

学 位 論 文 要 旨	
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題 目	Effect of <i>koji</i> making process on the quality of <i>koji</i> and liquor (製麴工程が麴や酒の品質に及ぼす影響)
<p><i>Koji</i> is a solid culture of <i>koji</i>-mold on the steamed cereal like rice. <i>Koji</i>-mold produces a lot of enzymes and second metabolites during growing. These enzymes and second metabolites play a role of the decomposition of nutrients such as starch in the ingredients and the flavor formation. Thus, <i>koji</i> making is one of the most important process which effects on the quality of liquor. Although <i>koji</i> making is carried out via various process, the effect of the process in <i>koji</i> making has not been revealed, yet. In this study, we aimed to reveal the effect of the specific process in <i>koji</i> making on the quality of <i>koji</i> and liquor.</p> <p>White <i>koji</i> is a kind of <i>koji</i> which is prepared by using white <i>koji</i>-mold (<i>Aspergillus luchuensis</i> mut. <i>kawachii</i>). Although it is recognized that the main purpose of <i>koji</i> making is to produce the enzyme, the speed of alcohol fermentation and the flavor of liquor is different between the liquor made from rice and enzyme as the replacement for <i>koji</i>. We expected that these influences are a consequence of differences in the microstructure. White <i>koji</i>-mold produces two kind of α-amylase (acid-labile and acid-stable) and glucoamylase. We researched that the expression pattern of two α-amylase from <i>A. kawachii</i>, acid-labile and acid-stable α-amylases concertedly affects to the microstructure of <i>koji</i>. In addition, starch decomposition by two α-amylases facilitated the alcohol fermentation of yeast. This resulted in the difference of the flavor profiles of the fermented mash. We could show that acid-labile α-amylase, which is recognized not important to brewing, contributed to decompose of starch in <i>koji</i> and affected the flavor formation for the first time. Our examination strongly suggested that <i>koji</i> plays a role of not only enzyme resource for brewing but also the flavor formation.</p> <p>Red <i>koji</i> is a kind of <i>koji</i> which is prepared red <i>koji</i>-mold (<i>Monascus</i> sp.). In red <i>koji</i> making, the additional moisture on the way of <i>koji</i> preparation is the traditional methods. We aimed to reveal the effect of the additional moisture for the quality of red <i>koji</i>. By additional moisture, the activities of glycohydrolase and the red pigment levels were increased 2-times and 6-times than that in red <i>koji</i> without additional moisture, respectively. Six genes of eight genes in the pigment biosynthetic gene cluster were upregulated within one hour. Therefore, it was shown that the expression of genes related to pigment production quickly responds to the presence of additional moisture during solid-state fermentation. The gene expressions of α-amylase and glucoamylase were also upregulated. The content of acetyl-CoA, which is the first substrate required for pigment production in red <i>koji</i>, increased within 3 hr of adding water. This study first described the relationship between the additional moisture on SSF and expression of pigment biosynthesis genes in <i>Monascus</i> sp. during red <i>koji</i> preparation.</p>	