peshawar during the year 1999-2000. The experiment was laid out in Randomized Complete Block Design (RCBD) and the total numbers of plants were 90. The Side-grafting and T-budding were practiced using cultivar Hawaiian as a scion on a common variety of *Hibiscus rosa-sinensis* (root stock). The propagation practices were carried out on 1st June (D1), 15th June (D2) and 1st July (D3), 1999. On each date, 15 plants were side-grafted and 15 were T-budded. The following various treatment combinations were applied:

D₁T₁ (Side-grafting on 1st June) D₂T₁ (side-grafting on 15th June)
D₃T₁ (Side-grafting on 1st July) D₁T₂ (T-budding on 1st June)
D₂T₂ (T-budding on 15th June) D₃T₂ (T-budding on 1st July)

In each treatment five plants were taken. The data was recorded on days to sprouting, shoot length (cm), shoot diameter (mm), number of shoots per plant and number of leaves per plant.

Results and Discussion

The maximum days (73.00) to sprouting were taken when T-budding was practiced on 1st June, 1999 whereas, minimum days (15.33) to sprouting were recorded in plants side-grafted on 15th June. More cell sap, high humidity and favorable temperature caused early sprouting. Carpenter (1989) reported that 26 and 30 °C medium temperatures caused faster and more number of roots with greater fresh and dry weights in *Hibiscus rosa-sinensis*. He also observed that the rooting percentage of each cultivar was

Table 1: Effect of different propagation methods and times on days to sprouting, shoot length, shoot diameter, number of shoots per plant and number of leaves per plant of *Hibiscus rosa-sinensis* cv. Hawaiian

Treatments	Days to sprouting	Shoot length (cm)	Shoot diameter (mm)	Shoots/plant	Leaves/plant
(D ₁ T ₁) Side-grafting on 1st June	25.67cd	5.96	1.93c	2.33	12.00
(D ₁ T ₂) T-budding on 1st June	73.00a	2.67	1.26d	1.00	7.33
(D ₂ T ₁) Side-grafting on 15th June	15.33e	7.33	1.73cd	2.67	16.33
(D ₂ T ₂) T-budding on 15th June	55.33b	3.50	2.63b	1.67	15.00
(D ₃ T ₁) Side-grafting on 1st July	19.00de	9.19	3.20a	3.00	18.33
(D ₃ T ₂) T-budding on 1st July	34.67c	3.25	1.56cd	1.67	8.67
Significant	*	NS	*	NS	NS
Coefficient of variation (%)	14.79	24.34	15.01	24.59	26.07

Mean values followed by different letters are significantly different at p < 0.05

NS = Non-significant

similar among all propagation temperatures, i.e., 18, 22, 26, 30, or 34 °C. The mean values for the number of shoots per plant showed that maximum number of shoots per plant (3.00) was recorded in plants side-grafted on 1st July, while minimum number of shoots per plant (1.00) was noted in plants T-budded on 1st June. This may be simply due to the more number of shoots on the scion in side-grafted plants. The mean values for the shoot length, shoot diameter and number of leaves per plant indicates that maximum shoot length (9.19 cm), shoot diameter (3.20 mm) and number of plants (18.33) were recorded in the plants in which side-grafting was practiced on 1st July, while the said parameters were minimum in plants T-budded on 1st June (Table 1).

The maximum shoot length may be due to early sprouting of buds and the presence of more reserved food material in the scion. Healthy shoots attained maximum diameter. Bertram (1991) studied rooting and post propagation growth of the cuttings from four *Hibiscus rosa-sinensis* cultivars and reported that the growth of roots and shoots was enhanced by increasing electrical conductivity (EC) in the media. The maximum number of leaves in the plants side-grafted on 1st July can be interpreted as the earlier opened buds underwent more photosynthesis and shoots attained maximum length, resulting in the development of maximum number of nodes and thus the leaves.

Based upon the observations under the prevailing conditions during the experiment (temperature, 75-80 °F and high relative humidity, 85-95 %), concluded that the best timing for

propagation of *Hibiscus rosa-sinensis* cv. Hawaiian is mid June to early July and the most suitable propagation method is side-grafting in early July or T-budding in mid June.

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