

B. Riaño, B. Molinuevo-Salces, I. González-García, M.C. García-González

Agricultural Technological Institute of Castilla y León, Ctra. Burgos, km 119, 47071 Valladolid, Spain.

Presenting author email: berta.riano@itacyl.es



INTRODUCTION

In the world, around 14 million tons of apple are processed per year and the solid waste produced (namely, apple pomace (AP)) accounts for 25% of the total processing biomass (Dhillon et al., 2013; Molinuevo-Salces et al., 2020).

The purpose of this study was to evaluate the potential of volatile fatty acid (VFA) production through anaerobic digestion under different operational conditions as an alternative option for AP valorization.

MATERIALS AND METHODS

- Apple pomace obtained after apple pressing for cider production (VS content= 287 g Kg⁻¹)
- Inoculum: anaerobic sludge from a municipal wastewater treatment plant
- Substrate: inoculum ratio = 1 g VS g VS⁻¹
- Bottles 570 mL; working volumen of 200 mL
- Mesophilic temperature (38°C)
- Three conditions tested at batch regime
 - ❖ Initial pH of 5.5
 - ❖ Initial pH of 10.0
 - ❖ Addition of a methanogenic inhibitor (BES) without pH control



RESULTS

- ✓ The highest VFA production was similar for all tested conditions, around 5.0 g COD_{VFA} L⁻¹ (Fig. 1).
- ✓ The VFA profile suggests that the production kinetic was favoured with an initial pH of 10.0 (Fig. 1).
- ✓ The composition of the fermentation broth was greatly affected by the fermentation conditions (Fig. 2):
 - At an initial pH of 5.5: acetic and butyric acids were the main products.
 - At an initial pH of 10.0: acetic (46%), butyric (29%) and propionic (11%) were the main products.
 - With the addition of BES without pH control: acetic acid (67%) was the main product, followed by propionic (14%) and butyric (11%) acids.
- ✓ The VFA yields obtained in the present study were 0.87 g COD_{VFA} g VS_{fed}⁻¹ for the assay at an initial pH of 5.5, 0.63 g COD_{VFA} g VS_{fed}⁻¹ for the initial pH of 10.0 and 0.83 g COD_{VFA} g VS_{fed}⁻¹ for the assay with BES.
- ✓ AP is a substrate that merits further research due to the considerable valorization potential for VFA production.

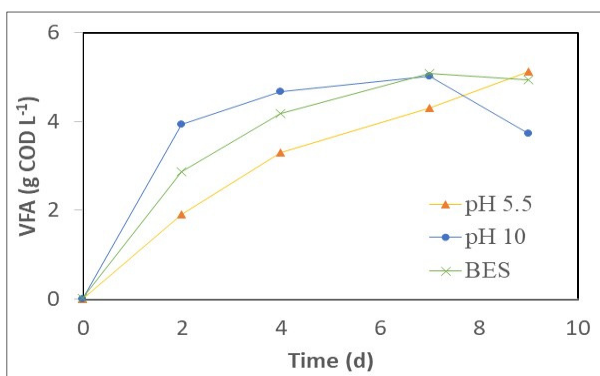


Fig. 1. Evolution of VFA production from AP under the three tested conditions.

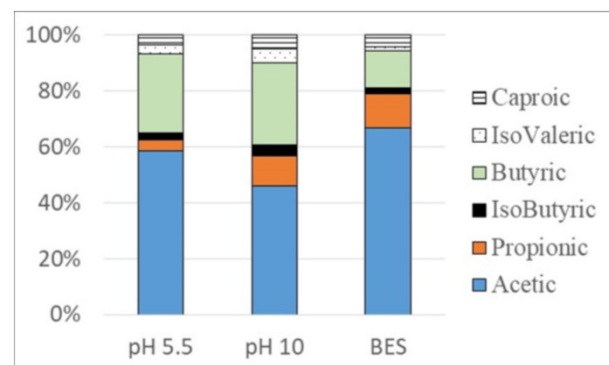


Fig. 2. VFA profile under the three tested conditions on day 9th of fermentation.

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