



Composting versus vermicomposting: A comparative study of organic matter evolution through straight and combined processes

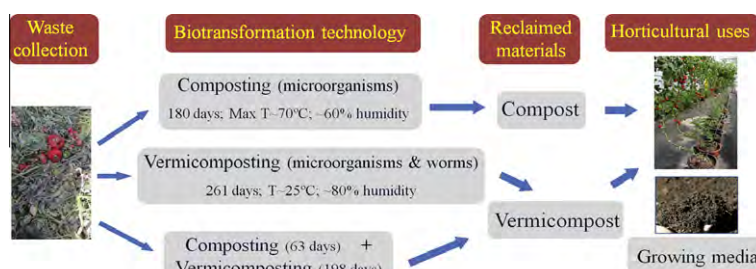
Fernando Fornes, Daicy Mendoza-Hernández, Rosana García-de-la-Fuente, Manuel Abad, Rosa M. Belda*

Instituto Agroforestal Mediterráneo, Universitat Politècnica de València, 46022 Valencia, Spain

HIGHLIGHTS

- ▶ Tomato waste composting, vermicomposting and the combined process were studied.
- ▶ Changes in physical and chemical properties of waste differed among processes.
- ▶ Compost had higher nutrient content than vermicomposts.
- ▶ Physically vermicomposts and peat are more alike than compost and peat.
- ▶ Vermicomposts seem more suitable than compost as growing media constituents.

GRAPHICAL ABSTRACT



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ABSTRACT

Changes in physical and chemical characteristics of an organic waste (tomato crop waste) throughout composting (COM), vermicomposting (VER) and the combination of both processes (C + V) were assessed at five selected stages. COM consisted of a combination of the static Rutgers system with forced aeration and pile turning. For VER *Eisenia* worms were fed with the raw material. For C + V pre-composted material was added to the worms. Particle size decreased during COM, yet it increased during VER and C + V due to the amalgamation of small particles. pH was alkaline throughout the processes. Heavy irrigation during vermicomposting resulted in greater decrease of EC and greater leaching of organic matter, total nitrogen and most macronutrients in VER and C + V than in COM. Final materials were not phytotoxic but compost could have salinity related problems. Thus, COM, VER and C + V produced treated organic material, which could be suitable for horticultural purposes.

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1. Introduction

Composting and vermicomposting are two well-known processes for solid organic waste reclamation: the final products, composts and vermicomposts, can be used as sources of organic matter for soil amendment, as sources of nutrients for soil fertilization or as growing media constituents for soilless cultivation (González et al., 2010).

Composting is the aerobic process in which indigenous microorganisms, both thermophile and mesophile, transform organic matter producing stabilized and sanitized compost. Sanitization of composts is generally related to the early thermophilic phase of composting, when temperatures reach 45–70 °C. During the mesophilic phase, also known as maturation, the remaining more recalcitrant organic compounds are degraded at a slow pace in a process similar to humification in soils, which entails the disappearance of residual phytotoxicity. Composting usually involves aeration, to maintain aerobiosis, and watering.

Vermicomposting is also a bio-oxidative process which engages earthworms and microorganisms. The microorganisms, both in the

* Corresponding author.

E-mail address: rmbelda@bvg.upv.es (R.M. Belda).