

# Rapid Organic Waste Stabilizer (ROWS)

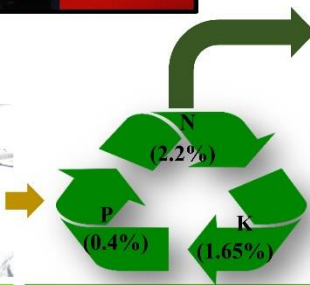
IN Patent No. 373169

*A Novel Technique for the Rapid Conversion of Solid Organic Waste into Nutrient Rich Organic Fertilizer*

Solid Organic Waste (SOW)



Soil Conditioner (Within 4 Hours)



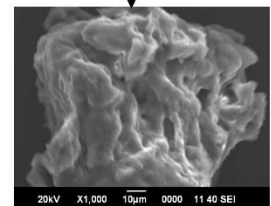
Recycling of Nutrients

Characterization & Maturity Assessment of the Soil Conditioner

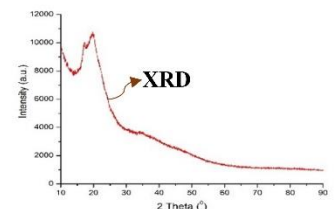
Seed Germination Assay



Instrumental Characterization



SEM



**Salient features of this technique:**

- Rapid Composting (within 4-6 hours).
- Onsite volume reduction of the SOW (>80%).
- Eco-friendly modular plant well suited for residential societies, hotels, restaurants, mess, municipalities of big cities and metros.



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## **Introduction:**

Accelerated growth in urbanization and industrialization in concurrence with lack of awareness and non-availability of suitable technologies has led to generation of huge quantities of municipal solid waste (MSW). The management of MSW is considered an important public health, economic and environmental concern, especially in developing countries. Presently, India is generating about 64 million tonnes MSW per year, which is expected to increase to 165 million tonnes by 2031. Compositional analysis revealed that solid organic waste (SOW) constitutes to about 40 - 60% of the total waste generated from the society. Nowadays, there is a paradigm shift towards looking at SOW, and it is globally recognized as resources than the waste. The nutrient contents such as nitrogen (N), phosphorus (P), and potassium (K) in the SOW make it an ideal feedstock for producing organic fertilizer. The traditional biological conversion techniques require months of time for completing the humification process. In this context, thermal digestion offering quick removal of moisture, eliminating the pathogens and converting organics to produce nutrient rich end product, could prove to be a viable technique.

The **Swachh Bharat Mission (2.0)**, under the aegis of the Ministry of Housing and Urban Affairs (MoHUA) encourages the bulk waste generator to use mechanized organic waste composter to promote decentralize treatment of the waste. This invention i.e., the rapid organic waste stabilizer is also in line with the GoI regulatory framework “**Solid Waste Management Rule, 2016**” which instructs waste generators to adopt suitable technique(s) to modify the physical, chemical, or biological characteristics of any waste to reduce its volume, potential to cause harm, and minimize the burden on landfill.

## **About the Technology:**

The working of the rapid organic waste stabilizer (ROWS) is based on novel thermal digestion technique in which the waste is shredded into a particle size < 10mm and then uniformly heated at a temperature around 150°C through convection mode of heating. This process digests the organics and converts the nutrients into a simpler and plant available form which can directly be used for agricultural purposes. ROWS takes around 4 - 6 hours to convert the solid organic waste into a completely dried nutrient rich end product of powder form consistency. Around 20 - 25 kg of organic fertilizer could be produced by feeding 100 kg of the SOW.

### Characteristics of the Organic Fertilizer:

The detailed fertilizing characteristics of the organic fertilizer generated from the process (Fig.1), is given in Table1. The total NPK value of the organic fertilizer is much higher than the standard recommended values required for organic fertilizer (FAI, 2019). Moreover, a lower C:N ratio revealed the maturity of the fertilizer.

**Table1:** Fertilizing characteristics of the end product

Characteristics	Values* (ROWS)	Standard Range (Patwa et al., 2020)		Recommended values, FAI (2019)
	End product (Digested)	Windrow composting	Vermi composting	
pH (1:10)	6.62±0.07	nm	nm	6.5 to 7.5
EC (mS/cm)	3.70±0.05	nm	nm	<4
Bulk density (g/cm <sup>3</sup> )	0.78±0.02	nm	nm	<1.0
C (%)	35.20 ± 0.16	nm	nm	Minimum 12%
Total N (%)	1.86±0.03	1.0 - 2.0	1.0 - 2.5	nm
P as P <sub>2</sub> O <sub>5</sub> (%)	0.42±0.01	0.2 - 1.0	0.6 - 1.8	nm
K as K <sub>2</sub> O (%)	1.62±0.02	2.0 - 3.0	1.0 - 1.3	nm
Total NPK (%)	3.90±0.04	nm	nm	Minimum 1.2%
C:N	18.92±0.39	18 - 25.5	14 - 21.6	<20:1
Ca (mg/kg)	126.75±0.27	nm	nm	nm
Na (mg/kg)	135.43±0.26	nm	nm	nm
Mg (mg/kg)	187.42±0.32	nm	nm	nm

\*Values represented as mean ± S.D; (nm): not mentioned



**Fig.1:** Organic fertilizer generated from ROWS

## **Salient features of the ROWS:**

- Rapid treatment of the solid organic waste (within 4 - 6 hours).
- Onsite reduction in the waste volume (>75%)
- Produces soil conditioner rich in macro and micro nutrients.
- Requires less space and ease in operation.
- Requires minimal maintenance.
- No effluent is generated during the process.
- Eco-friendly modular plants can be designed for various capacities as per the end user's requirement.

## **Well suited for:**

- Apartments & Residential Societies;
- Hostels;
- Hotels, restaurants, canteens, mess;
- Vegetable & fruit/Meat markets;
- Agricultural waste;
- Municipalities & *Nagar Palikas* of big cities and metros.
- Bio reclamation of degraded lands.