POMIS Project: experience and good practice of home-composting in the Region of Eastern Macedonia and Thrace (REMTH), Greece

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Overview

- Introduction – home composting & POMIS Project
- Objective
- Methods
  1. Distribution of bins & awareness & information events
  2. Monitoring
  3. Laboratory analysis
- Results
- Conclusions
Introduction

- Waste management hierarchy: avoidance, minimization, source reduction of waste and Municipal Solid Waste (MSW)

- High organic fraction 35% - 50% (w/w) of MSW in many countries

- Composting: decomposition of organic material by aerobic microorganisms resulting in compost - a product rich in organic material
Home composting (1/2)

- Home composting of source-separated organic household waste (OHW) like kitchen waste, fruit and vegetables leftovers, etc.
- A wide practice of home composting may have as a result a significant amount of OHW to avoid the costly management of MSW via collect, transfer, treatment and landfill of residue.
- Life Cycle Analysis (LCA) studies show low environmental impacts.
Home composting (2/2)

- Studies verify positive feedback from households as users of the home composters in their daily activities.
- Final compost product is usually of a high quality used as gardening soil while difficulties are easily managed.
- Minor requirements: a composting bin, some green-waste as bulking material, free space usually in a garden or backyard, aeration, moisture, user attention.
Home composting in Greece

- Previous experience: mostly municipalities and small number of bins without monitoring
- First time in a Region of ~608,000 inh.: 1,900 home composting bins, systematic monitoring and laboratory analysis of compost

<table>
<thead>
<tr>
<th>Region/Municipality</th>
<th>Number of bins</th>
<th>Year or period of project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region of Eastern Macedonia – Thrace</td>
<td>500</td>
<td>2009</td>
</tr>
<tr>
<td>Municipality of Trikala</td>
<td>39</td>
<td>2011</td>
</tr>
<tr>
<td>Municipality of Alexandria</td>
<td>250</td>
<td>2010</td>
</tr>
<tr>
<td>Municipality of Pavlos Melas</td>
<td>108</td>
<td>2011</td>
</tr>
<tr>
<td>Heraklion/Crete ESDAK</td>
<td>170</td>
<td>2011-2014</td>
</tr>
<tr>
<td>POMIS project – Region of Eastern Macedonia - Thrace</td>
<td>1,900</td>
<td>2013-2015</td>
</tr>
</tbody>
</table>
POMIS Project
ETC Greece-Bulgaria 2007–2013

- Project of “European Territorial Cooperation Programme Greece-Bulgaria 2007–2013” (MIS Code 900101) to optimize the operation of the MSW management system in Regions of Greece & Bulgaria

- Project partners: LP: DIAAMATH SA from Greece, P2 Regional Association “For Cleaner Rhodopi” and P3 Municipality of Kardzhali from Bulgaria

- Budget: 1.057.329,95 €, ERDF 85% - NC 15%

- Duration: 1/10/2013 – 30/09/2015

- Info: [http://www.pomis.eu](http://www.pomis.eu)
Objective

- Presentation of POMIS project with emphasis to its contribution on enhancing the practice of home-composting through a pilot action of monitoring a Region wide network of 1.900 home composting bins.

- Main aim:
  - optimizing the operation of the MSW management system in the Region of Eastern Macedonia – Thrace (REMTH) in Greece and in the Region of Kardzhali in Bulgaria
  - emphasis on home composting, material recycling like packaging waste and edible oils recycling.
  - disseminating information & invaluable experience!
Pilot action & location

- Monitoring 1,900 bins
- Region of Eastern Macedonia & Thrace in Northern Greece - REMTH
- REMTH ~608,000 inh.
Methods

Three main stages:

1. Distribution of home-composting bins and information and awareness events
2. Monitoring of home-composting bins
3. Laboratory analysis
Methods

1. Distribution of bins

- Polypropylene resistant in UV, 72x72cm, height 80cm, Vol. 330 l
- Distribution of 1,900 bins and guidelines in interested citizens.
- Collaboration with municipalities on information & awareness events
Methods

1. Distribution of bins

- Organization of information and awareness events across the whole Region of EMTH including the two islands of Thassos and Samothrace!
Methods

1. Awareness & information events

- Type of event: Target audience
  - Municipalities: people, citizens
  - Primary schools: students, teachers
  - Workshops: engineers, civil servants
Methods

2. Monitoring of home composting

- Continuous monitoring and support of households by expert scientists & engineers
  - on-site visits in households & telephone contacts
  - personal interviews by preparing & completing questionnaires

1. Preparation
2. Site visit (interview, advising, completing questionnaire, pictures)
3. After visit (registration of data, editing database, statistical results)
Methods

2. Monitoring - Questionnaire

- **Part 1: General Owner Information**
  - Name, Address, House/manor, number of members, age of members, education level

- **Part 2: Consistency of User and incoming waste**
  - 1. Frequency of use, 2. Status of bin, 3. Type of waste, 4. Size of waste

- **Part 3: Quality characteristics of bin content**

- **Part 4: Quality characteristics of produced compost**
  - 1. Homogeneity, 2. Colour of compost, 3. Odour of compost
QUESTIONNAIRE OF HOME COMPOSTING BINS MONITORING

DATE: ........................................
BIN NUMBER: ............................

PART 1: GENERAL OWNER INFORMATION
1. NAME: ........................................
2. SURNAME: ....................................
3. ADDRESS: ......................................
4. HOUSE/MANOR: ..............................
5. NUMBER OF MEMBERS: ........................
6. AGE OF MEMBERS: ...........................
   (eg M/50, F/45, M/18, F/13 for a family with two children)
7. EDUCATION LEVEL: ...........................

PART 2: CONSISTENCY OF USER & AND INCOMING WASTE
1. FREQUENCY OF USE
   (Scale 1 to 3)
   1: Approximately twice/week
   2: Approximately once/week
   3: Seasonally with clarification
Mark with X

2. STATUS OF BIN: ...............................

3. TYPE OF BIN WASTE

<table>
<thead>
<tr>
<th>Type</th>
<th>Mark with X</th>
<th>Type</th>
<th>Mark with X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetables</td>
<td>Brunches</td>
<td>Branches</td>
<td></td>
</tr>
<tr>
<td>Bread</td>
<td>Leaves</td>
<td>Leaves</td>
<td></td>
</tr>
<tr>
<td>Fruits</td>
<td>Grass</td>
<td>Grass</td>
<td></td>
</tr>
<tr>
<td>Coffee</td>
<td>Earth</td>
<td>Earth</td>
<td></td>
</tr>
<tr>
<td>Eggs</td>
<td>Manure</td>
<td>Manure</td>
<td></td>
</tr>
<tr>
<td>Oils</td>
<td>Paper-boxes</td>
<td>Paper-boxes</td>
<td></td>
</tr>
<tr>
<td>Meat</td>
<td>Other (describe)</td>
<td>Other (describe)</td>
<td></td>
</tr>
</tbody>
</table>

4. SIZE OF BIN WASTE

(Scale 1 to 3)
1: Small/appropriate
2: Medium/not the best
3: Large/inappropriate
Mark with X

PART 3: QUALITY CHARACTERISTICS OF BIN CONTENT
1. PROPORTION OF INGREDIENTS
   (Scale 1 to 4)
   1: Satisfactory
   2: Many green
   3: Many brown
   4: Existence of several inappropriate
Mark with X

2. TEMPERATURE
   (Scale 1 to 2)
   1: Satisfactory
   2: Cold-inactive
   Thermometer indication (°C)
Mark with X

3. VOLUME
   (Scale 1 to 3)
   1: >1/2 of bin-satisfactory
   2: ~1/2 of bin-medium
   3: <1/2 of bin-small
Mark with X
Methods

2. Monitoring of home-composting bins
Methods

3. Laboratory analysis

- Evaluation of action by sampling and laboratory quality analysis of produced compost samples.
- 100 samples in 4 sampling excursions from the 5 Regional Units of REMTH: Drama, Kavala, Xanthi, Rodopi and Evros.
- Realised in the laboratory of the Department of Environmental Engineering, of Democritus University of Thrace
Methods

3. Laboratory analysis

- Dry mass content (moisture)
- Organic mass content (volatile solids)
- C,N,H determination using EA & pH determination
- Microbial Respirometric Activity (MRA) using:
  - static solid phase manometric respirometers (SRI)
  - dynamic solid phase respirometers (DRI)
- Maturity status, after calculation of germination index (GI), using tomato seeds
- Measurement of total content of six heavy metals (Pb, Ni, Cr, Zn, Cu, Cd) in selected samples
Methods

3. Laboratory analysis
Results

- Monitoring of the network of 1,900 bins
- Basic rules by the operator and the production of mature compost is guaranteed.
  - 1. caution on input materials (only bio-waste and no others like plastic, meat or dairy)
  - 2. small size of input materials
  - 3. periodic stirring
  - 4. regulating the humidity
- Great importance on the behaviour of operator.
Results

3 visits to a home composting bin

(a) 23/03/2015

(b) 21/07/2015

(c) 27/08/2015
Results

Problems occurred

- Disasters of home composting bins by strong winds, fire, stealing or human factor.
- Difficult weather conditions delayed composting process.
- Communication problems with some of the owners of home composting bins.
- Problems only in a small fraction of whole population, not affecting the “Big picture”
Results

- Benefits and statistical results from questionnaires

- Significant benefits:
  - reduction of volume of MSW ending up in landfills
  - avoidance of air pollution & resource depletion
  - avoided CO$_2$ emissions
  - reduced trucks routes
Results

Type of waste as input in bins

- Various types of OHW were used as input
- Most common waste were fruits, vegetables and leaves with progressing verification in each consecutive visit.
Results

Humidity inside the bins

- Progress in satisfactory humidity level through visits
- This was a result of the thorough communication of the expert scientists and engineers providing guidelines to bins’ users

<table>
<thead>
<tr>
<th>Visit</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfactory humidity</td>
<td>~54%</td>
<td>~56%</td>
<td>~81%</td>
</tr>
</tbody>
</table>
Results

Results of laboratory analysis

- Results from the laboratory analysis showed that home compost was both stable and mature in almost all cases.
- The heavy metal concentrations were far below the regulated limits.
- Compost can result after at least 3 months of treatment period inside the home-composting bin.
Conclusions (1/2)

- Home composting action of POMIS project was presented confirming home-composting as a best management option of OHW.
- POMIS project of ETC Programme Greece-Bulgaria 2007-2013 optimized the operation of MSW management system in Region of EMTH in Greece and in Region of Kardzhali in Bulgaria.
- For the first time 1,900 home composting bins covered a whole Region in Greece.
- Continuous monitoring & support of households through visits, interviews and information events.
Conclusions (2/2)

- Quality analysis of compost samples showed stable and mature compost without heavy metals.

- **Invaluable experience gained**: thorough communication of basic rules of home composting to the bins’ operators can have a dramatic effect on the behaviour of the home composting bins and as a consequence on the production of a mature compost.

- **Significant benefits earned**: reduction of the volume of OHW ending up in landfills, avoidance of air pollution and reduction of GHG emissions as well as minimisation of resource depletion.
Acknowledgements

- POMIS Project (MIS Code 900101) was implemented under the "European Territorial Cooperation Programme Greece - Bulgaria 2007 - 2013" 1 - Quality of life, Measure 1.1 - Protection, Management and Promotion of Environmental Resources and was funded by the European Regional Development Fund (ERDF) of the European Union by 85% and by national resources by 15%.

- Home-composting bins users and all participating households’ members across the Region of EMTH

- Department of Environmental Engineering of Democritus University of Thrace, Associate Professor Dimitrios Komilis and PhD Candidate Alexandros Evangelou.
Thank you for your attention!

More information: http://www.pomis.eu
End of slideshow, click for exit.
## Part 1: General Owner Information
Name, Surname, Address, House/manor, number of members, age of members, education level

## Part 2: Consistency of User and incoming waste

<table>
<thead>
<tr>
<th>1. Frequency of use (scale 1 to 3)</th>
<th>1. Approximately twice/week</th>
<th>2. Approximately once/week</th>
<th>3. Seasonally (clarification)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Status of bin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Type of waste</td>
<td>Vegetables, Bread, Fruits, Coffee, Eggs, Oils, Meat, Branches, Leaves, Grass, Soil, Manure, Paper-boxes, other (describe)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Size of waste (scale 1 to 3)</td>
<td>1. Small/appropriate</td>
<td>2. Medium not the best</td>
<td>3. Large/inappropriate</td>
</tr>
</tbody>
</table>

## Part 3: Quality characteristics of bin content

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Temperature (scale 1 to 2)</td>
<td>1. Satisfactory</td>
<td>2. Cold-inactive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Volume (scale 1 to 3)</td>
<td>1. &gt;50% of bin’s volume – Satisfactory</td>
<td>2. ~50% of bin’s volume – medium</td>
<td>3. &lt;50% of bin’s – small</td>
<td></td>
</tr>
<tr>
<td>5. Colour of content (scale 1 to 3)</td>
<td>1. Light brown</td>
<td>2. Dark brown</td>
<td>3. Black</td>
<td></td>
</tr>
<tr>
<td>6. Odor of bin (scale 1 to 3)</td>
<td>1. Does not exist</td>
<td>2. Exist but does not disturb</td>
<td>3. Intense, disturbing</td>
<td></td>
</tr>
</tbody>
</table>

## Part 4: Quality characteristics of produced compost

<table>
<thead>
<tr>
<th>1. Homogeneity (scale 1 to 3)</th>
<th>1. Satisfactory</th>
<th>2. Medium – There are large pieces</th>
<th>3. Inhomogeneous</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Colour of compost (scale 1 to 3)</td>
<td>1. Light brown</td>
<td>2. Dark brown</td>
<td>3. Black</td>
</tr>
<tr>
<td>3. Odour of compost</td>
<td>1. Does not exist</td>
<td>2. Exist but does not disturb</td>
<td>3. Intense, disturbing</td>
</tr>
</tbody>
</table>