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

Dr. Dhruba Jyoti Nath,
Dr. Rajen Baruah,
Dr. Anjuma Gayan
and
Dr. Santosh Ranjan Mohanty

ICAR - All India Network Project on
Soil Biodiversity-Biofertilizers
Directorate of Research (Agri.)
Assam Agricultural University,Jorhat-785013,Assam

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 Crotolaria, 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 Crotolaria/ Tephrosia, Ipomeoa, Azolla, Water Hiacynth, *Sesbania rostrata*, Paddy Straw, Weed Biomass etc

Paddy straw | Agrowaste | Water hyacinth | Azolla

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

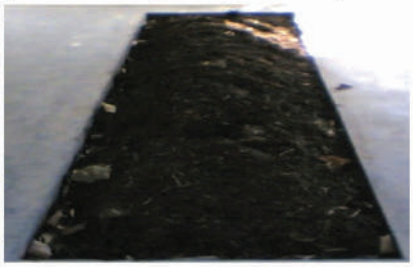
Layering of paddy straw and spraying cowdung slurry

Layering of green crop biomass over brown substrates in composting pit

PVC tubes inserted to facilitate gas exchange and hastening composting

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.

Mixing of biofertilizer



Curing and stabilization

Final product

Composition of microbial enriched compost

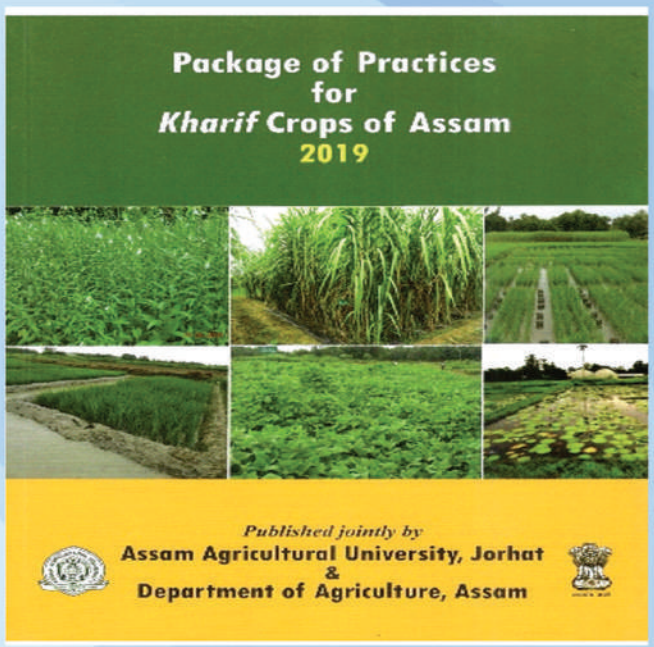
Parameters	Values
C:N ratio of Solid Phase	10.05-12.30
C:N ratio of Liquid Phase	0.05-0.08
pH values Stabilized in between	7.5-7.87
EC (dS m-1)	3.57 -3.80
CEC c mol (p+) kg-1	49.92- 55.42
NH4+-N (%)	0.024-0.029
Respiration (µg CO2-C g-1 24 h-1)	13.66-16.73
Microbial Biomass Carbon(µg g-124-1)	1369-1450
Total bacteria (cfu x 108g-1)	252-270
Total fungi (cfu x 107 g-1)	22.70-25.32
Total N(%)	1.85-1.97%
Total P (%)	1.03-1.15
Total K (%)	0.81-0.91

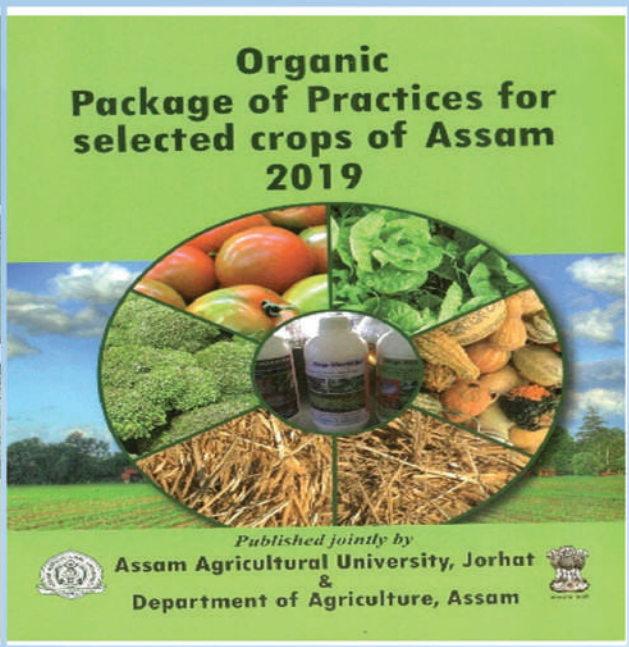
Application of enriched composts in different crops

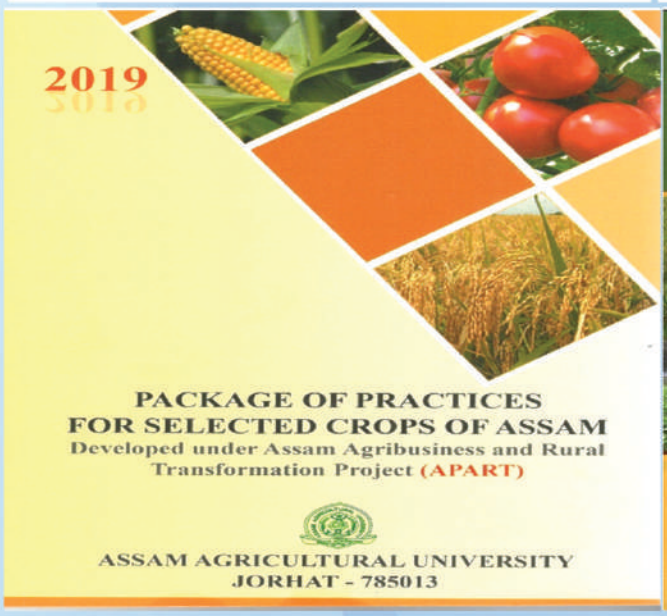
Crop	Application and crop response	
Rice	Application : 2t / ha Saving of NP fertilizer: > 25 % Effect on rice yield : Save NP fertilizer without affecting yield (4.18t/ha)	
Rice	Application : 1t/ha primed with biofertilizer agents & rock phosphate) + 50% RDF (NPK at 60:20:40) Yield with microbial enriched compost : 4.28t/ha Yield with RDF : 3.79t/ha	
Rice (organic)	Application:5.0t/ha +Biofertilizers (azospirillum, azotobacterand 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% capsacian 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)	

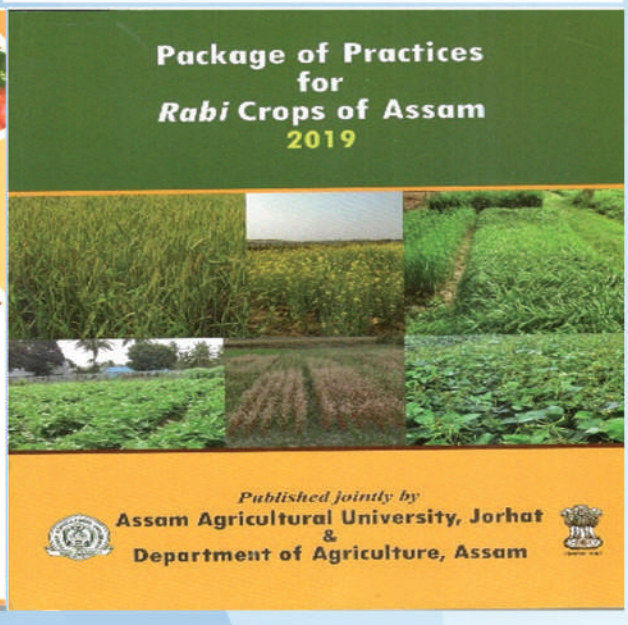
Technology transfer

Farmers benefitted (2017-2020)	About 850 farmers of NEH regions and 20 state agriculture officers were trained.
Technology transfer	Technology transferred to State Agriculture Department, Assam
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.

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Prepared by :

Dr.Dhruba Jyoti Nath and Dr. Anjuma Gayan
Department of Soil Science
Assam Agricultural University, Jorhat:785013
ndhrubajyoti@yahoo.co.in
anjumagayan@gmail.com

Dr. Santosh Ranjan Mohanty
Principal Scientist
ICAR All India Network Project on Soil Biodiversity-Biofertilizers (AINP SBB), Indian Institute of Soil Science, Bhopal
mohantywisc@gmail.com;
santosh.mohanty@icar.gov.in

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