

## REFERENCES

- Aerts, R. J., Schaefer, A., Hesse, M., Baumann, T. W. and Slusarenko, A. 1996. Signalling molecules and the synthesis of alkaloids in *Catharanthus roseus* seedlings. *Phytochemistry*. 42: 417-422.
- Ahmad, M. S. A., Javed, F. and Ashraf, M. 2007. Iso-osmotic effect of NaCl and PEG on growth, cations and free proline accumulation in callus tissue of two indica rice (*Oryza sativa* L.) genotypes. *Plant Grow. Regul.* 53: 53-63.
- Ahn, J. C., Chong, W. S., Kim, Y. S. and Hwang, B. 2006. Optimization of sucrose and ion concentrations for saikosaponin production in hairy root culture of *Bupleurum falcatum*. *Biotechnol. Bioproc. Engineer.* 11: 121-126.
- Almansouri, M., Kinet, J. M. and Lutts, S. 2000. Physiological analysis of salinity resistance in *Triticum turgidum* var durum Desf. Callus versus whole plant responses. *Option Meriterraneenes*. 40: 263-265.
- Ajungla, L., Patil, P. P., Barmukh, R. B. and Nikam, T. D. 2009. Influence of biotic and abiotic elicitors on accumulation of hyoscyamine and scopolamine in root cultures of *Datura metel* L. *Indian J Biotechnol.* 8: 317-322.
- Al-Khayri, J. M. and Al-Bahrany, A. M. 2002. Callus growth and proline accumulation in response to sorbitol and sucrose induced osmotic stressing rice. *Biol. Plant.* 45: 609-611.
- Baird, M. C., Pyne, S. G., Ung, A. T., Lie, W., Sastraruji, T., Jatisatienr, A., Jatisatienr, C., Dheeranupattana, S., Lowlam, J. and Boonchalermkit, S. 2009. Semisynthesis and biological activity of Stemofoline alkaloids. *J. Nat. Prod.* 72: 679-684.
- Bajji, M., Lutts, S. and Kinet, J. M. 2000. Physiological changes after exposure to and recovery from PEG induced water deficit in callus cultures issued from durum wheat (*Triticum durum* Desf.) Cultivars differing in drought resistance. *J. Plant Physiol.*, 156: 75-83.

- Balaji, K., Veeresham, C., Srisilam, K. and Kokate, C. 2003. Azadirachtin, a Novel Biopesticide from Cell Cultures of *Azadirachta indica*. J. plant biotechnol. 5(2): 121-129.
- Baldi, A. and Dixit, V. K. 2008. Enhanced artemisinin production by cell cultures of *Artemisia annua*. Current Trends in Biotechnol. and Pharma. 2 (2): 341-348.
- Ballica, R., Ryu, D. D. Y. and Kado, C. Y. 1993 Tropane alkaloid production in *Datura stramonium* suspension culture: Elicitor and precursor effects. Bioeng. 41: 1075-1081.
- Brem, B., Seger, C., Pacher, T., Hofer O., Vajrodaya, S., and Greger, H. 2002. Feeding deterrence and contact toxicity of *Stemona* Alkaloids - a source of potent natural insecticides. J. Agric. Food Chem. 50: 6383-6388.
- Bunrathep, S. 2006. Production of secondary metabolites by plant tissue cultures and biological technology. J. Health Res. 20 (2): 185-196.
- Burikam, S., Jiwajinda, S. Wongmaneeroj, M. and Homhaul, R. 2005. Investigation on stemofoline and 16,17-Didehydro-16(E)-stemofoline extracted from *in vitro* culture of *Stemona collinsae* Craib. Proceedings of 43<sup>rd</sup> Kasetsart University Annual Conference, Thailand, 1-4 February, 2005. Subject: Plants : 681-688.
- Cheng, D. M., Yousef, G. G., Grace, M. H., Rogers, R. B. Gorelick-Feldman, J. and Raskin, I. and Lila, M. A. 2008. *In vitro* production of metabolism-enhancing phytoecdysteroids from *Ajuga turkestanica*. Plant Cell Tiss. Org. Cult. 93:73-83.
- Chidburee, A., Nualbunruang, P. and Puttawarachai, P. 2008. *In Vitro* micropropagation of *Stemona tuberosa* Lour. J. Agriculture, Chiang Mai University. 24 (1): 31-36.
- Chotikadachanarong, K., Dheeranupattana, S. and Jatisatienr, A. 2005. Micropropagation and alkaloid production in *Stemona* sp. Acta Hort. 676: 67-72.
- Chung, H. S., Hon, P. M., Lin, G., But, P. P. H., and Dong, H. 2003. Antitussive activity of *Stemona* alkaloids from *Stemona tuberosa*. Planta Medica. 69: 914-920.

- Cosio, E. G., Frey, T., Verduyn, R., van Boom, J. and Ebel, J. 1990. High-affinity binding of a synthetic heptagluco-side and fungal glucan phytoalexin elicitors to soybean membranes. *FEBS Lett.* 271: 223–226.
- De Oliveira, A. J. B. and Da Silva Machado, M. 2002. Alkaloid production by callous tissue cultures of *Cereus peruvianus* (Cactaceae). *Appl. Biochem. Biotechnol.* 104: 149-155.
- Dong, X. 1998. SA, JA, ethylene and disease resistance in plants, *Curr. Opin. Plant Biol.* 1: 316–323.
- Dörnenberg, H. and Knorr, D.. 1997. Challenges and opportunities for metabolite production from plant cell and tissue cultures. *Food Technol.* 51:47–54.
- Durner, J., Shah, J. and Kleesing, G. F. 1997. Salicylic acid and disease resistance in plants, *Trends Plant Sci.* 6: 266–274.
- Ertola, R. J. and Hours, R. 1998. Role of yeast extract components in microbial cultures not associated with amino acid, vitamins and minerals: A review. *Appl. Biol. Sci.* 4: 1-15.
- Gangopadhyay, M., Sircar, D., Mitra, A. and Bhattacharya, S. 2008. Hairy root culture of *Plumbago indica* as a potential source for plumbagin. *Biologia Plantarum.* 52(3): 533-537.
- George, E. L. F. and Sherington, D. P. 1984. Plant propagation by tissue culture Exegetic Ltd. London. pp: 108-124.
- Gergorio, G. H. and Victor, M. L. V. 1997. Effect of acetylsalicylic acid on secondary metabolism of *Catharanthus roseus* tumor suspension cultures. *Plant Cell Rep.* 16: 287–290.
- Greger, H. 2006. Structural relationships, distribution and biological activities of *Stemona* alkaloids, *Planta Medica.* 72: 99-113.
- Gundlach, H., Müller, M. J. Kutchan, T. M. and Zenk, M. H. 1992. Jasmonic acid is a signal transducer in elicitor-induced plant cell cultures. *Proc. Natl. Acad. Sci. U S A.* 89(6): 2389–2393.
- Guo-Jing, L., Shu-Cai, W., Kai, X. and Xie, Z. 2003. Effect of yeast elicitor and salicylic acid on the fluctuation of phytohormone contents in Ti-transformed *Salvia miltiorrhiza* cell cultures. *Plant Growth Reg.* 39: 27–32.

- Hagimori, M., Matsumoto, T. and Obi, Y. 1982. Studies on the production of *Digitalis cardenolides* by plant tissue culture. II: Effect of nutrients on digitoxin formation in shoot forming cultures of *Digitalis purpurea* L. grown in liquid medium. *Plant Cell Physiol.* 23: 1205-1211.
- Hahn, E. J., Kim, Y. S., Yu, K. W., Jeong, C. S., Paek, K. Y. 2003. Adventitious root cultures of *Panax ginseng* C. A. Meyer and ginsenoside production through large scale bioreactor systems. *J. Plant Biotechnol.* 5: 1-6.
- Hazarika, B. N. 2003. Acclimatization of tissue cultured plants. *Curr. Sci.* 85: 1704-1711.
- Hilton, M. G. and Rhodes, M. J. C. 1990. Growth and hyoscyamine production of hairy root cultures of *Datura stramonium* in modified stirred tank reactor. *Appl Microbiol Biotechnol.* 33: 132-138.
- Hilton, M. G. and Rhodes, M. J. C. 1994. The effect of varying levels of gamborgs B5 salt and temperature on the accumulation of starch and Hyoscyamine in batch culture of transformed roots of *Datura stramonium*. *Plant Cell Tiss. Org. Cult.* 38: 45-51.
- Huang, W. and Liu, L. F. 2002. Carbohydrate metabolism in rice during callus induction and shoot regeneration induced by osmotic stress. *Bot. Bull. Acad. Sci.*, 43: 107-113.
- Inthachub, P., Vajrodaya, S. and Duyfjes, B. E. E. 2010. Census of *Stemona* (*Stemonaceae*) in Thailand. *Blumea.* 55: 143-152.
- Iranbakhsh, A. R., Oshagi, M. A. and Ebadi, M. 2007. Growth and production optimization of tropane alkaloid in *Datura stramonium* cell suspension culture. *Pakistan J. Biol. Sci.* 10(8): 1236-1642
- Javed, F. 2002. *In vitro* salt tolerance in wheat. III: Water relations in callus. *Int. J. Agric. Biol.* 4: 465-467.
- Jensen, R. A. 1986. The Shikimic Acid Pathway. *Advances in Phytochemistry.* Conn, E. E., ed. Plenum New York. pp: 1-57.
- Jian, D., Shuai, S., Bao-Hua, J., Yong-Hua, Y., Jie, H., Heng-Guan, S. and Kai, X. 2004. Effects of methyl jasmonate with indole-3-acetic acid and 6-benzylaminopurine on the secondary metabolism of cultured *Onosma paniculatum* cells. *In Vitro Cell Dev. Biol. Plant* 40: 581-585.

- Jin, J. H., Shin, J. H., Kim, J. H., Chung, I. S. and Lee, H. J. 1999. Effect of chitosan elicitation and media components on the production of anthraquinone colorants in Madder (*Rubiaakane* Nakai) Cell Culture. *Biotechnol. Bioprocess Eng.* 4: 300-304.
- Juhasz, G. A., Simon-Sarkadi, L., Velich, I. and Varro, P. 1997. Studies of non-ionic osmotic stress on bean callus and seedling cultures. *Acta Hort.* 44: 455-456.
- Kaltenegger, E., Brem, B., Mereiter, K., Kalchhauser, H., Kahlig, H., Hofer, O., Vajrodaya, S. and Greger, H. 2003. Insecticidal pyrido[1,2-a]azepine alkaloids and related derivatives from *Stemona* species. *Phytochemistry.* 63: 803-816.
- Kee-Won, Y., Wen-Yuan, G., Sung-Ho, S. and Kee-Yoeup, P. 2000. Improvement of ginsenoside production by jasmonic acid and some other elicitors in hairy root cultures of Ginseng (*Panax ginseng* C. A. Meyer). *In Vitro Cell Dev. Biol. Plant.* 36: 424-428.
- Ketchum, R. E. B., Gibson, D. M., Croteau, R. B. and Shuler, M. L. 1999. The kinetics of taxoid accumulation in cell suspension cultures of *Taxus* following elicitation with methyl jasmonate. *Biotechnol. Bioeng.* 62: 97-105.
- Kim, J. H. U., Shin, J. H., Lee, H. J., Chung, I. S. and Lee, H. J. 1997. Effect of chitosan on indirubin production from suspension culture of *Polygonum tinctorium*. *J. Ferment. and Bioeng.* 83(2): 206-208.
- Kim, S. H. and Kim, S. K. 2002. Effect of sucrose level and nitrogen source on fresh weight and anthocyanin production in cell suspension culture of 'Sheridan' Grape (*Vitis* spp). *J. Plant Biotech.* 4: 2327-2330.
- Kim, Y. S., Chakrabarty, D., Hahn, E. J. and Paek, K.Y. 2003. Methyl jasmonate increases saponin content in bioreactor culture of Ginseng (*Panax ginseng* C.A. Meyer) adventitious roots. *Acta Horticulturae. (ISHS)* 625: 289-292.
- Kim, Y. S., Yeung, E. C., Hahn, E. J. and Paek, K.Y. 2007. Combined effects of phytohormone, indole-3-butyric acid, and methyl jasmonate on root growth and ginsenoside production in adventitious root cultures of *Panax ginseng* C.A. Meyer. *Biotechnol. Lett.* 29:1789-1792.
- Kishore, P. B. K., and Dange, V. 1990. Sucrose metabolism in callus cultures of cotton during growth. *Ind. J. Exp. Biol.*, 28: 352-355.

- Kitamura, Y., Sugimoto, Y., Samejima, T., Hayashida, K. and Miura, H. 1991. Growth and alkaloid production in *Duboisia myoporoides* and *D. leichhardtii* root cultures. *Chem. Pharm. Bull.* 39(5): 1263-1266.
- Lee, K. T., Hirano, H., Yamakawa, T., Kodama, T., Igarashi, Y. and Shimomura, K. 2001. Responses of transformed root culture of *Atropa belladonna* to salicylic acid stress. *J. Biosci. and Bioeng.* 91(6): 586-589.
- Lee-Parsons C. W. T., Ertürk1, S. and Tengtrakool, J. 2004. Enhancement of ajmalicine production in *Catharanthus roseus* cell cultures with methyl jasmonate is dependent on timing and dosage of elicitation. *Biotechnol Lett* 26(20): 1595–1599.
- Li, W., Koike, K., Asada, Y., Yoshikawa, T. and Nikaido, T. 2005. Rosmarinic acid production by *Coleus forskohlii* hairy root cultures. *Plant Cell Tiss. Org. Cult.* 80(2): 151-155.
- Lila, M. A. 2005. Valuable secondary products from in vitro culture. *Plant Development and Biotechnology*. CRC Press LLC. pp: 285-289.
- Lois, R., Dietrich, A., Hahlbrock, K. and Schulz, W. 1989. A phenylalanine ammonialyase gene from parsley: structure, regulation and identification of elicitor and light responsive cis-acting elements. *EMBO J.* 8: 1641–1648.
- Luna-Palencia, G. R, Cerda-García-Rojas, C. M., Rodríguez-Monroy, M. and Ramos-Valdivia, A. C. 2005. Influence of auxins and sucrose in monoterpenoid oxindole alkaloid production by *Uncaria tomentosa* cell suspension cultures. *Biotechnol. Prog.* 21(1): 198-204.
- Madhavi, D.L., Juthangkoon, S., Lewen, K., Berber-Jimenez, M. D. and Smith, M. A. L. 1996. Characterization of anthocyanins from *Ajuga-reptans* 'Metallica Crispa' cell cultures. *J. Agric. Food Chem.* 44: 1170–1176.
- Malamy, J., Carr, J. P., Klessig, D. F. and Raskin, I. 1990. Salicylic acid: a likely endogenous signal in the resistance response of tobacco to viral infection. *Science.* 250: 1001–1004.
- Malarz, J., Stojakowska, A. and Kisiel, W. 2007. Effect of methyl jasmonate and salicylic acid on sesquiterpene lactone accumulation in hairy roots of *Cichorium intybus*. *Acta Physiol. Plant.* 29: 127–132.

- Medina-Bolivar, F., Condori, J., Rimando, A. M., Hubstenberger, J., Shelton, K., O'Keefe, S. F., Bennett, S., Dolan, M. C. 2007. Production and secretion of resveratrol in hairy root cultures of peanuts. *Phytochemistry*. 68 (14) :1992-2003.
- Mehmetoglu, U. and Curtis, W. R. 1997. Effects of abiotic inducers on sesquiterpene synthesis in hairy root and cell-suspension cultures of *Hyoscyamus muticus*. *Appl. Biochem. Biotechnol.* 67: 71-77.
- Mehta, U. J., Krishnamurthy, V. K. and Hazra, S. 2000. Regeneration of plant via adventitious bud formation from zygotic embryo axis of tamarind (*Tamarindus indica*). *Curr. Sci.* 78: 1231-12.
- Misawa, M. 1994. Plant tissue culture: an alternative for production of useful metabolite. *FAO Agricultural services bulletin* 108.
- Montri, N., Wawrosch, C. H. and Kopp, B. 2006. Micropropagation of *Stemona curtisii* Hook f., a Thai medicinal plant. *Acta Horti.* 725: 341-346.
- Mukundan, U. and Hjortsa, M. 1991. Effect of light on growth and thiophene accumulation in transformed roots of *Tagetes patula*. *J. Plant Physiol.* 138: 252-255.
- Mungkornasawakul, P., Pyne, S. G., Jatisatienr, A., Supyen, D., Lie, W., Ung, A. T., Skelton, B. W. and White, A. H. 2003. Stemocurtisine, the first pyrido[1,2-a]azepine *Stemona* alkaloid. *J. Nat. Prod.* 66: 980-982.
- Mungkornasawakul, P., Pyne, S. G., Jatisatienr, A., Supyen, D., Jatisatienr, C., Lie, W., Ung, A. T., Skelton, B. W., and White, A. H. 2004. Phytochemical and larvicidal studies on *Stemona curtisii*: structure of a new pyrido[1,2-a]azepine *Stemona* alkaloid. *J. Nat. Prod.* 67: 675-677.
- Muranaka, T., Ohkawa, H. and Yamada, Y. 1992. Scopolamine release into media by *Duboisia Leichhardtii* hairy root clones. *Appl. Microbiol. Biotechnol.* 37 : 554-559
- Murashige, T. and F. Skoog. 1962. A revised medium for rapid growth and bioassays with tobacco cultures. *Physiol. Plant* 15: 473-497.
- Murthy, H. N., Hahn, E. J. and Paek, K. Yoeup. 2008. Adventitious roots and secondary metabolism. *Chinese J. Biotechnol.* 24 (5): 711-716.

- Murugan, C. 2010. *Stemona curtisii* (Stemonaceae) – A New Record for India from the Bay Islands, Little Nicobar. *Rheedea* 20 (2): 77-79.
- Neumann, D. G., Krauss, G., Hieke, M. and Groger, D. 1983. Indole alkaloid formation and storage in cell suspension cultures of *Catharanthus roseus*. *Planta Med.* 48: 20–23.
- O'Donnell, P. J., Calvert, C., Atzorn, R., Wasternack, C. Leyser, H. M. O. and Bowles, D. J. 1996. Ethylene as a signal mediating the wound response of tomato plants. *Science*. 274: 1914–1917.
- Ohlsson, A. B., Bjork, L. and Gatenbeck, S. 1983. Effect of light on cardenolide production by *Digitalis lanata* tissue cultures. *Phytochemistry*. 17: 1907-1910.
- Ok-Tae, K., Kyong-Hwan, B., Yu-Su, S., Min-Jeong L. and Su-Jin, J. 2007. Enhanced production of asiaticoside from hairy root cultures of *Centella asiatica* (L.) Urban elicited by methyl jasmonate. *Plant Cell Rep.* 26:1941–1949
- Oliveira, A. J. B. and Machado, M. F. P. S. 2003. Alkaloid production by callous tissue cultures of *Cereus peruvianus* (Cactaceae). *Appl. Biol. and Biotech.* 104 (2): 149-155.
- Pilli, R. A., Rosso, G. B. and De Oliveira, M. C. F. 2005. “The *Stemona* alkaloids”, *The Alkaloids*, Ed. G. A. Cordell. Elsevier, New York. pp: 62.
- Pitta-Alvarez, S. I. and Giuliatti, A. M. 1999. Influence of chitosan, acetic acid and citric acid on growth and tropane alkaloid production in transformed roots of *Brugmansia candida*. Effect of medium pH and growth phase. *Plant Cell Tiss. Org. Cult.* 59: 31–38.
- Pitta-Alvarez, S. I., Spollansky, T. C. and Giuliatti, A. M. 2000. The influence of different biotic and abiotic elicitors on the production and profile of tropane alkaloid in hairy root cultures of *Brugmansia candida*. *Enzyme Microb. Technol.* 26: 252-258.
- Plas, L. H. W. and Wagner, J. M. 1984. Influence of osmotic stress on the respiration of potato tuber callus. *Physiol. Plant.* 62: 398-403.
- Putalun, W., Udomsin, O., Yusakul, G., Juengwatanatrakul, T., Sakamoto, S. and Tanaka, H. 2010. Enhanced plumbagin production from in vitro cultures of *Drosera burmanii* using elicitation. *Biotechnol. Lett.* 32(5): 721-724.

- Putalun, W., Yusakul, G., and Patanasethanont, D. 2009. Dicine production from a hairy roots culture of *Stephania suberosa*. Z. Naturforsch. 64: 692 – 696.
- Pyne, S. G., Ung, A. T., Jatisatienr, A, and Mungkornasawakul, P. 2007 The pyrido[1,2-a] azepine *Stemona* alkaloids. Maejo Int. J. Sci. and Tech. 1(2): 157-165.
- Rahman, N. N. N. A., Zakaris, Z. and Kadir, M. O. A. 2003. Influence of elicitor availability on limonene and linalool accumulation from *Citrus grandis* cell cultures. Malaysian J. Pharma. Sci. 1: 39-49.
- Ramos, M. L. G., Gordon, J. A., Minchin, R. F., Sprent, I. J. and Parsons, R. 1999. Effect of water stress on nodule physiology and biochemistry of a drought tolerant cultivar of common bean (*Phaseolus vulgaris*). Ann. Bot. 83: 57-63.
- Renaudin, J. P. and Guern, J. 1990. Transport and vacuolar storage of secondary metabolites in plant cell cultures. In: Charlwood BV & Rhodes MJC (eds) Secondary Products from Plant Tissue Cultures. Clarendon Press, Oxford. pp: 59–78.
- Rhoton, C. and Bouteraouy, F. 1994. Study of the effect of soil temperature and type of phosphorus fertilizer on growth and chemical composition of tobacco plants. Annales du Tabac Section. 26: 51-58.
- Riham, W. T., Shibli, R. A. and Ajlouni, M. M. 2001. Growth responses and physiological disorders in wild pear (*Pyrus syriaca* Boiss.) during slow growth *in vitro* preservation on osmostressing media. Plant Tiss. Cult. 11: 15-23.
- Ruiz-May, E., Galaz-A' valos, R. M. and Loyola-Vargas, V. M. 2009. Differential secretion and accumulation of terpene indole alkaloids in hairy roots of *Catharanthus roseus* treated with methyl jasmonate. Mol. Biotechnol. 41:278–285
- Sastrarujji, K., Sastrarujji, T., Pyne, S. G., Ung, A. T., Jatisatienr, A. and Lie, W. 2010 Semisynthesis and acetylcholinesterase inhibitory activity of stemofoline alkaloids and analogues. J. Nat. Prod. 73: 935–941.
- Sastrarujji, T. 2006. Bioinsecticide production from *Stemona* extract and its application in agricultural use. PhD Thesis. Chiang Mai University. 145 p.

- Sastraraji, T., Jatisatiern, A., Pyne, S. G., Ung, A. T., Lie, W. and Williams, M. C. 2005. Phytochemical studies on *Stemona* plants: isolation of Stemofoline alkaloids. *J. Nat. Prod.* 68: 1763–1767.
- Satdive, R. K., Fulzele, D. P. and Eapen. S. 2007. Enhanced production of azadirachtin by hairy root cultures of *Azadirachta indica* A. Juss by elicitation and media optimization. *J. biotechnol.* 128: 281-289.
- Sauerwein, M. and Shimomura, K. 1991. Alkaloid production in hairy roots of *Hyoscyamus albus* transformed with *Agrobacterium rhizogenes*. *Phytochemistry.* 30(10): 3277-3280.
- Schinnerl, J., Brem, B., But, P P. H., Vajrodaya, S., Hofer, O. and Greger, H. 2007. Pyrrolo and pyridoazepine alkaloids as chemical markers in *Stemona* species. *Phytochemistry*, 68: 1417-1427.
- Seger, C., Mereiter, K., Kaltenecker, E., Pacher, T., Greger, H. and Hofer, O. 2004. Two pyrrolo[1,2a]azepine type alkaloids from *Stemona collinsae* CRAIB: structure elucidations, relationships to asparagine A, and a new biogenetic concept of their formation. *Chem. Biodivers.* 1: 265-279.
- Seung-Mi, K., Ji-Yun, M., Yong-Duck, K., Young-Min, K., Dong-Jin, P., Ha-Na, J., Seon-Won, K. and Myung-Suk, C. 2006. Effects of methyl jasmonate and salicylic acid on the production of bilobalide and ginkgolides in cell cultures of *Ginkgo biloba*. *In Vitro Cell Dev. Biol. Plant* 42: 44–49.
- Shah, J, Kachroo, P. and Klessig, D. F. 1999. The *Arabidopsis ssi I* mutation restores pathogenesis related gene expression in *npr I* plants and renders defensive gene expression salicylic acid dependent. *Plant Cell.* 11: 191-206.
- Sharan, M., Taguchi, G., Gonda, K., Jouke, T., Shimosaka, M., Hayashida, N. and Okazaki, M. 1998. Effects of methyl jasmonate and elicitor on the activation of phenylalanine ammonia-lyase and the accumulation of scopoletin and scopolin in tobacco cell cultures. *Plant Sci.* 132:13–19.
- Shibli, R. A., Smith, L. A. M. and Spomer, A. L. 1992. Osmotic adjustment and growth responses of three (*Chrysanthemum morifolium* Ramat.) cultivars to osmotic stress induced *in vitro*. *J. Plant Nutr.* 15: 1373-1381.

- Shinde, A. N., Malpathak<sup>1</sup>, N. and Fulzele, D. P. 2009. Enhanced production of phytoestrogenic isoflavones from hairy root cultures of *Psoralea corylifolia* L. using elicitation and precursor feeding. *Biotechnol. and Bioproc. Engineer.* 14: 288-294.
- Singlaw, C., Kongbangkerd, A. Promthep, K. and Saenpote, P. 2008. Effect of cytokinins on *In vitro* shoot proliferation of *Stemona tuberosa* Lour. *Naresuan Sci. J.* 5(2): 221-229.
- Smith, M. A. L., Kobayashi, H., Gawienowski M. and Briskin D. P. 2002. An *in vitro* approach to investigate medicinal chemical synthesis by three herbal plants. *Plant Cell Tiss. Org. Cult.* 70: 105–111.
- Song, S. H. and Byun, S. Y. 1998. Elicitation of camptothecin production in cell cultures of *Camptotheca acuminata*. *Biotechnol. Bioprocess Eng.* 3: 91–95.
- Spollansky, T. C., Pitta-Alvarez, S. I. and Giulietti, A. M. 2000. Effect of jasmonic acid and aluminium on production of tropane alkaloids in hairy root cultures of *Brugmansia candida*. *Plant Biotechnol.* 3: 1-3.
- Sudha, C. G. and Ravishankar, G.A. 2003. Elicitation of anthocyanin production in callus cultures of *Daucus carota* and the involvement of methyl jasmonate and salicylic acid. *ACTA Physio. Plantarum.* 25(3): 249-256.
- Thic, N. H. 1992. Peace is every step; The path of mindfulness in every day life. Bantam Publisher. pp: 160.
- van der Fits, L. and Memelink, J. 2000. ORCA3, a jasmonate-responsive transcriptional regulator of plant primary and secondary metabolism. *Sci.* 289: 295–297.
- Vazquez-Flota, F., Hernandez-Dominguez, E., Miranda-Ham, M. L. and Monforte-Gonzalez, M. 2009. A different response to chemical elicitors in *Catharanthus roseus in vitro* cultures. *Biotechnol. Lett.* 31: 591-595.
- Walling, L. L. 2000. The myriad plant responses to herbivores, J. *Plant Growth Regul.* 19: 195–226.
- Wei, W., Zhan-Ying, Z. and Jian-Jiang, Z. 2005. Enhancement of ginsenoside biosynthesis in high-density cultivation of *Panax notoginseng* cells by various strategies of methyl jasmonate elicitation. *App.l Microbiol. Biotechnol.* 67: 752–758.

- Wu, J.Y., and Shi, M. 2008. Ultrahigh diterpenoid tanshinone production through repeated osmotic stress and elicitor stimulation in fed-batch culture of *Salvia miltiorrhiza* Hairy Roots. *Appl. Microbiol. Biotechnol.* 78: 441–448.
- Yimin Fang, M. A. L. S. and Pepin M. F. 1999. Effects of exogenous methyl jasmonate in elicitation anthocyanin producing cell cultures of ohelo (*Vaccinium pahalae*). *In Vitro Cell Dev. Biol. Plant* 35: 106-113
- Young-Am, C., Hee-Suk Y., Ji-Sook, S., Hee-Kyung, C. and Sang-Un, P. 2000. Indigo production in hairy root cultures of *Polygonum tinctorium* Lour. *Biotechnol. Lett.* 22: 1527–1530.
- Yu, K. W., Gao, W. Y., Son, S. H. and Paek, K.Y. 2006. Improvement of ginsenoside production by jasmonic acid and some other elicitors in hairy root culture of ginseng (*Panax ginseng* C. A. Meyer). *In Vitro Cellular & Developmental Biology - Plant.* 36(5): 424-428.
- Zabetakis, I., Edwards, R, and O'Hagan, D. 1999. Elicitation of tropane alkaloid biosynthesis in transformed root cultures of *Datura stramonium*. *Phytochemistry.* 50: 53-56.
- Zárate, R. 1998. Tropane alkaloid production by *Agrobacterium rhizogenes* transformed hairy root cultures of *Atropa baetica* Willk. (Solanaceae). *Plant Cell Rep.* 18 (5): 418-423.
- Zayedb, R. and Winka, M. 2004. Induction of tropane alkaloid formation in transformed root cultures of *Brugmansia suaveolens* (Solanaceae). *Z. Naturforsch.* 59c. 863-867.
- Zhou, X., Wu, Y., Wang, X., Liu, B. and Xu, H. 2007. Salidroside production by hairy roots of *Rhodiola sachalinensis* obtained after transformation with *Agrobacterium rhizogenes*. *Biol. Pharm. Bull.* 30: 439 – 442.

## Curriculum Vitae

- Name** Mr. Kittisak Chotikadachanarong
- Date of Birth** 8 September 1978
- Educational Background**
1. B.S. (Biology), Naresuan University, Phitsanulok, Thailand (2000).
  2. M.S. (Biology), Chiang Mai University, Chiang Mai, Thailand (2003).
- Scholarship**
1. The program Strategic Scholarships for Frontier Research Network for the Ph.D. Program Thai Doctoral degree from the Office of the Higher Education Commission, Thailand (2007).
  2. Human Resource Development Scholarship for Chiang Mai Rajabhat University, Thailand (2006)
- Working Experience** Biology program, Faculty of Science and Technology, Chiang Mai Rajabhat University (Since 2003)
- Publications**
1. Chotikadachanarong K., S. Dheeranupattana and A. Jatisatiern. 2005. Micropropagation and alkaloid production in *Stemona* sp. *Acta Horticulturae* 676:67-72.

2. Chotikadachanarong K., Dheeranupattana S., Jatisatienr A., Jatisatienr C., Pyne S. G. , Ung A. T. and Sastraruji T. Secondary compound production in root cultures of *Stemona curtisii* Hook. f. (2008) *Planta Medica*. 74:1166.
3. Chotikadachanarong K., Dheeranupattana S., A. Jatisatienr, Wangkarn S., Mungkornasawakul P., Pyne S. G., Ung A. T. and Sastraruji T., 2011. Influence of salicylic acid on alkaloid production by root cultures of *Stemona curtisii* Hook. F.. *Current Research Journal of Biological Sciences*, 3(4): 322-325.
4. Chotikadachanarong K., Dheeranupattana S. 2011. Effects of methyl Jasmonate on alkaloid production by root cultures of *Stemona curtisii* Hook. f. The 1<sup>st</sup> International Graduate Study Conference 2011 “Creative Education”, Bangkok, Thailand, May 2011, 73-78.



