Alternate substrate formula for mushroom cultivation by utilizing coir waste

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Introduction and Objectives: Mushroom cultivation traditionally relies on sawdust as a primary substrate due to its high carbon content. However, the scarcity of sawdust in Sri Lanka imposes a search for alternative materials. Abundant availability of coir, a by-product of coconut processing, is a potential substrate for mushroom cultivation with sufficient mineral and cellulose contents, and restored water holding capacity. This study explores the potential substrate formula using coir waste as an alternative substrate to sawdust.

Methods: Cultivation of oyster mushroom (*Pleurotus ostreatus*) was conducted in a mushroom hut under 20-30 ^{o}C temperature and 80-90% humidity. The experiment was carried out in a complete randomized design (CRD) with four treatments, and each treatment had five replicates. The substrate was prepared by including coir dust, sawdust, and rice bran in various proportions on the dry weight basis, while constant amounts of $CaCO_3$ (2%) and $MgSO_4$ (0.2%) were maintained for all treatments. The treatments were sawdust and rice bran (10:1) (T1-standard), coir dust and rice bran (10:1) (T2), sawdust, coir dust, and rice bran (5:5:1) (T3), sawdust, coir dust, and rice bran (6:3:2) (T4). Growth parameters were observed daily. The mean values for mycelium invasion, pinhead formation, fruiting body formation, stipe length, pileus diameter, fresh weight, and biological efficiency were compared for the first harvest using Duncan's Multiple Range Test (DMRT) using SPSS 26.

Results: The time required for growth phase, growth parameters, and yield parameters varied with the treatments (p value<0.05) as shown in Table 1.

Table1: Growth phase, growth parameters and yield parameters of oyster mushroom

Parameters	T1	T2	T3	T4
Mycelium invasion(days)	18.80±0.44^{a}	20.80±1.78^{b}	18.40±0.54^{a}	**18.40±0.54^{a}**
Pinhead formation(days)	46.20±2.28^{b}	51.20±1.30^{b}	43.00±1.22^{a}	**41.20±1.64^{a}**
Fruiting body formation (days)	49.60±2.30^{b}	53.20±1.30^{c}	45.20±1.30^{a}	**43.20±1.64^{a}**
Stipe length(mm)	35.40±1.67^{b}	33.80±1.78^{b}	36.20±1.30^{ab}	**38.40±1.51^{a}**
Pileus diameter(mm)	60.20±5.93^{b}	59.20±2.58^{b}	63.40±4.66^{ab}	**66.80±3.27^{a}**
Fresh weight (Kg)	31.77±6.35^{b}	28.40±3.11^{b}	30.54±9.16^{b}	**42.93±7.21^{a}**
Biological efficiency (%)	5.61	5.01	5.39	**7.58**
Cost (Rs)	38.00	23.00	30.50	**36**
Benefits (Rs)	1.71	12.50	7.67	**17.66**

Note: Each value represents mean ± SD of sample (n=5), values with the same superscript letter along the column are not significantly different (positive results order: a>b>ab>c). T1:sawdust + rice brane, T2:coir dust + rice brane, T3: sawdust + coir dust + rice brane, T4: sawdust + coir dust + rice brane.

Conclusion: As per the study, all studied growth and yield parameters were better in treatment T4 compared to other treatments and standards. Further, coir dust can be mixed with sawdust instead of standard traditional farming practices adding sawdust as the primary carbon source. The formula 6:3:2 of sawdust, coir dust, and rice brane is a potential alternative to reduce dependence on sawdust and utilise coir dust as a better resource.

Keywords: *Alternate substrate, coir dust, mushroom production, sawdust, substrate combination.*

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