ACID HYDROLYSIS TIME EFFECT ON FECAL FLORA GROWTH IN *A* SUBMERGED FERMENTATION USING AMARANTH STUBBLE'S HYDROLIZATES AS SUBSTRATE

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Introduction. Amaranth stem's lignocellulosic residue has a hemicellulose content of 25.2% and 12.3% of pentosans (1). The xylan hemicellulose is made of a polymer to be chemically or enzymatically hydrolyzed which allows to obtain xylooligosaccharides (2), with prebiotic activity. The chemical composition and physicochemical properties affect fiber fermentability. Pectic substances and gums are easily metabolized, whereas the fermentability of hemicelluloses mainly depends on their solubility. The susceptibility of cellulose to bacterial fermentation is primarily determined by its crystallinity. However, lignin is not fermented (4).
The purpose of this work was to assess the effect of time on acid hydrolysis of amaranth stubble in order to observe, through a submerged fermentation, its possible prebiotic activity.

Methods. Amaranth stubble hydrolysis was carried out with 5% H_2SO_4 at 100°C during 30, 60, 90, 120 and 150 min. Hydrolyzates so obtained were used as carbon source in fermentation under anaerobic conditions. The base culture medium was prepared according to Campos-Vega, 2009 (5).Total sugar content was evaluated by the phenol-sulfuric acid method, cell growth by turbidimetry at 620 nm and pH by a pHmeter.

Results. The increase in cell growth due to the carbohydrate consumption indicated that the colonic microbiota was capable of metabolizing the carbon source of amaranth stubble hydrolyzates (Figure 1).
The anaerobic fermentation parameters assessed were specific growth rate, doubling time (td) and biomass yield (Y x/s). They were consistent and indicated than they had similar degradation patterns when they were compared to the controls used (Table 1).

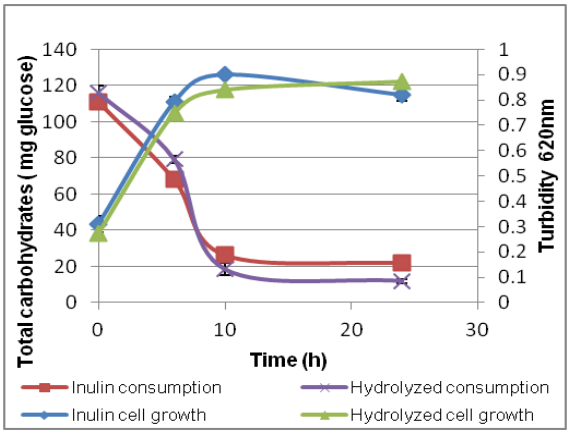

Fig.1 Cell growth and carbohydrate intake of the hydrolyzates obtained at 100°C at different times by the colonic microbiota during fermentation.

Table 1. Fermentation parameters of growth kinetics of the hydrolyzates obtained at different times at 100°C.

Time of hydrolysis:	μ (h^{-1})	td (h)	Yx/s
30 min	0,25 (± 0,003)	2.80	0.015 (± 0.0004)
60min	0,27 (±0,020)	2.57	0.016 (± 0.0006)
90min	0,46 (±0,070)	1.50	0.022 (± 0.002)
120min	0,40 (±0,006)	1.73	0.019 (± 0.003)
150min	0,39 (±0,006)	1.75	0.020 (± 0.02)
CONTROLS:			
Inulin	0,38 (±0,005)	1.84	0.018 (± 0.0004)
Pectin	0,27 (±0,002)	2.60	0.015 (± 0.002)

Conclusion. The hydrolysis time for obtaining amaranth stubble hydrolyzates had a significant effect on the fermentation parameters (μ, td and Yx/s) on the colonic anaerobic bacteria growth which was similar to that observed for inulin and pectin used as controls.

References.

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