

学 位 論 文 要 旨	
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題 目	Identification of characteristic aroma components and study on quality stabilization in rice-flavor <i>baijiu</i> (小曲米酒の特徴香気成分の同定と品質安定化に関する研究)
<p>Rice-flavor <i>baijiu</i> is a traditional Chinese liquor, one of the basic types, mostly produced in the southern region such as Guangxi and Guangdong. It is made from rice as the raw material and <i>xiaoqu</i> (cereals cultured with fungi) as the fermentation starter. The raw material and manufactural method of rice-flavor <i>baijiu</i> are different from the other types' <i>baijiu</i>, but all <i>baijiu</i> production undergo solid-state saccharification process. On the other hand, compared to traditional Japanese liquor <i>awamori</i> and <i>kome-shochu</i>, the raw material and manufactural method are similar except for the solid-state saccharification process. This implies rice-flavor <i>baijiu</i> is a rare liquor that is produced using the combination of Chinese and Japanese liquor manufactural methods. However, it has a low <i>baijiu</i> market share in China, and its large-scale manufactures are still few. Due to less scientific guidance in producing rice-flavor <i>baijiu</i>, quality instability of the final product is the main problem. Furthermore, its flavor profile is not quite clear. Thus, these 2 problems are addressed in this study.</p> <p>To reveal the chemical and flavor profiles of rice-flavor <i>baijiu</i>, we analyzed the components of commercial liquor using HPLC and GC-MS. Of the 15 rice-flavor <i>baijiu</i> samples, 5 contained both glucose and amino acids, and 3 contained trace amounts of amino acids. Lactic acid was detected in all rice-flavor <i>baijiu</i> samples. Rice-flavor <i>baijiu</i> contained more acetic acid as compared to <i>awamori</i> and <i>kome-shochu</i>. We identified and quantified 34 volatile compounds in all liquors. Nineteen compounds in rice-flavor <i>baijiu</i>, 15 in <i>awamori</i> and 13 in <i>kome-shochu</i> had an odor activity value (OAV) more than 1. From these compounds, 11 compounds showed a three-fold higher OAV in rice-flavor <i>baijiu</i> than in <i>awamori</i> and <i>kome-shochu</i>. The result of principal component analysis revealed that the volatile component composition of rice-flavor <i>baijiu</i> varied depending on the manufacturer and ethyl lactate is the key volatile compound that is distinct in rice-flavor <i>baijiu</i>.</p> <p>To scientifically produce rice-flavor <i>baijiu</i> with stable quality, we investigated the role of the unique solid-state saccharification process in making of rice-flavor <i>baijiu</i> using chemical and biological quantitative analysis approaches. More than 70% of starch in rice decomposed to glucose after saccharification process. In addition, the number of fungal cells, saccharification activity, and lactic acid concentrations increased during the process. Based on denaturing gradient gel electrophoresis analysis targeting the internal spacer transcribed region, <i>Rhizopus oryzae</i> was identified as the major fungus proliferating during the process. Lactic acid bacteria were not detected by 16S rRNA gene-based next-generation sequencing analysis during the process. Conversely, <i>R. oryzae</i> that was isolated from <i>xiaoqu</i> exhibited a capability to produce lactic acid. The results imply that the solid-state saccharification is essential not only for the starch degradation but also for the culture of <i>R. oryzae</i>, which promote saccharification activity and lactic acid production. We also investigated the most appropriate temperature for solid-state saccharification and 35°C was found to be the optimum temperature for <i>R. oryzae</i> cultivation, enzyme production, and saccharification process. The results could promote efficient and stable production of rice-flavor <i>baijiu</i>.</p>	