Isolation of *Lactobacillus* spp. from diverse environmental sources and strain improvement for increased production of D-lactic acid

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Abstract

Lactic acid and its derivatives are widely used in the food, pharmaceutical and cosmetic industries. It is also a major raw material for the production of poly lactic acid (PLA), a biodegradable and environment-friendly polymer, which could be a replacement for synthetic plastics derived from petroleum. In this study, for the production of D-lactic acid by *Lactobacillus* spp., diverse samples were screened for new lactobacilli isolates using selective (Rogosa) medium. Over 149 isolates were isolated from human vagina and saliva, soil, water, plain yogurt, shellfishes and kimchi. D-lactic acid production by individual isolates was examined using HPLC analysis with Chiralpak MA column and UV detector. PCR amplified *ldhD* gene from *Lactobacillus rhamnosus* ATCC53103 was cloned using a *Lactobacillus*/*E. coli* shuttle vector, pTRKH2. pTRKH2::*ldhD* was constructed using enzyme restriction and ligation, and was introduced into *L. plantarum*, *L. paracasei*, and *L. gasseri* by electroporation for over-expression of D-lactic acid. Transformants were confirmed by colony PCR method and compared with its wild types in growth and pH change. In several transformants, D-lactic acid production was increased up to 50% compared to that of wild types. This study confirms the potential of strain improvement for the production of renewable resources such as D-lactic acid.