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Effect of *Hypsozygous Ulmarius* Spent Substrates on Growth and Yield of Aerobic Rice (Oryza Sativa L.)

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ABSTRACT: *Paddy straw, jatropha husk and coir pith were used as a substrate for the cultivation of* Hypsozygous Ulmarius *mushroom. After the cultivation of mushroom, the spent substrates alone and in combination with compost were used to know the effect on growth and yield of aerobic rice. The green house experiment showed significantly higher plant height (84.30 cm), number of productive tillers per hill (7.61 cm), panicle length (22.19 cm), number of grains per panicle (86.11 cm), root length (22.20 cm), root dry weight (5.40 g), total dry weight of plant (45.22g), and grain yield per plant (16.88g) with Sand+ Soil+* Hypsozygous Ulmarius *spent jatropha husk + compost. However, it was followed by in Sand + Soil +* Hypsozygous Ulmarius *spent paddy straw + compost.*

INTRODUCTION

Mushrooms are the fruiting bodies of the fungi belonging to basidiomycetes and ascomycetes and they are considered as good vegetables. Spent mushroom substrate is the material remaining after a crop of mushrooms. Spent mushroom substrate adds nutrients to soil, helps to neutralize acidic soils, facilitates plant growth in barren areas and in some cases, adds organic matter (Yadav *et al*., 2001). The recomposted spent mushroom substrate has been found to be a good growing medium for majority of vegetables and field crops and has shown multifacet utilities in improving the yield and quality of the crop. The other utilities of spent mushroom substrate are in vermicomposting, bioremediation and as organic-mineral fertilizer (Tewari, 2007).

MATERIAL AND METHODS

A green house experiment was conducted at Department of Agricultural Microbiology, UAS, GKVK, Bengaluru-65. The battery boxes of 50 cm × 30 cm were filled with *Hypsozygous Ulmarius* mushroom spent paddy straw, jatropha husk, coir pith in combination with Soil : Sand : Compost, in the ratio of 2:1:1 at the rate of 15 kg per box for the growth of aerobic rice (MAS-99). In the treatments instead of compost mushroom, spent substrates alone or in combination with compost was used. Following treatment combinations were used.

T_1 – Soil + Sand + Compost (Control)
(7.5 + 3.75 + 3.75 = 15 kg)

T_2 – Soil + Sand + *Hypsozygous ulmarius* mushroom spent paddy straw
(7.5 + 3.75 + 3.75 = 15 kg)

T_3 - Soil + Sand + *Hypsozygous ulmarius* mushroom spent coir pith
(7.5 + 3.75 + 3.75 = 15 kg)

T_4 - Soil + Sand + *Hypsozygous ulmarius* mushroom spent jatropha husk (7.5 + 3.75 + 3.75 = 15 kg)

T_5 - Soil + Sand + Compost + *Hypsozygous ulmarius* mushroom spent paddy straw (7.5 + 3.75 + 1.875 +1.875 = 15 kg)

T_6 - Soil + sand + Compost + *Hypsozygous ulmarius* mushroom spent coir pith (7.5 + 3.75 + 1.875 +1.875= 15 kg)

T_7 - Soil + Sand + Compost + *Hypsozygous ulmarius* mushroom spent jatropha husk (7.5 + 3.75 + 1.875 +1.875 = 15kg).

Pots were kept in green house, watered whenever necessary. Recommended fertilizers were added at the time of sowing.

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Observation on crop growth

Growth attributes

Plant height (cm)

The plant height was measured in cm from the base of the plant to tip of the fully emerged leaves. It was recorded at 30, 60, 90 Days after sowing (DAS).

Tillers per hill

The numbers of tillers per hill were counted at 30, 60 and 90 days after sowing and expressed as average number of tillers per hill.

Total dry matter production

The plant samples collected at harvest stage were dried under shade for few days followed by oven drying at 70 °C until a constant weight was obtained. Then it was weighed and expressed in gram.

Root studies

Root length

Root length was measured from the base of the plant to the tip of the longest root and expressed in cm.

Root dry weight

The roots were dried in shade and then oven dried at 70 °C till a constant weight was obtained and expressed in gram.

Observation on yield parameters

Panicle length

At harvest, panicle length was measured from the base of the panicle to the tip and expressed in cm.

Number of grains per panicle

After recording the length of panicles, number of grains per panicle was counted.

Grain yield

The crops from each pot were threshed. Grains were winnowed, cleaned. The grain weight from each plant were recorded and expressed in gram / plant.

RESULT AND DISCUSSION

Significantly higher growth parameters (Plant height, numbers tillers per hill, total dry weight per plant, root length and root dry weight) and yield attributes (Panicle length, number of grains per panicle and grain yield per plant) were found in **T_7** (Soil + Sand + Compost + *Hypsozygous ulmarius* mushroom spent jatropha husk) followed by **T_5** (Soil + Sand + Compost + *Hypsozygous ulmarius* mushroom spent paddy straw). The lowest growth parameters and yield attributes were found in **T_3** (Soil + Sand + *Hypsozygous ulmarius* mushroom spent coir pith) (table 1 and 2).

The maximum growth and yield attributes were recorded in the combination of spent jatropha husk + compost followed by spent paddy straw + compost. This could be due to spent mushroom substrates contributing to higher organic matter and nutrients to the soil, which in turn, improved the growth and yield parameters of aerobic rice. Similar results were reported by Yadav *et al.* (2001) in maize by using *Agaricus bisporus* spent mushroom compost, Ahlawat *et al.*(2007) by using recomposted button mushroom spent substrate with wheat crop and Mallesha (2008) with *P. Florida* spent substrate on tomato crop.

Table 1
Effect of *Hypsozygous ulmarius* Spent Substrates on Plant Height and Numbers of Tillers of Aerobic Rice

Substrates	*Plant height (cm)*			*No. of tillers per hill*		
	30 DAS	*60 DAS*	*90 DAS*	*30 DAS*	*60 DAS*	*90 DAS*
T_1 = S_a:S_i: Co	18.88^{bc}	34.45^{ab}	79.22^{b}	2.29^{c}	5.46^{c}	5.69^{b}
T_2 = S_a:S_i :*Hu*SPS	16.65^{d}	33.93^{ab}	84.30^{a}	2.46^{c}	5.54^{c}	7.17^{a}
T_3 = Sa:S_i : *Hu*SCP	12.58^{f}	33.19^{b}	77.45^{b}	2.16^{c}	4.79^{c}	4.90^{c}
T_4 = Sa:S_i : *Hu*SJH	17.35^{cd}	33.95^{ab}	86.24^{a}	3.33^{ab}	6.53^{b}	7.25^{a}
T_5 = Sa:S_i : *Hu*SPS + Co	20.11^{ab}	35.53^{ab}	84.07^{a}	3.06^{b}	6.42^{b}	7.20^{a}
T_6 = S_a:S_i : *Hu*SCP + Co	14.59^{e}	33.91^{ab}	86.69^{a}	2.21^{c}	5.33^{c}	5.58^{bc}
T_7 = Sa:S_i : *Hu*SJH + Co	21.48^{a}	36.49^{a}	84.30^{a}	3.54^{a}	7.38^{a}	7.61^{a}
SEm±	0.44	0.60	0.99	0.07	0.16	0.16
C. D. at 5%	1.34	1.83	3.03	0.21	0.51	0.50

Note: S_a = Sand , S_i = Soil, Co = Compost, *Hu*SPS = *Hypsozygous ulmarius* spent paddy straw, *Hu*SCP = *Hyposozygous ulmarius* spent coir pith, *Hu*SJH = *Hypsozygous ulmarius* spent jatropha husk, DAS = Days after sowing

Table 2
Effect of *Hypsozygous ulmarius* Spent Substrates on Growth of Aerobic Rice

Treatments	*Panicle length (cm)*	*No. of grains / panicle*	*Root length / plant(cm)*	*Dry weight/ plant(g) (at harvest)*			
				Leaf	*Stem*	*Panicle*	*Root*
T_1 = S_a:S_i: Co	20.05^{ab}	81.08^{cde}	21.00^{a}	5.40^{cd}	9.12^{bc}	28.00^{bc}	4.73^{b}
T_2 = S_a:S_i :*Hu*SPS	20.47^{ab}	82.30^{bcd}	21.17^{a}	5.70^{bc}	9.25^{bc}	28.11^{bc}	4.83^{b}
T_3 = Sa:S_i : *Hu*SCP	18.33^{b}	79.08^{e}	20.73^{a}	5.15^{d}	8.70^{c}	27.50^{c}	4.69^{b}
T_4 = Sa:S_i : *Hu*SJH	20.53^{ab}	83.08^{bc}	22.01^{a}	5.90^{ab}	9.30^{bc}	28.42^{bc}	5.00^{ab}
T_5 = Sa:S_i : *Hu*SPS + Co	20.58^{ab}	84.30^{ab}	20.63^{a}	6.10^{a}	9.78^{b}	28.70^{b}	5.20^{ab}
T_6 = S_a:S_i : *Hu*SCP + Co	19.11^{b}	80.08^{de}	22.00^{a}	5.23^{d}	9.03^{bc}	27.80^{bc}	4.71^{b}
T_7 = Sa:S_i : *Hu*SJH + Co	22.19^{a}	86.11^{a}	22.20^{a}	6.20^{a}	11.35^{a}	29.00^{a}	5.40^{a}
SEm±	0.50	0.51	0.41	0.09	0.20	0.15	0.13
C. D. at 5%	1.52	1.57	1.27	0.28	0.63	0.47	0.41

Note: S_a = Sand, S_i = Soil, Co = Compost, *Hu*SPS = *Hypsozygous ulmarius* spent paddy straw, *Hu*SCP = *Hypsozygous ulmarius* spent coir pith, *Hu*SJH = *Hypsozygous ulmarius* spent jatropha husk.

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