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Effect of media on hardening of in vitro multiplied plantlets of gloxinia and saintpaulia under low cost polytunnels

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ABSTRACT

The studies were carried out in the year 2002 with an objective to standardize the hardening medium for gloxinia (*Sinningia speciosa*) and saintpaulia(*Saintpaulia ionantha)*. The experiment was laid out in a CRD design with four media viz cocopeat, cocopeat + perlite (3: 1) , soil + sand (1: 1) and perlite replicated eight times. The plantlets were planted in protrays and were kept under a portable tunnel (3 x 1.5 x 1.65 m) which was placed on a water tank and covered initially with a hashien cloth and then with a polysheet to maintain humid conditions. The protrays containing plantlets were placed on the wire mesh inside the chamber. After 10 weeks of hardening, observations were recorded and cocopeat + perlite (3:1) was found to be the best hardening medium which gave a survival percentage of 79.02 and 89.77 in gloxinia and saintpaulia, respectively. Complete programme for hardening of in vitro multiplied plants has been discussed.

Keywords: Gloxinia, saintpaulia, hardening, polytunnels, media

INTRODUCTION

Gloxinia (*Sinningia speciosa* Hierm*)* and saintpaulia (*Saintpaulia ionantha* Wendl) are the two magnificent flowering pot plants from the family Gesneriaceae. Their exquisite shape, bewitching colours, delightful appearance and a prolonged flowering display provide them a pre-eminent place in the world list of topmost pot plants.

Both the plants can be produced through leaf with petiole cuttings but the number of plants produced in this way is very low. Seed propagation is also possible but it takes a lot of time from the seeds to finished product. Mass propagation through tissue culture is very successful in both gloxinia and saintpaulia (Johnson 1978, Start and Cumming 1976). However, hardening is the major bottleneck in the micropropagation on a commercial scale. Tissue cultured plants are fragile, delicate and vulnerable to the transplanting shocks. There are only few reports regarding hardening procedures and methods of acclimatization of ornamental plants.

Therefore, this study was carried out in the research laboratory of Department of Floriculture and Landscaping, Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan, HP in the year 2002 to develop a low cost technology for hardening of tissue cultured plants of gloxinia and saintpaulia and to find out the effect of different media on hardening.

MATERIAL AND METHODS

Firstly, a protocol for mass multiplication of gloxinia and saintpaulia under in vitro conditions was established as per the method given by Kashyap (2004) and the material generated was used for this experiment. The in vitro raised plantlets of gloxinia and saintpaulia were thoroughly washed with running water so as to remove the entire agar sticking to the roots. The hardening chamber consisted of a low cost portable tunnel (3 x 1.5 x1.65 m, Fig 1) which was placed on a water tank and covered initially with a hashien cloth and from outside with a polythene sheet for maintaining humid conditions (85_+ 5%) inside the chamber. The washed plantlets were planted in protrays containing four different hardening media viz cocopeat, perlite, cocopeat +perlite (3:1) and sand + soil (1:1). These protrays containing plantlets were placed on the wire mesh inside the chamber. After planting, the plantlets were sprayed with a fungicidal solution of mancozeb (0.25%) and carbendazim (0.1%). Initially the plantlets were sprayed 3-4 times a day with water for a fortnight and afterwards twice a day upto 10 weeks of planting. Fertigation with 50 ppm NPK was started 4 weeks after planting and continued till the termination of the experiment. After 10 weeks of hardening, the plants were taken out of the protrays and the observations were recorded. Sturdiness of the hardened plants was also measured by set criteria in which out of a total of 10 marks; 7 marks were given to thick, stout stem and 3 marks for number and types of roots.

RESULTS AND DISCUSSION

The effects of different hardening media on hardening parameters of gloxinia are depicted in Table 1. It was found that maximum plant height (7.19 cm) and number of leaves (9.04) were recorded in the medium containing cocopeat + perlite (3:1), whereas, both the parameters were minimum in sand + soil. Maximum per cent survival of the plantlets (79.02%) was observed in the medium comprising of cocopeat + perlite (3:1), and minimum (45.16%) in sand + soil. The plants grown in cocopeat + perlite medium were sturdier and scored the highest score (8.23).

Table 2 shows the effects of different hardening media on hardening parameters of saintpaulia. It was found that maximum number of leaves (7.85) was recorded in a medium comprising of cocopeat + perlite, whereas, minimum

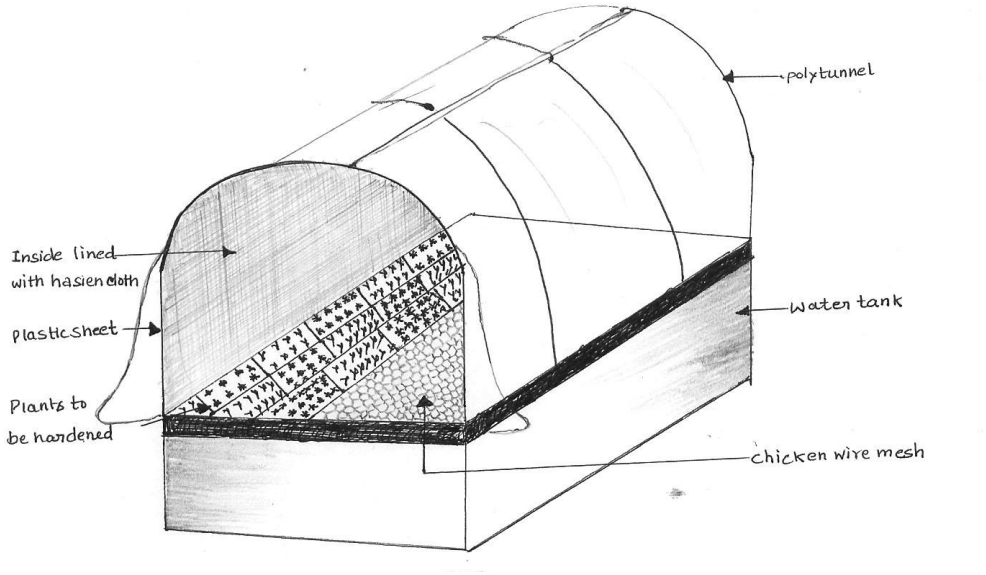

Fig 1. Diagram showing a low cost hardening chamber

Table 1. Effect of hardening media on hardening parameters of in vitro raised plants of gloxinia (after 10 weeks of planting)

Hardening media	Plant height (cm)	Number of leaves	Sturdiness (score out of 10)	Per cent survival
Sand + Soil (1:1)	6.27	5.94	7.49	45.16 (42.22)
Cocopeat	6.91	8.05	8.08	73.37 (59.40)
Perlite	6.85	7.05	8.13	61.19 (51.64)
Cocopeat + perlite (3:1)	7.19	9.04	8.23	79.02 (69.97)
$CD_{0.05}$	0.56	1.06	0.38	(5.57)

Table 2. Effect of hardening media on hardening parameters of in vitro raised plants of saintpaulia (after 10 weeks of planting)

Hardening media	Number of leaves	Plant spread (cm^2)	Per cent survival
Sand + Soil (1:1)	7.85	20.66	73.76 (59.57)
Cocopeat	8.82	22.01	83.97 (67.64)
Perlite	9.08	23.26	77.97 (62.11)
Cocopeat + perlite (3:1)	11.23	24.83	89.77 (73.15)
$CD_{0.05}$	0.55	1.94	(7.45)

(7.85) was observed in sand + soil medium. Similarly, maximum plant spread (24.63 cm^2) and survival (89.77 %) was obtained in cocopeat + perlite medium.

The study revealed that hardening medium had a great influence on growth parameters. In case of the plant species, cocopeat + perlite (3:1) medium excelled other media with respect to various hardening parameters. The better results in this medium could be due to better aeration, porosity, pH and drainage, which provided suitable conditions for further growth and development. However, sand + soil proved to be the nastiest medium on account of poor water holding capacity, which made the media dry and of high bulk density causing the compaction of roots. These results are in line with those of Haramaki (1971) who found that peat + perlite (1:1) was a good substrate for hardening gloxinia. On the other hand, Start and Cumming (1976) opined that saintpaulia plantlets could be hardened in a medium containing perlite: peat: sand. Similarly, Maciel et al (2000) observed 100 per cent survival in compost + sand while hardening saintpaulia.

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