

Improved Production and Flowering Programs for High Value Poinsettia in the Tropics

Thohirah Lee Abdullah, Ong Jyh Seng, Khairul Naim, Nor Sa'adah bt. Sejo. and Lee Jai Hooi

Faculty of Agriculture,
Universiti Putra Malaysia
43400 UPM, Serdang, Selangor
Malaysia

Telephone Number of Corresponding Author: 03-8946 6947
E-mail of Corresponding Author: thohirah@agri.upm.edu.my

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Introduction

Poinsettia is only produced in Cameron Highlands and a substantial quantity is imported from Holland and Taiwan to meet increasing demand. It can be grown in the lowland under specific day length and temperature regimes to obtain the quality required. This can be achieved through precise cultural practices and environmental-controlled production system.

Materials and Methods

Poinsettia Pot Production-Flower Induction :

Experiment on differences between day and night temperature (DIF) on Growth and flowering responses was conducted in the walk-in chamber (Convicon). Poinsettia was grown under three DIF from the start of short days until flowering. Treatment consisted of three DIF viz., natural DIF difference between natural day and night temperature for Malaysia, negative DIF day temperature (17°C) lower than night temperature (22°C) and positive DIF day temperature (22°C) higher than night temperature (17°C).

Chemical Regulation of Poinsettia Flowering :

Plant growth retardants (PGR) study on the growth and flowering responses of potted poinsettia. Three types of PGR were used viz., paclobutrazol, flurprimidol and Daminozide. Treatment consisted of spraying PGR at different concentrations on pot-plant poinsettia.

Substitution of Sewage Sludge for Peat in the Growing Medium of Poinsettia:

Comparison on growth responses of poinsettia was carried out in standard potting media (3 soil: 2 peat: 1 sand) with 100% peat substitution of (3 soil: 2 sewage sludge: 1 sand) or 50% of (3 soil: 1 peat + 1 sewage sludge: 1 sand). Treatment consisted of 8 different substitution of sewage sludge and an observation on fertilization effect which include the use of Agroblen (slow-release fertilizer) and Growfas (foliar fertilizer).

Results and Discussion

DIF significantly affected the vegetative and reproductive growth of poinsettia. Negative DIF grown plants resulted in reduced number of internodes, internode length, plant height, number of bracts and bract diameter compared to positive and natural DIF. Negative DIF grown plants also resulted in delayed visible bract colour compared to positive DIF but bract colour appeared earlier than natural DIF. Positive DIF resulted in earliest visible bract colour followed by negative DIF and natural DIF. According to Nitsch (1962), under short day condition, low auxin level, low gibberelin level, low auxin synergists level, high anthocyanins and high inhibitors were obtained within the plants.

Flurprimidol, paclobutrazol and daminozide significantly affected both the vegetative and reproductive growth of poinsettia. All three growth retardants reduced number of internodes, internodes length, plant height, number of days to visible bract colour, number of bracts and leaf area. Leaf chlorophyll content, anthocyanin content and chromaticity values of the bracts (L*, C* and h0) were increased. The results obtained were similar to the experiments done by Pobudkiewicz and Nowak (1994). Poinsettia sprayed with flurprimidol produced shorter and more compact plants with darker green foliage when applied either as foliar spray or soil drench. Growth retardant slowed down cell division and cell elongation in shoot tissues which regulate plant height physiologically without inducing other growth malformations (Dicks, 1979).

The substitution of sewage sludge and fertilization significantly affected the plant height, number of internodes and leaf area of pot-plant poinsettia. Results obtained showed that the soil was an acidic clay loam high in Fe. The peat was rich in Ca and Mg and showed comparable carbon organic content to sewage sludge. Sewage sludge was the most acidic material that contained high amount of organic carbon, heavy metals and most of the macronutrients and micronutrients. Results also indicated that plants grown in T5 (3 soil: 1 peat + 1 sewage sludge: 1 sand & Growfas) and T6 (3 soil: 1 peat + 1 sewage sludge: 1 sand & Agroblen) exhibited a better performance to plants grown in T1 (3 soil: 2 peat : 1 sand & Agroblen + Growfas) – control media. On the contrary, the plants of T2 (3 soil: 2 sewage sludge: 1 sand & Agroblen + Growfas), T3 (3 soil: 2 sewage sludge: 1 sand & Agroblen) and T4 (3 soil: 2 sewage sludge: 1 sand & Growfas) that peat was 100% substituted by sewage sludge exhibited retarded growth in number of leaves, number of bract, bract area and chemicals properties.

Conclusions

DIF study showed that environmental manipulation such as DIF can be used as an alternative method to plant poinsettia with controlled plant height and for production purposes in the tropics. Concentrations between 20 and 40mg^l⁻¹ of paclobutrazol, 25 to 100mg^l⁻¹ of flurprimidol and 2000 to 4000 mg^l⁻¹ of daminozide produced poinsettia plants with suitable characteristics for pot-plant production.

The direct use of high ratio of sewage sludge in potting media mixtures cause retarded growth of poinsettia as it tended to decrease the pH of the media and needed liming to increase the pH of the medium. Sewage sludge also needed to be composted with organic residues like oil palm residues and wood chips to improve its physical and chemical properties.

Benefits from the study

Techniques and methods of plant growth development and management developed from this project can be adapted immediately by the growth and producers in the floriculture industry.

Project Publications in Refereed Journals

1. Thohirah LA, and Ong JS. 1999 "Effect of Number and Timing of Pinching on Reproduction Growth of Potted Poinsettia (*Euphorbia pulcherrima* Willd.). *Pertanika Journal of Tropical Agriculture Science*. Makalah Vol. 26 No. 1 (2003).
2. Nor Sa'adah bt. Sejo. 2002. "Kesan enapcemar kumbahan sebagai pengganti gambut dalam media pasuan terhadap pertumbuhan poinsettia (*Euphorbia pulcherrima*)."
Final Year B.S. Hort Project.
3. Lee Jai Hooi. 2003. "The effect of using sewage sludge as the substitution for peat in the growing medium on the vegetative growth of poinsettia (*Euphorbia pulcherrima*)."
Final Year B.S. Hort Project.

Project Publications in Conference Proceedings

1. Thohirah LA, Asiah AM and Khairul N. 1998. "Vegetative propagation of poinsettia (*Euphorbia pulcherrima* var. Ecke's Red) by terminal cuttings." 9th Malaysian Society of Plant Physiology Conference, UKM, Bangi, Selangor

Graduate Research

Name of Graduate	Research Topic	Field of Expertise	Degree Awarded	Graduation Year
Ong Jyh Seng	Effect of Pinching and Timing on Reproductive Growth of Potted Poinsettia (<i>Euphorbia pulcherrima</i> Willd.)	Plant Production	B.Sc. Horticulture	1999
Nor Sa'adah bt. Sejo	Kesan enapcemar kumbahan sebagai pengganti gambut dalam media pasuan terhadap pertumbuhan poinsettia (<i>Euphorbia pulcherrima</i>)."	Plant Production	B. Sc. Bioindustry	2002

Lee Jai Hooi	The effect of using sewage sludge as the substitution for peat in the growing medium on the vegetative growth of poinsettia (<i>Euphorbia pulcherrima</i>).	Plant Production	B. Sc. Bioindustry	2003
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