NOVCOM Compost – An Effective and Economic Solution for Soil Health Management Most Important Key For Regenerative Farming & Carbon Offsetting

Presented by



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NOVCOM COMPOST could be a game changer for Carbon Offsetting



One Stop Solution for All Problems

- Erosion of Top Soil Loss of Soil Productivity Sub Soil Compaction
- Increase of Soil Borne Diseases
 Acquisition of Residual Toxicity

NOVCOM COMPOST

A Integral Component for SOIL HEALTH MANAGEMENT

under any Sustainable Initiative

Ensures Elimination of Nitrate Fertilizers. Validated On- field Study indicates that ... NOVCOM COMPOST - Ideal Exogenous Soil Inoculation

Self Generated Microbial Population in order of 10¹⁶ c.f.u.

1 unit of Novcom-N can Replace 2 units of Urea-N



What is Novcom Compost?

It is an 'NOVEL COMPOSTING' method, which helps to develop microbially rich quality compost within shortest time period through replication of natural biodegradation method in a an intensified manner. Novcom solution, developed under Element Energy Activation principle (EEA Principle) **provides the desired energy for rapid intensification of microbial activity** within the compost heap to enable stable, mature and non- phytotoxic compost within **21 days period**, securing Less GHG Emission, Preservation of more carbon in changing format and Enhanced Atmospheric Nitrogen Fixation.





NOVCOM COMPOST – A Technology Driven Composting Process

So far there is no composting process that is backed by Specific Technology except, the Novcom Composting Method

Infusion of Technology in the Novcom Composting Method has brought about a Shift Paradigm in Я **Biodegradation Process leading to Stupendous** Advancement its in SAFETY, EFFECTIVITY, CONVENIENCE , ECCES ECONOMICS and SPEED -**MODEL** that is prerequisite for of success any **Biodegradation process.**



Five irreversible pillars for any Effective Composting Process



Process Efficiency and Convenience for Large Scale composting-

Novcom composting technology miles ahead than others

1. Speediest Composting : Novcom Compost can be ready within **shortest period of 21 days** where as other compost ready by shortest 60 days to 180 days

- **2. Applicable to All shorts of raw material:** Novcom Compost can be done with all type of weeds including obnoxious weeds like **fern, perthenium etc.**
- 2. SAFE: High Temperature (> 65°C) generation in Novcom Compost can destroy any pathogens, weed seeds and roots and completely safe for any use.



Process Efficiency and Convenience for Large Scale composting in Tea – Novcom composting technology miles ahead than others

- 4. No Infrastructure Requirement: Novcom Compost do not required any specific infrastructure, can make heaps any time, any where in any amount
- **5. Highest end product quality:** Microbial population in Novcom compost is **1000 times higher** than vermi compost and total NPK is atleast 50% higher than other compost.
- 6. Lowest Cost : 60 % less than that of vermi compost



Uniqueness of the NOVCOM Compost ?



- Aerobic composting process
- Ready in 21 days
- No Infrastructure Required & No raw material specificity
- Process simplicity (required no infrastructure and mechanization)
- Upto 200 % N Appreciation with Atmospheric N fixation
- 1000 times higher Native Microflora
- 90% higher Carbon Mitigation Potential (per ton raw material basis)
- Post Soil Application Effectiveness (Better Crop Sustenance)







NOVCOM COMPOSTING IS AN AEROBIC COMPOSTING METHOD

Novcom composting method being a aerobic biodegradation process (as indicated by **high temperature generation**) ensures less GHG emission than any anaerobic composting process. **Prevents methane emissions through aerobic decomposition,** as methane-producing microbes are not active in the presence of oxygen.



CASE STUDY:

A Comparative study of GHG emission potential of Aerobic and Anaerobic composting in Germany indicated **up to 4 times more GHG emission** $(457 \text{ kg CO}_2 \text{ equivalents / Mg bio}$ waste under anaerobic digestion *vis-a-vis* 118kg CO₂ equivalent/ Mg bio waste under aerobic composting)

Source : Dr. Joachim Clemens & Dr. Wolfgang Büscher, 2012

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Novcom composting is probably the speediest composting process (within 21 days) without any mechanical intervention.

The Novcom composting process follows the same science of any biodegradation process and goes through same four phases viz. first mesophilic $(25^{\circ}C - 40^{\circ}C)$ stage, followed by the thermophilic $(40^{\circ}C-65^{\circ}C)$ and then the second mesophilic stage and finally the Curing Stage. However due to induction of energy elements through Novcom solution, a speedy, intense and natural generation of microbes occur within the compost heap, which automatically shortens the time gap between the different composting phases.

The higher speed of biodegradation process induced by the microbial pool (*not by mechanization or any artificial induction*) **reduces the escaping chances of NH₃, and N₂O during the breakdown process and thus reduce the GHG emission**. Moreover during the mineralization process what ever nitrogen is released due to organic matter breakdown is immobilized quickly by the high pool of microbes.

Thus intensification of the biodegradation process reduces the possibility of GHG emission as in case of Novcom composting process.



Shortening of Biodegradation steps under Novcom composting method as studied through daily temperature generation within compost heap



Intensified Biodegradation process under Novcom Composting also helps higher carbon transformation from Raw materials to final End Product Comparative analysis of Organic

A case Study from FAO-CFC-TBI Project (2009-11) of 4 different composting process with same raw materials and Quality analysis of the final compost indicated highest Percent of organic carbon in Novcom compost as compared to the other studied compost using same raw materials. On an average 8 - 10 kg more Organic carbon/ ton of compost was saved from being lost in environment as CO₂ during biodegradation process.

Faster biodegradation process with presence of very high diversified microbial pool enables higher carbon transformation from raw materials to final end product .



Every tonne of organic carbon is the equivalent of **about 3.67** tonnes of atmospheric carbon dioxide (Agriculture and Food, 2021).

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Process simplicity of Novcom Composting (requires no infrastructure and mechanization), also helps in Higher Reduction of GHG Emission

Novcom composting method is one of the simplest method for compost preparation which needs no infrastructure, no mechanical intervention and only two turnings (7 and 14 days) during the composting period.

In the case of other composting methods, either very long period is required (upto 90 - 150 days) for compost production or reduction of biodegradation time is ensured though by frequent turnings or through interventions like providing oxygen flow, all of which require extra energy expenditure and thus higher GHG emission.



Mechanical windrow composting system with tractor and turner

Process simplicity helps Novcom Composting Method to save any extra GHG Expenditure.



Higher N Appreciation under Novcom Composting indicates higher Atmospheric N Fixation

Nitrogen appreciation under Novcom Composting Method has been documented as highest among the other composting processes. Findings from FAO-CFC-TBI Project (2009 – 2011) showed on an average 77.6 % higher N appreciation in case of Novcom Compost which was contributed by higher Atmospheric N Fixation.



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Higher N Appreciation under Novcom Composting replaces higher N from chemical source

Evaluation of the decrease in organic carbon and increase in total N value revealed that the trend lines (Figure 6) gradually separated from each other over time.

This indicated that there was a relatively greater increase in total N compared with the decrease in the organic carbon content. The finding might provide an indirect **indication of the fixation of atmospheric N within the compost heap by the autotrophic micro organisms** generated during the composting process (Seal et al, 2012).

According to de Bertoldi et al. (1982, 1983), an **increase in the population of N-fixing bacteria** in the later phase of composting, can be attributed to the increase in the value of total N in compost.



Reduction of 1 kg N from chemical fertilizer (e.g. Urea) can offset 11.19 kg CO₂ equivalent.

Post Soil Application Effectiveness (Crop Sustainability) with Lower Dose of Novcom Compost Application - indicator of higher carbon offsetting

Most Important and significant impact of Novcom compost towards offsetting of carbon is related to post soil application effectivity both in terms of soil development and crop Sustainability.

Number of studies showed that post soil application of Novcom compost with lesser dose (in terms of nutrition equivalency of chemical fertilizer) sustained / enhanced crop productivity.

In West Jalinga T.E. Crop productivity was sustained with only 1/3rd of Novcom compost Application (in terms of nutritional requirement) without any negative impact on soil nutrient balance sheet. Similar observation was also documented under FAO-CFC-TBI Project (2009-2011).

In Agriculture, a number of case studies in cereals, pulses and vegetables done by the State and Central Agricultural Universities, ICAR Institutes (Nadia & Howrah KVK) also documented yield sustainability under application dosage of Novcom compost (in terms of nutrition equivalency of respective recommended chemical fertilizer). This was in stark contrast to the available data of yield loss under conventional compost application even with equivalent nutritional requirement.

Enhancement of Crop Productivity contributes to Carbon Offsetting

1.65 to 1.80 Kg of CO₂ is tapped through photosynthesis for production of 1 kg biomass

Reduces the requirement of 1 Kg N fertilizer (Ex. Urea) that offsets 11.19 kg CO₂ equivalent.



Post Soil Application Effectiveness in terms of Soil Rejuvenation - indicator of higher carbon offsetting

Number of studies already documented the post soil application impact of Novcom compost on soil rejuvenation both in terms of soil fertility and microbial population.

Enhancement of soil microbial population not only helped in crop sustenance but also helped in soil atmospheric-N fixation, maintenance of soil nutrient balance sheet and most importantly enhanced soil carbon sequestration.

No of studies showed post application of Novcom compost, soil microbial pollution enhance 100 to 1000 times . Specially in W.Jalinga T. E., soil microbial population enhanced from $10^5 - 10^6$ c.f.u to 10^8 c.f.u.

Significant improvement of soil microbial population after 3 years continuous application of Novcom compost was also documented under FAO-CFC-TBI Project.

A long term Study in Jena, Germany (Prommer et al, 2019) conclude that faster rates of microbial growth and turnover, resulting in higher amounts of microbial biomass and necromass that translate into the observed increase in Soil Organic carbon (SOC) Crop Sustainability and Soil Rejuvenation are the two sides of a same coin

Soil Microbial Rejuvenation is directly proportionate to the rate of Soil Carbon Sequestration

Post Soil Application Effectiveness in terms of increase of soil Organic carbon Stock - indicator of higher carbon offsetting

Study of the Temporal variation of soil organic carbon stock under Inhana Rational Farming (IRF) at Maud T. E. from 2009 to 2012 under FAO-CFC-TBI Project showed significant enhancement of soil carbon stock with application of Novcom compost. Upliftment in soil organic carbon stock might not only be due to net carbon gain following adoption of a new management practice but also due to reduced carbon loss if with previous compared conventional organic practice.

Temporal variation of soil organic carbon stock under Inhana Rational Farming (IRF) at Maud T. E. from 2009 to 2012 under FAO-CFC-TBI Project.





Fig. 153: Spatial distribution of soil Org. C stock before project initiation in 2009.

Fig. 154: Spatial distribution of soil Org. C stock post experiment in 2012.

Post Soil Application Effectiveness in terms of increase of Soil carbon Sequestration even in Conventional Tea cultivation framework - indicator of higher carbon offsetting / 1

A case Study from Lakhipara T.E., India

To study the impact of Inhana Sustainable Tea Initiative on the soil carbon sequestration, the soil organic carbon stock up to the major root zone (0 to 50 cm) were evaluated for the different treatment plots, in 2014 and again in 2017 i.e., after the end of the harvesting period. The study revealed about 6.72 % in the soil organic carbon stock (7370 kg/ha in 2014) in the project area by 2017, the value figuring at 7865 kg/ha.



Comparative change of soil organic carbon stock in pre & post experimentation under different soil management protocol using Novcom compost.



Post Soil Application Effectiveness in terms of increase of Soil carbon Sequestration even in Conventional Tea cultivation framework - indicator of higher carbon offsetting / 2

A case Study from Lakhipara T.E., India

organic However soil carbon sequestration rate was higher in both Organic and r integrated soil management with application of Novcom compost, indicating the importance of enhance soil microbial activity towards improving the rate of soil organic carbon sequestration. Compost provide a continuous mass and an energy flow that release organic compounds to stimulate the soil biota biodiversity and the soil organic matter (SOM) changes (Uphoff et al., 2006; Six et al., 2006; Séguy et al., 2006).



Soil Organic Carbon Sequestration Rate (ΔSOSR) under different soil management with Novcom Compost at Lakhipara Tea Estate, Dooars, West Bengal.

CARBON OFFSETTING EFFICIENCY: Comparative

Study of Vermi compost, Novcom compost & FYM



than vermi compost

NOVCOM Compost Best Exogenous Soil Inoculation With : HIGHEST CARBON MITIGATION Effectency

CARBON MITIGATION EFFICIENCY: Comparative Study of Vermi compost, Novcom compost & FYM



NOVCOM COMPOST – Miles ahead in ALL Sector

- **1.Biodegradation (process) Efficiency**
- **2. Recovery Efficiency**
- **3. Microbial Efficiency**
- **4.Urea Offsetting Efficiency**
- **5. Nitrous Oxide (N₂O) Abatement Efficiency**
- **6.Carbon Sequestration Efficiency**
- **7. Total Carbon Mitigation Efficiency**
- 8. Efficiency of per unit Carbon Mitigation Cost



NOVCOM COMPOST - BEST SOIL INOCULATION towards Highest GHG Mitigation



The Potential of Novcom Compost towards Reduction of Agricultural GHG's is UN-DEBATED

In the pretext of **Reduction of the GHG Emission**, Novcom Composting Technology is perhaps having the **highest CARBON MITIGATION**, **SEQUESTRATION AND ABATEMENT POTENTIAL of about 0.7 MT CO₂e/ton Novcom Compost**, which is **2-4 times higher** than other composts.

Simultaneously, continuously application of Novcom Compost, due to its very rich microbial diversity, ensures significant improvement of carbon stock of the soil.

Addition of 10 Billion Trillion Self-generated Microbial Population / per ton NOVCOM Compost

10000 times higher Microbes Addition /ton of NOVCOM Compost



Novcom compost : Validation in Field

- 1. More than 60 research paper published in National and International Research journals.
- 2. Presented in more than 15 National and International seminar/conference
- 3. More than 12 MSc programs in Calcutta University and Visva Bharati University.
- 4. Practiced in more than 15 tea estates
- 5. Used in World's 1st Carbon Neutral Tea Estate
- 6. Used in FAO-CFC TBI Project (2008-13)
- 7. Used in NABARD funded Farmers program
- 8. Used in more than 50 FLD programs by different KVKs, ICAR





mied out at Maud tea estate (Assam) during 2008-2009 and 09-2010. Generation of high temperatures (>65 ° C) within the compost heap during the riodegradation process provided an indication regarding the destruction of pathogens and weed seeds

n the composted material. The most significant finding was the high microbial population (in the order of 10¹⁴cfu /gm) in the final product, which was generated naturally during biodegradation. Assessment of the naturity and stability parameters of the compost indicated that biodegradation was complete in 3 weeks. The study provided an indication of the potential of the <u>Novcem</u> composing method for the predaction of good abity, stable and mature compost, within a short period.



A.Das¹, R.K. Sarkar², and A.K.Dolui² nomy, Calcutta University, India atry & Soil Science, Calcutta Univer Key Findings: End product quality of different biodezradan Indimension and

tal NPK percent (9.33%), to ndex (13.3% high CQ16.03). Soil Develo

umElo Crop and Wood 1): 60-64 (2012) aluation of On- farm produced Novcom Compost ality and its Post Soil Application Effectivity in Acid Tea Soils – A Case Study from West Jalinga Tea Estate, the Largest Organic Tea Estate in Assam, India.

But get of games, the Longen microsom, passes B. Ben, A. Dens, A. M. Delli, S. Charnes, V. K. Beler, V. <u>Emperit, J.</u>, Palaratharya And A. Sai <u>Homes Residence, Filler and Approximation and Apple of Constructions and Apple (Dense, Filler Berger, Warner, John (Dense, Gamesmer, Stathard, Constructions, India (Dense of Aproximant Estimation), and a "Dense of Approximation International States (Dense of Apple Constructions)." A second state of Constru-tions of Constructions, Construction, States (Dense of Constructions). States (Constructions), States (Dense of Constructions), States (Construction), States (Dense of Constructions). States (Construction), States (Dense of Construction), States (Construction), States (Construction), States (Construction), States (Construction), States (Dense of Construction), </u>

Findings: A study was conducted during 2010 – 2011 at Ganila nuncipality in coordination with North reackgore Manicpality. West Bengal to evaluate a new biologradation process called <u>'Novcem</u> composing thed' for management of municipality solid waste (ASW). arrackpore Municipality,

During composting process >65% temperature generated within compost heap for more than 3 cor training competing process voice impression generations within compositioning to interesting references with any ensures the absence of any pathogenic microcognitions. Final composit samples were stable (CO2 volution rate 2.15 mgCO2 - Cig OM.day), mature and free from any phytoxicis effect (G0 varied within 0.76 - 0.94). Moderately high mutrient content (mean N, P and K status 1.38, 0.79 and 0.67 percent respectively). with moderately low CN ratio (ranged from 13 : 1 to 16 : 1), and high microbial population in terms of total facteria, fingl and <u>action provents</u> (in the outer of 10¹⁶ to 10¹⁶ <u>cful</u>) of the final compos sample conclusively proved good quality compost on the generated from municipality solid waste using fits composing method.



Inatian Agriculturus, 2012, Volume 56 No. 1 & 2, Page 971-78 Evaluation of a New Biodegradation Process and its End Product Quality Assessment for Organic Soil Management R. Beral, A. Seall, A.K. Dolui2, A.K. Chamerjee4, R.K. Sarkar3, A. Duna, G.C. Def, A.K. Baris4 and D. Majumder4 (Soil Science, Pirva Bharati Univ

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> > oil effectivity.

rent quality parameters viz. p ad phytotoxicity. The analytical s n-farm produced Novcom Compost Quality and its Post Effectivity in Aad Tea Sods – A Case Study from West See, the Largest Organic Tea Estate in Assam, India. ndicating the possibility of obtain rugh this new biodegradation pr the high microbial population in o

ers, A. Seal, A. Datta, S. Saba, A.K. Dolm, A.K. Chatteries, A.K. Barik, G.C. De and D. Majoundar Intern Organic Research Foundation (ODF), West Bengal, India Dept. of Soil Science, Virva Bhare Dept. of Agronomy, Virva Bharat Dept. of Statistics, Bideat Chandra N

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Key Findings: Novem composing methods being used for on-fam production of compost at We Jalinga Tea Estate (presently largest certified organic tea estate in Assam, India).

Soil microbial population increased by 1,000 to 10,000 times, apart from significant increas-recorded in case of soil organic carbon (49,4%) and soil fertility (Available-N: 13,6%, P2O5 5.8% and K2O 9.5%). The study revealed that <u>Novcom</u> composting method could serve as an alternate option for production of good quality on-farm compost in order to enable effective od nanagement Recent. Adv. Agr., 2014, 2(2): 181-191



Assessment of Novcom Composting Method as an Effective Bio-Degradation Process and its Impact on Acid Tea Soils under Various Management Practices. ¹Dolai A. K., ²Banerjee S., ⁷Bera R., ⁴Datta A., ⁴Saha S. and ⁴⁴Seal A. epertneet of Agricultural Oneniesy and Sol Science, Institute of Agricultural Science, Calcuta University, 15 Bablygang Creatur Road, Kalkara - 20019, West Bengd, India ¹⁶¹⁹ Intiana Organic Research Foundation (2007), 193 Judgue Park, Kalkara - 20008, West Bengd, India

Key Findings: End product quality of Novcom composting method and its post soil application effectivity in tea garden soils following organic and chemical management practices; was evaluated during

compost produced in the three different tea estates were found to be of good and ely good quality as indicated by their Quality Index. (CQI). Post application of compost i rend of soil quality especially in terms of soil microbial population was not ee tea estates. Assessment of the degree of soil development in these tea estates in ent Index (SDI) indicated positive influence of compost application on soil qu

THANK YOU



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