

# **The Complete Book on Biological Waste Treatment and their Utilization**

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The organic waste stream is composed of waste of a biological origin such as paper and cardboard, food, green and garden waste, animal waste and biosolids and sludges. Organic waste is usually generated as a component of most waste streams. For information on the treatments for managing organic wastes click on the links to the right. Four significant components of this organic, biodegradable stream are from food preparation, agricultural production, livestock manures, and municipal sewage sludge. Organic waste from food sources includes vegetables, fruits, grains, meats, fish, dairy products, etc., and constitutes some 18% of the typical municipal organic waste stream. An average of 1 kg per person per day of organic waste is produced, originating from households, wholesalers & processors, restaurants, and institutions. Urban centers are the major generators of organic food waste. Agricultural waste includes waste made up of those materials such as manure and animal output, in either solid or liquid form from poultry or other livestock operations. It also includes harvest remains from grain, oilseed, vegetable, and orchard crops. Increase in biological waste has led to the increase in biological waste management technology. Waste management is the collection, transport, processing or disposal, managing and monitoring of waste materials.

The book includes organic waste for biological treatment, organic waste forms and treatment strategies, transformation of liquid manure into a solid, modeling of agricultural waste treatments, utilization of Indian waste in livestock feeds etc. This book also explains the different types of organic wastes like waste from tomato, jute, cotton, agro-industries, dehydration process of onion, piggeries, poultry, milk parlour etc. This book describes the methods how organic waste can be converted into useful products like oxalic acid, oxytetracycline, humic acids etc. The book is highly recommended to new entrepreneurs, existing units who wants to get more information of organic waste treatment.

## **1. Organic Waste for Biological Treatment**

Introduction, Physiological basis for Hazardous Organic Compound Degradation, Anaerobic Versus Aerobic Transformations, Examples of Hazardous Waste Amenable to Biological Treatment, Petroleum Components, Beta Oxidation, Aromatic Hydrocarbons, Halogenated Compounds, Halogenated Alkanes and Alkanoic Acids, Halogenated Aromatic and Polycyclic Aromatic Compounds, Biodegradation by Mixed Populations, Conclusions

## **2. Organic Waste Forms and Treatment Strategies**

Overview Of Biological Remediation And Waste Treatment Processes, In Situ Treatment, Bioreactor Designs, Examples of Biological Treatment Processes, Treatment of Liquid Wastes, In Situ Treatment for the Remediation of Surface and Groundwater, Bioreactor Treatment of

Contaminated Water, Treatment of Solids, In Situ Treatment for the Remediation of Contaminated Soils, Soil Composting and Land Treatment, Bioreactors for the Treatment of Solids, Treatment of Gases, A Summary

### 3. Transformation of Liquid Manure into a Solid

Possible Processes for Manufacturing Solids from Wet Manure, Methodology of the Selected Process and Design of Plant, Tests of the Plant, Producing the mixture for composting, Producing the pellets, Composting, Drying, Qualities of the Product, Mechanical stability, Odour, Pathogen destruction, Fertiliser, Evaluation of the Process

### 4. Tomato Waste Water Treatment

Materials and Methods, Experimental cycle, Experimental apparatus, Results, Discussion, Cost Analysis, Conclusions

### 5. Oxalic Acid From Jute Stick

Methods, Alkali fusion, Nitric acid oxidation, Results and Discussion, Alkali fusion process, Nitric acid oxidation process, Effect of reaction time, Effect of temperature, Effect of catalyst concentration, Effect of nitric acid concentration, Nitric acid oxidation, Conclusions

### 6. Digestion of Cotton Processing Waste

Methods, Substrate, Analytical methods, Batch fermentation, Bench-scale studies, Experimental plant studies, Gas analysis, Results and Discussion

### 7. Properties of Sorghum Stalk

Nomenclature, Methods, Selection of materials, Harvesting schedule, Sample preparation, Measurement of physical properties, Strength characteristics of sorghum stalk, Compression strength, Tensile strength, Shear strength, Results and Discussion, Overall and internodal lengths, Moisture distribution, Solid density of stalk, Compressive strength, Tensile strength, Shear strength

### 8. Fermentation of Fish Waste

Methods, Fish, Sample preparation, Inoculum, Analytical methods, Microbiological examination, Statistical analysis, Experiment 1, Experiment 2, Experiment 3, Experiment 4, Experiment 5, Results and Discussion

### 9. Agro-Industrial Wastes

Methods, Results and Discussion

### 10. Bioconversion of Pretreated Wheat Straw and Sunflower Stalks to Ethanol

Methods, Substrates, Enzyme, Substrate hydrolysis, Analytical methods, Ethanol assay, Ethanol production, Results and Discussion, Pretreatment of wheat straw, Pretreatment of sunflower stalks, Yeast fermentation

### 11. Modelling of Agricultural Waste Treatments

Chemical Reactor Theory, Microbial Kinetics, Model Implementation, Extension of the Previous Model to Digestion

### 12. Utilization of Waste of Dehydrated Onion

Methods, Isolation of Yeasts, Maintenance of strains, Preparation of onion juice from waste products of the dehydrated onion industry, Fermentation media, Tests of C and N sources, etc., Onion juice media, Analytical methods, Results and Discussion, Production of fodder yeast in a laboratory medium, Production of fodder yeast in an onion juice medium

### 13. Palm Oil Mill Effluent Disposal on Land

Methods and Results, Infiltration tests, Small-scale trials of the general effects of application of sludge (POMS) to land Trial 1, Application to give Specific Benefits to Land, Mulching effect (Trial 3), Restoring rintailings (Trial 4), Commercially Practical Methods and Optimum Input Rates for Application to Oil Palms, Preliminary trials, Long-term experiments (Trial 7), Discussion

### 14. Studies on Beef-Cattle Manure Slurry

Model Development, Materials, Methods, Measurement of rheological properties, Apparatus and procedure, Results and Discussion, Temperature and total solids effect on limiting viscosity,  $\eta_0$ , Temperature and TS effect on  $K'$ , Summary and Conclusions

### 15. Meat Meal and Algae for Calves

Methods , Results and Discussion, Performance of calves, Nutritive value of the ration

#### 16. Manures and Sewage Sludges for Algal Growth

Materials and Methods, Collection and treatment of samples of sludge and manure, Analysis of the wastes, Preparation of media for cultivation of algae, Analysis of properties of waste extracts, Cultivation of algae in various media, Analysis of properties of waste-grown algae, Results, Properties of the wastes, Properties of the waste extracts, Growth rates of algae in various waste extracts, Oven-dried weight of harvested algae, Chlorophyll content of harvested algae, Heavy metal content of harvested algae, Discussion

#### 17. Management and Treatment of Wastes from Large Piggeries

Typical Production Plant Layout and Sewerage, Wastewater Characteristics, Agricultural Applicability of Wastewaters, Wastewater Treatment for Stream Disposal, Efficiency of Wastewater Treatment, Primary treatment, Secondary treatment, Tertiary treatment, Economics of Treatment and Conclusions

#### 18. Tower Digestion of Pig Waste

Methods, Equipment, Seed sludge, Pig manure, Tower operation, Analytical methods, Flocculant testing, Experimental design, Results and Discussion , Tower design changes, Flocculant testing, Tower performance, Flocculant effectiveness in the tower, Prospects for scale-up

#### 19. Nutritive Value of Poultry Waste

Methods, Results and Discussion

#### 20. Digestion of Rabbit and Pig Waste

Methods, Experimental design, Digesters, Substrates, Experimental procedure, Analytical methods, Results and Discussion , Energy production, Rabbit wastes, Mixed substrates: Pig manure and rabbit wastes, Pollution Control, Rabbit wastes, Discussion

#### 21. Chemical Composition of Palm Oil Mill Effluent

Methods, Sampling, Fractionation procedure, Assays, Results and Discussion , Pome, Clarification sludge, Conclusions,

#### 22. Humic Substances from Composed Barks

Methods, Organic fertilizers, Chemical analysis, Extraction of humic matter, Sephadex gel filtration, Results and Discussion, Organic carbon content, Extracting efficiencies of reagents, Influence of extracting solutions, Time of extraction and sample-to-solvent ratio, Number of extractions, Sample particle size

#### 23. Humic Substances From Decomposing Bark

Methods, Raw materials, Chemical analysis, Humic materials, Results and Discussion, Spruce bark, Spruce bark plus hen manure (20%)

#### 24. Particle Size and Tomato Waste Digestion

Experimental Procedures, Results and Discussion

#### 25. Humic Acids on Hydrolysis of Potato Protein

Methods , Materials, Analysis, Experimental procedures, Results, Discussion

#### 26. Effects of Composts on Wheat Yields

Materials and Methods, Results and Discussion, Composition of composts, Experiment 1. Evaluation of composts on an equal nitrogen basis, Experiment 2. Evaluation of composts when added at a flat rate of 5 t/ha in addition to NPK fertilizers

#### 27. Production of Oxytetracycline

Methods, Maintenance of *Streptomyces rimosus* 12907, Vegetative medium, Fermentation medium, Production of oxytetracycline in a fermenter (1200 litre), Determination of amino acids present in fermented mash, Anti-microbial spectrum of oxytetracycline present in the dry mash, Results and Discussion

#### 28. Use of Manure in Fish Farming

Keeping Livestock in the Vicinity of Fish Ponds, Applying Manures to Fish Ponds, Adding Manures to Feeds, Economic Comparison of Feeding and Manuring, Modes of Action of Manure, Direct Consumption of Manure, Manure as a Fertiliser for Autotrophic Production

#### 29. Bacteria in Swine Waste

Materials and Methods, Analytical techniques, Results , Identification, Effect of waste concentration, Effect of pH, Effect of sulfide concentration, Protein production and nutrient uptake, Discussion , Growth characterization, Protein production and treatment capacity, Integration with algal systems

#### 30. Poultry Waste Water as Broiler Feeds

Results and Discussion

#### 31. Utilization of Indian Wastes in Livestock Feeds

Prominence of Salseed Meal, Similarity of Oak Kernels and, Salseed Meal, Oak Kernels in Poultry Mash, Oak Kernels in Cattle Rations, Importance of a Negative Control in Experimental Designs, Rationing of Animals on the Minimum Adequate Requirement

#### 32. Methane from Cattle Waste

Methods , Herd characteristics, Fermenter substrate, Fermenters, Experimental, Results, Discussion , Methane yield, Temperature effect

#### 33. Treatment of Milking Parlour Wastewater

Methods, Pilot-scale reactor system description, Time allocation and operation of each phase of reactor, Analyses, Results and Discussion

#### 34. Indicators of Pig Slurry Odours

Materials and Methods, Chemical analysis, Odour offensiveness test, Raw slurries of excreta, Treated slurries, Results and Discussion, Non-specific characteristics, Specific odourants, Prediction of odour offensiveness from chemical and biochemical characteristics, Conclusions

#### 35. Pig Liquid Manure

Materials and Methods, Results, Discussion

#### 36. UASB Treatment of Wastes

Introduction, Materials and Methods , Sampling and analysis, Seed sludge, Wastewater characteristics, The 30 m<sup>3</sup> semi-technical experimental, pilot plant, RESULTS, Start up and operation, Loading rates and treatment efficiency, Sludge wash out, COD balance and sludge increment, Sludge retention and total methanogenic activity, Discussion, The performance of the reactor at an intermittent feeding, Performance at process temperatures of 20 °C and 30 °C, Sludge retention and sludge wash out, The rate of hydrolysis in the reactor

#### 37. Digestion of Poultry Litter

Methods, Digester feedstock, Digester construction, Digester operation, Analytical methods, Data handling, Solids digestion, Results, Daily fed digesters, Batch digestion, Discussion, Daily fed digesters, Litter composition, Ammonium-N levels, Gas composition and biogas yields, Kinetic model, Batch digestion

#### 38. Beef-Cattle Manure Slurries

Material, Methods, Apparatus, Computational procedure, Modified Reynolds Number, Results, Comparing capillary and rotational viscometer results, The  $f=NRe$  correlation for cattle manure slurries, Summary and Conclusions,

## About NIIR

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Opportunities for Most Profitable Business in India, Manufacturing Business Ideas, Preparation of Project Profile, Pre-Investment and Pre-Feasibility Study, Market Research Study, Preparation of Techno-Economic Feasibility Report, Identification and Section of Plant, Process, Equipment, General Guidance, Startup Help, Technical and Commercial Counseling for setting up new industrial project and Most Profitable Small Scale Business.

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