Vol III Issue III April 2013

Impact Factor : 0.2105

ISSN No : 2230-7850

Monthly Multidisciplinary
Research Journal

Indian Streams Research Journal

Executive Editor

Ashok Yakkaldevi

Editor-in-chief

H.N.Jagtap

IMPACT FACTOR : 0.2105

Welcome to ISRJ

RNI MAHMUL/2011/38595

ISSN No.2230-7850

Indian Streams Research Journal is a multidisciplinary research journal, published monthly in English, Hindi & Marathi Language. All research papers submitted to the journal will be double - blind peer reviewed referred by members of the editorial Board readers will include investigator in universities, research institutes government and industry with research interest in the general subjects.

International Advisory Board

Flávio de São Pedro Filho Federal University of Rondonia, Brazil	Mohammad Hailat Dept. of Mathmatial Sciences, University of South Carolina Aiken, Aiken SC 29801	Hasan Baktir English Language and Literature Department, Kayseri
Kamani Perera Regional Centre For Strategic Studies, Sri Lanka	Abdullah Sabbagh Engineering Studies, Sydney	Ghayoor Abbas Chotana Department of Chemistry, Lahore University of Management Sciences [PK]
Janaki Sinnasamy Librarian, University of Malaya [Malaysia]	Catalina Neculai University of Coventry, UK	Anna Maria Constantinovici AL. I. Cuza University, Romania
Romona Mihaila Spiru Haret University, Romania	Ecaterina Patrascu Spiru Haret University, Bucharest	Horia Patrascu Spiru Haret University, Bucharest, Romania
Delia Serbescu Spiru Haret University, Bucharest, Romania	Loredana Bosca Spiru Haret University, Romania	Ilie Pintea, Spiru Haret University, Romania
Anurag Misra DBS College, Kanpur	Fabricio Moraes de Almeida Federal University of Rondonia, Brazil	Xiaohua Yang PhD, USA
Titus Pop	George - Calin SERITAN Postdoctoral Researcher	Nawab Ali Khan College of Business Administration

Editorial Board

Pratap Vyamktrao Naikwade ASP College Devrukh,Ratnagiri,MS India	Iresh Swami Ex - VC. Solapur University, Solapur	Rajendra Shendge Director, B.C.U.D. Solapur University, Solapur
R. R. Patil Head Geology Department Solapur University, Solapur	N.S. Dhaygude Ex. Prin. Dayanand College, Solapur	R. R. Yalikal Director Managment Institute, Solapur
Rama Bhosale Prin. and Jt. Director Higher Education, Panvel	Narendra Kadu Jt. Director Higher Education, Pune	Umesh Rajderkar Head Humanities & Social Science YCMOU, Nashik
Salve R. N. Department of Sociology, Shivaji University, Kolhapur	K. M. Bhandarkar Praful Patel College of Education, Gondia	S. R. Pandya Head Education Dept. Mumbai University, Mumbai
Govind P. Shinde Bharati Vidyapeeth School of Distance Education Center, Navi Mumbai	Sonal Singh Vikram University, Ujjain	Alka Darshan Shrivastava Shaskiya Snatkottar Mahavidyalaya, Dhar
Chakane Sanjay Dnyaneshwar Arts, Science & Commerce College, Indapur, Pune	G. P. Patankar S. D. M. Degree College, Honavar, Karnataka	Rahul Shriram Sudke Devi Ahilya Vishwavidyalaya, Indore
Awadhesh Kumar Shirotriya Secretary, Play India Play (Trust),Meerut	Maj. S. Bakhtiar Choudhary Director,Hyderabad AP India.	S.KANNAN Ph.D , Annamalai University,TN
	S.Parvathi Devi Ph.D.-University of Allahabad	Satish Kumar Kalhotra
	Sonal Singh	

**Address:-Ashok Yakkaldevi 258/34, Raviwar Peth, Solapur - 413 005 Maharashtra, India
Cell : 9595 359 435, Ph No: 02172372010 Email: ayisrj@yahoo.in Website: www.isrj.net**

STUDIES ON CULTIVATION OF OYSTER MUSHROOM (PLEUROTUS FLORIDA) ON USING DIFFERENT SUBSTRATES

ELAIYA RAJA. R AND P.GANESH

PhD – scholar, Department of Microbiology, Annamalai University,
Annamalainagar -Tamilnadu.
Assistant professor in Microbiology, Department of Zoology, Annamalai University,
Annamalainagar -Tamilnadu, India.

Abstract:

A study to determine the winter mushroom production of the fruiting bodies on Pleurotus florida and to utilize ragi straw, black gram empty pod, green gram empty pod, bamboo dry leaf and casuarina dry leaf as supplements on paddy straw substrate and their effect on the sporophore production mushroom Pleurotus florida. The ragi straw(RS), black gram empty pod(BGP) and green gram empty pod(GGP) either alone or in combination with paddy straw (1:1, 1:2, 1:3 and 1:0 v/v) were used for sporophore production of Pleurotus florida. However, the biological efficiency of the fungus could be improved when these were used in various combinations with paddy straw. There was also faster substrate colonization and primordial initiation and higher number of fruiting bodies. The higher yield produced on by GGP + paddy straw (2:1) with total yield 905.30, B.E 90.53%, moisture 90.90%. folled GGP + paddy straw (1:1) having total yield 893.00, B.E 89.30%, moisture 92.12%. This study suggests using these three agricultural wastes to make good yield, income and eco friendly nature.

INTRODUCTION

Mushrooms are rich in all nutrients like protein, vitamins and minerals. So, it is called as God's gifted vegetarian meat. Pleurotus florida belongs to Oyster mushroom (i.e. Pleurotus spp.) and it is commonly called as Dhengri in India because of its oyster like shape (Genus: Pleurotus, Family: Tricholomataceae). Cultivation of the oyster mushroom, Pleurotus spp has increased greatly throughout the world during the last few decades and constitute the second largest variety of mushrooms produced in the world. Its popularity has been increasing due to its ease of cultivation on various unfermented cellulose and lignin containing wastes, high yield potential, high nutritional value and purported to have medicinal properties [Banik and Nandi, 2004 : Gregori et al., 2007]. Although Pleurotus spp (oyster mushrooms) are efficient decomposers and its multilateral enzyme system can biodegrade a large range of lignocelluloses wastes. But all the wastes are not suitable for every species of Pleurotus [Yesmin et al., 2009].

Oyster mushroom (Pleurotus florida) is an edible mushroom having excellent flavor and taste. The quality of the waste product (rice straw) is improved due to the degradation of cellulose and hemicellulose by mushroom enzymes and hence has been rendered more digestible. Thus rice straw is transformed to a valuable roughage and mushrooms provide an additional income without an extension of the limited acreage (Mueller and Cantner, 1990). Pleurotus is an efficient lignin-degrading mushroom and can grow well on different types of ligno - cellululosic materials. So, it is extensively cultivated throughout the world. The conventional method of cultivation of mushroom is done with paddy straw, but the yield is not appreciating. By adding extra cheap nutrients in the substrate the yield can be increased.

MATERIALS AND METHODS

2.1. Inoculum preparation: The main culture of *Pleurotus florida* was obtained from Ezhil Mushroom farm, Melmavelangai, Tindivanam, Tamilnadu. The 2.0 percent of Malt-Extract Agar was used to maintain the mushroom culture. Malt-Extract agar plates were inoculated with a mycelial tissue in agar plugged plates, young and actively growing mushroom on margin of the colony in culture plates can be visualised on incubation at 25°C in the dark light for 7 - 10 days.

2.2. Mushroom substrates: Paddy straw, Ragi straw, Black gram empty pod, Green gram empty pod, Bamboo dry leaf and Casuarina dry leaf.

2.3. Spawn preparation Spawn of the two edible oyster mushrooms (*Pleurotus florida*) were prepared with intact sorghum grains. The grains were washed thoroughly, and 1 kilogram of sorghum grains was boiled in 2 liters of water until the grains were semi-soft. The grains were left for 15 minutes in hot water to allow them to absorb moisture. Then the grains were decanted over a sieve to remove excess water and allowed cool to ambient tropical temperature. They were mixed with 1% (w/w) CaSO_4 and 2% (w/w) CaCO_3 to prevent sticking and adjusting pH, respectively. One hundred gram wet weight grains were put in 500 ml wide mouthed bottles which were later on covered with aluminium foil. Bottles were sterilized at 121°C and 15lbs/sq.inch for 15 minutes. Thereafter was aseptically inoculated with three 1 cm² pieces of mycelia taken from 5-day-old cultures of oyster mushroom species used. The mycelia inoculated grains were incubated in darkness at $27 \pm 2^\circ\text{C}$ until the mycelia fully colonized the grains.

2.4. Mushroom bed spawn preparation: Paddy straw is the most commonly used substrate for growing oyster mushroom in India. Though it is considered as self sufficient growing medium for mushroom cultivation, the substrate still responds positively to the external supply of nutrients / substrates (Amin et al., 2008). Keeping this in view, the substrate was supplemented with different materials to study their effect on the sporophore production of cultivation in low density polythene bags (60 cm X 40 cm) with layer spawning was followed as per standard procedure [Nirmalendu and Mukherjee, 2007].

Various supplements tried were paddy straw, ragi straw, black gram empty pod, green gram empty pod, bamboo dry leaf and casuarina dry leaf. The supplements were added at the time of spawning the substrate. Two hundred grams of each material was used in each of the four layers in equal quantities. Substrates without any supplement served as control. Three replications were maintained for each treatment. Matured fruiting bodies were harvested from two flushes and observations regarding the number and weight of sporophores were recorded. Biological efficiency was calculated as a ratio between the fresh weight of harvested mushrooms and the dry weight of substrate per bag and was expressed as a per cent. Data pertaining to yield were analyzed statistically. Addition of supplements to the cultivation substrate showed varied effects on the sporophore production.

2.5. Harvesting of mushroom: Fruit primordia (pinhead) after allowing to develop to a complete fruiting bodies and were picked. Mushrooms were harvested by removing them by hand from the substrate, then were taken away and weighed on the same day of harvesting. The oyster mushrooms were harvested when the in-rolled margins of the basidiomycetes began to flatten Stamets (2000). Duration of time from inoculation to final harvest was calculated. Seven aspects of crop yield were evaluated according to Morais et al. (2000) and Tisdale et al. (2006) and Amin et al. (2008) as follows: (i) Biological efficiency (BE), (ii) mushroom yield (MY), (iii) Crop period (sum of incubation and fruiting periods) (iv) Fresh weight. BE values were calculated according to Stamets (2000) and Royse et al. (2004) $\text{BE} = [\text{Weight of fresh mushrooms harvested (g)} / \text{dry substrate weight (g)}] \times 100$. On the other hand MY values were calculated as previously reported by Morais et al. (2000). $\text{MY} = [\text{Weight of fresh mushrooms harvested (g)} \text{ per fresh substrate weight}]$. Determination of moisture in fresh weight of each mushroom sample was determined by electronic balance. 5 g of sample was oven dried at 95°C for 24 hours. The loss in weight obtained after drying was regarded as the moisture content in percentage was calculated as follow.

3. RESULT AND DISCUSSION :

In this study various concentration of agro wastes of ragi straw, black gram empty pod, green gram empty pod, bamboo dry leaf and casuarina dry leaf carried out this process Among the various concentrations, the maximum yield was obtained on ragi straw, black gram empty pod (BGP), paddy straw (PS) and green gram empty pod (GGP) respectively on primary study and best yield producing substrate are

along with paddy straw (1:0, 1:1, 2:1, 3:1, 0:1) was used for the improving the qualitative and quantitative analysis of mushroom production (Table 1). The higher yeield produced on by GGP + paddy straw 2:1 905.30gm, 90.53, 90.90. followed by GGP + paddy straw (1:1) with total yield 893.00gm, B.E 89.30%, moisture 92.12% and ragi + paddy straw (1:1) and total yield 897.17gm, B.E 89.71%, moisture 90.87. The %, BGP + paddy straw (2:1)- total yield 896.00gm, B.E 89.60% moisture 90.35% and ragi + paddy straw (2:1)- total yield 893.00, B.E 89.30, moisture 90.17 compare to less different in above the similar work reported on Prakash et al.(2010). Similar reports were made by earlier workers. Jandaik and Kapoor (1974) reported that 20 to 28°C temperature was optimum for obtaining maximum yield of Pleurotus flabellatus. P. flabellatus required relative humidity (RH) of 70 to 80% for its cultivation which is lower than required for Pleurotus sajorcaju (Chadha, 1992). Similar findings have been reported in India earlier by Jadhav and Jagtap (1991), Patil and Jadhav (1994) and Sarkar et al. (1995).

The essential nutrients like organic carbon and nitrogen sources from the various agriculture wastes are utilized for the mushroom growth, this will also improve the growth and qualitative parameters. According to Asaduzzaman Khan et al.(2008) and Eswaran and Thomas (2003) the substrate influences the yield and nutrient components of the mushroom. The spawn running and mycelial formation was very well on paddy straw alone and along with combination of ragi straw, black gram empty pod and green gram empty pod. In bamboo and casuarina dry leafutilized the pin head formation was absent (Not very well) in both the supplementary substrates. Hence it is inferred that bamboo dry leaf and casuarina dry leaf only convert to compost by pleurotus florida and cannot be utilized for mushroom production.

Table No. 1. Utilization of different Substrates test for Pleurotus florida Production

Substrate	I st picking (gm)	II nd Picking (gm)	III rd Picking (gm)	Total yield (gm)	B.E. (%)	Moisture (%)
Ragi straw	412.00	365.66	98.00	875.66	87.56	89.55
Paddy straw	396.00	318.33	140.00	854.00	83.43	91.45
Black gram empty pod (BGP)	387.00	298.62	135.00	820.62	82.62	89.40
Green gram empty pod (GGP)	389.00	295.80	137.50	822.30	82.23	89.90
Bamboo dry leaf	100.00	110.00	92.00	302.00	30.20	89.10
Casuarina dry leaf	106.00	120.00	102.00	328.00	32.80	84.14
Ragi + paddy straw 1:0	412.00	365.66	98.00	875.66	87.56	89.50
Ragi + paddy straw 1:1	410.05	357.02	130.10	897.17	89.71	90.87
Ragi + paddy straw 2:1	413.00	356.00	134.00	893.00	89.30	90.17
Ragi + paddy straw 3:1	408.05	318.95	134.00	860.95	86.10	90.05
Ragi + paddy straw 0:1	396.00	318.33	140.00	854.00	83.43	91.45
BGP + paddy straw 1:0	387.00	298.62	135.00	820.62	82.62	89.40
BGP + paddy straw 1:1	397.00	338.05	135.05	870.10	87.10	90.40
BGP + paddy straw 2:1	409.00	352.00	139.00	896.00	89.60	90.35
BGP + paddy straw 3:1	395.00	334.62	137.08	866.7	86.67	89.90
BGP + paddy straw 0:1	396.00	318.33	120.00	854.00	83.43	91.45
GGP + paddy straw 1: 0	389.00	295.80	137.50	822.30	82.23	89.90
GGP + paddy straw 1:1	403.00	336.00	139.00	893.00	89.30	92.12
GGP + paddy straw 2:1	410.00	355.80	139.50	905.30	90.53	90.90
GGP + paddy straw 3:1	394.00	325.50	135.50	855.00	85.50	89.90
GGP + paddy straw 0:1	396.00	318.33	140.00	854.00	83.43	91.45
S.E. ±	19.58	14.94	3.51	38.20	-	-
C.D at 5%	40.85	31.17	7.32	79.95	-	-

4. REFERENCES

- Amin. R.S.M, N. Alam, N.C. Sarker, K. Hossain, M.N. Uddin., 2008. Influence of different amount of rice straw per packet and rate of inocula on the growth and yield of oyster mushroom (*Pleurotus ostreatus*). Bangladesh J. Mushroom. 2 :15-20.
- Asaduzzaman Khan.M.D, Mousumi Tania, S.M. Ruhul Amin, Nadia Alam and Md. Nazim Uddin., 2008. An investigation on the Nutritional Composition of Mushroom (*Pleurotus florida*) cultivated on different substrates. Bangladesh J. Mushroom. 2(2): 17-23.
- Banik. S, R.Nandi., 2004. Effect of supplementation of rice straw with biogas residual slurry manure on the yield, protein and mineral contents of oyster mushroom. Ind. Crops Prod. 20 :311-319.
- Chandra A, Purkayastha RP (1976). Effect of plant hormones of the sporocarp of an edible species of *Calocybe*. In: Proc. First Symp. Survey and cultivation of edible mushroom in India. 11: 172.
- Eswaran A, Thomas S (2003). Effect of various substrates and additives on the sporophore yield of *Calocybe indica* and *Pleurotus eous*. Indian J, Mushroom, XXI (1&2): 8-10.
- Gregori. A, V.Mirjan, J. Pohleven., 2007.Cultivation Techniques and Medicinal Properties of *Pleurotus* spp. Food.Technol. Biotechnol. 45 : 238-249.
- Jadhav SN Jagtap VD (1991). Chemical pasteurization of wheat straw used for growing Oyster mushroom. In. (M.C.Nair ed.) Indian Mushroom, Proc. Natl. Symp. Mushroom., K.A.U. Thiruvananthapuram, pp. 122-124.
- Jandaik CL, Kapoor JN (1974). Studies on cultivation of *P. sajor-caju*. Mushroom Sci. 9: 667-672.
- Morais. M.H., A.C. Ramos, N. Matos, E.J. Santos-Oliveira., 2000. Production of shiitake mushroom (*Lentinus edodes*) on ligninocellulosic residues. Food Sci. Technol. Int. 6 : 123-128.
- Mueller, M. and Cantner, E.W. 1990. Mushroom cultivation for feed and food. Entwicklung-und-laendlicher-Raum (Germany, F.R.). 22(2) 15-17.
- Nirmalendu. D, M.Mukherjee., 2007. Cultivation of *Pleurotus ostreatus* on weed plants Bioresour. Technol. 98:2723-2726.
- Patil BD, Jadhav SV (1994). Impact of fluctuating weather parameter on the performance of different *Pleurotus* spp under pune conditions. Mushroom Res. 3: 45.
- Philippoussis. A., G. Zervakis, P. Diamantopoulou, 2001. Bioconversion of lignocellulosic wastes through the cultivation of the edible mushrooms *Agrocybe aegerita*, *Volvariella volvacea* and *Pleurotus* spp. World J. Microbiol. Biotechnol. 17 : 191-200.
- Prakash.P, S.Anuradha, P.K. Dhanalakshmi and N. Niveditha., 2010. Application of statistical methods to optimize medium for increased yield of Oyster Mushroom (*Pleurotus ostreatus*)'. International Journal of Biological Technology 1(1):66-74.
- Royse. J., T.W. Rhodes, S. Ohga, J.E. Sanchez, 2004. Yield, mushroom size and time to production of *Pleurotus cornucopiae* (oyster mushroom) grown on switch grass substrate spawned and supplemented at various rates. Bioresour. Technol. 91 85-91.
- Stamets. P., 2000. Growing Gourmet and Medicinal Mushrooms. Third ed , Ten Speed Press, Berkley, California.
- Tisdale.T.E., C. Susan, D.E. Miyasaka-Hemmes., 2006. Cultivation of the oyster mushroom (*Pleurotus ostreatus*) on wood substrates in Hawaii. World. J. Microbiol. Biotechnol. 22 : 201-206.
- Yesmin. S, Moonmoon, A.S.Khan, N.C.Sarker, S.Ahmed., 2009, Performance of *Pleurotus citrinopileatus* on different agro-wastes and its proximate composition. Bangladesh J. Mushroom. 3 :39-43. Chadha KL (1992). Mushroom Research and development in India. Mushroom Res. 1: 1-12.

ELAIYA RAJA. R

PhD – scholar, Department of Microbiology, Annamalai University, Annamalainagar -Tamilnadu.

Publish Research Article International Level Multidisciplinary Research Journal For All Subjects

Dear Sir/Mam,

We invite unpublished research paper.Summary of Research Project,Theses,Books and Books Review of publication,you will be pleased to know that our journals are

Associated and Indexed,India

- ★ International Scientific Journal Consortium Scientific
- ★ OPEN J-GATE

Associated and Indexed,USA

- Google Scholar
- EBSCO
- DOAJ
- Index Copernicus
- Publication Index
- Academic Journal Database
- Contemporary Research Index
- Academic Paper Databse
- Digital Journals Database
- Current Index to Scholarly Journals
- Elite Scientific Journal Archive
- Directory Of Academic Resources
- Scholar Journal Index
- Recent Science Index
- Scientific Resources Database

Indian Streams Research Journal
258/34 Raviwar Peth Solapur-413005,Maharashtra
Contact-9595359435
E-Mail-ayisrj@yahoo.in/ayisrj2011@gmail.com
Website : www.isrj.net