

Contents

PLENARY SECTION

Historical review of composting and its role in municipal waste management 3
C.G. GOLUEKE AND L.F. DIAZ

The Thermie programme and composting projects in the energy from biomass and waste sector 5
G.L. FERRERO

The role of composting in sustainable agriculture
P. SEOUI

I.S.W.A. policy in the regard of composting as an integrated system of waste management 30
J.H. SKINNER

Waste management and legislation 41
W.A. VAN BELLE

PART A COMPOSTING PROCESS 47

Composting control: principles and practice 49
E.I. STENTIFORD

Composting plant design and process management 60
R.T. HAUG

Odor emissions from composting plants 71
W. BIDLINGMAIER

Environmental impact of composting plants
K. FISHER

Production of functional compost which can suppress phytopathogenic fungi of lawn grass by inoculating *Bacillus subtilis* into grass clippings
K. NAKASAKI, M. KUROKI, AND H. KUROTA

Nutrient transformation of pig manure under pig-on-litter system N.F.Y. TAM, S.M. TIQUIA AND L.L. VRIJMOED	96
Heat evolution during composting of sewage sludge F.C. MILLER	106
Process control based on dynamic properties in composting: moisture and compaction considerations K. DAS AND H.M. KEENER	116
Compost facility operating guide P.B. LEEGE	126
Glucose influence on the asymbiotic nitrogen fixation during lignocellulosic waste composting K. EZELIN, G. BRUN, M. KAEMMERER AND J.C. REVEL	137
Taxonomic and metabolic microbial diversity during composting T. BEFFA, M. BLANC, L. MARILLEY, J.L. FISHER, P.F. LYON AND M. ARAGNO	149
A new composting plant realized within the THERMIE program of the European Commission T. PAPI, G. MARANI, R. MANIRONI AND M. DE BERTOLDI	162
PART A2 THE QUALITY OF COMPOST	173
Evaluation of compost stability R. BARBERIS AND P. NAPPI	175
Quality of composts: organic matter stabilization and trace metal contamination C. MASSIANI AND M. DOMEIZEL	185
Chemical and physico-chemical parameters for quality evaluation of humic substances produced during composting N. SENESI AND G. BRUNETTI	195
Heavy metals in compost and their effect on soil quality G.A. PETRUZZELLI	213
Occurrence of microorganisms pathogenic for man and animals in source-separated biowaste and compost: importance, control, limits, epidemiology D. STRAUCH	224

CONTENTS

Phytohygienic aspects of composting G.J. BOLLEN AND D. VOLKER	233
Canadian national compost standards N. FOLLIET-HOYTE	247
Ninhydrin reactive nitrogen of CHCl_3 fumigated and non-fumigated compost extracts as a parameter to evaluate compost stability M. DE NOBILI, M.T. BACA, F. FORNASIER AND C. MONDINI	255
Impact of composting type on compost organic matter characteristics C. SERRA-WITTLING, E. BARRIUSO AND S. HOUOT	262
Respirometric techniques in the context of compost stability assessment: principles and practice K.E. LASARIDI AND E.I. STENTIFORD	274
Different location of acid and alkaline phosphatases extracted from a compost of urban refuse J.C. RAD MORADILLO AND S. GONZALES CARCEDO	286
Biological parameters to estimate the effect of biogenic waste composts on plant growth in pot-trials L. POPP AND P. FISCHER	294
Parameters to estimate the nitrogen effect of biogenic waste composts TH. EBERTSEDER, R. GUTSER AND N. CLAASSEN	306
Biowaste compost and heavy metals: a danger for soil and environment? F. AMLINGER	314
Polychlorinated dibenzo-p-dioxins and dibenzofurans: level of contamination and dynamic in bio and yard waste composting K. FRIKE, U. EINZMANN, A. BRUNETTI, H. FIEDLER AND H. VOGTMANN	
The influence of composts and mineral fertilizers on the heavy metal concentration and transfer in soil and plants H. VOGTMANN, G. BOURS AND W. FUCHSHOFEN	

CONTENTS

PART A3 LEGISLATION	355
USEPA regulations for compost production and use J. WALKER	
PART A4 USE OF COMPOST	
Suppression of plant diseases by composts H.A.J. HOITINK, A.G. STONE AND M.E. GREBUS	
Formation and properties of humic substance originating from composts Y. CHEN, B. CHEFETZ AND Y. HADAR	382
Waste researches at the IRNAS, CSIC R. LOPEZ, F. CABRERA, J.M. MURILLO AND A. TRONCOSO	394
Compost as a source of organic matter in Mediterranean soils M.T. FELIPÒ	402
Utilizing composts in land management to recycle organics W.H. SMITH	413
Effect of compost/fertilizer blends on crop growth L.J. SIKORA	
The influence of compost and sewage sludge on agricultural crops G. BALDONI, L. CORTELLINI AND L. DAL RE	431
Compost from selected organic wastes as a substitute for straw-bedded horse manure in <i>Agaricus bisporus</i> production G. GOVI, G. INNOCENTI, G. FERRARI, C. GALLI AND G. SACCHINI	
Use of composted societal organic wastes for sustainable crop production M.S. RODRIGUES, J.M. LOPEZ-REAL AND H.C. LEE	
Effects on the content of organic matter, nitrogen, phosphorus and heavy metals in soil and plants after application of compost and sewage sludge L. CORTELLINI, G. TODERI, G. BALDONI AND A. NASSISI	457
An evaluation of soil nutrient status following the application of (i) co-composted MSW and sewage sludge and (ii) greenwaste to maize R. PARKINSON, M. FULLER, S. HURY AND A. GROENHOFF	

Development of compost products H. HAUKE, H. STOPPLER-ZIMMER AND R. GOTTSCHALL	477
Political implications for integrating composting into solid waste management in West Virginia, USA R.G. DIENER, A. COLLINS, R. MENESES, M. MORRIS AND A. DAME	495
Yard waste composting strategies: considering technical conditions and organizing systems E. FAVOINO, M. CENTEMERO, M. CONSIGLIO, A. PANZIA OGLIETTI, E. ACCOTTO AND G. NERI	507
Experiences of compost use in agriculture and in land reclamation projects F. PINAMONTI AND G. ZORZI	517
PART B1 STARTING MATERIAL	529
Importance of lignocellulosic compounds in composting P.J. WHITNEY AND J.M. LYNCH	531
Composting of agricultural wastes J.M. LOPEZ-REAL	542
Seven decades of sludge compost marketing K. KELLOG JOHNSON	551
Utilizing scraps from blue crab and calico scallop processing plants J.C. CATO	557
Dairy cattle slurry and rice hull co-composting P.L. GENEVINI, F. ADANI AND C. VILLA	567
Field scale study of the effect of pile size, turning regime and leaf to grass mix ratio on the composting of yard trimmings F.C. MICHEL, J.F. HUANG, C.A. REDDY AND L.J. FORNEY	577
Optimisation of anaerobically digested primary sludge as a composting substrate D. WONG AND H. HOFSTEDE	585
The production of compost from agricultural and municipal solid waste P.F. BLOXHAM AND I.L. COLCLOUGH	593

Manufacture of artificial soil by composting coal fly ash and bottom ash with poultry litter	603
H.L. BRODIE, L.E. CARR, G.A. CHRISTIANA AND J.R. UDINSKEY	
Composting of a mixture of vegetable, fruit and garden waste and used paper diapers	612
C. VERSCHUT, T.D. TNO-ME AND V. BRETHOUWER	
Processes regulating grass straw composting	627
W.R. HORWATH, L.F. ELLIOTT, D.B. CHURCHILL AND H.F. MINSHEW	
Olive-mill wastewater bioremediation: evolution of a composting process and agronomic value of the end-product	637
U. TOMATI, E. GALLI, L. PASETTI AND E. VOLTERRA	
Agricultural composting in the United States: trends and driving forces	648
R.M. KASHMANIAN AND R.F. RYNK	
PART B2 STATE OF THE ART OF COMPOSTING	661
Effectiveness of the Rutgers system in composting several different wastes for agricultural uses	663
A. ROIG AND M.P. BERNAL	
Composting in Finland: Experiences and perspectives	763
K. HANNINEN	
Perspectives and state of the art of composting in France	684
J.M. MERILLOT	
Composting of agricultural waste in Denmark	691
M. HEDEGAARD AND I. KRUGER	
Composting in Italy: Current state and future outlook	698
G. ZORZI, S. SILVESTRI AND A. CRISTOFORETTI	
State of the art and perspectives for composting in the United States of America	714
J. GOLDSTEIN	
The present situation and a new trend on composting in Japan	722
M. SHODA	

Composting: experiences and perspectives in Brazil J.T. PEREIRA NETO	729
Structural changes to a MSW composting plant in accordance with modern waste management concepts in Italy D. SCHONAFINGER	
The power of composting; the power of partnership J. BEYEA	
Composting plant in the city of Forlì: the public administration experience T. GIUNCHI, G. VERONESI AND G. ZECCHI	
Digestion by WAASA process of optically separated waste R. WESTERGAARD	758
PART B3 COMPOSTING AS AN INTEGRATED SYSTEM OF WASTE MANAGEMENT	
The co-treatment of municipal and industrial wastes R.P. BARDOS, S. FORSYTHE AND K. WESTLAKE	767
The importance of waste characteristics and processing in the production of quality compost G.M. SAVAGE	784
The role of biological treatment in integrated solid waste management P. WHITE	792
Results of laboratory and field studies on wastepaper inclusion in biowaste in view of composting B. DE WILDE, J. BOELENS AND L. DE BAERE	803
Fuel recovery: valorization of RDF and PDF M. FRANKENHAEUSER AND H. MANNINEN	813
A database for I.W.M. covering recycling and composting J. HUMMEL	822
Alternative utilization of MSW compost in landfills R. COSSU AND A. MUNTONI	831

PART B4 BIOREMEDIATION	847
Stabilization of hazardous wastes through biotreatment	849
L.F. DIAZ, G.M. SAVAGE AND C.G. GOLUCKE	
Starch based biodegradable materials in the separate collection and composting of organic waste	863
C. BASTIOLI AND F. DEGLI INNOCENTI	
Degradation of naphthalene by microorganisms isolated from compost	870
M. CIVILINI AND N. SEBASTIANUTTO	
Composting and selected microorganisms for bioremediation of contaminated materials	884
M. CIVILINI, C. DOMENIS, M. DE BERTOLDI AND N. SEBASTIANUTTO	
Bioremediation of PAH-contaminated soil	892
R. LILYA, J. UOTILA AND H. SILVENNOINEN	
Minimum effective compost addition for remediation of pesticide-contaminated soil	903
X. LIU AND M.A. COLE	
Enhancement of the biological degradation of contaminated soils by compost addition	913
K. HUPE, J.C. LÜTH, J. HEERENKLAGE AND R. STEGMANN	
Heavy metals removal by clinoptilolite in pepper cultivation using compost	924
E.G. KAPETANIOS	
PART B5 COMPOSTING DESIGN	937
Composting technology in the United States: research and practice	939
R.J. TARDY AND R.W. BECK	
Reconversion of traditional composting plants for a policy of quality	948
B. RANINGER	
Basic processing technologies and composting plant design in Italy	958
F. CONTI, G. URBINI AND G. ZORZI	
Design of passively aerated compost piles	973
N.J. LYNCH AND R.S. CHERRY	

A review of features, benefits and costs of tunnel composting systems in Europe and in the USA	
D. BORDER, R. DE GAMO AND K. PANTER	
PART B6 MARKETING AND ECONOMY	987
Compost marketing trends in the United States	
L.L. EGGERTH	
The natural markets for compost	
R.W. TYLER	
Monitoring strategies and safeguarding of quality standards for compost	
J. BARTH	
Minimizing the cost of compost production through facility design and process control	
H.M. KEENER, D.L. ELWELL, K.C. DAS AND R.C. HANSEN	
FINAL REPORTS	
A1 Composting process	
E.I. STENTIFORD	
B1 Starting materials	
J. LOPEZ-REAL AND J. MERILLOT	
B2 The state of the art of composting and perspectives	1040
J. GOLDSTEIN	
B3 Composting as an integrated system of waste management	
B. LEMMES	
B4 Bioremediation	
L. DIAZ	
B5 Composting design	1050
R.T. HAUG	
B6 Marketing and economic	
L.L. EGGERTH	

POSTERS	1055
Additional papers (see publisher's note, page vi)	
Index of posters	I1
Index of contributors	I4