



EVOLUTION OF pH, SUGARS AND XYLANASE AND CELLULASE ACTIVITIES DURING FIRST STAGE OF ORGANIC SOLID WASTE DEGRADATION

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Introduction. In the process of aerobic degradation of organic solid waste (OSW), the digestibility and hydrolysis of raw material depend on the early appearance of hydrolytic enzymes (1). Several treatments have been suggested in order to accelerate digestion of OSW (2). The aim of this work was to determine the profile of pH, xylanase, cellulase, total (TS) and reducing sugars (RS) during the first hours of aerobic digestion of OSW under controlled conditions.

Methods. A mixture of OSW (85%), paper (3%), and bulking material (7%) and conditioned microbial consortium [compost (3%) and bovine manure (2%)] was used. On line monitoring of the process was carried out using a respirometer (3) during 21 hours. Conditions of the process were: air flow 1mL/min, 35°C and 70% of moisture. TS (4), RS, cellulolytic and xylanolytic activity (5) were determined.

Results. CO₂ and pH evolution are shown in Fig.1, a decrease of pH was observed during the first 15h of cultivation. Simultaneously a rapid increase of the rate of carbon dioxide production was noticed; this behavior can be explained by the consumption of TS and RS, and possibly the accumulation of organic acids in the medium (Fig 2).

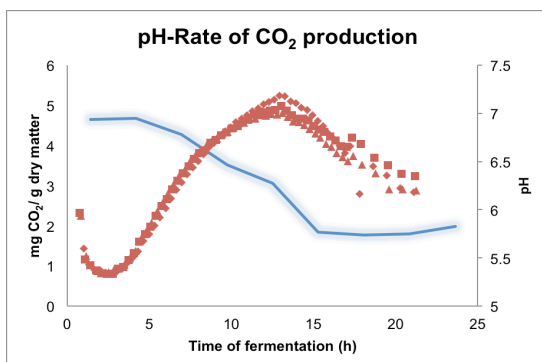


Fig.1 CO₂ production and pH evolution during aerobic degradation of OSW under controlled conditions.

Comparison of the profiles of water soluble RS and TS, indicated that most of TS correspond to soluble RS, probably easily assimilable sugars coming from fruits and vegetables present in the OSW.

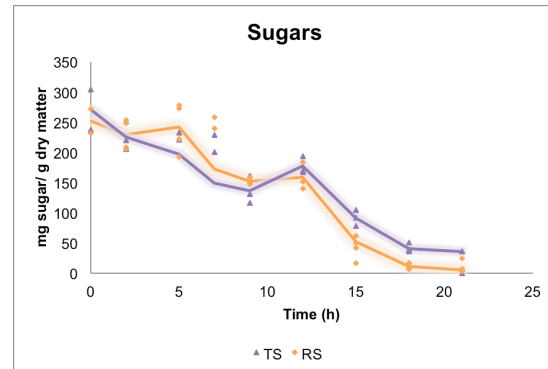


Fig 2. Water soluble total and reducing sugars during aerobic degradation of OSW under controlled conditions.

Xylanase and cellulase activities are present from the beginning of the process, decrease of hydrolytic activities can be related to the decline of pH (Fig.3).

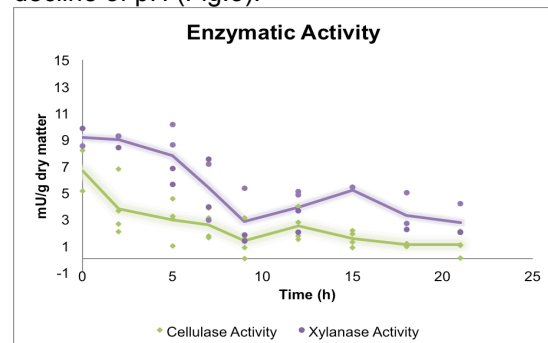


Fig 3. Evolution of cellulase and xylanase activity.

Conclusions. During the first hours of aerobic degradation of OSW under controlled conditions, the content of easily assimilable sugars are rapidly consumed, associated to an increased in the rate of production of CO₂. A decline of pH is observed. It is worth noticing that hydrolytic enzyme activities (cellulases and xylanase) are observed during the first stage of the process, showing a potential of degradation of biopolymer in an advanced stage of the process

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