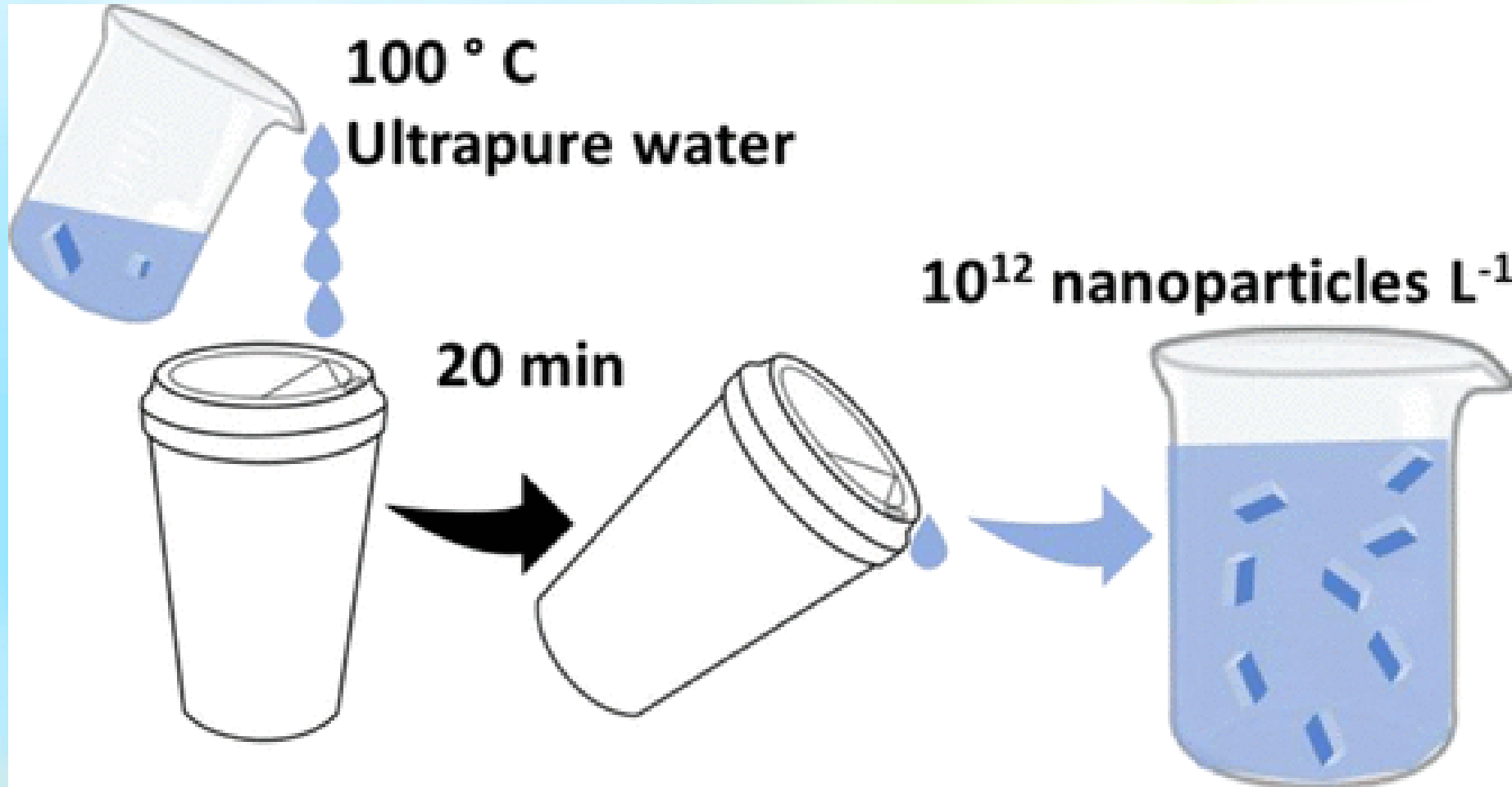
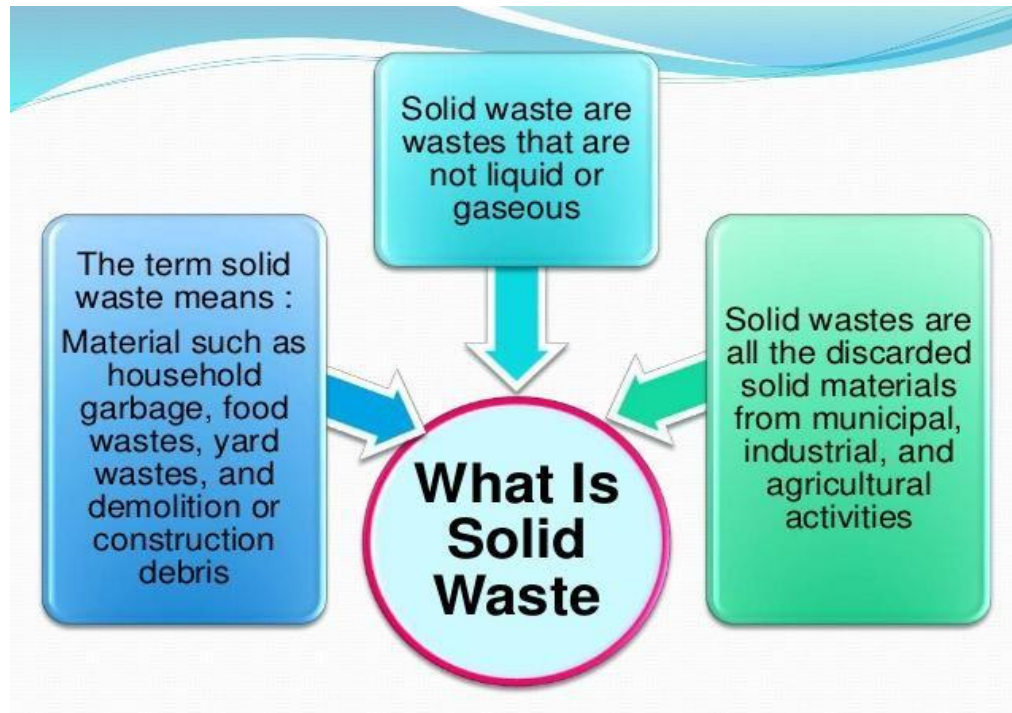


Zero Waste Houses

Prof Rakesh Sharda
Project Coordinator
AICRP on PEASEM
ICAR-CIPHET Ludhiana



Solid Waste Management



Solid waste is the unwanted or useless solid materials generated from human activities in residential, industrial or commercial areas



Solid Waste Management involves segregation, storage, collection, transportation, processing and disposal of solid waste

Solid waste - Problems

170K

Tonnes of waste
generated daily across
India

~50%

Of collected waste
currently treated or
processed

\$7.85B

India municipal SWM
market size in 2025

165 MT

Projected annual waste
generation by 2030

Change (SWM-2026)



Wet Waste

Kitchen waste, vegetable peels, fruit scraps, meat, flowers. Processed via composting or bio-methanation at nearest facility.



Dry Waste

Plastic, paper, metal, glass, wood, rubber. Routed to Material Recovery Facilities (MRFs) for sorting and recycling.



Sanitary Waste

Diapers, sanitary towels, tampons, condoms. Must be securely wrapped and stored separately.



Special Care Waste

Paint cans, bulbs, mercury thermometers, expired medicines. Collected by authorised agencies at designated centres.

4 Bin Segregation



WASTE MANAGEMENT AT HOME

FOLLOW **4 BIN SYSTEM** AS PER SOLID WASTE MANAGEMENT RULES, 2026 (INDIA)



CLEAN INDIA
GREEN INDIA



Effective from **1 April 2026**

Segregate Waste • Protect Environment • Build a Better Tomorrow

1. GREEN BIN WET WASTE (BIODEGRADABLE)

Includes:

- Kitchen waste
- Food leftovers
- Vegetable peels
- Fruit scraps
- Meat waste
- Flowers



PROCESSING:



Composting
at home



Bio-methanation
at nearest facility

2. BLUE BIN DRY WASTE (RECYCLABLE)

- Plastic (bottles, wrappers, containers)
- Paper & cardboard
- Metal (cans, foil)
- Glass (bottles, jars)
- Tetrapacks



WHAT TO DO:
Keep clean & dry.
Sent to Material
Recovery Facilities
(MRFs) for recycling.

3. RED BIN SANITARY WASTE

- Diapers
- Sanitary pads
- Tampons
- Condoms
- Nappies



IMPORTANT:
Wrap securely in
paper or bag.
Label if possible.
Do NOT mix with
other waste.

4. ORANGE BIN SPECIAL CARE / HAZARDOUS WASTE

- Used/expired medicines
- Batteries, cells
- CFL bulbs, tube lights
- E-waste (chargers, small electronics)
- Paints, chemicals, aerosols
- Thermometers, medical waste



WHAT TO DO:
Store safely.
Do NOT mix with
other waste.
Dispose through
authorised collection
points / special drives.

PROCESSING:



Composting
at home



Bio-methanation
at nearest facility



WHAT TO DO:

Keep clean & dry.
Sent to Material
Recovery Facilities
(MRFs) for recycling.

IMPORTANT:



Wrap securely in
paper or bag.
Label if possible.
Do NOT mix with
other waste.



WHAT TO DO:

Store safely.
Do NOT mix with
other waste.
Dispose through
authorised collection
points / special drives.

Wet Waste Management

Bioenzyme

Compost

How to Make Bio-Enzyme

Bio-Enzyme Ready to use

Orange, Lemon, any Citrus Peel
300g or 3 parts

Jaggery
100g or 1 part (best powdered)

Water
1000ml (1lit) or 10 parts

A pinch of yeast -
(optional ingredient)

Don't fill to the brim

Strain to separate pulp and liquid

Mix together and keep away from direct sunlight for 3 months (or 1 month if using yeast) - each day opening ones

By Nina Sengupta



ORGANIC MATERIALS USED FOR BIOENZYMES

- Citrus peels, pomace
- Kinnow Droppings
- Neem leaves
- Neem fruits
- Moronga leaves
- Curry patta
- Flowers like Rose, Marigold
- Fruit Peels
- Vegetable leftovers
- Pulp of fruit juice



HOW TO PREPARE BIOENZYMES?

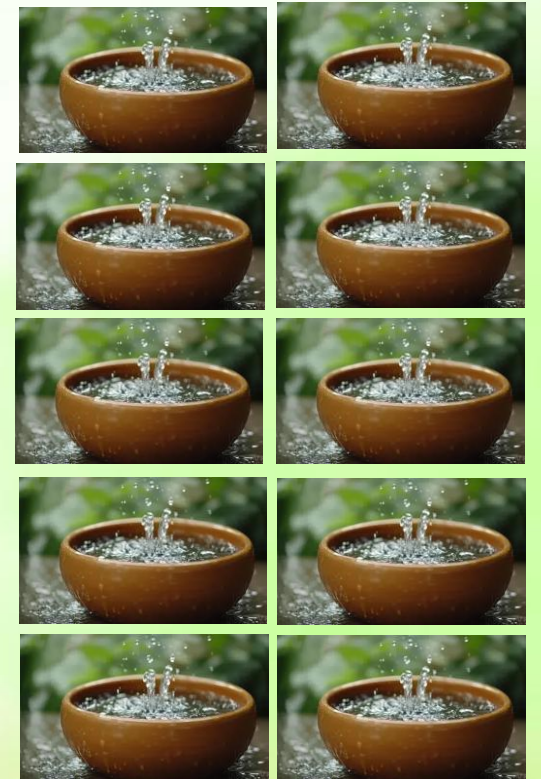
Formula is
1:3:10



One part jaggery



Three parts peels



Ten parts Water

Containers to be used





Day 1



Day 35



Day 70



Day 90



Decant the liquid, and your Bioenzyme is ready to use

Microbiological richness, quality and safety of Bioenzyme

S.No.	Bacterial composition of Bioenzyme	Bacterial count (Log ₁₀ CFU/ml)
8	<i>Escherichia coli</i>	Absent
9	Total coliforms	Absent
10	Faecal coliforms	Absent
11	<i>Staphylococcus aureus</i>	Absent
12	<i>Proteus mirabilis</i>	Absent
13	<i>Klebsiella pneumoniae</i>	Absent

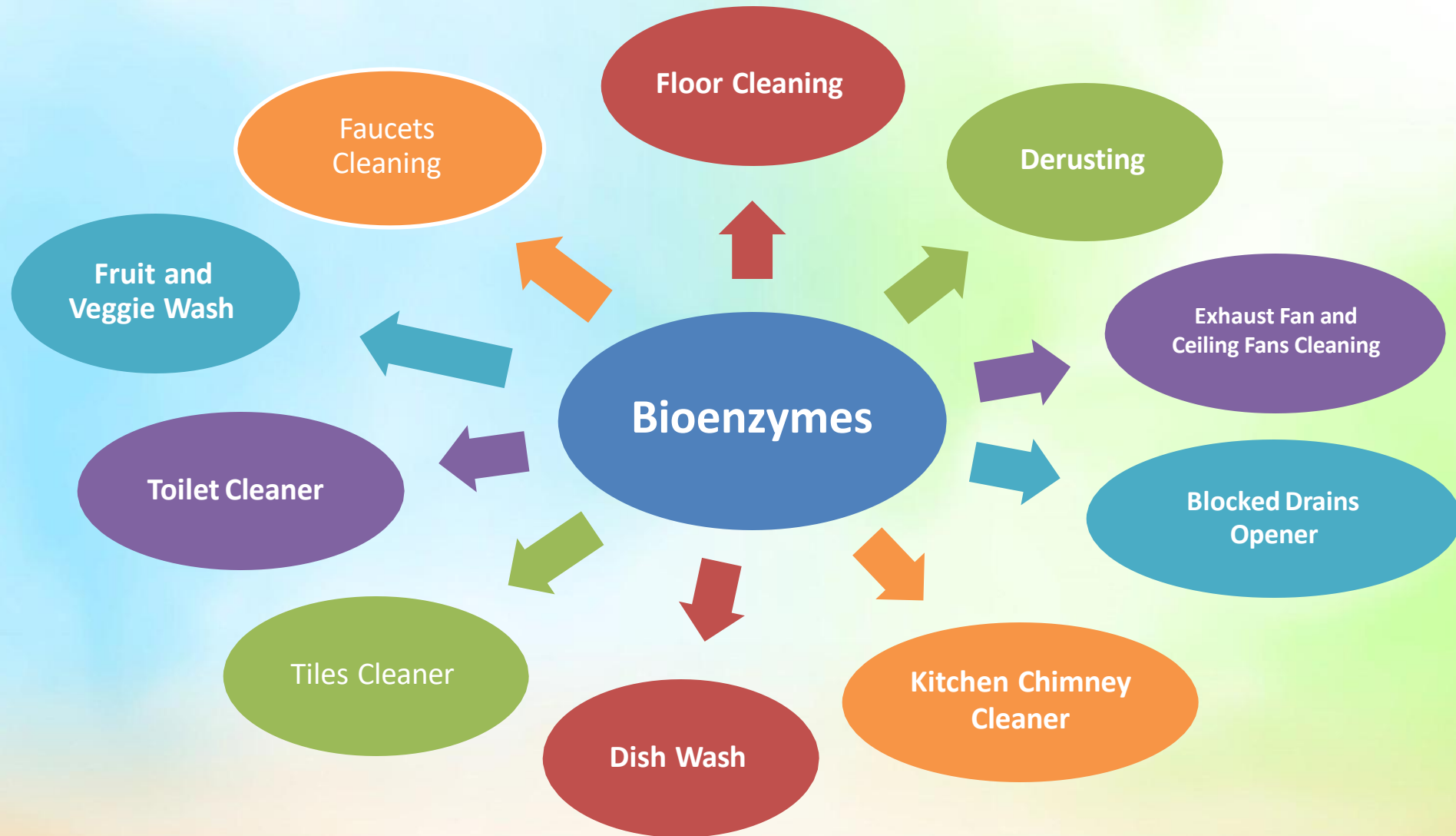
Fungal growth inhibition

Fungal Cultures	Microbial Growth Inhibition Zone Diameter (mm) as influenced by concentration of Bioenzyme			
	Control	0.1ml	0.5ml	1ml
<i>Sclerotinia sclerotiorum</i>	34±2.56	15±1.13	No growth	No growth
<i>Fusarium oxysporum</i>	27±2.04	12±0.91	12±0.70	No growth
<i>Sclerotium</i>	56±4.22	41±3.09	36±2.72	No growth
<i>Rhizoctonia solani</i>	80±6.03	30±2.26	30±2.26	No growth

Fungal growth inhibition

Fungal Cultures	Microbial Growth Inhibition Zone Diameter (mm) as influenced by concentration of Bioenzyme			
	Control	0.1ml	0.5ml	1ml
<i>Pleurotus ostreatus</i>	46±3.47	No growth	No growth	No growth
<i>Aspergillus oryzae</i>	Profuse growth	Less growth	Poor growth	Limited growth
<i>Aspergillus sp.</i>	Profuse growth	Good growth	Less growth	Poor growth
<i>Alternaria gosypium</i>	Profuse growth	Less growth	Poor growth	Limited growth

APPLICATIONS



HOME CARE BIOENZYME FORMULATIONS

Shampoo and soaps (after adding amla, shikakayi, soapnut)

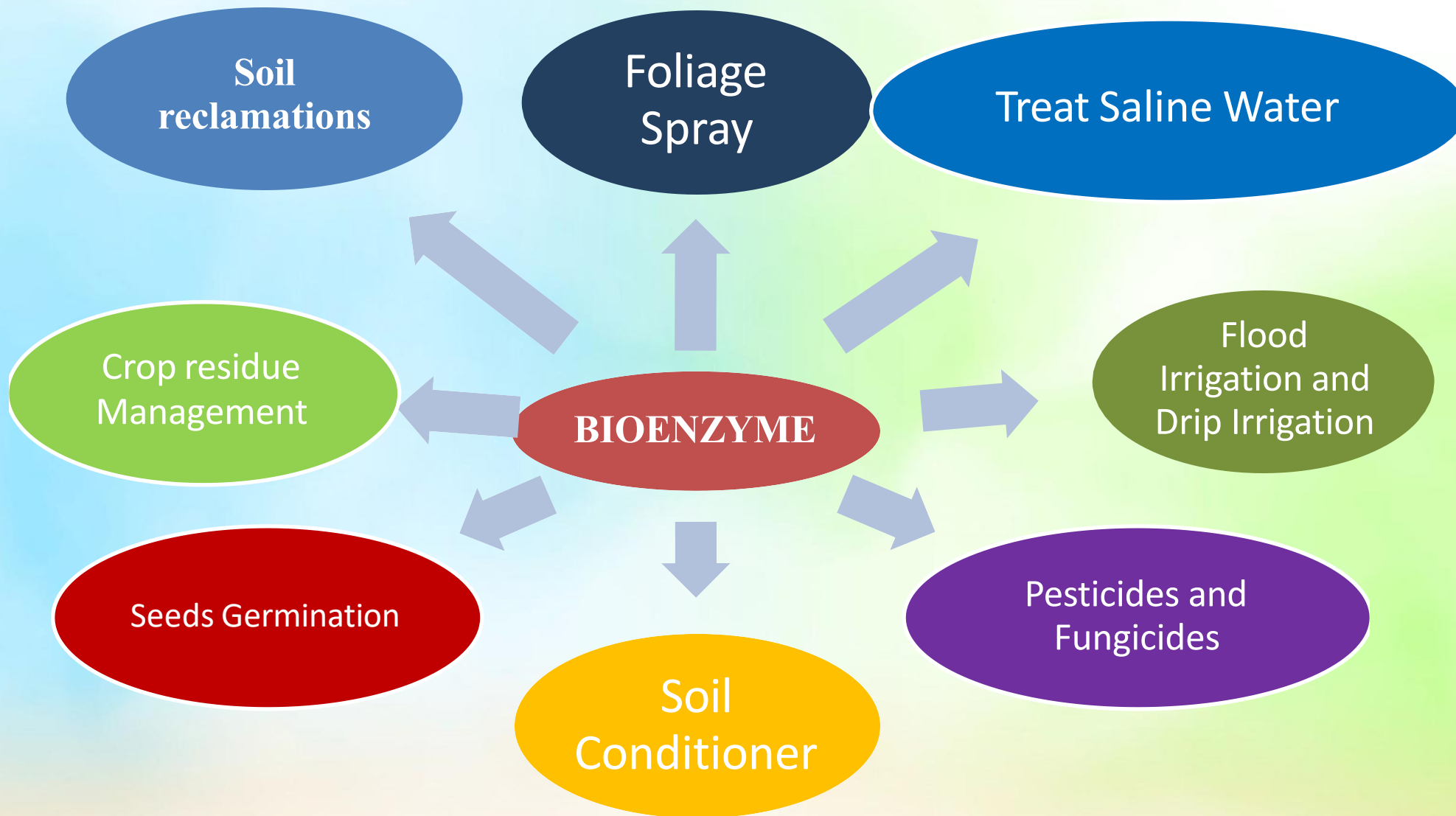
Handwash (after adding essential oils, tulsi-neem extract)

Liquid Detergents

Disinfectants and mosquitos, Flies repellents

Car, dish wash (after adding soapnut/reetha

KITCHEN GARDEN AND AGRICULTURE



FRUIT AND VEGGIE WASH

Soak vegetables/fruits into water together with 2 spoon of bioenzyme for 30 mins, it will remove Microbes from vegetables. It will enhance the taste of food.



Removal of scaling from granite surface and Metal cleaner

BEFORE



AFTER



WASHING OF CLOTHES



Waste water treatment with Bioenzyme



COST COMPARISON

Cost of Kinnow bioenzyme /litre	Rs. 19.30/-
Cost of Harpic / litre (Inorganic cleanser)	Rs. 200/litre
Cost of Satopardhan Bioenzyme cleanser (280/700ml)	Rs. 400/litre
Cost of Relive Nature Bioenzyme cleanser (159/500ml)	Rs. 318 / litre



Bioenzyme based home care products:
production technology and characterization
309th REC meeting held on 8.10.2025)



Preparing Compost From The Kitchen Waste



Kitchen waste



Leaf Litter



Bioenzyme

30 kg COMPOST BIN – LAYERING METHOD

Turn your kitchen waste into natural compost!

BIN SETUP



- ✓ Use a 30 kg capacity bin with lid
- ✓ Make small holes at the bottom for drainage
- ✓ Add ventilation holes on the upper sides for airflow
- ✓ Place the bin on bricks/stand for proper air circulation

INSTRUCTIONS

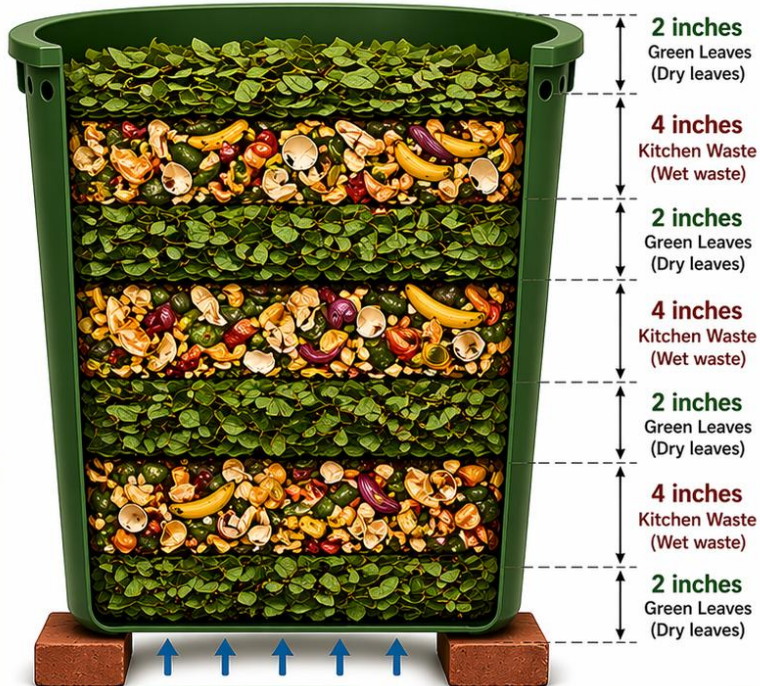
- ✓ Add waste in thin layers daily.
- ✓ Cover each wet layer with dry leaves.
- ✓ Maintain proper moisture (not too wet, not too dry).
- ✓ Keep the bin covered but ventilated.
- ✓ Turn or mix the contents once in a week.

BENEFITS

- Produce natural compost (manure)
- Reduces household waste
- Eco-friendly and sustainable
- Improves soil health and plant growth

LAYERING PATTERN

Repeat this pattern till the bin is full
(Leaves → Waste → Leaves → Waste ...)



AIR VENTILATION

Air enters through upper side holes and bottom space for better oxygen supply and faster composting.

TIME REQUIRED

Compost will be ready in
30-35 DAYS

QUICK GUIDE

- 2 inches = Green Leaves (Dry leaves)
- 4 inches = Kitchen Waste (Wet waste)

Bioenzyme solution for speeding up the process of composting

- ✓ One litre bioenzyme
- ✓ 2 kilo gram of jaggery
- ✓ 20 liters of water
- ❖ Place it in the sun shade for one week
- ❖ After every seventh day sprinkle it on the compost bin.
- ❖ Take it out from the bin
- ❖ Let it dry under the shed
- ❖ If you want to sell it sieve it and pack it and you can sell in retail at 2Rs. 25 per kg
- ❖ Your compost will be ready in 30-35 days

Good layering + Air + Moisture = Fast compost in 30-35 days!

Dry Waste Management - Segregation of Single Use Plastic at Home



- Do you throw a polythene in the garbage?



Cutting down the Plastic Footprint

Dry Waste Management - Ecobricks

Ecobrick is a Plastic bottle packed with clean and dry used or single use plastics like polythene, packaging plastics, and small pieces of plastics.



Polythenes take more than 500 years to degrade. Beaches of the Indian ocean are polluted with Polythene and Single-use plastics. 1 lakh aquatic animals & nearly thousands of animals die every year because of polythenes.

How to make an Eco-brick



Step 1

Find a plastic bottle

Find any used/ waste plastic bottle of 200ml/500ml/1 lit. wash and dry it.

(Basically any bottle of varying capacity and shape can be used.)



Step 2

Collect Plastic waste

Collect all kinds of single use plastic waste coming to your house. Wash and dry it if necessary. If the polythene size is big then cut strips for ease.



Step 3


Stuff the bottle

- Stuff all the plastic waste into the bottle. Make sure you compress it completely with a stick.
- Approx 350 gm plastic can be stuffed into a 1 lit capacity bottle.



Ecobricks - Application



The Plastic Solution

ECOBRIK DONATION GUIDELINES

Average sizes of bottles and their ideal weight in grams

250mL	= 100 grams
500mL	= 180 grams
600mL	= 200 grams
1L	= 350-370 grams
1.5L	= 500 grams
2L	= 640-650 grams



Ecobricks - Benefits

- **Source separation of single use plastic.**
- **Reducing pollution of land and water.**
- **It is easy to separate an eco-brick from waste rather than 100 plastic bags. So, you are also indirectly helping out the solid waste management workers.**
- **Polythene and plastic waste covering about 100sq.ft area can be stuffed in a 1 lit bottle .**
- **Even if you throw it in dustbin, you have saved lives of a few animals who would have been probably died after plastic consumption.**



Solid Waste and Water Pollution

300 Million
tons of plastic is
produced worldwide
and discarded
every year



90% of floating marine
debris is plastic

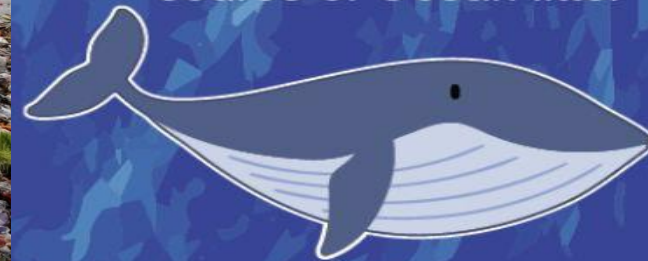
An illustration of a ship with a smokestack emitting smoke, and a whale swimming nearby.

By **2050**, there will be more
plastic in ocean than **FISH**

20 Million
tons of plastic reaches
the ocean every year



Plastic is the **largest**
source of Ocean litter



Source -<https://plasticwaste.github.io>

Water pollution due to solid waste is damaging the health of aquatic ecosystems

My Home



Plastic Segregation

Kitchen Waste Management





DOT & KEY
SKINCARE

boAt

CO-PRESENT

Jamna PAAR

SEASON 2

CO-POWERED BY

LinkedIn

DR. FIXIT

OFFICIAL TRAILER

amazon



MXPLAYER

Domestic Automated Watering System



Bhairo Munna Village, Near Kohara





CLEAN HOME
HEALTHY INDIA

CLEAN HOME, HEALTHY INDIA

OUR HOME, OUR RESPONSIBILITY



CLEAN INDIA
GREEN INDIA



MANAGE WASTE PROPERLY – KEEP YOUR HOME CLEAN!

1 GREEN BIN

WET WASTE (BIODEGRADABLE)

- Kitchen waste
- Food leftovers
- Vegetable & fruit peels
- Meat waste
- Flowers



PROCESS:

Composting at home /
Bio-methanation

2 BLUE BIN

DRY WASTE (RECYCLABLE)

- Plastic (bottles, wrappers)
- Paper & cardboard
- Metal (cans, foil)
- Glass



ACTION:

Keep clean & dry →
Send for recycling

3 RED BIN

SANITARY WASTE

- Diapers
- Sanitary pads
- Tampons
- Condoms



IMPORTANT:

Wrap securely and
keep separate

4 ORANGE BIN

HAZARDOUS / SPECIAL WASTE

- Medicines
- Batteries
- Bulbs, tube lights
- E-waste
- Chemicals



ACTION:

Dispose safely through
authorized collection



Reduces
landfill burden



Protects
environment



Improves
public health



Supports
recycling



Builds a
cleaner India



Use 4
separate bins



Educate
family members



Never
mix waste

WHY SEGREGATE WASTE?

START AT HOME



MY WASTE, MY RESPONSIBILITY

**Segregate Today,
Sustain Tomorrow!**





ਸਾਫ਼ ਘਰ
ਸਿਹਤਮੰਦ ਭਾਰਤ

ਸਾਫ਼ ਘਰ, ਸਿਹਤਮੰਦ ਭਾਰਤ

ਸਾਡਾ ਘਰ, ਸਾਡੀ ਜ਼ਿੰਮੇਵਾਰੀ



ਸਾਫ਼ ਭਾਰਤ
ਹਰਿਤ ਭਾਰਤ



ਕਚਰਾ ਠੀਕ ਤਰੀਕੇ ਨਾਲ ਸੰਭਾਲੋ - ਆਪਣਾ ਘਰ ਸਾਫ਼ ਰੱਖੋ!

1 ਹਰਾ ਡੱਬਾ

ਗੀਲਾ ਕਚਰਾ (ਜੈਵਿਕ)

- ਰਸੋਈ ਦਾ ਕਚਰਾ
- ਬਚਿਆ ਖਾਣਾ
- ਸਬਜ਼ੀਆਂ ਅਤੇ ਫਲਾਂ ਦੇ ਛਿਲਕੇ
- ਮਾਸ ਦਾ ਕਚਰਾ
- ਫੁੱਲ



ਪ੍ਰਕਿਰਿਆ:
ਘਰ ਵਿੱਚ ਖਾਦ ਬਣਾਓ /
ਬਾਇਓ-ਮੀਥੇਨੇਸ਼ਨ

2 ਨੀਲਾ ਡੱਬਾ

ਸੁੱਕਾ ਕਚਰਾ (ਰੀਸਾਈਕਲਯੋਗ)

- ਪਲਾਸਟਿਕ (ਬੋਤਲਾਂ, ਰੈਪਰ)
- ਕਾਗਜ਼ ਅਤੇ ਕਾਰਡਬੋਰਡ
- ਧਾਤੂ (ਡੱਬੇ, ਫੇਇਲ)
- ਕੱਚ



ਕਾਰਵਾਈ:
ਸਾਫ਼ ਤੇ ਸੁੱਕਾ ਰੱਖੋ →
ਰੀਸਾਈਕਲ ਲਈ ਭੇਜੋ

3 ਲਾਲ ਡੱਬਾ

ਸੈਨਿਟਰੀ ਕਚਰਾ

- ਡਾਇਪਰ
- ਸੈਨਿਟਰੀ ਪੈਡ
- ਟੌਪਾਨ
- ਕੱਡੇਮ



ਮਹੱਤਵਪੂਰਨ:
ਸੁਰੱਖਿਅਤ ਤਰੀਕੇ ਨਾਲ
ਲਪੇਟੋ ਅਤੇ ਅਲੱਗ ਰੱਖੋ

4 ਮੰਤਰੀ ਡੱਬਾ

ਖਤਰਨਾਕ / ਵਿਸ਼ੇਸ਼ ਕਚਰਾ

- ਦਵਾਈਆਂ
- ਬੈਟਰੀਆਂ
- ਬਲਬ, ਟਰੂਬ ਲਾਈਟ
- ਈ-ਵੇਸਟ
- ਰਸਾਇਣ



ਕਾਰਵਾਈ:
ਅਧਿਕਾਰਿਤ ਇਕੱਠ ਕੇਂਦਰਾਂ 'ਤੇ
ਹੀ ਨਿਪਟਾਰਾ ਕਰੋ

ਕਚਰਾ ਵੱਖਰਾ ਕਿਉਂ ਕਰੀਏ?



ਲੈਂਡਫਿੱਲ
ਘਟਾਉਂਦਾ ਹੈ



ਵਾਤਾਵਰਣ ਦੀ
ਰੱਖਿਆ ਕਰਦਾ ਹੈ



ਜਨਤਕ ਸਿਹਤ
ਸੁਪਾਰਦਾ ਹੈ



ਰੀਸਾਈਕਲਿੰਗ ਨੂੰ
ਬਫਾਉਂਦਾ ਹੈ



ਸਾਫ਼ ਭਾਰਤ
ਬਣਾਉਂਦਾ ਹੈ

ਘਰ ਤੋਂ ਸ਼ੁਰੂ ਕਰੋ



4 ਵੱਖ-ਵੱਖ
ਡੱਬੇ ਵਰਤੋ



ਪਰਿਵਾਰ ਨੂੰ
ਸਿੱਖਿਆ ਦਿਓ



ਕਚਰਾ ਕਦੇ
ਨਾ ਮਿਲਾਓ



ਮੇਰਾ ਕਚਰਾ, ਮੇਰੀ ਜ਼ਿੰਮੇਵਾਰੀ

ਅੱਜ ਵੱਖ ਕਰੋ,
ਕੱਲ੍ਹ ਸੁਰੱਖਿਅਤ ਬਣਾਓ!





स्वच्छ घर
स्वस्थ भारत

स्वच्छ घर, स्वस्थ भारत

हमारा घर, हमारी जिम्मेदारी



स्वच्छ भारत
हरित भारत



कचरा सही तरीके से प्रबंधित करें - घर को साफ रखें!

1 हरा डिब्बा गीला कचरा (जैविक)

- रसोई का कचरा
- बचा हुआ खाना
- सब्जी और फल के छिलके
- मांस आदि का कचरा
- फूल-पत्तियाँ



प्रक्रिया:
घर पर खाद बनाएं /
बायो-मीथनेशन करें

2 नीला डिब्बा सूखा कचरा (रीसाइक्लेबल)

- प्लास्टिक (बोतल, रैपर आदि)
- कागज और गत्ता
- धातु (डिब्बे, फॉयल आदि)
- काँच की बोतलें और जार



कार्यवाही:
साफ और सुखा रखें →
रीसाइक्लिंग के लिए भेजें

3 लाल डिब्बा सैनिटरी कचरा

- डायपर
- सैनिटरी पैड
- टैम्पोन
- कंडोम



महत्वपूर्ण:
अच्छी तरह लपेटें
और अलग रखें

4 नारंगी डिब्बा खतरनाक / विशेष कचरा

- दवाइयाँ
- बैटरी
- बल्ब, ट्यूब लाइट
- ई-वेस्ट (इलेक्ट्रॉनिक कचरा)
- रसायन (केमिकल)



कार्यवाही:
अधिकृत संग्रहण के माध्यम से
सुरक्षित रूप से निपटान करें

कचरा अलग करने के फायदे



लैंडफिल का बोझ
कम करता है



पर्यावरण
की रक्षा करता है



सार्वजनिक स्वास्थ्य
में सुधार करता है



रीसाइक्लिंग
को बढ़ावा देता है



एक स्वच्छ और
सुंदर भारत बनाता है

शुरुआत घर से करें



4 अलग डिब्बों
का उपयोग करें



परिवार के सदस्यों
को जागरूक करें



कचरे को कभी
मिलाएं नहीं



मेरा कचरा, मेरी जिम्मेदारी

आज ही अलग करें,
कल का भविष्य संतारें!

