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Improvement of Propagation by Hardwood Cuttings With or Without Using Plastic Tunnel in (*Quisqualis indica*)

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Abstract: Quisqualis (*Quisqualis indica*) is an important ornamental plant, which is known to be difficult to propagate under dry arid condition of Khartoum State, in Sudan. Stem cuttings of the plant were subjected to different treatments, comprising season of cutting (winter, summer or karif," the rainy season") and level of humidity (using plastic tunnels).The experiment was carried out under the normal nursery conditions to determine the best conditions for growth and development of stem cuttings of plant. The results revealed that the winter season gave the best performance in number and length of both roots and leaves of the cuttings. Plastic tunnels with water mist gave the best rooting and vegetative growth followed by the cutting under plastic tunnels without mist, irrespective of season.The control treatment(not under plastic cover) gave the poorest results.

Key words: Cutting · Season · Plastic tunnel · Quisqualis plant

INTRODUCTION

The Quisqualis ornamental plants (*Quisqualis indica*) related to the family (Combreataccae) is considered as an important plant used in outdoor gardens in Khartoum, for its various flower colors and its potential for other uses such as hedge plant or climber.

It is generally accepted that most of perennial ornamental plants are multiplied and propagated by the use of vegetative propagation that comprise cuttings, layering or grafting. The use of cutting from stems, leaves, roots or terminal buds is considerable as the most commonly applied technique, due to its practicability and simplicity, specially in devolving countries.

It is well known that the success of rooting of woody stem cuttings, in the majority of ornamental plants and fruit trees depends mainly on the physiological stage of the mother plant [1], the time of planting of the cutting [2,3] and the type of growth regulators used [4].

The prevailing environmental conditions in the nursery i.e. light, temperature and humidity play an important role in rooting and successeeding growth and development stages of cuttings [5-7].This may be related to changes in the indigenous plant growth regulators or carbohydrate conditions[1]. Several researchers have investigated the influence of planting time on the rooting of stem cuttings and plant growth such as Darwesh[3] on *Ficus retusa* "Hawaii"; Deng Xiong *et al.* [8] on *Quisqualis indica* and Rowezak [4] on *Ficus benjamina* var. *exotica*.In general, thy showed that the plants gave the best results concerning the rooting and the vegetative growth when the cuttings were planted during Marsh and April. However, other species gave the best results when the cuttings were planted in July and August as reported by Yong Kweon and KiSun [9] on *Abeliophyllum distichum*..

On the other hand Pipattanawong *et al*. [10] study the effect of the plastic pavilions on the propagation of (*Ficus carica*) hardwood cuttings. The result indicate that using plastic pavilion increased the temperature which promotes early callus formation of buds and roots in the propagation of Ficus cuttings in cool area.

The problem with this plant in that is difficult to propagate in the nursery under the dry conditions of Khartoum State, the render it rare and difficult to fined in most of the nurseries.

MATERIALS AND METHODS

The experiment was carried out in the nursery of the Mogran Family Park, in Khartoum-Sudan. The nursery is made of wood stands and covered with Bamboos in 10×10 cm spaces.

Stem cuttings (20 cm long each) from one yare old stems of Quisqualis plants growing in the garden of Mogran Family Park were taken during winter (4/12/1999),

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summer (7/3/2000) and Kharif, the rainy season (17/8/2000). The cuttings were planted in rectangular plastic containers filled with sand. Fifteen cuttings were planted in each of nine plastic in each treatment, as follows:

1st Treatment: Cuttings planted in containers and without plastic cover and no water mist (control).

2nd Treatment: Cuttings planted in the containers under plastic tunnels (70×100×150 cm) and without water mist.

3rd Treatment: Cuttings planted in the containers, under plastic tunnels (70×100×150 cm) and with water mist. (once in the morning).

All the treatments were irrigated in the mid day, during the course of the experiment in the three seasons.

A split plot design was used, with three replications. The seasons were considered as the main plots and the plastic tunnel with the mist, the plastic tunnel without mist and the uncovered treatments were the subplots.

Growth parameters, that comprise; number and length of roots, number and length of leaves of the cuttings, in each treatment were measured every fifteen days using gentle digging, to uproot the cuttings. After washing the required readings were taken and the cuttings were replanted in their respective container.

The average temperature during the day was recorded during the course of the experiment.

RESULTS AND DISCUSSION

The maximum number of roots from the Quisqualis cuttings, in the experiment was obtained from the treatments under the plastic tunnels, both with and without water mist in three seasons as compared with the control (Table 1). The winter season gave the maximum number of roots compared to the other two seasons (summer and Kharif). These results suggest the importance of planting of the Quisqualis stem cuttings under plastic tunnels in the nursery under the dry arid conditions of Khartoum State, since it will insure continuous high humidity and temperature microenvironment needed for the initiation for the roots [10,11,12] and thus maintain the humidity balance between the outside and inside of cutting [13]. These stimulant effects on root growth my be attributed to the low temperature and to increase in photosynthetic rate during winter months, which leads to produce more carbohydrate content[14]. Similar results were obtained by Rowezak [4] on *Ficus retusa* who recorded an increase in root growth during January, which help the initiation of the mechanism needed for the complicated physiological activities between the time of cuttings taking and the roots initiation [15].

Table 1: Effect of Time of Cuttings Taking and Humidity on the Average Number of Root in the Stem Cutting of Quisqualis Plant

	Time of cuttings taking			
Treatments	Winter	Summer	Karif	Mean for seasons
1-without plastic tunnel(control)	2.0	1.9	1.8	1.9
2-plastic tunnel no mist	7.6	7.5	10.1	8.4
3- plastic tunnel +mist	9.6	7.3	5.7	7.5
Mean for treatments	4.4	5.6	5.9	5.9

Table 2: Effect of Time of Cuttings Taking and Humidity on the Average of Root length in the Stem Cutting of Quisqualis Plant

	Time of cuttings taking			
Treatments	Winter	Summer	Karif	Mean for seasons
1-without plastic tunnel(control	0.2	0.2	0.2	0.2
2-plastic tunnel no mist	13.0	11.9	0.4	8.4
3- plastic tunnel +mist	13.2	13.0	0.8	9.0
Mean of treatments	8.8	8.3	0.5	5.9

Table 3: Effect of Time of Cuttings Taking and Humidity on the Average Number of Leaves in the Stem Cutting of Quisqualis Plant

	Time of cuttings taking			
Treatments	Winter	Summer	Karif	Mean for seasons
1-without plastic tunnel(control	2.1	1.5	1.5	1.7
2-plastic tunnel no mist	13.0	10.6	14.0	12.5
3- plastic tunnel +mist	14.1	15.1	13.0	14.1
Mean of treatments	9.7	9.0	9.5	9.4

The length of roots of cuttings in the treatments under the plastic tunnels was significantly longer than that in the treatment without plastic cover (control), regardless of season (Table 2). This effect on root elongation under the plastic tunnels might be attributed to the temperature (about 25°C during the day), light and humidity which were prevailing under the plastic tunnels during winter and summer seasons in the nursery [16,1], whereas during Kharif season the light was not intense enough during the intermitant cloud cover prevailing during this growing season.

The same trend was observed for number of leaves and the length of the leaf, where the cuttings under the plastic cover gave the largest number of leaves and the longest leaves (Table 3 and 4) compared to the control treatment. The plastic tunnel with mist treatment gave the

Table 4: Effect of Time of Cuttings Taking and Humidity on the Average of Leaves length in the Stem Cutting of Quisqualis Plant

	Time of cuttings taking			
Treatments	Winter	Summer	Karif	Mean for seasons
1-without plastic tunnel(control	0.2	0.2	0.2	0.2
2-plastic tunnel no mist	4.9	0.2	4.4	3.2
3- plastic tunnel +mist	4.1	4.4	4.4	4.3
Mean of treatments	3.1	1.6	3.0	2.6

best number of leaves in winter compared with the other two seasons. These results emphasized, the positive relation ship between the growth of leaves and humidity, which is similar to that obtained by Darwesh[3] on *Ficus retusa*, Whitecomb [17] and Sutter and Hutze [18].

The above obtained results, emphasized the importance of humidity and time for cuttings taking to obtain successful plants from the hard to root cuttings, like Quisqualis plant.

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