EFFECT OF RICE COMPLEX MEDIUM ON MONACOLIN K PRODUCTION OF MONASCUS RUBE

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ABSTRACT

IN THIS STUDY, MONACOLIN K WAS PRODUCED BY MONASCUS RUBER CCRC 31535 IN FLASK CULTURE. THE OBJECTIVE OF THIS STUDY WAS TO DEVELOP THE EFFECTS OF THE FOOD-GRADE RICE-YEAST POWDER OR RICE-VEGATABLE OIL COMPLEX MEDIA ON MONACOLIN K PRODUCTION BY M. RUBER. SEVERAL DIFFERENT STRATEGIES OF MANIPULATING VARIABLES, SUCH AS CULTURE TEMPERATURE, INITIAL PH AND VOLUME OF THE COMPLEX MEDIUM, WERE INVESTIGATED. IT WAS FOUND THAT THE OPTIMUM CULTURE MEDIUM WAS THE RICE-VEGATABLE OIL COMPLEX MEDIUM. THE TEMPERATURE AND MEDIUM VOLUME IN 250-ML FLASK CULTURE WERE AT 25℃AND 50 ML, RESPECTIVELY. THE OPTIMUM INITIAL PH OF THE RICE COMPLEX MEDIUM WAS TO BE 5.0-6.0. THE OPTIMUM INITIAL PH FOR 0.06 G/ML RICE PARTICLE IN THE COMPLEX MEDIUM WAS TO BE 5.0, WHILE THAT FOR 0.20 G/ML RICE PARTICLE WAS TO BE 6.0. IN GENERAL, THE RICE PARTICLE, RATHER THAN THE RICE POWDER, WAS CONSIDERED TO BE A SUITABLE COMPOSITION FORM FOR IMPROVING YIELD OF MONACOLIN K. FINALLY, THE RESULT INDICATED THAT THE ADDITION OF VEGATABLE OIL IN THE RICE COMPLEX MEDIUM WAS FOUND TO INCREASE THE MONACOLIN K PRODUCTION. THE MAXIMUM YIELD WAS 0.058 MG/ML WHEN 0.10 G/ML RICE PARTICLE, 0.036 ML/ML VEGATABLE OIL, 0.13 G/ML SUCROSE, 0.01 G/ML YEAST EXTRACT WAS USED IN THE COMPLEX MEDIUM. BY USING THE RICE-VEGATABLE OIL COMPLEX MEDIUM DESCRIBLE ABOVE, THE MAXIMUM MONACOLIN K YIELD, 0.023 G/L, WAS OBTAINED AT THE 9TH DAY UNDER CONTROLLING 400 RPM STIRRED SPEED IN A 5-L STIRRED TANK FERMENTOR. THIS RESEARCH DEMONSTRATED THE FOOD-GRADE RICE COMPLEX MEDIUM WAS WORTH IMPROVING THE YIELD OF MONACOLIN K BY USING RESPONSE SURFACE METHODOLOGY TO OPTIMZE THE COMPOSITION CONCENTRATION AND TO STUDY THE FERMENTATION CONDITIONS BY USING A 5-L STIRRED TANK FERMENTOR.

Keywords : MONASCUS RUBER, FOOD-GRADE RICE COMPLEX MEDIUM, MONACOLIN K

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REFERENCES

1. 內藤巖、兒玉正(1932)台灣專賣局酒課試驗報告，第二號，239頁。經左籐喜吉(1934)優良紅麴菌 的檢索。釀造學雜誌，12(2):119，引用。 2. 台灣省菸酒公賣局業務手冊(1965)紅露酒製造。台灣省菸酒公賣局編印，台北。 3. 行政院衛生(1999)，88年台灣地區死因統計結果摘要(統計表)。 4. 杜姿瑩(2000)具調節血脂功能的機能性食品漫談。食品工業，32(10): 22-31。 5. 宋應星(1637)，天工開物，紅麴第十七卷。 6. 李時珍(1590)，本草綱目，穀部第二十五卷。 7. 李昭蓉(1997)漫談紅麴菌。食品工業月刊，29(2):33-39。 8. 林俊宏(1999)製備紅麴菌膽固醇合成抑制劑MONACOLIN K健康之研究。國立東華大學生物技術所碩 士論文，花蓮縣壽豐鄉。 9. 林讚峰(1980)紅露酒之展望。製酒科技專論彙編，2:36-39。 10. 林讚峰(1982)紅麴菌研究發展之演進。製酒科技專論彙編，4:66-77。 11. 林讚峰(1983)紅麴菌之鑑定及實用分類法。製酒科技專論彙編，5:104-113。 12. 林讚峰、黃正財(1983)紅麴菌釀造性質之研究(一)澱粉分解酵素。酒類試驗所研究報告72年度， 157-167。 13. 林讚峰(1986)紅麴菌及代謝物的經濟性評估及增產策略。製酒科技專論彙編，8:81-99。 14. 林讚峰(1992A)紅

麴菌在保健食品上的新應用。食品工業，24(10):41-45。 15. 林讚峰(1992B)紅麴菌研究發展之演進。科學農業，40(3-4):193-198。 16. 邱建人(1997)紅麴菌色素之各種性質及其應用。食品科學文摘，5(11): 8-14。 17. 陳彥霖、李昭蓉、陳建洲、袁國芳(1998)紅麴菌種的研究開發與應用。食品工業月刊，30(7):1- 10。 18. 翁家瑞(2000)「健康食品」的是與非。食品資訊，175:27-29。 19. 顏慶堂、鄭正峰(1998)高效率液相層析術基礎介紹。科儀新知，19(4): 43-51。 20. 黃顯宗、包運生(1978)談古代中國的真菌學。科學月刊，9(10):23-25。 21. 黃顯宗(1985)紅麴菌研究之回顧展望。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號台北。 22. 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發展中心專刊第十二集，台北。 23. 蘇遠志(1979)台灣的發酵食品。發酵工業，37(2):1-112。 24. ALBERT, A. W., C. CHEN, G. KURON, V. HUFF, C. HOFFFMAN, J. ROTHROCK, 25. M. LOPEZ, H, JOSHUA, E. HARRIS, A. PATCHETT, R. MONAGHAN, S. CURRIE, E. STAPLEY, G. ALBERTS-SCHONBERG, O. HENSENS, J. HIRSHFIELD, K. HOOGSTEEN, J. LIESCH AND J. SPRINGER(1980)MEVINOLIN:A HIGHLY POTENT COMPETITIVE INHIBITOR OF HYDROXYMETHYL-GLUTARYL-COENZ -YME A REDUCTASE AND A CHOLESTEROLLOWERING AGENT. PROC. NATI. ACAD. SCI., USA, 77:395 7-3961. 26. CHAN, J. K., R. N. MOORE, T. T. NAKASHIMA, AND J. C. VEDERAS (1983) BIOSYNTHESIS OF MEVINOLIN (SPECTRAL ASSIGNMENT BY DOUBLEQUANTUM COHERENCE NMR AFTER HIGH CARBON-13 IN CORPORATION). J. AM. CHEM. SOC., 105:3334-3335. 27. ENDO, A. (1979) MONACOLIN K, A NEW HYPOCHOLESTERROLEMIC AGENT PRODUCED BY MONASCUS SPE -CIES. J. ANTIBIOTICS, 32:852-854. 28. ENDO, A., K. HASUMI, AND S. NEGISHI (1985) MONACOLINS J AND L, NEW INHIBITORS OF CHOLE -STEROL BIOSYNTHESIS PRODUCED BY MONASCUS RUBER. J. ANTIBIOTICS, 38: 420-422. 29. ENDO, A., K. HASUMI, T. NAKAMURA, M. KUNISHIMA, AND M. MASUDA (1985) DIHYDROMONACOLIN L AND MONACOLIN X, NEW METABOLITES THAT INHIBIT CHOLESTEROL BIOSYNTHESIS. J. ANTIBIOTI -CS, 38: 321-327. 30. ENDO, A., D. KOMAGATA, AND H. SHIMADA (1986) MONACOLIN M, A NEW INHIBITOR OF CHOLESTE -ROL BIOSYNTHESIS. J. ANTIBIOTICS, 39: 1670-1673. 31. HAWKSWORTH, D. L., AND J. I. PITT (1983) A NEW TAXONOMY FOR MONASCUS SPECIES BASED ON CULTURAL AND MICROSOPICAL CHARACTERS. AUST. J. BOT., 31: 51-61. 32. JOSEPH, L. GOLDSTEIN, AND MICHAEL S. BROWN (1990) REGULATION OF THE MEVALONATE PATHWAY , NATURE, 343: 425-430. 33. JUZLOVA, P. L. MARTINKOVA, AND V. KREN (1996) SECONDARY METABOLITES OF THE FUNGUS MON -ASCUS : A REVIEW. J. IND. MICROBIOL., 16: 163-170. 34. KIMURA, K., D. KOMAGATA, S. MURAKAWA, AND A. ENDO (1990) BIOSYNTHESIS OF MONACOLINS : CONVERSION OF MONACOLIN J TO MONACOLIN K(MEVIOLIN). J. ANTIBIOTICS, 43(12): 1621-1622. 35. 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. MICROBI -OL., 9: 173-179. 36. LIN, T. F., AND A. L. DEMAIN (1994) LEUCINE INTERFERENCE IN THE PRODUCTION OF WATER- SOLUBLE RED MONASCUS PIGMENTS. ARCH MICROBIOL., 162: 114-119. 37. NIL(1995A) SSRI: UNPRECEDENTED US GROWTH, SCRIP, 2024: 23. 38. NIL (1995B) YEN EFFECT ON JAPAN'S PHARMA MARKET, SCRIP, 2023 : 22. 39. NIL (1996) TOP 10 DRUGS IN EUROPE, SCRIP, 2120 : 23.