ARTIFICIAL SEED PRODUCTION OF LOBELIA CHINENSIS LOUR

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ABSTRACT

An efficient protocol was developed for production of the artificial seed of Lobelia chinensis Lour. In vitro nodal segments of L. chinensis were used as inclusion materials for artificial seeds by entrapping them in various combinations of sodium alginate and calcium nitrate. The artificial seed was produced by mixing 3.5% sodium alginate and 50 mM calcium nitrate, supporting the optimal in vitro conversion potential. The number of shoots produced by encapsulated nodal segments was 3.4 while non-encapsulated nodal segments produced 3.5 shoots per explant. Plantlets regenerated from the artificial seeds of nodal segments were hardened, acclimatized and established well in the field, showing similar morphology with donor plants. This encapsulation technology would provide an easy and novel propagation system for L. chinensis.

INTRODUCTION

Lobelia chinensis, a species from family Lobeliaceae, is commonly known as Chinese lobelia herb. L. chinensis is used to reduce inflammation, contract tissues, clear toxins, and can serve as a respiratory stimulant and antifungal herb (Bown, 2002; Liu and Peng, 1994). This plant has been used for removal of fever and tumors

through detoxification and diuresis. It possesses some unique pharmaceutical efficacies for schistosomiasis or liver cirrhosis (Wang, 2001; Tada et al., 1995).

Synthetic seeds or artificial seeds are defined as artificial encapsulation of somatic embryos, shoot buds, cell aggregates, or any propagules that can be used for sowing as seeds. They can convert into plants under in vitro or ex vitro conditions

and retain this potential even after storage (Hussain et al., 2000; Capuano et al., 1998). Recently, there has been an increasing interest in the production and use of synthetic seed due to the benefits of offering an alternative way for maintenance of elite germplasm and producing virus-free, genetically uniform planting material for easy handling, transportation and storage (Maziah et al., 2006; Nyende et al., 2005, 2003, 2002; Saiprasad and Polisetty, 2003; Ganapathi et al., 2001; Patel et al., 2000; Maruyama et al., 1997; Padmaja et al., 1995; Senaratna et al., 1989).

L. chinensis is not commonly found in the wild. It has a low growth rate and is easily infected by some pathogens. Artificial seed production ais currently considered an effective, alternative method that could scale up the micropropagation rapidly and economically (Wang et al., 2007). This encapsulation technology and technique can serve as a low-cost and high-volume propagation system (Saiprasad and Polisetty, 2003).

To date, there is no report on the production of artificial seeds using in vitro nodal segments of L. chinensis for clonal propagation. The major objectives of this research were a) to investigate the optimal combination of sodium alginate and calcium nitrate for artificial seed production, b) to examine the effect of encapsulation on shoot regeneration, and c) to investigate the survival potential of plantlets produced from artificial seeds in the field.

MATERIALS AND METHODS

Source of plant materials

Nodal segments of in vitro grown L. chinensis were used as inclusion materials for artificial seed production.

Culture conditions

The pH of the medium was adjusted to 5.7-5.8 using 0.01 M NaOH or 0.01 M HCl before autoclaving at 121°C under 1.2 kg cm-2 for fifteen minutes Gelrite 0.25% (w/v) was included as a gelling agent. All cultures were incubated at 25±2°C under a sixteen-hour photoperiod provided by cool-white fluorescent lamps and eight hours of darkness.