Study tour report

"ReUseWaste" study tour report in Portugal

By: Maxwell Owusu-Twum

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Background

The study tour was organised by ReUseWaste partners in Portugal (University of Trás-os-Montes and Alto Douro) as part of the third annual ReUseWaste meeting held in Vila Real, Portugal on the 10th of September, 2014. The goal of the study tour was to offer participants an opportunity to get acquainted with some treatment approaches associated with the management of agricultural waste in Portugal.

Excursion details

Visit to SOBRADOS unit – Agricultural valorization of mushroom growth substrates

INTRODUCTION

The main purpose of SOUSACAMP, SA is to transform all the resources connected to production and trading of mushrooms, and other horticultural products, in wealth and sustainable development, with proper technology and superior quality, aiming the client satisfaction and contributing for the rise of the agricultural productivity, respecting the individual, the society and the environment. In order to achieve these goals:

• Produce mushrooms having into account all criteria regarding the biological way of production and agricultural good practices.

• Presently, use biomass as a complement to electricity and gas.

• Reuse the substrate used in mushrooms production.

• Trade the substrate so it can be used for agricultural and horticultural purposes, due to its high content in organic matter and excellent nourishing properties.

• Transform the substrate into biomass, a "clean" energy source.

• Implement a water utilisation system, which will allow solve all the needs at the production level and simultaneously to fulfil all criteria regarding consumption rationalization and reuse.

• Use technologies that allow rationalising electrical power consumption.

• Investing in the use of biomass as the main power source with the aim of reducing electricity and gas consumption to residual levels.

• Recycle all the packages that are produce.

Organic peat compost production

The organic peat compost production undergoes four stages:

1. Composting

2. Pasteurization

3. Inoculation/Spawning

4. Incubation/Spawn

1. Composting

The composting phase starts with the reception and analysis of the raw materials, namely wheat straw (50%), poultry manure (40%), ammonium sulphate (5%) and limestone (5%). Based on the analysis, the composition of the compost material is determined in order to obtain a nutrient balanced mixture, especially concerning the C/N ratio. Composting is made in bunkers, where the mixture is ventilated and due to microbial action reaches temperatures of about 80ºC.

2. Pasteurization

Once the composting procedure is terminated, compost is then placed in pasteurization tunnels where it is submitted to 57ºC temperatures for 8 hours, in order to eliminate all micro flora produced in the previous procedure;

3. Inoculation/Spawning

In this phase, spawn (wheat seeds inoculated with mycelium that grows through the grain) is added to the pasteurized mushroom compost.

4. Incubation/Spawn-growing period

In this phase, the mycelium incubation takes place, and mycelium will develop in the compost.

When the mycelium is well developed in all the compost, the incubated compost is then transferred to the mushroom production rooms. Incubated compost is placed in 5cm of peat where mushroom will develop. Once mushroom production is terminated, the compost used and all rooms are sterilized. The final sterilization process of the organic substrate (compost + peat) is to ensure that this substrate can be later used as

a farming additive without the possible dissemination of fungi from the previous production use. The sterilization process takes place by water vapour action. Substrate is kept in the production rooms by a 12hour period at 70ºC. At the end of this period, temperature is cooled by forced convection with outside air at environment temperature.

Sobrados unit where substrate used for mushroom production are processed for valorisation as agricultural compost

Once sterilized, the spent mushroom compost is taken into Sobrados Unit where it is gathered and stored in order to follow two possible destinations:

1- Stored at the warehouse, oven dried at ca. 200ºC, with exit temperatures of 50-55ºC and 16-18% moisture content. The dried product is then passed through a gravity table where inert materials are eliminated (small stones and metals). The product is then taken by conveyors to a deposit that will supply two pelleting machines. Once pelleted, the product is cooled, riddled, stored in a deposit and then packaged into 25, 500 or 1000kg bags.

2- Stored in warehouse, revolved with a rotary machine, leading to a fermentation phase, where temperatures are controlled. After fermentation takes place, the fermented compost is air dried, and when the moisture content reaches 45%, it is bagged or bulk sold.

This unit receives about 1000 m3 of spent mushroom compost every week. This material comes from all the mushroom production units in Vila Real and Paredes.

There are three main products that are commercialized: Pellets, Corretivo Orgânico (Organic corrective) and Substrato Universal (universal substrate). Chemical characteristics are presented below.

These products can be used in gardening, and/or in vineyards, olive, fruit and legume culture. Some of the advantages of these products are high water retention capacity (due to its high turf content).

Picture 1: The study tour at Sobrados unit

ReUseWaste visit to the Poultry waste Biomass Boiler – Vapour and electricity production – Campoaves / Lusiaves

In March 2012, the Campoaves enterprise (an associate of the Lusiaves Group) adjudicated to a Portuguese company the research and development of a project in collaboration with the Aveiro University for the construction of a biomass boiler for the production of steam and electricity. The boiler is a unique and innovative project in Portugal, since it uses poultry waste especially, bedding from poultry industry without any other biomass source.

The solid fuel combustion system was specially designed for burning this type of material, which is mainly composed of pine tree residues (dust and saw), rice hulls, and poultry waste. This steam generator was placed in the plant and animal waste transformation unit of the Lusiaves Group, which consumes high amount of vapour in its production (drying) processes. The main objective of this project was to substitute the use of fossil fuels (gas and fuel oil) by poultry bedding.

The boiler represents a structural investment of extreme importance, both economically and ecologically. The Lusiaves Group can assess this combustible at almost “zero cost”, since it is produced in its associate’s poultry production unit and only the transportation of residues needs to be ensured. In a second stage of the project, this boiler can be used, with the addiction of turbines, to produce electricity.

With this innovative project, the Lusiaves group ensures treatment of residues produced within the group and valorised in the residue transformation unit. This allows an added value to these residues and contributes to a more sustainable and effective production**.**

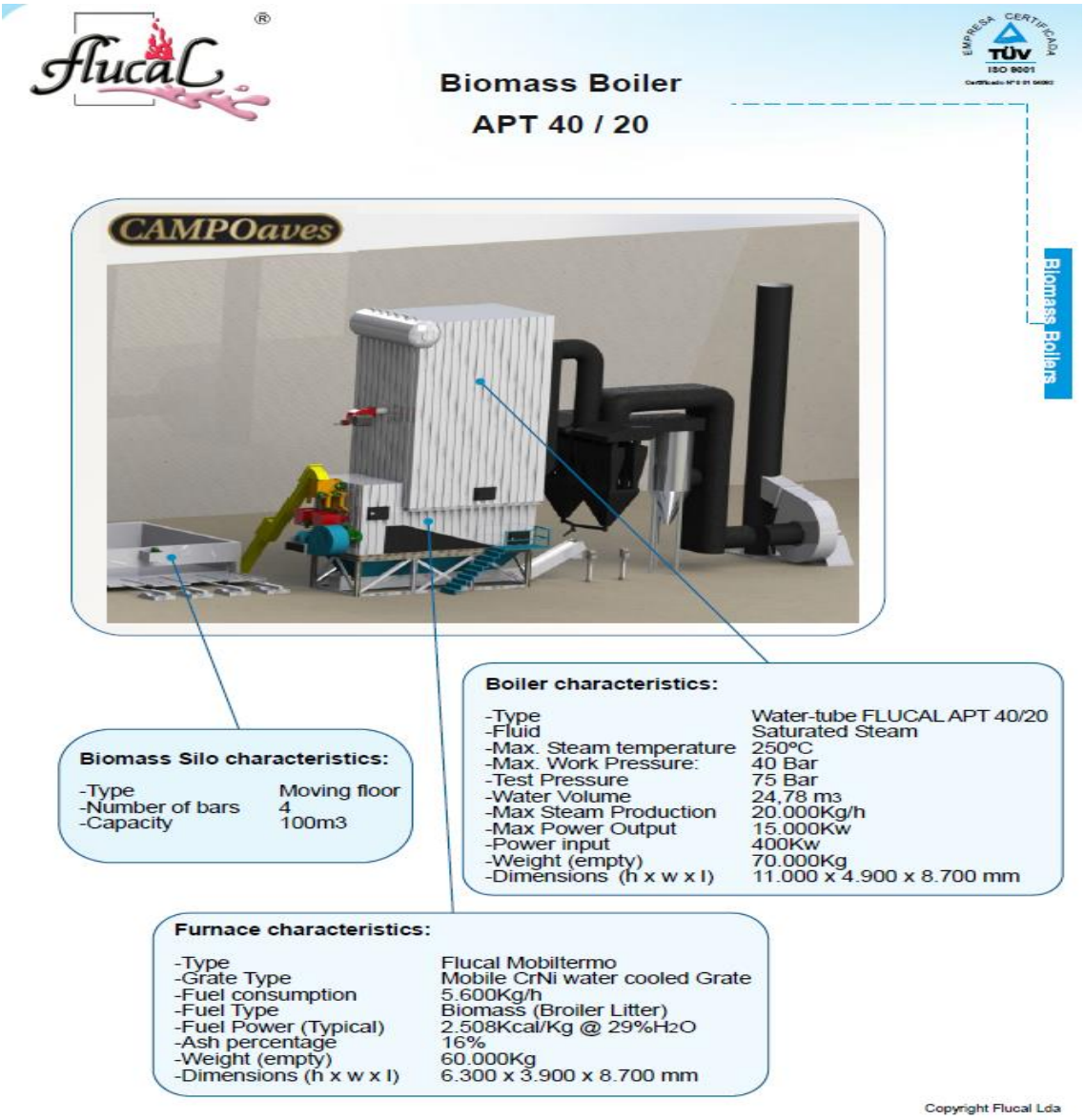

Figure 1: A diagram showing the main components for the transformation unit

Picture 2: The study tour at the Poultry waste Biomass Boiler

Picture 3: Group photo of participants at the Poultry waste Biomass Boiler Campoaves – Lusiaves.

Conclusion

The study tour was quite successful. Although only two treatment sites could be visited, participants were happy to have an overview of some treatment approaches associated with the management of agricultural waste in Portugal.