Sustainable Technologies for Environmental Remediation (STER)

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INZYMES INNOVATIVE ENZYMES GROUP

One WATER YORK U

AGRICULTURAL

MUNICIPAL

INDUSTRIAL

WASTES

WATER

DECONTAMINATION

CONTAMINANTS

CEC*

PFAS*

NUTRIENTS

6	1	7	15
C Carbon 12.011	H 1.0078 Hydrogen	N Nitrogen 14.00674	P Phosphorus 30.973762

ENZYMES

BIOENGINE

BIOPRODUCTS

- BIOFERTILIZER
- BIOPESTICIDES
- BIOSURFACTANTS
- BIOCLEANER

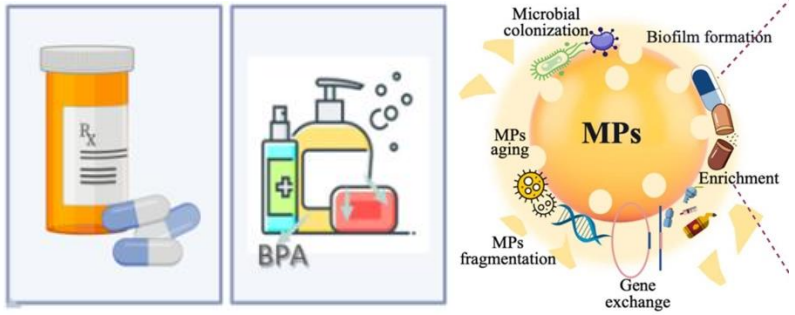
*PFAS - Polyfluoroalkyl Substances; CEC - Contaminants of Emerging Concern

Research Profile

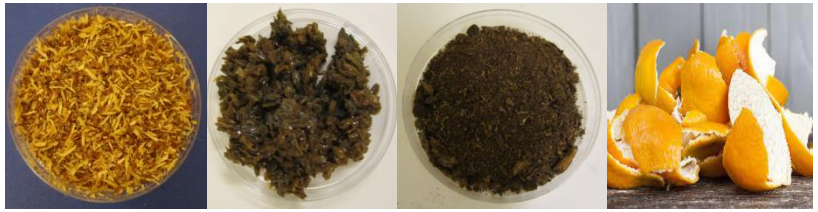
BENCH SCALE ACTIVATED SLUDGE REACTOR

BIOCOMPOSITES

EMERGING CONTAMINANTS



WASTE RESIDUES



VOLATILE FATTY ACIDS

PILOT PLANT

PFCAS

OIL TAILINGS

BIOREMEDIATION

- https://www.cbc.ca/player/play/video/1.5438201

Nature's Cleanup Crew: Alcanivorax

5 years ago | Documentaries | 6:32

One of the tiniest members of Nature's Cleanup Crew is alcanivorax, a bacteria that was discovered to digest oil. Microbiologist Satinder Kaur Brar has been studying this incredible species and putting it to good use, employing its enzymes to clean up oil in soil with hopes it can be used for giant oil spills in the future.

Focus Areas

Science	Technology	Policy
Bioremediation	Pilot-Scale Plants	Regulations
Resource Recovery	Patents	Transboundary water thresholds
Emerging Contaminants	Spin-off	

What do we do?

Waste to Valorization

1

WASTEWATER TREATMENT

2

RESOURCE RECOVERY

3

EMERGING CONTAMINANTS

4

LIFE CYCLE ANALYSIS

TECHNO ECONOMIC ANALYSIS

*Additional value to environmental research & technology

How we do?

RESOURCE RECOVERY

Food Waste → VFAs

Oil tailings → Critical Metals

Wood Residue → Lipids

WASTEWATER TREATMENT

Pretreatment

Nutrient Removal

Assimilation

Fermentation

EMERGING CONTAMINANTS

Fate

Transport

Removal

Microplastics

PFAS

LIFE CYCLE ANALYSIS

TECHNO ECONOMIC ANALYSIS

Scale up

*Additional value to environmental research & technology

So what?

Environmental Justice and Equity

- Affordable, modular water treatment
- Reaches marginalized, rural, and Indigenous communities
- Closes the gap in access to clean water

"No community should be left behind in access to clean water"

Innovation in High-Risk, High-Reward Science

- Targets hard-to-remove pollutants like PFAS
- Develops multifunctional systems: catalysis + microbiology + engineering
- Pushes boundaries of remediation science

"Bold, interdisciplinary solutions for persistent pollutants."

Global Sustainability and Circular Economy

- Uses green catalysts and waste-derived materials
- Reduces environmental footprint through biotechnology
- Aligns with SDG 6 & 12

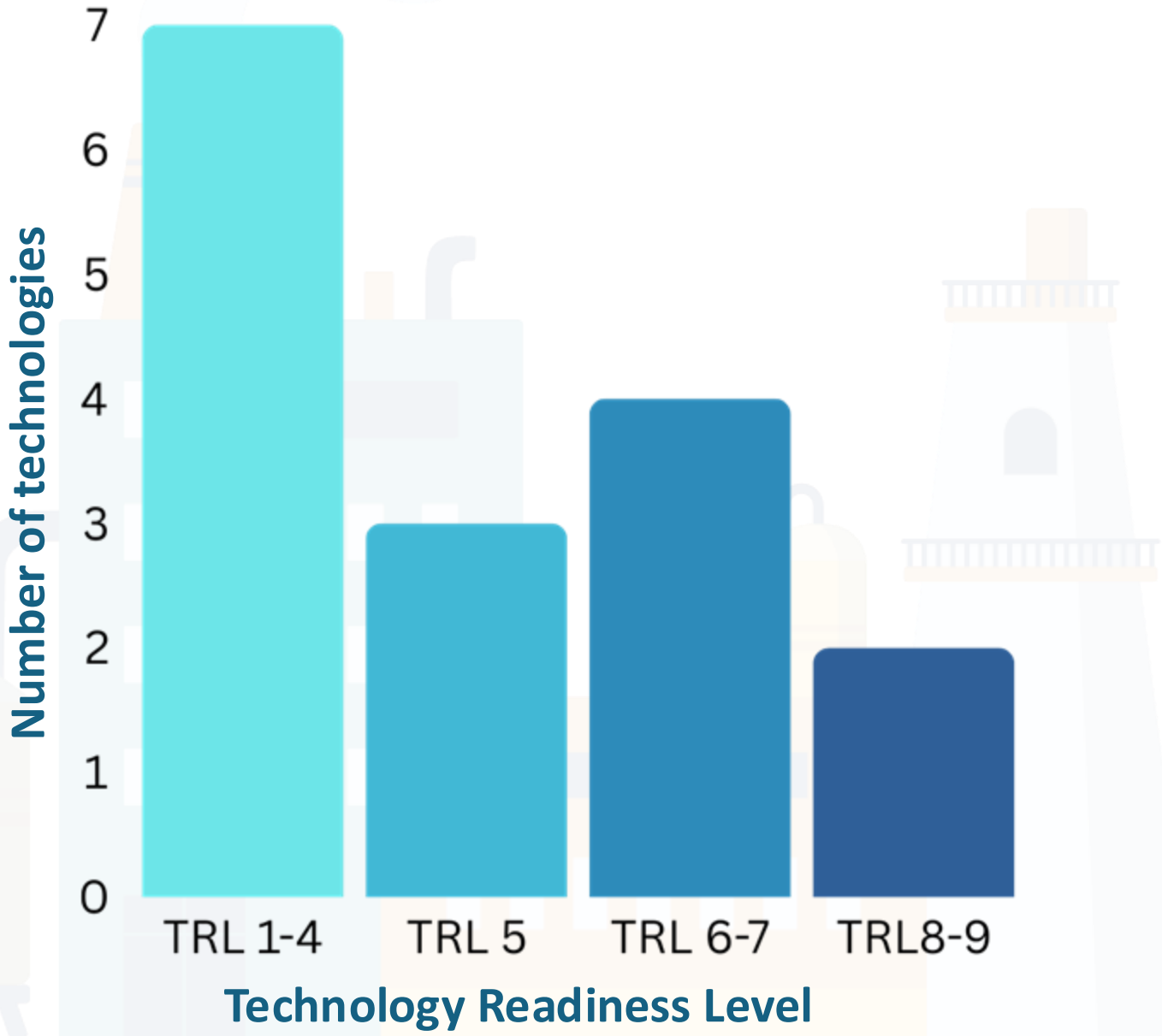
"Solving pollution without creating new waste."

Knowledge Transfer and Capacity Building

- Trains personnel in advanced environmental technologies
- Prioritizes equity-deserving groups
- Builds next-generation green engineering leaders

"Empowering diverse talent to solve global challenges"

Technology Progress



Acknowledgement

INRS Institut national de la recherche scientifique

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INZYMES INNOVATIVE ENZYMES GROUP

INNOVATION Canada Foundation for Innovation / Fondation canadienne pour l'innovation

ABES

One WATER YORK U

Environment and Climate Change Canada / Environnement et Changement climatique Canada

Fonds de recherche Santé Québec

Mitacs

NSERC CRSNG

James and Joanne Love Chair in Environmental Engineering

For more updates

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What does “clean” mean in an era of invisible pollutants?

Will policy catch up to pollution, or will science and engineering have to outpace both?

Can biotechnology turn pollution into opportunity without creating new risks?