



# Sugarcane Bagasse as a Sustainable Source of Bioactive Xylo-Oligosaccharides: A Comparative Study with Commercial XOS

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## INTRODUCTION

Xylo-oligosaccharides (XOS) are non-digestible, low-calorie carbohydrates obtained from xylan-rich materials, including agro-industrial residues such as rice husk, corn cob, and sugarcane bagasse. Although XOS are already produced commercially, extensive research continues to explore different chemical, physicochemical, and enzymatic hydrolysis routes to produce XOS with controlled purity and structure. These differences strongly affect their functional properties, including antioxidant activity and  $\alpha$ -glucosidase inhibition, as well as their potential use as sugar substitutes and functional food ingredients.

## OBJECTIVE

To assess and compare the functional properties of commercial XOS (XC) and XOS hydrolyzed from sugarcane bagasse (XSCB) by quantifying their phenolic compounds, antioxidant capacity, and  $\alpha$ -glucosidase inhibition.

## METHODS

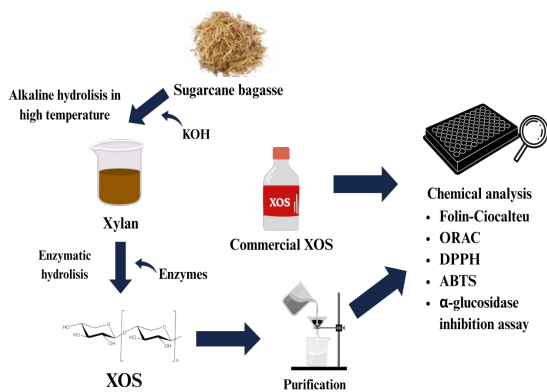


Figure 1: Production of XOS from sugarcane bagasse and assessment of its functional properties, in comparison with commercial XOS.

## RESULTS AND DISCUSSION

### Phenolic compounds and Antioxidant Activity

Table 1: Antioxidant activity found in XSCB and XC samples.

Chemical analysis	XSCB activity ( $\mu\text{mol TE/mg}$ )	XC activity ( $\mu\text{mol TE/mg}$ )
ORAC	$0.762 \pm 0.181$	$0.224 \pm 0.051$
ABTS	$0.941 \pm 0.578$	n.d.
DPPH	n.d.	n.d.

- XSCB and XC showed no phenolic compounds due to purification.
- XSCB (2.26 g/L) exhibited higher ORAC activity ( $0.762 \mu\text{mol TE/mg}$ ) than commercial XOS (2 g/L) ( $0.224 \mu\text{mol TE/mg}$ ).
- The absence of DPPH activity may be due to limited interaction between purified XOS and this radical.

### Antidiabetic Activity

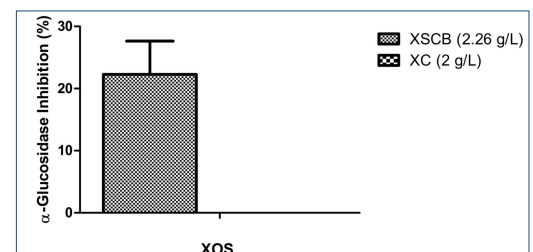


Figure 2:  $\alpha$ -Glucosidase inhibition (%) of XSCB and XC samples.

- $\alpha$ -Glucosidase inhibition was limited by the low phenolic content of purified XOS.
- Commercial XOS showed no inhibition due to their high purity and lack of bioactive compounds, while XSCB showed low inhibition.
- Preserving phenolics or increasing the XOS concentration may improve glycemic modulation.

## CONCLUSION

- XSCB showed superior antioxidant capacity compared with XC sample.
- Only XSCB exhibited ABTS radical scavenging and  $\alpha$ -glucosidase inhibition, highlighting its unique bioactive profile and potential advantages.
- The lack of DPPH activity in purified XOS may evoke curiosity about its specific reactivity profile, emphasizing the distinct antioxidant mechanisms involved.
- Residual bioactive compounds in XSCB, possibly phenolics and flavonoids, may contribute to its enhanced antioxidant and metabolic effects.
- Sugarcane bagasse XOS emerges as a functional ingredient with enhanced bioactivity, demonstrating clear potential for food and nutraceutical applications.

## ACKNOWLEDGEMENTS

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