Korakoth Soontornkul. 2012. **Red Rice Wine Production from Black Sticky Rice and *Monascus purpureus***. Master of Science Thesis in Biotechnology, Graduate School, Khon Kaen University.

Thesis Advisors: Asst. Prof. Dr. Kanit Vichitphan

ABSTRACT

Rice wine is one of the most ancient wines in Thai society for a long time. Traditional rice wine produced from sticky rice fermented with a various microorganism in mixed culture starter granules or look-pang that contains mold, yeast, and bacteria. The fermenting goes until the product, rice wine, has the clear color or smoky white color. However, the rice wine from the mentioned process has not been stable and low quality. This research study focuses on using black sticky rice as raw material and using *Monascus purpureus* and *Saccharomyces bayanas* EC1118 as pure culture during red rice wine production process. *M. purpureus* was selected in step of digesting black sticky rice because it can produce various useful metabolites (monacolin K and citrinin) and colour agent which are yellow, orange and red color.

Five varieties of black sticky rice, black sticky rice from Faculty of Agriculture, Khon Kaen University, black sticky rice grown in Nakhon Ratchasima, Chiang Rai and Roi-Et province of Thailand, were selected to determine the gramma oryzanol, antioxidant and phenolic compounds. The results showed that black sticky rice from Faculty of Agriculture, Khon Kaen University and black sticky rice grown in Roi-Et province of Thailand exhibited higher concentration of those compounds than the others 2 varieties. Moreover, the starch degrading ability of 4 strains of *M. purpureus* TISTR 3002, 3385, 3541 และ 3090 were evaluated. The results showed that *M. purpureus* TISTR 3002 exhibited highest starch degrading ability.

Red rice wine production was performed by using the black sticky rice from the Faculty of Agriculture, and Roi-Et province with pure culture of *R. oryzae* and *M. purpureus* TISTR 3002. It was showed that red rice wine producing from black sticky rice and *R. oryzae* exhibited highest concentration of gramma oryzanol, anti-oxidant, phenolic compounds. This is because almost of those compounds extracted from black sticky rice and *R. oryzae* exhibited the higher starch degrading ability than *M. purpureus* TISTR 3002. Thus, the red rice wines production by varied ratio of black sticky rice and white sticky rice as 0:100, 55:45, 70:30, 85:15 and 100:0 % (w/w) with *R. oryzae* and *M. purpureus* TISTR 3002 were performed. The result showed that red rice wine produced at ratio 55:45 by using *M. purpureus* TISTR 3002 contained gramma oryzanol, and phenolic compounds higher than red rice wine made from *R. Oryzae*. Furthermore, the final products of red rice wine were concentrated and were tested for antibacterial activity of 5 pathogenic bacteria which were *Bacillus cereus*, *Staphylococcus aureus* TISTR 029, *Pseudomonas aeruginosa* ATCC 27533, *Escherichia coli* TISTR 073 และ *Enterobacter aerogenes* TISTR 1540 The results showed that the ratio of black sticky rice and white sticky rice at 55:45 and 70:30 substantially inhibited the growth of 5 pathogenic bacteria.

Five red rice wines containing both high beneficial compounds and antibacterial activity were selected for sensory evaluation. The result showed that red rice wine made from 100 %w/w black sticky rice with *M. purpureus* TISTR 3002 and red rice wine made from 100 %w/w white sticky rice with *R. oryzae* exhibited the highest scores in color, smelling, tasting, and over all liking.

This research could be concluded that red rice wine produced from black sticky rice with *M. purpureus* achieved the red rice wine containing beneficial compounds and accepting sensory evaluation. However, *M. purpureus* compared with *R. oryzae* exhibited low ability to degrade black sticky rice. The study of material preparation particularly black sticky rice was further elucidated. Moreover, the efficient *M. purpureus* to degrade the black sticky rice was screened from nature and were developed by genetic engineering tool. The accumulated data from this research could be used as a guideline to produce red rice wine in the line of both health benefit and consumers' want.