

## เอกสารอ้างอิง

- จาตุรนต์ แซ่ลิ้ม และสินชัย ทองขาว. 2543. การสกัดแคโรทีนอยด์จากปาล์มน้ำมันดิบ. ปัญหาพิเศษ คณะอุตสาหกรรมเกษตร มหาวิทยาลัยสงขลานครินทร์.
- ดำรง พงศ์มานะวุฒิ. 2532. ปาล์มน้ำมัน : ประวัติการปลูกปาล์มน้ำมันในประเทศไทย. ศูนย์วิจัยพืชสวนสุราษฎร์ธานี กรมวิชาการเกษตร, 1-2.
- พรชัย เหลืองอาภาพงศ์. 2523. ปาล์มน้ำมัน. ภาควิชาพืชศาสตร์ คณะทรัพยากรธรรมชาติ มหาวิทยาลัยสงขลานครินทร์.
- ศิริชัย มามีวัฒนะ. 2532. ปาล์มน้ำมัน : พันธุ์. กลุ่มปรับปรุงพันธุ์ ศูนย์วิจัยพืชสวนสุราษฎร์ธานี กรมวิชาการเกษตร, 11-15.
- ศิวาพร ศิวเวช. 2529. วัตถุประสงค์ปนในอาหารเล่ม 2. ภาควิชาวิทยาศาสตร์และเทคโนโลยีการอาหาร คณะอุตสาหกรรมเกษตร มหาวิทยาลัยเกษตรศาสตร์.
- เศรษฐกิจการเกษตร, สำนักงาน. 2541. ปาล์มน้ำมันเป้าหมายการผลิตสินค้าเกษตรที่สำคัญปี 2541/42. กระทรวงเกษตรและสหกรณ์.
- สุรกิตติ ศรีกุล และ ภิญญ มีเดช. 2541. การจัดการสวนปาล์มน้ำมันในภาคใต้. เอกสารประกอบสัมมนาวิชาการปาล์มน้ำมันแห่งชาติครั้งที่ 1 ณ โรงแรมสยามธานี จังหวัดสุราษฎร์ธานี. หน้า 111-138.
- อุไรวรรณ วิจารณกุล. 2545. ดีเอ็นเอเทคโนโลยี. คณะวิทยาศาสตร์และเทคโนโลยี สถาบันราชภัฏพิบูลสงคราม.
- อรษา เสือทิม. 2532. ปาล์มน้ำมัน : ลักษณะทางพฤกษศาสตร์. กลุ่มปรับปรุงพันธุ์ ศูนย์วิจัยพืชสวนสุราษฎร์ธานี กรมวิชาการเกษตร, 3-10.
- Abdullah, S.N.A., Shah, F.H. and Chach, S.H. 1995. Construction of oil palm mesocarp cDNA library and the isolation of mesocarp specific cDNA clones. *Asia Pac. J. Mol. Biol. Biotech.* 3,106-111.
- Adam, K.P. and Zapp, J. 1998. Biosynthesis of the isoprene units of chamomile sesquiterpene. *Phytochemistry.* 48, 653-659.
- Adam, K.P., Thiel, R., Zapp, J. and Becker, H. 1998. Involvement of the mevalonate acid pathway and the glyceraldehyde pathway in terpenoid biosynthesis of the

- liverworts *Ricciocarpos natans* and *Conocephalum conicum*. *Arch. Biochem. Biophys.* 354, 181-187.
- Affek, M.P. and Yakir, D. 2003. Natural abundance carbon isotope composition of isoprene reflects incomplete coupling between isoprene synthesis and photosynthetic carbon flow. *Plant Physiol.* 131, 1727-1736.
- Albrecht, M., Takaichi, S., Misawa, N., Schnurr, G., Boger, P. and Sandmann, G. 1997. Synthesis of atypical cyclic and acyclic hydroxyl carotenoids in *Escherichia coli* transformants. *J Biotechnol.* 58, 177-185.
- Armstrong, G.A. and Hearst, J.E. 1996. Carotenoids 2 : genetics and molecular biology of carotenoid pigment biosynthesis. *FASEB J.* 10, 228-237.
- Bartley, G.E. and Scolnik, P.A. 1995. Plant carotenoids : pigments for photoprotection, visual attraction and human health. *Plant Cell.* 7, 1027-1038.
- Bick, J.A. and Lange, B.M. 2003. Metabolic cross talk between cytosolic and plastidial pathways of isoprenoids biosynthesis : unidirectional transport of intermediates across the chloroplast envelope membrane. *Arch. of Biochem. Biophys.* 415, 146-154.
- Biesalski, H.K. and Obermueller-Jevic, U.C. 2001. UV light, beta-carotene and human skin-beneficial and potentially harmful effects. *Arch. Biochem. Biophys.* 389, 1-6.
- Bora, P.S., Rocha, R.V.M., Narain, N., Moreira-Monteiro, A.C. and Moreira, R.A. 2003. Characterization of principal nutritional components of Brazilian oil palm (*Elaeis guineensis*) fruits. *Bioresource Technol.* 87, 1-5.
- Bouvier, F., dHerlingue A., Suire, C., Backhaus, R.A. and Camara, B. 1998. Dedicated roles of plastid transketolases during the early onset of isoprenoid biosynthesis in pepper fruits. *Plant Physiol.* 117, 1423-1431.
- Burleigh, S.H. 2001. Relative quantitative RT-PCR to study the expression of plant nutrient transporters in arbuscular mycorrhizas. *Plant Science.* 160, 899-904.
- Busch, M., Seuter, A. and Hain Rudiger. 2002. Functional analysis of the early steps of carotenoid biosynthesis in tobacco. *Plant Physiol.* 128, 439-453.

- Campos, N., Rodriguez-concepcion, M., Sauret-gueto, S., Gallego, F., Lois, L. and Boronat, A. 2001. *Escherichia coli* engineered to synthesize isopentenyl diphosphate and dimethylallyl diphosphate from mevalonate : a novel system for the genetic analysis of the 2-C-methyl-D-erythritol-4-phosphate pathway for isoprenoid biosynthesis. *Biochem. J.* 353, 59-67.
- Chahed, K., Oudin, A., Guivarch, N., Hamdi, S., Chenieux, Jean-Claude, Rideau, M. and Clastre, M. 2000. 1-Deoxy-D-xylulose-5-phosphate synthase from periwinkle : cDNA identification and induced gene expression in terpenoid indole alkaloid-producing cells. *Plant Physiol. Biochem.* 38, 559-566.
- Choo, Y.M. 1994. Palm oil carotenoids. *Food Nutr. Bull.* 15, 130-137.
- Dahlgren, R.M.T., Clifford, H.T. and Yeo, P.F. 1985. The families of the monocotyledon : structure, evolution and taxonomy. New York : Springer-Verlag Berlin Heidelberg Press.
- Dewick, P.M. 2002. The biosynthesis of C<sub>5</sub>-C<sub>25</sub> terpenoid compounds. *Nat. Prod. Rep.* 19, 181-222.
- Disch, A., Schwender, J., Muller, C., Lichtenthaler, H.K. and Rohmer, M. 1998. Distribution of mevalonate and glyceraldehyde phosphate/pyruvate pathways for isoprenoid biosynthesis in unicellular algae and the cyanobacterium *Synechocystis* PCC 6714. *Biochem. J.* 333, 381-388.
- Dixon, R.A. 1999. Plant natural products : the molecular genetic basis of biosynthetic diversity. *Plant biotechnol.* 10, 192-197. Cane, D.E., eds. Oxford : Pergamon Press.
- Dubey, V.S., Bhalla, R. and Luthra, R. 2003. An overview of non-mevalonate pathway for terpenoid biosynthesis in plants. *J. Biosci.* 28,101-110.
- Eisenreich, W., Menhard, B., Hylands, P.J., Zenk, M.H. and Bacher, A. 1996. Studies on the biosynthesis of taxol : the taxane carbon skeleton is not of mevalonoid origin. *Proc. Natl. Acad. Sci. USA.* 93, 6431-6436.
- Eisenreich, W., Sagner, S., Zenk, M.H. and Bacher, A. 1997. Monoterpenoid essential oils are not mevalonoid origin. *Tetrahedron Lett.* 38, 3889-3892.

- Eisenreich, W. Rohdich, F. and Bacher, A. 2001. Deoxyxylulose phosphate pathway to terpenoids. *Trends in Plant Science*. 6, 78-83.
- Emanuelsson, O., Nielsen, H. and Von Heijne, G. 1999. ChloroP, a neural network-based method for predicting chloroplast transit peptides and their cleavage sites. *Protein Science*. 8, 978-984.
- Endler, K. Schuricht, U., Hennig, L., Welzel, P., Holst, U., Aretz, W., Bottger, D. and Huber, G. 1998. Exploratory investigations into the biosynthesis of the antibiotic monomycin A. *Tetrahedron Letters*. 39, 13-16.
- Estevez, J.M., Cantero, A., Reindl, A., Reichler, S. and Leon, P. 2001. 1-Deoxy-D-xylulose-5-phosphate synthase, a limiting enzyme for plastidic isoprenoids biosynthesis in plants. *J. of Biol. Chem.* 276, 22901-22909.
- Estevez, J.M., Cantero, A., Romero, C., Kawaide, H., Jimenez, L.F., Kuzuyama, T., Seto, H., Kamiya, Y. and Leon, P. 2000. Analysis of *CLA1*, a gene that encodes the 1-Deoxyxylulose-5-phosphate synthase of the 2-C-methyl-D-erythritol-4-phosphate pathway in *Arabidopsis*. *Plant Physiol.* 124, 95-103.
- Feng, D.F. and Doolittle, R.F. 1990. Alignment and phylogenetic tree of protein sequences. In *Method in enzymology*. (ed. R.F. Dolittle). Vol. 183, pp. 375-381 , New York : Academic Press.
- Gavel, Y. and Heijne, G.V. 1990. A conserved cleavage-site motif in chloroplast transit peptide. *FEBS Letters*. 261(2), 455-458.
- Goldstein, J.L. and Brown, M.S., 1990. Regulation of the mevalonate pathway. *Nature*. 243, 425-430.
- Hahn, F.M., Eubanks, L.M., Testa, C.H., Blagg, B.S.J., Baker, J.A. and Poulter, C.D. 2001. 1-Deoxy-D-xylulose-5-phosphate synthase, the gene product of open reading frame (ORF) 2816 and 2895 in *Rhodobacter capsulatus*. *J. Bacteriol.* 183(1), 1-11.
- Hamano, Y., Dairi, T., Yamamoto, M., Kuzuyama, T., Itoh, N. and seto, H. 2002. Growth-phase dependent expression of the mevalonate pathway in a terpenoid

- antibiotic-producing *Streptomyces* strain. *Biosci. Biotechnol. Biochem.* 66, 808-819.
- Han, Y., Roytrakul, S., Verberne, M.C., Heijden, van der Heijden, R., Linthorst, H.J.M. and Verpoorte, R. 2003. Cloning of a cDNA encoding 1-deoxy-D-xylulose-5-phosphate synthase from *Morinda citrifolia* and analysis of its expression in relation to anthraquinone accumulation. *Plant Science.* 164, 911-917.
- Harker, M., Bramley, P.M. 1999. Expression of prokaryotic 1-deoxy-D-xylulose-5-phosphate in *Escherichia coli* increases carotenoid and ubiquinone biosynthesis. *FEBS Lett.* 448, 115-119.
- Hawkins, C.F., Borges, A. and Perham, R.N. 1989. A common structural motif in thiamin pyrophosphate-binding enzymes. *FEBS Lett.* 255(1), 77-82.
- Heijne, G.V. and Abrahmsen, L. 1989. Species-specific variation in signal peptide design implications for protein secretion in foreign host. *FEBS Lett.* 244(2), 439-446.
- Heijne, G.V. and Nishikawa, K. 1991. Chloroplast transit peptide : the perfect random coil. *FEBS Lett.* 278(1), 1-3.
- Heinrich, U., Gartner, C., Wiebusch, M., Eichler, O., Sies, H., Tronnier, H. and Wilhelm, S. 2002. Human nutrition and metabolism research communication: supplementation with  $\beta$ -carotene or a similar amount of mixed carotenoids protects humans from UV-induced erythema. *Am. Soci. Nutrition. Science.* 98-101.
- Hemmerin, A., Hoeffler, J.F., Meyer, O., Tritsch, D., Kagan, I.A., Grosdemange-Billiard, C., Rohmer, M. and Bach, T.J. 2003. Cross-talk between the cytosolic mevalonate and the plastidial methylerythrol phosphate pathways in Tobacco Bright Yellow-2 cells. *J. Biol. Chem.* 278, 26666-26676.
- Henderson, J. and Osborne, D.J. 2000. The oil palm in our lives : how this came about. *Endeavour.* 24, 63-68.
- Herbers, K. 2003. Vitamin production in transgenic plants. *J. Plant Physiol.* 160, 821-829.
- Holmes, D.S. and Quigley, M. 1981. A rapid boiling method for the preparation of bacterial plastids. *Anal. Biochem.* 114-193.

- Hong, S., Hughes, E.H., Shank, J.V., San, K. and Gibson, S.I. 2003. Role of the non-mevalonate pathway in indole alkaloid production by *Catharanthus roseus* hairy roots. *Biotechnol. Prog.* 19, 1105-1108.
- [http://www.au.expasy.org/cgi-bin/pi\\_tool](http://www.au.expasy.org/cgi-bin/pi_tool).
- <http://www.cbs.dtu.dk/services/ChloroP>.
- <http://www.cbs.dtu.dk/services/SignalP>.
- <http://www.dip.go.th/Research/PreviewInvestment1.asp?WebSiteID=19&InvestmentFromID=72>.
- [http://www.dnalc.org/bioinformatics/dnalc\\_nucleotide\\_analyzer.htm](http://www.dnalc.org/bioinformatics/dnalc_nucleotide_analyzer.htm).
- <http://www.inra.servilet/webPredator>.
- <http://www.ncbi.nlm.nih.gov>.
- <http://www.oils-vegetable.com/palmoil.htm>.
- <http://www.ymbc.ym.edu.tw/est/1473vaw4.gif>.
- Hughes, C.A., Gebhardt, J.S., Reuss, A. and Matthews, B.F. 1999. Identification and expression of a cDNA encoding cystathionine  $\gamma$ -synthase in soybean. *Plant Science*. 146, 69-79.
- Ikemefuna, J. and Adamson, I. 1984. Chlorophyll and carotenoid changes in ripening palm fruit, *Elaeis quineensis*. *Phytochemistry*. 23, 1413-1415.
- Irie, K. Nakagawa, Y. Tomimatsu, S. and Ohigashi, H. 1998. Biosynthesis of monoterpenoid moiety of teleocidins via the non-mevalonate pathway in *Streptomyces*. *Tetrahedron Lett.* 39, 7929-7930.
- Jourdan, C., Michaux-ferriere, N. and Perbal, G. 2000. Root system architecture and gravitropism in the oil palm. *Annals of Botany*. 85, 861-868.
- Kasahara, H., Hanada, A, Kuzuyama, T., Takagi, M. and Kamiya, Y. 2002. Contribution of the mevalonate and methylerythritol phosphate pathways to the biosynthesis of gibberellins in *Arabidopsis*. *J. Bio. Chem.* 227, 45188-45194.
- Kim, S.W. and Keasling, J.D. 2001. Metabolic engineering of the nonmevalonate isopentenyl diphosphate synthesis pathway in *Escherichia coli* enhances lycopene production. *Biotechnol. and Bioengineer.* 72(4), 408-415.

- Knoss, W., Renter, B. and Zapp, J. 1997. Biosynthesis of the labdane diterpene marrubilin in *Marrubium vulgare* via a non-mevalonate pathway. *Biochem J.* 326, 449-454.
- Kritchevsky, D., Tepper, S.A., Czarnecki, S.K. and Sundram, K. 2002. Red palm oil in experimental atherosclerosis. *Asia Pacific J. Clin. Nutr.* 11, S433-S437.
- Kuzuyama, T., Takagi, M., Takahashi, S. and Seto, H. 2000. Cloning and characterization of 1-deoxy-D-xylulose-5-phosphate synthase from *Streptomyces* sp. strain CL190, which uses both the mevalonate and nonmevalonate pathway for isopentenyl diphosphate biosynthesis. *J. Bacteriol.* 182, 891-897.
- Lange, B.M., Wildung, M.R., McCaskill, D. and Croteau, R. 1998. A family of transketolase that direct isoprenoid biosynthesis via a mevalonate-independent pathway. *Proc. Natl. Acad. Sci. USA.* 95, 2100-2104.
- Lange, B.M., Rujan, T. Martin, W. and Croteau, R. 2000. Isoprenoid biosynthesis : the evolution of two ancient and distinct pathway across genomes. *Proc. Natl. Acad. Sci. USA.* 97, 13172-13177.
- Laule, O., Fuhrholz, A., Chang, H.S., Zhu, T., wang, X., Heifetz, P.B., Grisse, W. and Lange, B.M. 2003. Crosstalk between cytosolic and plastidial pathways of isoprenoid biosynthesis in *Arabidopsis thaliana*. *Proc. Natl. Acad. Sci. USA.* 100, 6866-6871.
- Lee, P.C. and Schmidt-Danert, C. 2002. Metabolic engineering towards biotechnological production of in microorganism. *Appl. Microbiol. Biotechnol.* 60, 1-11.
- Li, S.M., Hennig, S. and Heide, L. 1998. Biosynthesis of the dimethylallyl moiety of novobiocin via a non-mevalonate pathway. *Tetrahedron Lett.* 39, 2717-2720.
- Lichtenthaler, H.K., Schwender, J., Disch, A. and Rohmer, M. 1997. Biosynthesis of isoprenoids in higher plant chloroplasts proceeds via a mevalonate-independent pathway. *FEBS Lett.* 400, 271-274.
- Lichtenthaler, H.K., Zeidler, J., Schwender, J. and Muller, C. 2000. The non-mevalonate isoprenoid biosynthesis of plants as a test system for new herbicides and drugs against pathogenic bacteria and the malaria parasite. *Naturforsch.* 55, 305-313.

- Lichtenthaler, H.K. 2000. Non-mevalonate biosynthesis : enzymes, genes, and inhibitors. *Biochem. Soc.* 28, 785-789.
- Lois, L.M., Rodriguez-Concepcion, M., Gallego, F., Campos N. and Boronat, A. 2000. Carotenoid biosynthesis during tomato fruit development : regulatory role of 1-deoxy-D-xylulose synthase. *Plant J.* 22(6), 503-513.
- Maier, W., Schneider, B. and Strack, D. 1998. Biosynthesis of sesquiterpenoid cyclohexenone derivatives in mycorrhizal barley roots proceeds via the glyceraldehyde-3-phosphate/pyruvate pathway. *Tetrahedron Lett.* 39, 521-524.
- Matthews, P.D. and Wurtzel, E.T. 2000. Metabolic engineering of carotenoid accumulation in *Escherichia coli* by modulation of the isoprenoid precursor pool with expression of deoxyxylulose phosphate synthase. *Appl. Microbiol. Biotechnol.* 53, 396-400.
- Mayne, S.T. 1996. Beta-carotene, carotenoids and disease prevention in humans. *The FASEB J.* 10, 690-701.
- Meyer, P.S., Preez, J.C. and Kilian, S.G. 1993. Selection and evaluation of astaxanthin overproducing mutants of *Phaffia rhodozyma*. *J. Microbiol. Biotechnol.* 9, 514-520.
- Miller, B., Heuser, T. and Zimmer, W. 1999. A *Synechococcus leopoliensis* SAUG 1402-1 operon harboring the 1-deoxyxylulose-5-phosphate synthase gene and two additional open reading frames is functionally involved in the dimethylallyl diphosphate synthase. *FEBS Lett.* 460, 485-490.
- Moehs, C.P., Tian, L., Osteryoung, K.W. and DellaPenna, D. 2001. Analysis of carotenoid biosynthetic gene expression during marigold petal development. *Plant Mol. Biol.* 45, 281-293.
- Mueller, C., Schwender, J., Zeidler, J. and Lichtenthaler, H.K. 2000. Properties and inhibition of the first two enzymes of the non-mevalonate pathway of isoprenoid biosynthesis. *Biochem. Soc. Trans.* 28, 792-793.
- Nabeta, K., Kawae, T., Saitoh, T., and Kikuchi, T. 1997. Synthesis of chlorophyll a and  $\beta$ -carotene from  $^2\text{H}$  and  $^{13}\text{C}$ -labeled mevalonates and  $^{13}\text{C}$ -labeled glycine in cultured

- cells of liverworts *Heteroscyphus planus* and *Lophocolea heterophylla*. *J. Chem. Soc. Perkin Tran. 1*, 261-267.
- Nabeta, K., Saitoh, T., Adachi, K. and Komuro, K. 1998. Biosynthesis of phytyl side-chain of chlorophyll a: apparent reutilization of carbon dioxide evolved during acetate assimilation in biosynthesis of chloroplastic isoprenoid. *Chem. Commun.* 371-372.
- Nicoletti, A. and Sassy-Prigent, C. 1996. An alternative quantitative polymerase chain reaction method. *Anal. Biochem.* 236, 229-241.
- Nielsen, H., Engelbrecht, J. and Brunak, S. 1997. A neural network method for identification of prokaryotic and eukaryotic signal peptidase and prediction of their cleavage site. *Internation. J. Neur. Syst.* 8(5), 581-591.
- Nielsen, H., Brunak, S and Heijne, G.V. 1999. Machine learning approaches for the prediction of signal peptides and other protein sorting signals. *Prot. Engineer.* 12(1), 3-9.
- Orihara, N., Furihata, K. and Seto, H. 1997. Studies on the biosynthesis of terpenoidal compounds produced by *Actinomycetes* 2. biosynthesis of caruinostatin B via the non-mevalonate pathway in *Streptomyces exfoliatus*. *J. Antibiot.* 50, 979-98.
- Orihara, N., Kuzuyama, T., Takahashi, S., Furihata, K. and Seto, H. 1998. Studies on the biosynthesis of terpenoid compounds produced by *Actinomycetes* 3. biosynthesis of the isoprenoid side chain of novobiocin via the non-mevalonate pathway in *Streptomyces niveus*. *J. Antibiot.* 51, 676-678.
- Palace, V.P., Khaper, N., Qin, Q. and Singal, P.K. 1999. Antioxidant potentials of vitamin A and carotenoids and their relevance to heart disease. *Free Rad. Biol. Med.* 26, 746-761.
- Philip, C.A. and Chen, T.S. 1998. Development of a method for the quantitative estimation of provitamin A carotenoid in some fruits. *J. of Food Sci.* 55, 1073-1076.
- Proteau, P.J. 1998. Biosynthesis of phytol in the cyanobacterium *Synechocystis* sp. UTEX 2470 : utilization of the non-mevalonate pathway. *J. Nat. Prod.* 61, 841-843.

- Querol, J., Rodriguez-Concepcion, M., Boronat, A. and Imperial, S. 2001. Essential role of residue H49 for activity of *Escherichia coli* 1-deoxy-D-xylulose-5-phosphate synthase, the enzyme catalyzing the first step of the 2-C-methyl-D-erythritol-4-phosphate pathway for isoprenoid synthesis. *Biochem. Biophys. Res. Commun.* 289, 155-160.
- Rodriguez-Concepcion, M., Ahumada, I., Diez-Juez, E., Sauret-Gueto, S. and Lois, L.M. 2001. 1-Deoxy-D-xululose-5-phosphate reductoisomerase and plastid isoprenoid biosynthesis during tomato fruit ripening. *Plant J.* 27, 213-222.
- Rodriguez-Concepcion, M. and Boronat, A. 2002. Elucidation of the methylerythritol phosphate pathway for isoprenoid biosynthesis in bacteria and plastids. A metabolic milestone achieved through genomics. *Plant Physiol.* 130, 1079-1089.
- Rohdich, F. Kis, K., Bacher, A. and Eisenreich, W. 2001. The non-mevalonate pathway of isoprenoids : genes, enzymes and intermediates. *Curr. Opin. Chem. Biol.* 5, 535-540.
- Rohmer, M., Knani, M., Simonia, P. Sutter, B. and Sahm, H. 1993. Isoprenoid biosynthesis in bacteria : a novel pathway for the early steps leading to isopentanyl diphosphate. *Biochem. J.* 295, 517-524.
- Rohmer, M., Seemann, M., Horbach, S. Bringer-Meyer, S. and Sahm, H. 1996. Glyceraldehyde and pyruvate as precursors of isoprenic units in an alternative non-mevalonate pathway for terpenoid biosynthesis. *J. Am. Chem. Soc.* 118, 2564-2566.
- Rohmer, M. 1999 a. A mevalonate-independent Route to isopentanyl diphosphate, In comprehensive natural product chemistry isoprenoids including steroids and carotenoids. pp. 45-68. Oxford : Pergamon Press.
- Rohmer, M. 1999 b. The discovery of a mevalonate-independent pathway for isoprenoid biosynthesis in bacteria, algae and higher plants. *Nat. Prod. Rep.* 16, 565-574.
- Rosa Putra, S., Disch, A., Bravo, J.M. and Rohmer, M. 1998. Distribution of mevalonate and glyceraldehyde-3-phosphate/pyruvate routes for isoprenoid biosynthesis in

- some gram-negative bacteria and mycobacteria. *FEMS Microbiol. Lett.* 164, 169-175.
- Sacchettini, J.C. and Poulter, C.D. 1997. Creating isoprenoid diversity. *Science.* 277, 1788-1789.
- Sambanthamurthi, R., Sundra, K. and Tan Y.A. 2000. Chemistry and biochemistry of palm oil. *Prog. Lipid Res.* 39, 507-558.
- Sambrook, J., Fritsch, E.F. and Maniatis, T. 1989. Molecular cloning : a laboratory manual. 2<sup>nd</sup> edition. New York : Cold Spring Harbor Laboratory Press.
- Schwender, J., Seemann, M., Lichtenthaler, H.K. and Rohmer, M. 1996. Biosynthesis of isoprenoids (carotenoids, sterols, prenyl side-chains of chlorophylls and plastoquinone) via novel pyruvate/glyceraldehyde-3-phosphate non-mevalonate pathway in the green alga *Scenedesmus obliquus*. *Biochemistry.* 316, 73-80.
- Serazin-Leroy, V., Denis-Henriot, D., Morot, M., de Mazancourt, P. and Giudicelli, Y. 1998. Semi-quantitative RT-PCR for comparison of mRNAs in cells with different amounts of housekeeping gene transcripts. *Mol. Cell. Probes.* 12, 283-291.
- Seto, H., Watanabe, H. and Furihata, K. 1996. Simultaneous operation of the mevalonate and non-mevalonate pathways in the biosynthesis of isopentenyl diphosphate in *Streptomyces aerioouvifer*. *Tetrahedron Lett.* 37, 7979-7982.
- Seto, H., Orihara, N., Furihata, K. 1998. Studies on the biosynthesis of terpenoids produced by *Actinomyces* part 4. formation of BE-40644 by the mevalonate and non-mevalonate pathway. *Tetrahedron Lett.* 51, 9497-9500.
- Solovchenko, A.E., Chivkunova, O.B., Merzlyak, M.N. and Reshetnikova, I.V. 2001. A spectrophotometric analysis of pigments in apples. *Russ. J. Plant Phys.* 48(5), 693-700.
- Suzuki, Y. and Shioi, Y. 2003. Identification of chlorophylls and carotenoids in major teas by high-performance liquid chromatography with photodiode array detection. *J. Agric. Food Chem.* 51, 5307-5314.
- Takagi, M., Kuzuyama, T., Kaneda, K., Watanabe, H. Dairi, T. and Seto, H. 2000. Studies on the nonmevalonate pathway: formation of 2 - C - methyl - D - erythritol

- 2,4 - cyclodiphosphate from 2 - phospho - 4 - (cytidine - 5'- diphospho)- 2-C-methyl -D-erythritol. *Tetrahedron Lett.* 41, 3395-3398.

Tsutsumi, N., Takusagawa, S., Suzuki, H. and Hirai, A. 1996. Molecular cloning and nucleotide sequencing of nuclear genes coding for the chloroplast ribosomal proteins L13, L24, L28 of rice (*Oryza sativa* L.). *Plant Science.* 121, 167-174.

Walter, M. and Fester, T. and Strack, D. 2000. Arbuscular mycorrhizal fungi induce the non-mevalonate methylerythritol phosphate pathway of isoprenoid biosynthesis correlated with accumulation of the yellow pigment and other apocarotenoids. *Plant J.* 21(6), 571-578.

Wanke, M., Skorupinska-Tudek, K. and Swiezewska, E. 2001. Isoprenoid biosynthesis via 1 - deoxy - D - xylulose - 5 -phosphate synthase / 2-C-methyl - D- erythritol-4-phosphate (DOXP/MEP) pathway. *Acta. Biochim. Polonica.* 48, 663-672.

Zeidler, J.G. Lichtenthaler, H.K., May, H.U. and Lichtenthaler, F.W. 1997. Is isoprene emitted by plants synthesis via the novel isopentenyl pyrophosphate pathway. *Z. Naturforsch.* 53, 1087-1089.