



ORGANIC WASTE VALORIZATION THROUGH COMPOSTING PROCESS: APPLICATION IN GERMINATION

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Abstract

Winemaking produced high levels of residues. Pruning residues represent a problem for vineyards and at the same time a production cost, hence the need for their treatment or their valorization. Composting is becoming an ecological and economical alternative for reusing plant biomass residues, it is a self-heating, aerobic, biodegradative process of organic waste materials.

This work proposes the valorization of winery by products as compost for the germination of wheat seeds. Our study focused on a three-month composting period.

Compost was characterized by physico-chemical parameters (organic matter, total carbon, moisture and pH) and biological parameters (germination index). The grape marcs compost had a very positive effect on germination of wheat seeds, regardless of the rate of dilution. The use of grape pomace as a compost has participated in the aerobic biodegradation of all substrates, as indicated by the measurement of parameters physicochemical as a function of time until it matures after 12 weeks.

Keywords: grape marcs, valorization, compost, germination.

I. Introduction

In recent years, there has been renewed interest in the use of by-products, for both economic and environmental reasons. The importance of these by-products lies in their abundance, their low cost and the fact that they represent a natural organic source available all over the planet. However, today, global industry uses less than 10% of the plant biomass produced, and huge quantities of residues are burnt each year, causing a serious environmental problem. Currently, several countries have imposed new regulations to limit the burning of these co-products in response to restrictions on the emission of greenhouse gases that cause global warming.

Our aim is therefore to study the composting process and monitor the chemical and biological evolution of composts, in order to eliminate and valorize bio-waste.

II. Materials and Methods

The plant biomass was obtained from the wine production and marketing unit located in Amer El-Ain the Wilaya of Tipaza

Steps in making compost

Shredding: to reduce the size of the coarse raw material in order to increase the surfaces of attack and maintain sufficient interstices between the particles.

Implementation: we have prepared a plastic basket with holes on all four sides (aeration, leachate evacuation) and lined with a mosquito net to prevent loss of compost and sawdust after decomposition of the organic matter.

Characterization of physical and chemical parameters

1. Temperature measurement
2. pH measurement
3. Moisture
4. Organic matter and carbon determination
5. Protein determination
6. Determination of reducing sugars (Miller)
7. Biological tests: Two phytotoxicity tests were used in this study. The germination test and The germination index test on wheat.

III. Results and discussion

1. Physico-chemical analysis of grape pomace

The results of physico-chemical analyses of grape pomace prior to composting are presented in the table below.

pH	4.51
Water content % (%)	10
Ash content %	5.15
Titrate acidity % (g/l)	4.7
Reducing sugars (g/l)	18.4
Protein (mg/l)	1,71

2. Compost obtained

Composting lasted 50 days, with watering and turning as required

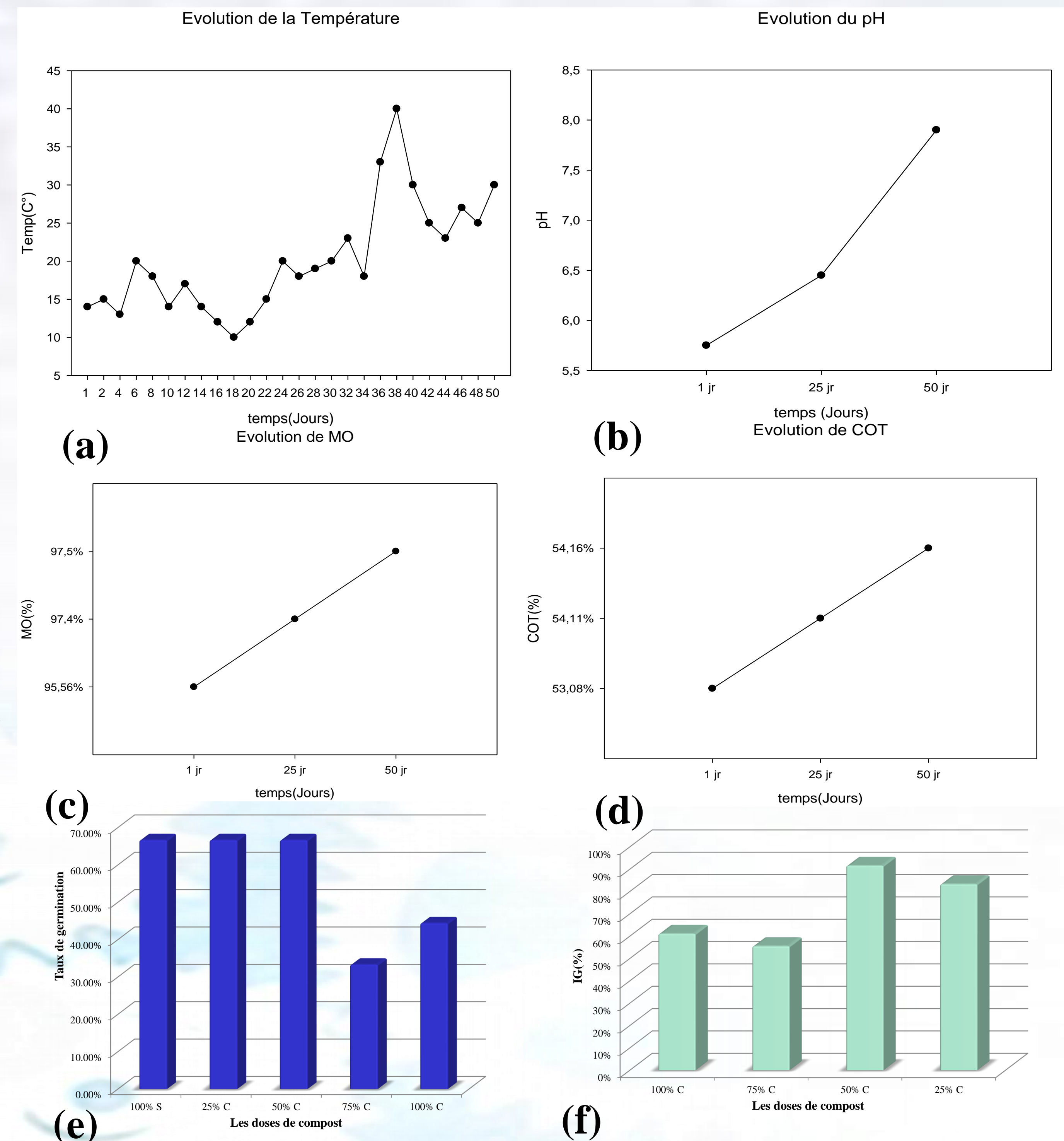


Figure 1: Characterization of physical and chemical parameters of the obtained compost: (a) Temperature changes during composting; (b) Evolution of pH during composting; (c) Evolution of OM during composting; (d) TOC % evolution during composting; (e) Germination rate (%) of wheat seeds on pure compost or mixed with soil; (f) Germination index (%) of wheat seeds on pure compost extracts or mixed with distilled water

IV. Conclusion

In the light of all these results, compost maturation seems clearly directed towards the development of humified organic matter. However, to obtain a product that can be used in agriculture, without any danger to health or the environment, we need to have methods for characterizing it, such as calculating the germination index, which shows that it is a viable, non-phytotoxic substrate with a germination rate (%) of over 50% for the different doses..