PROPAGATION OF *IPOMOEA HORSFALLIAE* IN HYDROPONICS

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Ipomoea horsfalliae is a native of the West Indies, a morning glory, commonly referred to here as cardinal creeper. Dense, glossy, palmately lobed leaves enhance the beauty of its clustered 6½ cm glossy, bell-shaped flowers, deep rose to cardinal red in colour; which bloom profusely from summer to mid-winter in southeast Queensland.

This showy creeper has been largely unavailable to the home gardener because its poor strike rate by conventional cutting propagation makes it non-viable as a commercial crop. With hydroculture as an alternative propagation method, the nurseryman can grow this beautiful plant economically and reap the benefits from a most desirable and rewarding crop.

The methods described in this paper are the results of trials carried out over a three year period. Many of the methods were duplicated in various standard propagation media; however, because of the extremely poor results in these media, the last year's work has been devoted entirely to hydroculture.

The Sub-Irrigation Gravel Unit. A commercial sub-irrigation system using 9 mm uniform gravel as a substrate in a V-shaped trough is used with an inlet-outlet pipe running the full length of the trough to ensure excellent drainage.

Large particles are used for maximum oxygen exchange during flooding which occurs automatically every 2½ hours during daylight but only twice at night.

Formula control is manual and a recirculating system is used to maintain economical use of nutrients and water.

Hygiene of Unit. Important points to watch are, firstly, that the gravel is thoroughly washed so no dust or limestone is left in it. The pipes from the media tank, the troughs, and the gravel should be sterilized with 1/100 formalin. After 24 hours rinse unit thoroughly.

Provided the unit is kept clean it may be used continuously for at least 5 years. All damaged plants, dropped leaves or diseased plants must be removed. After removing cuttings the gravel should be turned over and any broken roots removed. It is advisable to use 5 ppm Benlate as a preventative treatment in damp, overcast conditions.

The hydroponic unit that we use is situated in the propagation house with forced air ventilation, temperature range 21 to 26°C, humidity 70%, and good light (1200 foot candles). No misting is used in hydroculture and the solution temperature is 20° to 24°C. However, provided the solution temperature does not vary more than 4° and the air temperature does not vary more than 5° and the air temperature does not fall below 12°, or exceed a range of 20°C daily, all cuttings, although slower to strike, will perform well.

Formula:

	M/F	M/W	Quantities
(a) Monopotassium phosphate	KH_2PO_4	(136) =	0.4536 kg
(b) Potassium nitrate	KNO_3	(101) =	2.2680 kg
(c) Calcium nitrate	$Ca(NO_3)4H_2O$	(236) =	3.5380 kg
(d) Magnesium sulfate	$MgSO_4 7H_2O$	(246) =	1.4152 kg

Water to 3785 liters

Ppm of the elements given in the above formula: N 190; P 34; K 275; Ca 52; Mg 45

Other trace elements should be adjusted in relation to the water used.

Scale for trace elements:

	Minimum ppm	Maximum ppm	Optimum ppm
Iron (Fe)	2.0	5.0	4.0
Manganese (Mn)	0.1	1.0	0.5
Copper (Cu)	0.01	0.1	0.05
Boron (B)	0.1	1.0	0.5
Zinc (Zn)	0.02	0.2	0.1
Molydbenum (Mo)	0.01	0.1	0.04

Notes:

1. Formula is used half strength for propagation purposes.
2. Trace elements are so minute that they are best calculated after obtaining a water analysis.
3. Accuracy is vital, a few grams either way will not do!
4. Careful storage and use of pure chemicals is of utmost importance if mixing your own formula.
5. Use clean filtered water.
6. pH of water should be adjsuted to 7 before adding nutrients. Use phosphoric acid or dehydrated lime.
7. Calcium nitrate is added separately.
8. A stock solution of trace elements is preferable, but iron should be added alone.
9. Check pH and conductivity after mixing formula.
10. Check all electrical and automatic systems for reliability and correct settings.

11. Prepare propagation material in clean aseptic conditions.

12. Plant out cuttings.

13. Commence irrigations.

Maintenance.

Daily:-

1. Cleanliness, remove damaged plant material, spilled soil, etc.; if gravel is soiled, remove, clean, and replace.

2. Function test.

3. Check time clocks and adjust if necessary.

4. Top up nutrient solution with water.

Weekly:-

1. Flood troughs to overflow and sprinkle cuttings. This removes any excess salts from top 2½ cm and prevents build up of dust.

2. pH (5.8 to 6.8) and conductivity (1.0 to 1.2) should remain steady or fall progressively.

Simple formula adjustments:

1. 28.3 gm iron sulfate weekly.

2. After 3 weeks, to return pH and conductivity to normal, add another 10% of the weight of all macronutrients.

3. If plants do not progress at a normal rate on a steady pH a 10% phosphorus boost may be necessary.

4. If pH and conductivity is swinging or rising rapidly a new solution needs to be prepared.

5. Half strength 3785 litre solution lasts 6 to 8 weeks if correctly managed.

6. Benlate, 5 ppm in solution, is used in winter.

7. Do not increase irrigation times, even on very hot days. New cuttings may be misted if humidity is low, every 6 hrs. for 48 hrs.

8. When using sprays, fungicides, etc., check for trace element content before use in hydroponic.

9. Remember there is no normal soil buffering effect in a hydroponic solution, so whatever is put in will be taken up by the plants.

Propagating *Ipomoea horsfalliae:*

Stock plants should be healthy, free from disease and insect infestation, true-to-type and vigorous. Take cuttings in spring (late October) when new growth is most vigorous and shortly before the new season's flower bracts are formed. Then

there is time for a second pruning in December without losing the beauty of the summer and autumn blooms.

Double node cuttings 30 to 35 mm long are taken from the last 1½ m of the previous season's growth or from new growth, not younger than 2 months. Variable, but mostly poor results are obtained with other wood.

To prevent damage to cuttings when planting into gravel use a stick with a central groove and plant cuttings 6 cm apart. After 3 to 5 weeks callused and rooted cuttings will be producing new trailers and can be planted out. Between 95 and 100% strike is obtained with the recommended wood (Table 1).

Table 1. Effect of cutting wood type on hydroculture propagation of *Ipomea horsfalliae*.

Time	Age of Wood	Number of cuttings Started	Rooted	Planted out
October, 1982	Old wood; last year's growth	96	94	94
October, 1982	New growth (2 months)	104	104	104
October, 1982	Hardwood (No leaf)	48	2	2
October, 1982	Tips and other	56	20	18
December, 1982	New growth (2 months)	56	53	53

Plantlets are carefully removed from the gravel using a grooved stick and and then potted into a good open mix, such as pine bark and sand, and then staked. They are kept in the glasshouse for 5 days to avoid shock and then shifted to 50% shade. Root growth is rapid during the first weeks and plant growth is normal.

USE OF HERBICIDES IN TUBE-STOCK PRODUCTION

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There are a number of points that should be checked before using any herbicide on your tube stock.

1. Read any available literature on the herbicide, noting such things as frequency of application.

2. Pay particular attention to the climatic factors in the data.

3. Pay particular attention to the soil mix being used in obtaining the data.