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## Microbial Diversity in Korean Traditional Fermenting Starter, *Nuruk*, Collected in 2013 and 2014

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A total of sixty-six samples of Nuruk, a fermentation starter used to make the Korean traditional rice wine, Makgeolli, were collected from central and southern regions of Korea in 2013 and 2014. We classified two groups of the Nuruk samples, “commercial” and “home-made”, according to the manufacturing procedure and purpose of use. Commercial Nuruks were made in a controlled environment where the temperature and humidity are fixed and the final product is supplied to Makgeolli manufacturers. Home-made Nuruks were made under uncontrolled conditions in the naturally opened environment and were intended for use in the production of small amounts of home-brewed Makgeolli. We obtained more than five hundred isolates including filamentous fungi and yeasts from the Nuruk samples followed by identification of fungal species. Also we stored glycerol stocks of each single isolate at -70°C.

We identified the species of each isolate based on the sequences of ITS regions amplified with two different universal primer pairs. We also performed morphological characterization of the filamentous fungi and yeast species through observations under the microscope. We investigated the major fungal species of commercial and home-made Nuruks by counting the colony forming units (CFU) and analyzing the occurrence tendency of fungal species. While commercial Nuruks contained mostly high CFU of yeasts, home-made Nuruks showed relatively high occurrence of filamentous fungi. One of the representative Nuruk manufacturers used both domestic wheat bran and imported ones, mainly from US, as raw material. Depending on the source of ingredient, the fungal diversity was somewhat different. Another commercial Nuruk sample was collected twice, once in 2013 and again in 2014, and showed different diversity of fungal species in each year. Nuruks obtained from the southern regions of Korea and Jeju island showed high frequency of yeast such as *Saccharomycopsis fibuligera* and *Pichia* species as well as unique filamentous fungus, *Monascus* species. *S. fibuligera* was easily found in many Nuruk samples with high CFU. The major filamentous fungi were *Aspergillus*, *Lichtheimia*, *Mucor* and *Penicillium* species. In order to further our understanding of the isolates and their potential industrial applications, we assayed three enzymes, alpha amylase, glucoamylase and acid protease from 140 isolates out of about five hundred isolates and selected about 10 excellent strains with high enzyme activities. With these fungal isolates, we will perform omics analyses including genomics, transcriptomics, metabolic pathway analyses, and metabolomics followed by whole genome sequencing of unique isolates associated with the basic research of Nuruk and that also has applications in the Makgeolli making process.