Microbial Enriched Compost Production and Application for North East Region of India

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**Background**

Sustainable and economically sound improvement of the fertility of soil requires better insight into the mechanisms of organics (compost) that govern the sustainable supply of nutrients. Beneficial microbe driven build-up of nutrients in compost may be a major target for future fertility improvement research. Considering the growing demand of compost, a technology developed under AINP on Soil Biodiversity-Biofertilizers, AAU, Jorhat Centre for rapid composting with readily available substances such as Crotalaria, Azolla, Paddy straw, Ipomoea, Water hyacinth and various agricultural wastes. The primary objectives were to improve of compost quality through rock phosphate amendments and inoculation of biofertilizer agents during curing stages of prepared composts.

**Preparation of compost**

**Step 1**: Collection of readily available substrates Like Crotalaria/ Tephrosia, Ipomoea, Azolla, Water Haycynth, Sesbania rostrata, Paddy Straw, Weed Biomass etc

**Step 2**: Layering of green (green crop biomass) and brown (rice straw) substrates in aerobic compost pit at a ratio of 1:10. Compost will be ready by 75-80days

**Step 3**: Addition of biofertilizer microbes (N-fixers, PSB and KSB) @1.0% and rock phosphate @1.0% (as P) in 80-90 days immature aerobic compost and kept for 25-30 days incubation for final enriched compost.

**Composition of microbial enriched compost**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>C:N ratio of Solid Phase</td>
<td>10.05-12.30</td>
</tr>
<tr>
<td>C:N ratio of Liquid Phase</td>
<td>0.05-0.08</td>
</tr>
<tr>
<td>pH values Stabilized in between</td>
<td>7.5-7.87</td>
</tr>
<tr>
<td>EC (dS m-1)</td>
<td>3.57 - 3.80</td>
</tr>
<tr>
<td>CEC c mol (p+) kg-1</td>
<td>49.92-55.42</td>
</tr>
<tr>
<td>NH4+ N (%)</td>
<td>0.024-0.029</td>
</tr>
<tr>
<td>Respiration (µg CO2-C g-1 24 h-1)</td>
<td>13.66-16.73</td>
</tr>
<tr>
<td>Microbial Biomass Carbon(µg g-124-1)</td>
<td>1369-1450</td>
</tr>
<tr>
<td>Total bacteria (cfu x 108g-1)</td>
<td>252-270</td>
</tr>
<tr>
<td>Total fungi (cfu x 107 g-1)</td>
<td>22.70-25.32</td>
</tr>
<tr>
<td>Total N(%)</td>
<td>1.85-1.97%</td>
</tr>
<tr>
<td>Total P (%)</td>
<td>1.03-1.15</td>
</tr>
<tr>
<td>Total K (%)</td>
<td>0.81-0.91</td>
</tr>
<tr>
<td>Crop</td>
<td>Application and crop response</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Rice                 | Application: 2t / ha  
Saving of NP fertilizer: > 25%  
Effect on rice yield: Save NP fertilizer without affecting yield (4.18t/ha) |       |
| Rice (organic)       | Application: 1t/ha primed with biofertilizer agents & rock phosphate + 50% RDF (NPK at 60:20:40)  
Yield with microbial enriched compost: 4.28t/ha  
Yield with RDF: 3.79t/ha |       |
| Rice (organic)       | Application: 5.0t/ha + Biofertilizers (azospirillum, azotobacter and PSB) as seedling root dip.  
Yield with microbial enriched compost + biofertilizers: 3.35 t/ha  
Yield with normal compost: 2.82t/ha |       |
| Carrot (organic)     | Application: 5t/ha + Azotobacter, PSB and rock phosphate  
Yield with microbial enriched compost: 21.44 t/ha  
Yield with normal compost: 20.97 t/ha in the treatment that received normal compost (5t/ha) with Azotobacter, PSB and rock phosphate. |       |
| Hot chilli (organic) | Application: 5.0t/ha  
Yield with microbial enriched compost: 2.18t/ha with 2.56% capsican content  
Yield with normal compost: 1.78t/ha |       |
| Flower (gerbera)     | Application: 10t/ha  
Yield with microbial enriched compost: 38 flowers/plant, size of flower (9.5cm), shelf life (21days) and vase life (10 days)  
Normal compost: 25 flowers/plant, size of flower (8.3cm), shelf life (17 Days) and vase life (7 days) |       |

**Technology transfer**

<table>
<thead>
<tr>
<th>Farmers benefitted (2017-2020)</th>
<th>About 850 farmers of NEH regions and 20 state agriculture officers were trained.</th>
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</thead>
<tbody>
<tr>
<td>Technology transfer</td>
<td>Technology transferred to State Agriculture Department, Assam</td>
</tr>
</tbody>
</table>
| Package of practices           | Package of practices developed and recommended to farmers of NEH regions. Published by AAU, Jorhat & State Agriculture Department, Assam as follows:  
• Package of practices for kharif crops of Assam, 2019  
• Package of practices for Rabi crops of Assam, 2019  
• Organic package of practices for selected crops of Assam, 2019 |
The information given in the document is based on the experiments carried out at the AINP centre-Department of Soil Science, Assam Agricultural University (AAU), Jorhat, Assam. For training, demonstration and other enquiries please contact Principal Investigator, AINP on Soil Biodiversity-Biofertilizers, AAU, Jorhat-13, Assam.

Acknowledgement: We acknowledge the different KVK scientists & Department of Horticulture, AAU for utilizing the technology standardized under the project.

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Citation: Nath D J, Baruah R, Gayan A, and Mohanty S R, 2020. Microbial enriched compost production and application for North East Regions of India, 1-4, AAU, Jorhat, Assam

Published by: ICAR-All India Network Project on Soil Biodiversity-Biofertilizers (AINP SBB), Directorate of Research(Agri), Assam Agricultural University, Jorhat: 785013