STUDY ON INFLUENCE OF SODIUM ACETATE AND METHIONINE ON MONACOLIN K PRODUCTION BY MONASCUS RUBER

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ABSTRACT

Monacolin K produced by Monascus ruber CCRC 31535 was studied in solid-liquid flask culture. Several different strategies of manipulating the addition of methionine and sodium acetate in rice-glycerin complex medium, such as addition time and ratio, were investigated. It was found that the production of Monascus monacolin K was inhibited by the addition of methionine and sodium acetate in complex medium at the first two or three days for any kind of addition ratio. The inhibition of monacolin K production was decreased as the addition time of methionine and sodium acetate increased. The monacolin K productions with the addition of methionine and sodium acetate at the 2nd and 11th day became close to 0 mg/L and 88 mg/L, respectively, while that without any addition was 137 mg/L. The inhibition phenomena of monacolin K production by the individual addition of methionine or sodium acetate were similar to those described above. At the first three days, the inhibition effect of sodium acetate was better than that of methionine. The monacolin K production with the addition of sodium acetate at the 3rd culture day became 0 mg/L, while that for methionine addition was 6.3 mg/L. This research demonstrated that the monacolin K production of M. ruber CCRC 31535 was inhibited by the addition of methionine and sodium acetate presumably due to the high addition concentration.

Keywords : Monascus ruber ; Monacolin K ; Methionine ; Sodium Acetate

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REFERENCES

王雲萍、張永吉（1996），文明產物－降血脂劑LOVASTATIN。化工資訊，10（4）:53-57。 王英凱、林仁混（1999），紅麴降血脂作用之探討與紅麴活性成分LOVASTATIN及天然藥物類黃素抗癌細 胞轉移與引發細胞凋亡機制之研究。國立台灣大學生化學研究所博士論文。 李昭蓉（1997）漫談紅麴菌，86-89。食品工業月刊，第29卷，第2期。 李志誠、白佳真、穆春菊、鄭顏昆、張耀南 (2001)，食品級白米複合培養基影響紅麴菌生產MONACOLIN K初步研究探討。中華民國食品科學技術學會第十五屆，PE-28，P121。 杜姿瑩（2000），具調節血脂功能的機能性食品漫談。食品工業月刊，32(10):23-32。 林怡昌、張耀南（1998），紅麴菌生產膽固醇合成抑制劑搖瓶培養條件之探討。大葉大學食品工程研究 所碩士論文。 林俊宏、曾耀銘（1998），備製含紅麴菌膽固醇合成抑制劑-MONACOLIN K健康酒之研究。國立東華大學 生物技術研究所碩士論文。 林讚峰（1982），紅麴菌研究發展之演進。製酒科技專論彙編，第四期，66-77。 林讚峰（1983）紅麴菌之鑑定及實用分類法。製酒科技專論彙編，第五期，104-113。 林讚峰（1986）紅麴菌級代謝物的經濟性評估及增產策略。製酒科技專論彙編，第8期，81-99。 林讚峰 （1986），紅麴菌級代謝物的經濟性評估及增產策略。製酒科技專論彙編，第8期，81-99。 林讚峰（1987），利用紅麴菌產生膽固醇合成抑制劑。酒類試驗所研究年報76年度，157-164。 林讚峰（1992 A）紅麴菌在保健食品上的新用途。食品工業，24（10）:41-45。 林讚峰（1992 B）紅麴菌研究發展之演進。科學農業，40（3-4）:193-198。 林讚峰，黃正財（1983）紅麴菌釀造性質之研究（一）澱粉水解酵素。酒類試驗所研究年報72年度， 157-167。 邱健人（1985），紅露酒之製法。食品科學文摘，5 (7):41-42。 陳彥霖（2000），紅麴與高血壓。食品工業月刊，32(12):55-59。 陳昭姿（1996）降低血膽固醇藥再添新兵。當代醫學，23（11）:937-939。 黃顯宗（1985），紅麴菌研究之回顧與展望。真菌學之最近發展（曾聰徹、陳瑞青主編）109-124。 國科會生物科學研究中心專刊 第十二集，台北。 黃育輝（2000）紅麴菌二級代謝物中紅麴色素與膽固醇合成抑制劑共存性之探討。私立大葉大學食品工 程研究所碩士論文，彰化縣員林鎮。 黃壬章（2001）利用回應曲面法尋求紅麴菌生產膽固醇合成抑制劑之培養基最適化。私立大葉大學食品 工程研究所碩士論文，彰化縣員林鎮。 張耀南（1997）利用紅麴菌以固-液態培養方式產生膽固醇合成抑制劑。八十六年度國科會化工學門專 題研究計劃成果報告，生化工程（I）專輯，25-28。 蕭明熙（1985）真

菌代謝物之最新研究趨勢。真菌學之最近發展（曾聰徹、陳瑞青主編）163-183。國 科會生物科學研究中心專刊第十二集，台北。 蕭明熙（1994）降膽固醇與抗動脈粥狀硬化藥物。中國化學會誌，52（4）:442-453。 謝鳳龍、黃育輝、張耀南、曾耀銘（1998）利用紅麴菌（MONASCUS PILOSUS）生產膽固醇合成抑制劑之 固-液態培養條件探討。第三屆生化工程研討會，P133-136，1998年6月27-28日，國立東華大學，花蓮縣 壽豐鄉。 謝鳳龍、黃育輝、陳亮尹、張耀南、曾耀銘（1997）利用紅麴菌（MONASCUS PILOSUS）產生膽固醇合成 抑制劑之搖瓶培養條件探討。中國化學會86年年會，NO.P-2-BI-010，P240。 ALBERT, A. W., C. CHEN, G. KURON, V. HUFF, C. HOFFFMAN, J. ROTHROCK, M. LOPEZ, H, JOSHUA, E. HARRIS, A. PATCHETT, R. MONAGHAN, S. CURRIE, E. STAPLEY, G. ALBERTS-SCHONBERG, O. HENS -ENS, J. HIRSHFIELD, K. HOOGSTEEN, J. LIESCH, AND J. SPRINGER, 1980, MEVINOLIN: A HIGHLY POTENT COMPETITIVE INHIBITOR OF HYDROXYMETHYL-GLUTARYL-COENZYME A REDUCTASE AND A CHOLEST -EROLLOWERING AGENT. PROCEESINGS OF THE NATIONAL ACADEMIC SCIENCE, USA, 77 : 3957-3961. BOX, G. E. P., AND K. B. WILSON, 1951, ON THE EXPERIMENTAL ATTAINMENT OPTIMUM CONDITIONS. J. ROY. STANT. SOC., B13:1-45. BROWN, M. S. AND J. L, GOLDSTEIN, 1984, HOW LDL RECEPTORS INFLUENCE CHOLESTEROL AND ATHERO -SCLEROSIS. SCIENTIFIC AMERICAN, 251(5) : 52-60. CHAN, J. K., R. N. MOORE, T. T. NAKASHIMA, AND J. C. VEDERAS, 1983, BIOSYNTHESIS OF MEVINO -LIN（SPECTRAL ASSIGNMENT BY DOUBLE-QUANTUM COHERENCE NMR AFTER HIGH CARBON-13 IN CORPORAT -ION）. J. AM. CHEM. SOC., 105:3334-3335 ENDO, A., 1979, MONACOLIN K, A NEW HYPOCHOLESTEROLEMIC AGENT PRODUCED BY MONASCUS SPECIES. THE JOURNAL OF ANTIBIOTICS, 32 : 852-854. ENDO, A., K. HASUMI, AND S. NEGISHI, 1985A, MONACOLINS J AND L, NEW INHIBITORS OF CHOLESTE -ROL BIOSYNTHESIS PRODUCED BY MONASCUS RUBER. THE JOURNAL OF ANTIBIOTICS, 38:420-422. ENDO, A., Y. NEGISHI, T. IWASHITA, K. MIZUKAWA, AND M. HIRAMA, 1985B, BIOSYNTHESIS OF ML- 236B（COMPACTIN）AND MONACOLIN K. THE JOURNAL OF ANTIBIOTICS, 28:444-448. ENDO, A., D. KOMAGATA, AND H. SHIMADA, 1986, MONACOLIN M, A NEW INHIBITOR OF CHOLESTEROL B -IOSYNTHESIS. THE JOURNAL OF ANTIBIOTICS, 39: 1670-1673. FEARS, R., 1983, PHARMACOLOGICAL CONTROL OF 3-HYDROXY-3-METHYLGLUTARYL COENZYME A REDUCTAS -E.IN 3-HYDROXY-3-METHYLGLUTARYL COENZYME A REDUCTASE, SABINE, J. R., ED, 189-208, CRC PRE -SS, INC., BOCA RATON. HAWKSWORTH D.L., AND PITT.J.I. 1983. A NEW TAXONOMY FOR MONASCUS SPECIES BASED ON CULTURAL AND MICROSOPICAL CHARACTERS. AUST.J.BOT. 31 : 51-61. HEBER D., L. YIP, J. M. ASHELY, ELASHOFF DA, ELASHOFF RM, GO VLW. 1998, CHOLESTEROLLOWERIN -G EFFECTS OF PROPRIETARY CHINESE RED YEAST DIETARY SUPPLEMENT. FASEB JOURNAL, 12 (4) : 206. JOHN, M. D. M. 1976, COLOR. PRINCIPLES OF FOOD CHEMISTRY, WESTPORT, CONN., 203-241. JUZLOVA, P., L. GOLDSTEIN, AND M. S. BROWN, 1990, REGULATION OF THE MEVALONATE PATHWAY.NAY -URE, 343:425-430. JUZLOVA, P., L. MARTINKOVA, AND V. KREN, 1996, SECONDARY METABOLITES OF THE FUNGUS MONASCU -S:A REVIEW. J. IND. MICROBIOL., 16:163-170. KIMURA, K., D. KOMAGATA, S. MURAKAWA, AND A. ENDO, 1990, BIOSYNTHESIS OF MONACOLINS:CONVE -RSION OF MONACOLIN J TO MONACOLIN K（MEVIOLIN）. J. ANTIBIOTICS, 43 (12):1621-1622. LIN, T. F., K. YAKUSHIJIN, G. H. BUCHI AND A. L. DEMAIN., 1992, FORMATION OF WATER-SOLUBLE -MONASCUS PIGMENTS BY BIOLOGICAL AND SEMI-SYNTHETIC PROCESSES. J. IND. MICROBIOLOGY, 9: 173-179. LIN, T. F., A. L. DEMAIN., 1994, LEUCINE INTERFERENCE IN THE PRODUCTION OF WATER-SOLUBLE RED MONASCUS PIGMENTS ARCH MICROBIOL, 162:114-119. MADDOX, I. S., AND S. H. RICHERT, 1977, PRODUCTION OF GIBBERELLIC ACID USING A DAIRY WASTE AS THE BASAL MEDIUM. APPL. ENVIRON. MICROBIOL. 33:201-202. NIL, 1995 A, SSRI: UNPRECEDENTED US GROWTH, SCRIP, 2024 : 23. NIL, 1995 B, YEN EFFECT ON JAPAN'S PHARMA MARKET, SCRIP, 2023 : 22. NIL, 1996, TOP 10 DRUGS IN EUROPE, SCRIP, 2120:23. SHIAO, M.S. AND H.S. DON, 1987, BIOSYNTHESIS OF MEVINOLIN A HYPOCHOLESTEROLEMIC FUNGAL MET -ABOLITE, IN ASPERGILLUS TERRUES. PROC. NATL. SCI. COUNC. B. ROC., 11 (3):223-231. WOJCIK, C., B. MARCIN, S. TOMASZ, AND G. ADAM, 2000, LOVASTATIN AND SIMVASTATIN ARE MODULA -TORS OF THE PROTEASOME. THE INTERNATIONAL JOURNAL OF BIOCHEMISTRY & CELL BIOLOGY, 32:957 -965.