SHORT COMMUNICATION

Development of SSR markers for typing cultivars in the mushroom *Auricularia auricula-judae*

Rui Ying Zhang • Dan Dan Hu • Jin Gang Gu • Qing Xiu Hu • Xue Mei Zuo • He Xiang Wang

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Abstract Auricularia auricula-judae, also known as black wood ear, is one of the most popular edible mushrooms in China. But the confusion about cultivars has limited the development of A. auricula-judae production. In this article, 17 polymorphic SSR markers were cloned and used to differentiate the cultivars of A. auricula-judae. The polymorphism information content (PIC) of these SSR ranged from 0.10 to 0.84, while the average was 0.47. The number of alleles detected for each locus was 2-11, with an average of 4.7 alleles per locus. The dendrogram, based on 17 SSR markers by UPGMA clustering, could differentiate the 16 A. auricula-judae cultivars in this study. In fact, the 16 cultivars analyzed in this study could be efficiently differentiated using a combination of three polymorphic SSR loci with high PIC. The total of 17 polymorphic SSR loci could also be amplified correctly in the A. polytricha strains surveyed. This is the first report on the development of SSR markers in the genus Auricularia.

Keywords *Auricularia auricula-judae* · Mushroom · Simple sequence repeat (SSR) · Polymorphism

R. Y. Zhang (⊠) • J. G. Gu • Q. X. Hu • X. M. Zuo
Key Laboratory of Microbial Resources Collection and
Preservation, Ministry of Agriculture, and Institute of Agricultural
Resources and Regional Planning,
Chinese Academy of Agricultural Sciences,
Beijing 100081, China
e-mail: zhangry@caas.ac.cn

D. D. Hu Beijing Academy of Science and Technology, Beijing 100089, China

H. X. Wang

State Key Laboratory for Agrobiotechnology and Department of Microbiology, China Agricultural University, Beijing 100094, China

Introduction

Auricularia auricula-judae, also known as black wood ear, is one of the most popular edible mushrooms in China. The cultivation of this mushroom has attracted much attention for converting agricultural waste to food and creating jobs for rural people. Over the past 30 years, the commercial production of *A. auricula-judae* has developed rapidly in rural areas of China. In 2010, total *A. auricula-judae* production was projected at 1.2 million tons. However, there have been many problems in the cultivation of *A. auricula-judae*, for example, labeling the same cultivar with a different name, or labeling the distinct cultivars with the identical name for economic benefit. The cultivars' name confusion resulted in economic loss for *A. auricula-judae* growers and intellectual property destruction for breeders.

The traditional approach to evaluate the diversity of edible mushrooms relied on resolving differences in morphological characters. However, it was difficult in A. auricula-judae to differentiate or identify the strains with morphological methods, because the morphological characters of the fruiting body may differ under different cultivation methods or varying environmental conditions. DNA markers have been shown to be effective tools to differentiate cultivars of edible mushrooms (Ramírez et al. 2001). So far, molecular markers such as RFLP (Yan et al. 1999), RAPD (Zhang and Luo 1999), AFLP (Xu et al. 2008), ISSR (Yu et al. 2008), and SRAP (Tang et al. 2010) have been developed in A. auricula-judae. It is important for molecular markers to have the properties of co-dominance, high reproducibility, multiallelic variation, and easy operation. On this basis, we hypothesized that SSR (simple sequence repeat) should be an effective method to differentiate A. auricula-judae cultivars.