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ORIGINAL PAPER

Evaluation of Korshinsk Peashrub (*Caragana korshinskii* Kom.) as a Substrate for the Cultivation of *Pleurotus eryngii*

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Abstract
The cultivation of *Pleurotus eryngii* is increasing rapidly in China due to its nutritional and medicinal importance, excellent flavor, and long shelf life; therefore, cheaper and locally available alternative substrates are urgently needed. Experiments were performed to investigate the use of alternative substrates for *P. eryngii* cultivation. Korshinsk peashrub (*Caragana korshinskii* Kom.), a perennial shrub, was included in the substrate at varying rates to substitute for the sawdust and sugarcane bagasse (21/38 and 21/35%, respectively) in the typical substrate. The cultivation substrate including 38% Korshinsk peashrub did not significantly affect linear mycelial growth. The fruit body yield (247.3 g/bag) and biological efficiency (70.66%) achieved by using this substrate were significantly higher than those achieved using the control substrate (229.6 g/bag and 65.59%). Crude polysaccharide content was highest (6.12%) in the mushroom grown on 38% Korshinsk peashrub substrate; in this mushroom, crude polysaccharide content was increased by 70.47% compared with that of the mushroom grown on the control substrate (3.59%). These results reveal that supplementing the substrate in which *P. eryngii* is grown with Korshinsk peashrub can improve polysaccharose accumulation by *P. eryngii*. The findings described above reveal that Korshinsk peashrub is an efficient, cost-effective, and promising substrate additive that can improve *P. eryngii* quality and yield while largely substituting for sawdust and sugarcane bagasse.

Keywords *Pleurotus eryngii* · Korshinsk peashrub · Substrate · Biological efficiency · Nutritional value

Introduction

Pleurotus eryngii, also known as the king oyster mushroom for its remarkable flavor, high nutritional value and numerous medicinal features, is cultivated and consumed worldwide [1, 2]. This mushroom was originally cultivated in northern Italy and Switzerland, where it is known locally as cardoncello [3]. *P. eryngii* has recently become the most commonly cultivated mushroom in China, Korea, and Japan [4]. Production of *P. eryngii* in China was estimated at 1,364,835 tons in 2015 (data from the China Edible Fungi Association). Current demand for *P. eryngii* indicates that production will continue to increase rapidly for the foreseeable future.

P. eryngii can be cultivated on a wide variety of substrates containing sawdust, cotton seed hulls, soybean meal, wheat bran [5], sugarcane bagasse [6], chopped rice straw [7], umbrella plant [3], rice husks, corn stover, wheat straw, peanut meal, and other materials [8–10]. In China, the substrate used for commercial production of *P. eryngii* consists mainly of sawdust and sugarcane bagasse supplemented with wheat bran and other materials. However, as the prices of sawdust and sugarcane bagasse have increased or fluctuated substantially with the rapid expansion of commercial production of mushrooms, increasing substrate cost has become a major concern for commercial mushroom producers. Now, potential shortages of sawdust and sugarcane bagasse have highlighted the need to identify alternatives substrates that may be used for sustainable cultivation of *P. eryngii* in the future.

Korshinsk peashrub (*Caragana korshinskii* Kom.), a drought-tolerant perennial mesquite shrub, is widely distributed in northeastern, northwestern and northern China [11, 12]. Korshinsk peashrubs generally live for decades, and some may grow for more than a century. In the year of 2004, there are 7.73 million hm^2 of Korshinsk peashrub in the Inner Mongolia and Ningxia Hui Autonomous Region

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