

**THE EFFECT OF LIGHT SPECTRUM ON THE GROWTH CHARACTERISTICS  
OF *IN VITRO* CULTURES OF *PHALAENOPSIS***

**Hsing-Cheng Hsu<sup>1</sup> and Chiachung Chen<sup>2\*</sup>**

<sup>1</sup>Department of Bio-industrial Mechatronics Engineering, National ChungHsing University,  
250 Kuokuang Road, Taichung, Taiwan

<sup>2</sup>Department of Bio-industrial Mechatronics Engineering, National ChungHsing University,  
250 Kuokuang Road, Taichung, Taiwan, \*Fax: + 886-4-22857135, \*E-mail: ccchen@dragon.nchu.edu.tw

**Abstract**

The effect of light spectrum on the growth characteristics of *in vitro* cultures of *Phalaenopsis* was studied. The experiment design included three different light sources, namely white (control), blue and red light. The growth characteristics of the plantlets were selected as a dependent variable to establish a nonlinear growth model. The results showed the fresh weight, dry weight, and total leaf area increased with following the red light treatment. However, the red light reduced the chlorophyll index of *Phalaenopsis* leaves. There was no statistical difference in the root length among the different light spectrum treatments.

**Key words:** growth model, *in vitro* culture, light spectrum, *Phalaenopsis*

**REFERENCES**

- CHEN C. (2003). Development of a heat transfer model for plant tissue culture vessels. *Biosystems Engineering*, 85: 67-77.
- CHEN C. (2004). Humidity in plant tissue culture vessels. *Biosystems Engineering*, 88: 231-241.
- CHEN C. (2005). Lighting distribution models of fluorescent for plant micropropagation. *Biosystems Engineering*, 90: 295-306.
- CHEN C., CHEN J. (2002). Measurement of gas exchange rates for plant tissue culture vessels. *Plant Cell, Tissue and Organ Culture*, 71: 103-109.
- D'ONOFRIO C., MORINI S., BELLOCCHI G. (1998). Effect of light quality on somatics embryogenesis of quince leaves. *Plant Cell, Tissue and Organ Culture*, 53: 91-98.
- MIYASHITA Y., KITAYA Y., KOZAI T., KIMURA T. (1994). Effects of red and far-red light on the growth and morphology of potato plantlets *in vitro*: Using light emitting diode as a light source for micropropagation. *Acta Horticultrae*, 393: 189-194.
- MOREIRA DA SILVA M. H., DEBEGH P. C. (1997). The effect of light quality on the morphogenesis of *in vitro* cultures of *Azorina vidalii* (Wats.) Feer. *Plant Cell, Tissue and Organ Culture*, 51: 187-193.
- NHUT D. T., TAKAMURA Y., WATANABE H., OKAMOTO K., TANAKA M. (2003). Response of strawberry plantlets cultured *in vitro* under superbright red and blue light-emitting diodes (LEDs). *Plant Cell, Tissue and Organ Culture*, 73: 43-52.
- SABO A., KREKLING T., APPELGREN M. (1995). Light quality affects photosynthesis and leaf anatomy of birch plantlets *in vitro*. *Plant Cell, Tissue and Organ Culture*, 41: 177-185.
- SHIN K. S., MURTHY H. N., HEO J. W., HAHN E. J., PAEK K. Y. (2008). The effect of light quality on the growth and development of *in vitro* cultured *Doritaenopsis* plants. *Acta Physiologiae Plantarum*, 30: 339-343.
- TAKAGI H., QU Y. (1994). Effects of light quality, photoperiod and cold treatment on *in vitro* bulbing of garlic shoot tip. *Acta Horticultrae*, 393: 181-188.
- WEISBERG S. (1986). *Applied Linear Regression*. PWS Publisher, Boston, Mass. USA: 26-38.
- WONGNOK A., PILUEK C., TECHASILPITAK T., TANTIVIVAT S. (2008). Effects of light emitting diodes on micropropagation of *Phalaenopsis* Orchids. *Acta Horticultrae*, 788: 149-156.