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# Use of sweet potato root residues as carbon source for the growth of xylanase-producing *Cellulosimicrobium sp.*

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**Introduction.** Forty percent of total sweet potato (*Ipomoea batatas*) root (SPR) production is discarded due to be outfit of the quality control parameter for marketing in northwest region of Buenos Aires province, Argentina. Therefore, local producers face a challenge to promote the use of SPR residues by producing a value-added product. In this way, SPR could be a promising alternative carbon source to formulate culture medium for growing microorganisms capable of metabolising starch. Research focused on low-cost and easy-to-acquire raw material that can be used as fermentable substrates, as sources of carbon or nitrogen, is one of the most interesting challenges in biotechnology today [1].

Additionally, *Cellulosimicrobium sp.* was reported to be able to use starch as a carbon source [2] and to produce xylanase [3, 4, 5]. Xylanases are applied in several food industry processes, such as breadmaking, starch extraction, coffee and vegetable oil extraction, fruit juice clarification [6].

The aim of this work is to evaluate the growth of *Cellulosimicrobium sp.* CO1A1 strain using different varieties of SPR as a carbon source.

**Materials and methods.** Six varieties of SPR were tested (Arapey, Beauregard, Covington, Selecta, Morada, Boni), which were harvested in northwest region of Buenos Aires province, Argentina. Each variety of SPR was processed into a paste.

CO1A1 strain studied in this work was previously isolated and identified genetically in the genus *Cellulosimicrobium* [7].

Erlenmeyer flasks (250 mL) containing 50 mL of minimal saline medium (MSM (g/L): $NaNO_3$ (4.0); $KH_2PO_4$ (1.5); $Na_2HPO_4$ (0.5); $FeSO_4.7H_2O$ (0.0011); $MgSO_4.7H_2O$ (0.2); $CaCl_2.2H_2O$ (0.0132) was supplemented with 5 % (w/v) of each variety of SPR. Then they were autoclaved at 1 atm., 121 ºC for 15 min. Mediums were inoculated with 3% (v/v) (OD 0.5) of *Cellulosimicrobium sp.* CO1A1 and kept at 135 rpm and 25 ºC. Controls (non-inoculated culture medium) were also tested for each variety of SPR. The tests were carried out in duplicate.

Bacterial growth was estimated by cell dry weight method, for this a sample of 6 mL culture broth was centrifuged at 13,500 rpm for 15 min, and pellet was dried at 100ºC for 24 h and weighed. Additionally, bacterial growth was estimated using optical density (OD) at 600 nm [8]

**Results and discussion.** At first step, we could noticed that *Cellulosimicrobium sp.* CO1A1 was able to grow in a medium formulated with SPR (Arapey variety), thus proving that it has the ability to use SPR as only a carbon source.

The growth kinetics of *Cellulosimicrobium sp.* CO1A1 determined by biomass estimation using OD and cell dry weight are shown in Figure 1A, 1B. It was noticed that by cell dry weight method, results showed high standard deviation and interference of unconsumed SPR. Therefore, the most appropriate method for biomass measurement was by OD method.

Considering the growth curve obtained by OD (Figure 1A), *Cellulosimicrobium sp.* CO1A1 culture reached the stationary phase at 5 days, obtaining 8.50 ± 0.60 of OD.

The growth of *Cellulosimicrobium sp. CO1A1* was then evaluated using several varieties of SPR (Arapey, Beauregard, Covington, Selecta, Morada, Boni) in order to determine whether varieties produce significant differences in biomass production. Biomass did not show significant differences ($p>0.05$) between each medium of varieties of SPR, being around 8.26 and 9.62 OD (Figure 2).

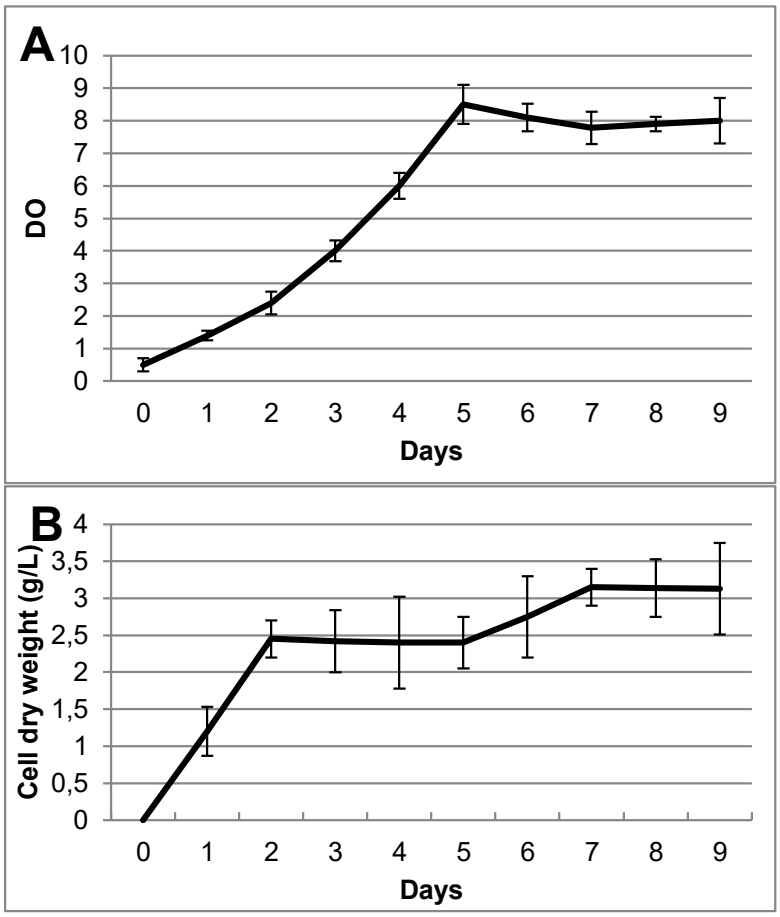


Figure 1. *Cellulosimicrobium sp.*CO1A1 growth curve estimated by OD (A) and cell dry weight (B).

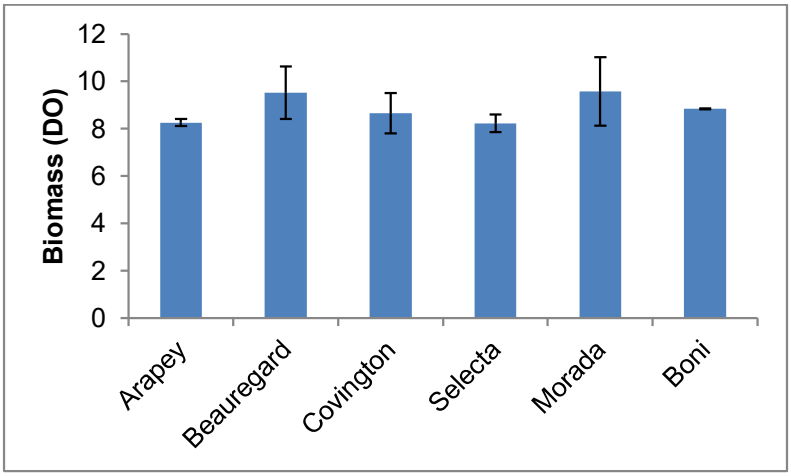


Figure 2. *Cellulosimicrobium sp.* CO1A1 biomass estimated in cultures formulated with MSM and supplemented with different SPR varieties, after 5 days of incubation.

**Conclusions**. We conclude that RPS can be used as carbon source in a process of *Cellulosimicrobium sp.* CO1A1 biomass production. The most appropriate method to monitoring the bacterial grow in a medium formulated with RPS is using OD. All the varieties of RPS tested in this work are equal promising source to be applied in a bioprocess to obtain biomass by *Cellulosimicrobium sp.* CO1A1.

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