Spent mushroom substrate as mulch for yield enhancement and management of rhizome rot complex disease of ginger

J. S. Remya*, and T. Sheela Paul

Department of Plant Pathology, College of Horticulture, Vellanikkara, Kerala Agricultural University, Thrissur, 680656, Kerala, India

*E mail: remyacohpath@gmail.com

Introduction

- Spent mushroom substrate (SMS) is the composted organic materials remained after the harvest of a mushroom crop
- Creates various environmental problems if not handled properly
- Rich in plant nutrients including minerals
- Can be used for disease management
- Full of microflora- fungi, bacteria and actinomycetes

Objectives

- To study the effectiveness of spent mushroom substrate as mulch for ginger
- To evaluate its efficacy in the management of rhizome rot complex disease caused by Pythium aphanidermatum and Ralstonia solanacearum

Methodology

- For the production of SMS, mushroom species : Pleurotus florida and P. sajor-caju
- substrates : Paddy straw, saw dust and neopeat
- Quantitative estimation of bacteria, fungi and actinomycetes from different SMS - by serial dilution method
- Evaluation of SMS against rhizome rot and bacterial wilt of ginger was conducted under pot culture condition
- Spent mushroom substrate was used as mulch at the time of planting, 60 DAP and 120 DAP
- Control- Dried paddy straw as mulch

Results and discussion

- Maximum number of microbial colonies was noticed in paddy straw, whereas it was minimum in neopeat
- In pot culture experiment, all the treatments with SMS as mulch showed better growth parameters and yield compared to control. Disease incidence was also less in these treatments
- Among the various treatments for the management of P. aphanidermatum and R. solanacearum, the treatment paddy straw SMS of P. sajor-caju as mulch were found to be the best giving cent per cent disease control
- In control treatment, cent per cent disease incidence was noticed
- The growth parameters like number of tillers, number of leaves per tiller and height of tillers and rhizome yield were also highest in the treatment paddy straw SMS of P. sajor-caju as mulch

Table 1: Effect of treatments on growth parameters and yield of ginger

<table>
<thead>
<tr>
<th>Tr. No.</th>
<th>Treatments</th>
<th>No. of tillers</th>
<th>No. of leaves/ tiller</th>
<th>Height of tiller (cm)</th>
<th>Yield (g/pot)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>Paddy straw SMS of P. florida</td>
<td>5.44a</td>
<td>17.20c</td>
<td>33.70ab</td>
<td>205.07c</td>
</tr>
<tr>
<td>T2</td>
<td>Paddy straw SMS of P. sajor-caju</td>
<td>10.56*</td>
<td>21.23a</td>
<td>45.77c</td>
<td>316.03c</td>
</tr>
<tr>
<td>T3</td>
<td>Saw dust SMS of P. florida</td>
<td>6.33bc</td>
<td>14.90d</td>
<td>30.77b</td>
<td>207.93c</td>
</tr>
<tr>
<td>T4</td>
<td>Saw dust SMS of P. sajor-caju</td>
<td>7.22b</td>
<td>18.10e</td>
<td>38.03ab</td>
<td>252.14b</td>
</tr>
<tr>
<td>T5</td>
<td>Neopeat SMS of P. florida</td>
<td>4.67a</td>
<td>16.77bc</td>
<td>36.10a</td>
<td>225.25c</td>
</tr>
<tr>
<td>T6</td>
<td>Neopeat SMS of P. sajor-caju</td>
<td>4.89a</td>
<td>15.10d</td>
<td>38.87e</td>
<td>214.52c</td>
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<tr>
<td>T7</td>
<td>Copper hydroxide 0.2%</td>
<td>8.00f</td>
<td>14.87e</td>
<td>29.77b</td>
<td>176.23e</td>
</tr>
<tr>
<td>T8</td>
<td>Control</td>
<td>0.33c</td>
<td>1.89c</td>
<td>8.89e</td>
<td>83.61e</td>
</tr>
</tbody>
</table>

CD (0.05) : 1.15 1.65 8.65 19.95

Fig. 3: Effect of treatments on per cent disease incidence

Fig.1 Comparison of Paddy straw SMS of P. sajor-caju (T7) with Control (T4)

Fig.2 SMS as mulch treatments

Conclusion

- The spent mushroom substrate obtained from P. florida and P. sajor-caju can be used as mulch for ginger crops. It is rich in antagonistic microorganisms like fungi and bacteria
- Paddy straw SMS of P. sajor-caju was found to be the best giving maximum enhancement of growth parameters and also reduces the incidence of rhizome rot complex disease of ginger
- High cellulolytic capacity of P. sajor-caju favour the maximum degradation of the substrate, thereby provides a niche for the multiplication of favourable microorganisms with antagonistic and plant growth promoting activity

Reference