

Degradation of different agrowastes by cultivation of *Pleurotus* species

V.K. MANDHARE*, A.V. SURYAWANSHI AND B.C. GAME

Department of Plant Pathology, Mahatma Phule Krishi Vidyapeeth, Rahuri, AHMEDNAGAR (M.S.) INDIA

ABSTRACT

The complex carbohydrates like cellulose and hemicellulose combined with lignin is un-accessible to the digestive processes and its degradation increased bio-availability and digestibility of cellulose and hemicellulose thereby enhancing the feed value of spent straws. The study was therefore, conducted on degradation of different agro-wastes by cultivation of various *Pleurotus* species. The results revealed that the cellulose, hemicellulose and lignin content of spent substrates significantly reduced with the cultivation of *Pleurotus* species. The maximum reduction was observed in soybean straw. The maximum reduction in hemicellulose content was evident in cotton + wheat straw. There was appreciable reduction in lignin content of spent substrates. The maximum reduction in lignin content was evident in cotton + wheat and paddy straw. Among the species, *P. florida* was found more efficient to degrade the cellulose, hemicellulose and lignin content of various substrates.

Key words : Degradation, Agro-wastes, Cellulose, Hemicellulose, Lignin, *Pleurotus* spp.

INTRODUCTION

The worlds most abundant and readily accessible natural waste product is available in the form of plant tissue. Lignin, cellulose and hemicellulose collectively known as lignocellulose, are the measure polymeric constituent of this wastes. The significance of lignocellulose is apparent from the fact that 50 to 60 per cent of the atmospheric carbon annually fixed in the photosynthetic process is ultimately incorporated in the tissue of higher plants as lignocellulosic substances. On dry weight basis they comprises of 15 to 35 per cent lignin, 45 to 53 per cent cellulose and 20 to 40 per cent hemicellulose (Naheed and Zafar, 1999). During colonization of substrates *P. sajor-caju*, alternation in chemical components like carbon, nitrogen, cellulose, hemicellulose, lignin, water and benzene and ether soluble matter occurs. Mushroom cultivation reduces lignin, cellulose, hemicellulose, tannin and crude fibre content with increased protein content of substrates thereby making it a good cattle feed (Khalon and Das, 1987; Zadrazil, 1976; Ortega *et al.*, 1986; Natrajan *et al.*, 1993). Coir pith and wheat straw was degraded more efficiently by *P. sajor-caju* and *P. ostreatus* with decreased cellulose, hemicellulose content thereby used the spent substrate as cattle feed (Raghunathan *et al.*, 1996 and Adamovic *et al.*, 1998). Therefore, the study was conducted on degradation of different agro-wastes by *Pleurotus* cultivation.

MATERIALS AND METHODS

The mushrooms *viz.*, *P. sajor-caju*, *P. eous*, *P. flabellatus*, *P. florida* and *P. sapidus* were grown on different agro-wastes like soybean, wheat, paddy, cotton and their combination (1:1) on dry weight basis in the department of Plant Pathology, College of Agriculture, Parbhani during 2005-06. The estimation of hemicellulose, cellulose and lignin content of above agro-wastes before cultivation, at spawn run and at the end of 3rd harvest (spent substrates) was carried out in the Department of Bio-chemistry and Human Nutrition, College of Technology, Marathwada Agriculture University, Parbhani. The above *Pleurotus* spp. were grown on various agro-wastes by following the method of Bahl (1988). The sample of agro-wastes after sterilization (autoclaving), at spawn run and after 3rd harvest of mushrooms were collected, air-dried, dehydrated (110°C for 4 hrs.) ground to fine size powder and used for the estimation of hemicellulose, cellulose and lignin.

Estimation of hemicellulose :

This was carried out as per the method described by Wankhede and Tharanathan (1976) and Wankhede *et al.* (1979). Ten g of the dried straw was extracted in 250 ml of 70 per cent alcohol, filtered through muslin cloth, the residue was dried at 60°C and the filtrate clarified by the centrifugation at 4000 x g for 15 minutes. The clear supernatant was used to estimate the total sugars by

* Author for correspondence.