

## SELECTION OF SUITABLE SAW-DUST AS GROWING MEDIA FOR REISHI MUSHROOM (*Ganoderma lucidum*) CULTIVATION

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### INTRODUCTION

Mushrooms are fleshy, spore-bearing fruiting bodies of macro fungus, (Kingdom Fungi, Phylum Basidiomycota) typically produced above ground on soil or on its food source. A majority of farmers in Sri Lanka cultivate oyster mushroom rather than the other mushroom varieties i.e. medicinal mushrooms such as *Ganoderma lucidum* (Reishi mushrooms) (Rajapakse *et al.*, 2007). Studies have shown that cultivated mushrooms such as *Ganoderma lucidum* (Reishi mushrooms), *Lentinus edodes* (Shiitake mushroom), *Grifola frondosa* (maitake mushrooms) contain a high amount of retene, which may have an antagonistic effect on some forms of tumor (Anonymous, 2004). *G. lucidum* consists of medicinal elements such as several types of glucans which have been found inhibitory to HIV virus and helpful in reducing blood sugar, blood pressure and constipation (Anonymous, 2004). Therefore, it is important to study growing methods, media and growing conditions for new varieties of mushroom so as to increase the diversity of mushroom available for the consumer. In Sri Lanka, synthetic log cultivation is commonly used for cultivating both edible and medicinal mushroom species rather than natural log cultivation (Rajapakse *et al.*, 2007). Mushroom growing media should contain appropriate conditions (adequate nutrients and growing surface) and free from antagonistic effects for proper mycelium running. Rubber (*Hevea brasiliensis*) sawdust has been used as the major media in mushroom cultivation. However, availability of rubber sawdust is limited in some areas and is difficult to obtain in pure form from the mill. Rubber is a soft wood which facilitates mushroom mycelium growth where as mixing hard wood sawdust with rubber sawdust may result in poor mycelium growth and low yield. The mango (*Mangifera indica*) and lunumidella (*Melia azedarach*) sawdust are locally available in all areas of the country and both are soft in nature. These may facilitate proper mycelium growth similar to rubber saw dust.

Therefore, there is a need to find an alternative for rubber sawdust or a combination of sawdust to obtain high mushroom yield. The aim of this study is to determine the best medium for the cultivation of *G. lucidum* under local conditions using readily available mango and lunumidella saw dust alone or different combinations of these as a replacement to rubber sawdust media.

### METHODOLOGY

Mother culture was prepared placing mushroom tissues in Potato Dextrose Agar media following the tissue culture procedure. Mother culture having fungal hyphae was introduced into saw dust media consisting of saw dust (1 kg), rice polish (150 g), dolomite (30 g) and glucose (20 g) to produce mother spawn according to the method (Rajapakse *et al.*, 2007). Mother spawn was introduced into the same media to multiply more spawn under aseptic condition to prepare bulk commercial spawn. Synthetic logs were made by filling the bags (heat resistant polypropylene (12×07 cm) with sawdust (89%), rice polish (7.8%), dolomite (2%), gypsum (1%) and magnesium sulfate (0.2%) were mixed according to the dry weight of the pure sawdust or saw dust combinations. Two thirds of the bags were filled with the substrate to leave air space for ventilation and sealed the opening surface using cotton wool. Bags were sterilized for 30 min with steam using a barrel with a lid. Commercial spawns

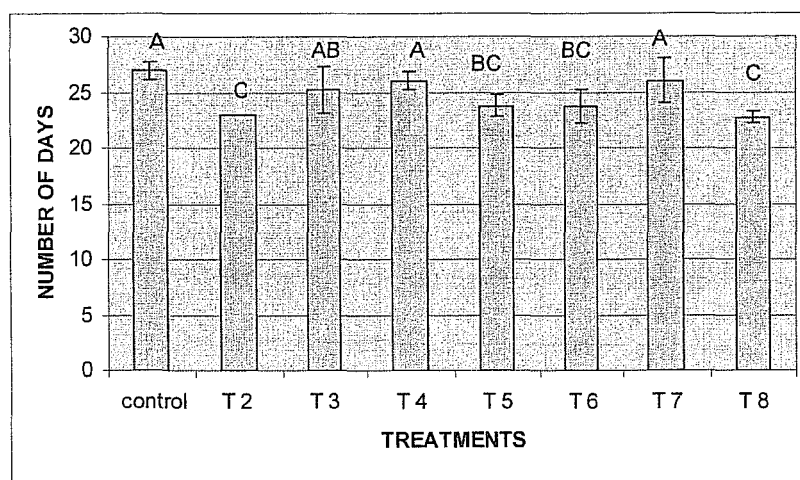
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(one-tea spoonful inoculums) were inoculated in to different bags according to the treatment combinations (Treatment 1 -100% rubber saw dust (control), Treatment 2 -100% lunumidella saw dust, Treatment 3 -100% mango saw dust, Treatment 4 -50% rubber saw dust + 50% lunumidella saw dust, Treatment 5 -50% rubber saw dust + 50% mango saw dust, Treatment 6 -50% lunumidella saw dust + 50% mango saw dust, Treatment 7 -25% Rubber saw dust + 75% lunumidella saw dust, Treatment 8 -25% rubber saw dust + 75% mango saw dust), The bags were arranged in the mushroom shed following Complete Randomized Design with 8 treatments with 4 replicates. Bags were incubated under 30-31°C (natural environment condition) for one-month period until mycelium running. Growth rate of the mycelium, amount of contamination percentage were measured at three day intervals. Number of days required to complete the mycelium growth was recorded during the incubation period. After one-month period the bags were opened for flowering. Number of days required to appear first pinhead formation, and the yield in grams were the measurements collected at the harvesting stage.

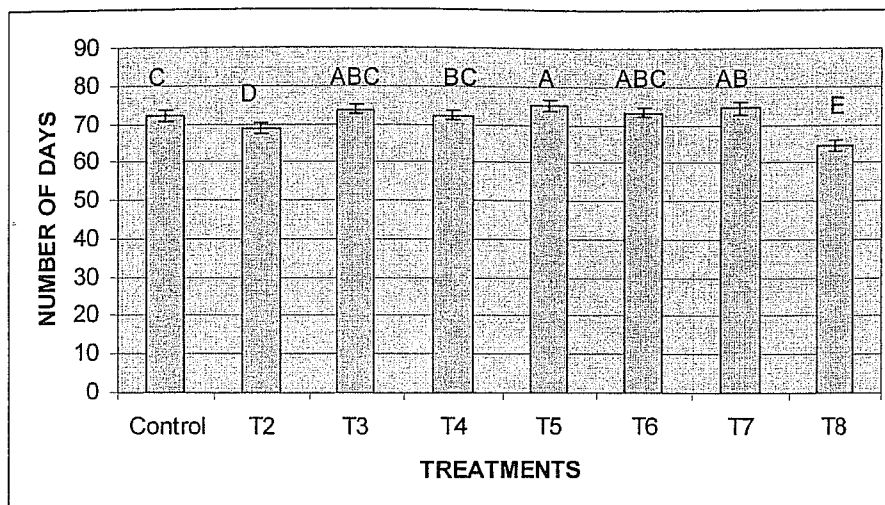
## RESULTS AND DISCUSSION

Number of days required to complete the mycelium growth are presented in Fig. 1 Among different treatments tested the treatments consists 75% mango 25% rubber combination (T8) and 100 % lunumidella (T2) took significantly fewer ( $p < 0.05$ ) days to  $22.75 \pm 0.05$  and  $23 \pm 0$  days respectively to complete the mycelium growth compared to the control. The control consists of 100% rubber sawdust, took significantly ( $p < 0.05$ ) longer days  $27 \pm 0.8$  for complete mycelium growth, compared to the T2, T5, T6 and T8 treatment combinations.



**Figure 1. Number of days required to complete the mycelium growth**  
Means with same letters between the bars are not significantly different

The time taken for the first pin head to appear from the bags are presented in Fig 2. The T8 (75% mango 25% rubber) combination took significantly ( $P < 0.05$ ) less number of days (65 days) to emerge first pin head compared to the other treatments. Treatment 5 (50% rubber sawdust + 50% mango saw dust) and treatment 7 (25% rubber sawdust + 75% lunumidella sawdust) took significantly longer time  $75 \pm 1.4$  and  $74.5 \pm 1.7$  days respectively to emerge first pinhead compared to the control.



**Figure 2. Time taken to appear first pin head**

Means with same letters between the bars are not significantly different

The effect of different media on yield of mushroom is presented in Table 1. The control (100% rubber sawdust) recorded the maximum yield ( $131 \pm 3.65$  g) compared to the other treatment combinations. However, there was no significant different yield difference ( $p > 0.05$ ) compared to the T3 ( $131 \pm 3.65$  g), T5 ( $135.75 \pm 2.5$  g), and T8 ( $135.75 \pm 5.44$  g). However, the yield in lunumidella containing treatment combinations T2, T4, T6, T7 was significantly low ( $P < 0.05$ ) compared to control. It clearly shows that the presence of lunumidella sawdust alone or combination resulted in reduction of the yield of mushroom. The reason for this is not clear but may be due to the presence of antagonistic chemicals or inadequate nutrients.

Even though, control (100% rubber sawdust) recorded higher yield it took significantly longer days for completing the mycelium growth and first pin head formation. The reason for that variation may be the slower rate of releasing the nutrients due to slower decomposition rate. But it has not affected the final yield.

**Table 1. Yield of mushroom (g)**

Treatment	Yield (g)*
Control	$141.25 \pm 7.89$ a*
T-2	$108.5 \pm 12.92$ bc
T-3	$131 \pm 3.65$ a
T-4	$118.5 \pm 2.65$ b
T-5	$135.75 \pm 2.5$ a
T-6	$103.5 \pm 13.89$ c
T-7	$115.75 \pm 3.3$ bc
T-8	$135.75 \pm 5.44$ a

\*Means with same letters between raw are not significantly different

## CONCLUSIONS/RECOMMENDATIONS

The findings of this study clearly revealed that, mango sawdust can be replace the rubber saw dust completely or in combination with rubber saw dust (75% mango saw dust+ 25% rubber saw dust combination and 50% mango saw dust+50% rubber saw dust combination) almost same insignificant yield was recorded compared to the control. In contrast, 100 %, 75%, 50%

lunumidella containing treatments recorded faster mycelium growth and shorter days to form first pin head but finally gave lower yield. Therefore growth parameters alone cannot predict the final yield of the medium. This may be due to a combination of biological factors that govern the final mushroom yield. It is important to find out the nutritional composition of rubber, lunumidella and mango sawdust in further studies.

## REFERENCES

Anonymous; 2004; Mushroom grower's handbook 1- oyster mushroom cultivation; India 1 – 14, 236 – 248 .

Rajapaksha,P., Urmilla,S., Abeynayake,N.R.; 2002; Economical feasibility of a new compositing media for oyster mushroom (*Pleurotus ostreatus*); Proceeding of 2<sup>nd</sup> Agricultural Research symposium; Faculty of Agriculture and Plantation management; Wayamba University of Sri Lanka; 299 – 301.