

# Artemisinin Production by Shoot Regeneration of *Artemisia annua* L. Using Thidiazuron

Wanwimon Lualon<sup>a</sup>, Wanchai De-Eknamkul<sup>b</sup>, Hiroyuki Tanaka<sup>c</sup>,  
Yukihiro Shoyama<sup>d</sup>, and Waraporn Putalun<sup>a,\*</sup>

<sup>a</sup> Faculty of Pharmaceutical Sciences, Khon Kaen University, Khon Kaen, 40002, Thailand.  
E-mail: waraporn@kku.ac.th

<sup>b</sup> Faculty of Pharmaceutical Sciences, Chulalongkorn University, Bangkok, 10330, Thailand

<sup>c</sup> Graduate School of Pharmaceutical Sciences, Kyushu University, 3-1-1, Maidashi,  
Higashi-ku, Fukuoka 812-8582, Japan

<sup>d</sup> Faculty of Pharmaceutical Sciences, Nagasaki International University,  
2825-7 Huis Ten Bosch, Sasebo City, Nagasaki 859-3298, Japan

\* Author for correspondence and reprint requests

Z. Naturforsch. **63c**, 96–100 (2008); received June 5/July 17, 2007

An efficient *in vitro* method for multiple shoot bud induction and regeneration has been developed in *Artemisia annua* L. using leaf and stem explants in various concentrations and combinations of plant growth regulators to evaluate the frequency of regeneration. The sources of explants as well as plant growth regulators in the medium were found to influence the multiple shoot induction. The result shows that the stem segment cultured on Murashige and Skoog (MS) medium supplemented with 0.1 mg/l thidiazuron (TDZ) gave a perfect shoot formation (100%) and good shoot multiplication (57 shoots/explant) after 2 weeks of culture. Healthy regenerated shoots were elongated and rooted in MS medium without hormones. The artemisinin content in plants regenerated from stem explants using 0.1 mg/l TDZ was  $(3.36 \pm 0.36) \mu\text{g}/\text{mg}$  dry weight and two-fold higher than that of *in vitro* grown plants of the same age  $[(1.73 \pm 0.23) \mu\text{g}/\text{mg DW}]$ . This system exhibited a potential for a rapid propagation of shoots from the stem explant and makes it possible to develop a clonal propagation of *A. annua*.

**Key words:** *Artemisia annua* L., Shoot Regeneration, Thidiazuron, Artemisinin