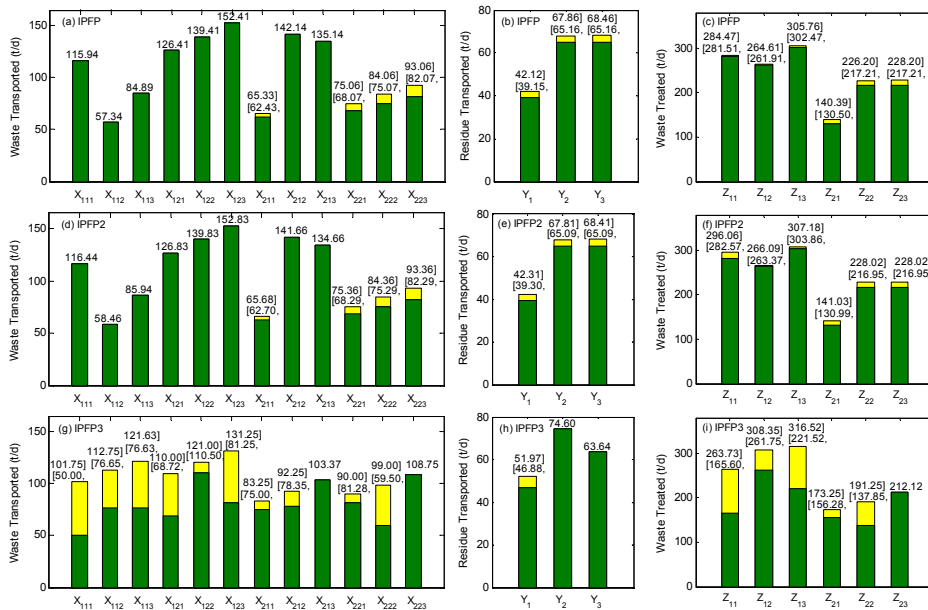


# Waste Management

Applications of mathematical models to waste management are usually complicated by the complexities involved in either waste management systems or waste treatment processes. A set of characterization and optimization methodologies have been developed and applied to waste management.

## Inexact Waste Management System

We have developed (a) an inexact piecewise quadratic programming (IPQP) model through coupling piecewise linear regression with interval-parameter quadratic programming for handling the nonlinear objective function in waste allocation planning, (b) an inexact piecewise-linearization-based fuzzy flexible programming (IPFP) model to tackle nonlinear economies-of-scale (EOS) effects in interval-parameter constraints for a representative waste management problem, and (c) an inexact joint-probabilistic left-hand-side chance-constrained programming (IJLCP) method for reflecting the inexact relationships between amounts of waste transported and treated effectively.



## Modeling for Composting Process

We have developed (a) a stepwise-cluster microbial biomass inference (SMI) model through introducing stepwise cluster analysis (SCA) into composting process modeling for tackling the nonlinear relationships between state variables and microbial activities and (b) a genetic algorithm (GA) aided stepwise cluster analysis (GASCA) method for describing the nonlinear relationships between the selected state variables and the C/N ratio in food waste composting. The SCA was for the first time introduced into mapping the relationships in composting processes; the GASCA combining GA with SCA would possess abilities in both variable searching and nonlinear fitting for modeling of composting processes.

