

## PROPOSALS FOR THE MANAGEMENT OF YARD WASTE IN THE VALLÈS ORIENTAL REGION

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### ABSTRACT

Management of yard waste is an important problem in communities with large green areas. The Vallès Oriental is a region where a high percentage of the population live in detached dwellings with garden. Results of this study show that 76% of the townships recognise having problems with the management of yard waste from private origin however, only 26% have introduced separate collection systems. This work proposes different management systems for the backyard waste where composting is considered as the most appropriate treatment. Also, backyard composting is encouraged on the basis of data presented here that confirm the viability of this system.

### INTRODUCTION

In the last decades, modern life and technology have originated along with the benefits, the problems associated with the disposal of wastes. Residential solid waste makes up an important proportion of the total municipal solid waste generated in a community. Amongst these, yard waste is particularly important since its production is seasonal and its characteristics make its handling and collection particularly cumbersome. Yard waste can be defined as the part of solid waste composed of grass clippings, leaves, twigs, branches, and garden refuse. An approximate composition of this residue is shown in table 1.

*Table 1. Yard waste composition.*

Leaves	19 - 28 %
Grass	54 - 64 %
Ligneous residues	17 - 18 %

Disposal of yard waste is often a problem. In most cases it is mixed with garbage, (with landfills as final destination), it is also accumulated on open air spaces or simply dumped in streams. This incorrect and often illegal disposal produces a number of problems that include collapsing of curbside refuse containers, higher landfilling disposal taxes, higher fire hazard, aesthetic problems and also, the disposal of a residue potentially valuable.

On this basis, the main objectives of this work have been the analysis of the present yard waste management in the Vallès Oriental region and the proposal of different strategies to improve the current management. These proposals consider composting as the final treatment since it has been demonstrated that yard waste has a good compostability either alone or mixed with other residues and that the process is energetically, economically and environmentally feasible. Besides, the final product, the compost, has a potential commercial value.

## **MATERIALS AND METHODS**

**Area of study:** The Vallès Oriental, a Catalanian region with an area of 851.9 km<sup>2</sup>. It has 295,000 inhabitants and 132,000 non-permanent residents, distributed in 43 towns. The region has two major cities with population over 50,000 inhabitants (Mollet and Granollers) while the other towns have less than 15,000 inhabitants. Disposal of the municipal solid waste of the region is under the management of the Consorci de Residus del Vallès Oriental.

**Methodology:** Heads of the Environmental Department of 38 townships agreed to answer a survey about the current management of the yard waste privately produced in their corresponding town. Waste from public gardens and trees were not considered in this study. These data were used as the basis for the different management strategies proposed.

**Backyard composting:** this study was carried out in an area of the Osona region (bordering the Vallès Oriental region) which conforms the Mancomunitat Intermunicipal Voluntària "La Plana". A survey was done amongst 148 out of the 238 people who perform backyard composting. Questions in the survey include, amongst others, composting materials, type of composter, composter performance and problems more frequently encountered. Besides, a closer monitoring of 6 composters was performed with the aim of determining the viability of the system.

## **RESULTS AND DISCUSSION**

### **Yard waste management**

Information obtained from the survey has given a general idea of the actual management of yard waste in the region:

- 76% of the surveyed towns have a high production of yard waste although no data are available about the actual amount that is produced.
- The main destination of this waste is landfill since yard waste is mixed with garbage (52.6%), a small amount (no accurate data available) is disposed in drop-off sites.
- 8 towns have implemented a separate collection system for yard waste. The systems used are:
  - Separate curbside containers (6 towns)
  - Disposing yard waste in plastic bags and leaving them by the curbside garbage containers on specific days (2 towns)
- Yard waste obtained in 2 of the towns that have implemented the separate collection is not suitable for composting since it is disposed together with lots of non-compostable residues. Therefore these mixtures have to be sent to landfills.
- Yard waste obtained in the 6 other towns is sent either to the composting facilities located in Granollers or to other composting facilities.
- 2.6% of the surveyed towns have designed areas where yard waste is processed to produce mulch.

### **Collection alternatives**

Survey results were the basis for the different alternatives proposed for an improved management of yard waste. These alternatives comprise the collection, destination of the yard waste and destination of the compost obtained as final product.

Three different alternatives are proposed for the collection of the waste:

- Separate collection: either by door-to-door collection, separate curbside containers, or in plastic bags disposed by the curbside garbage containers. Each town would choose the

most appropriate on the basis of its own characteristics such as: its extension, available space, quantity of yard waste produced, and population density.

- Disposal in drop-off site: there are 26 drop-off sites in the region where yard waste can be disposed of.
- Backyard composting: one of the main objectives of this alternative would be to obtain a significant reduction in the amount of waste transported. Besides, this processing enables the waste to be recycled at source.

### **Yard waste destination**

Production of compost or mulch are the alternatives considered. Choice would depend on the waste collection model. One of the most important destinations is the composting plant of the Consorci de Residus del Vallès Oriental located in Granollers. This plant can process 25,000 t/year of organic fraction of municipal solid wastes. This OFMSW is processed mixed with yard waste in a 1:3 V/V proportion. Therefore, this plant cannot handle all the yard waste produced in the region. Then, the proposed alternatives are:

- Modified drop-off sites: it is proposed that current drop-off sites may be used as small composting plants. 14 out of the 26 drop-off sites of the region have enough space to incorporate a processing unit. 13 townships stated that their towns have available space where a small storage and processing plant could be implemented.
- Centralised processing plants: this alternative involves the construction of 1 or 2 composting plants. These plants would process yard waste from different towns. Waste would come either from separate collection or from drop-off sites where yard waste had been disposed of previously. Location must be a compromise between the different townships.

Both alternatives consider low technology composting (requiring 1 m<sup>2</sup>/t yard waste-year) as the most appropriate treatment for the waste with the aim of producing a good quality product at a low cost. This would enable its use and trade.

### **Product destination**

Three different destinations for the final compost or mulch considered are:

- Sale
- Use in the same town
- Give it away

It is considered that any of the parts involved in the waste management system, from transport of the waste to composting, can be run by private companies. Currently there are 5 companies willing to take part in one way or another in the management system.

However, it is very important to bear in mind that the implementation of any waste management system must be accompanied by an effective educational campaign. Also, an intensive promotion campaign is needed for the process to be implemented successfully.

### **Backyard composting**

Survey indicated that backyard composting is performed mainly by families with 4 or less members who live in detached dwellings. Also, composting was performed mainly by permanent residents of the community. Backyard composting was started in the years 2000-2001.

In general, results from the backyard composting program were very positive, with a low percentage of withdrawals (around 16% in two years). Withdrawals were mainly associated to a lack of time to perform the maintenance operations of the composters. Most of the participants defined their experience with backyard composting as very good (68%) or good (24%).

Main findings of the surveys were:

- Organic wastes origin and frequency of additions: kitchen waste (vegetal origin) and garden wastes (grass clippings and pruning wastes) were the main organic materials composted. Most of the participants declared to add wastes in a twice-a-week or weekly frequency (60%). The rest only used the composter in a fortnightly or monthly periodicity; this normally corresponds to people who live in the community during the weekends.
- Bulking agent: The proper utilization of a bulking agent was studied in detail because it is a key factor for the process since it provides an adequate porosity to the material. About 76% of the participants were bulking agent self-sufficient (from pruning wastes) whereas some of them obtained the bulking agent from neighbours. The lack of bulking agent was the reason for the majority of the detected composter failures.
- Turning: participants conducted manual turning in different frequencies: more than once a week (8%), weekly (26%), fortnightly (20%) or monthly (46%). In general, it was observed that turning favoured the composting process, especially in situations of porosity deficiency or moisture excess.
- Moisture content: composters were classified into: excess of moisture (30%), correct moisture (44%) or low moisture (26%).
- Presence of bad odours, leachates or rodents: problems with bad odours, leachates or rodents were only detected in rare occasions. 4% of participants reported presence of leachates (associated with excess of moisture and irrigation), 7% of participants detected bad odours (normally in composters with very compacted materials, being ammonia as the most perceived gas) and the presence of rodents or cats were detected only in 5% of the composters.
- Sanitation: temperature was followed in some of the composters, in which a thermophilic range of temperatures (>45°C) was reached in the first days of composting. Flies or other insects were not detected when temperature reached values over 55°C. Thermophilic values of temperature were maintained for approximately 12 days, which ensured a complete sanitation of the material. This was of special interest since one of the main objectives of the backyard composting is to recycle *in situ* the compost obtained as organic fertilizer in horticultural and garden applications.
- Compost utilisation: in all the cases, the compost produced was used by the participants in the backyard composting program. It was mainly applied to gardens and, in some cases, in horticultural uses. In general, it was observed a high degree of satisfaction in the compost final appearance and positive effects of the compost utilization were reported in several experiences.

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