SOLULYS®: AN EXCELLENT GROWTH FACTOR FOR THE FERMENTATION INDUSTRY

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INTRODUCTION

Minimization of costs associated with nutrients and supplements is essential for economical largescale industrial fermentations. Corn steep liquor (CSL) is a common by-product of the corn wet-milling industry. Traditionally, CSL has been utilized as a cost-effective source of nitrogen and other nutrients in a variety of fermentation applications. However, as a by-product, CSL can widely vary in consistency from lot to lot, and vary by manufacturer due to starch processing demands. The difficulty in predicting composition and performance makes CSL a less than ideal nutrient source for many end users.

SOLULYS® is not a by-product, rather a corn steep type product developed specifically by Roquette. The tightly controlled process is aimed at producing a characteristic product profile that differentiates SOLULYS® from CSL. SOLULYS® demonstrates lot to lot consistency, predictable performance, and offers industrial pricing and availability.

In this work, we will demonstrate the performance of SOLULYS® in both cell growth and enzyme productivity compared to commercial CSL, yeast extract, and various other common nitrogen sources.

A performance comparison was completed by utilizing an alpha-amylase fermentation model with Bacillus subtilis (ATCC #21770).

OBJECTIVES

To demonstrate SOLULYS® as an excellent and cost effective nutrition source for industrial fermentation applications, by performance comparison of:

1. SOLULYS® with commercial CSL, yeast extract and soy flour; and
2. SOLULYS® with corn peptone, potato peptone and gluten hydrolysates.

MATERIALS

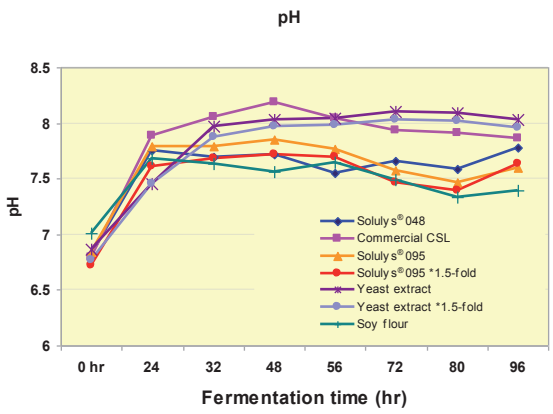
1. Microorganism: Bacillus subtilis (ATCC #21770);
2. Temperature controlled rotary shaker: JEIO IS971;
3. Spectrophotometer: Shimadzu UV160U
4. HPLC: Waters system with Waters 410 Differential Refractometer;
5. Chemicals: L-lactose (Sigma), Soy flour, Tryptone (Difco), Beef extract (BBL), K2HPO4/KH2PO4 (EMD); CaCl2 (JII), and Nutrients broth/Terrific broth (Difco), Yeast extract, CSL and peptones are commercially purchased and used in this study.

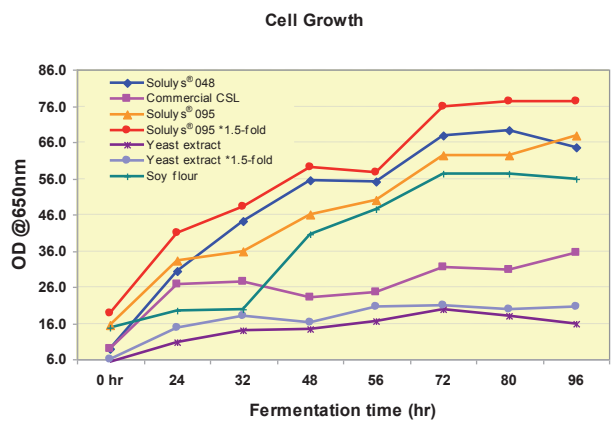
METHODS

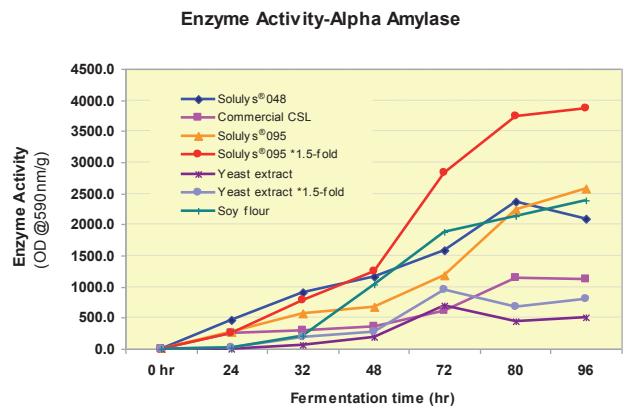
1. Inoculum was prepared by culturing cells in 50ml of Terrific Broth in 250ml Erlenmeyer flasks at 250 rpm and 30°C in a shaker incubator for 24 hrs. 3ml (6%) cross over volume was transferred to each production flask.
2. Fermentation medium was comprised of Soy flour 1%, Tryptone 0.75%, Beef extract 0.75%, K2HPO4 2.625%, KH2PO4 1.125%, CaCl2 0.1%, Lactose 10% (autoclaved separately), and each additional variable protein separately dosed on an equal protein basis (3.5%). Fermentations were carried out in triplicate in 250ml Erlenmeyer flasks at 225 rpm and 30°C in a shaker incubator and sampled at prescribed intervals.
3. pH was monitored with a pH meter, lactose content was analyzed with HPLC, and the cell growth was determined with OD at 650nm.
4. Enzyme activity of alpha-amylase was determined with a modified assay (5) developed by Xiao et. al., a quantitative starch-iodine method for measuring alpha-amylase activity by OD at 590nm.

RESULTS AND DISCUSSION

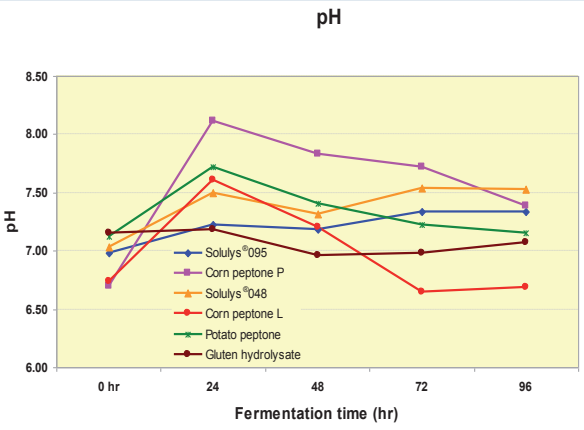
Study I: SOLULYS® vs. CSL, Yeast extract, and Soy flour

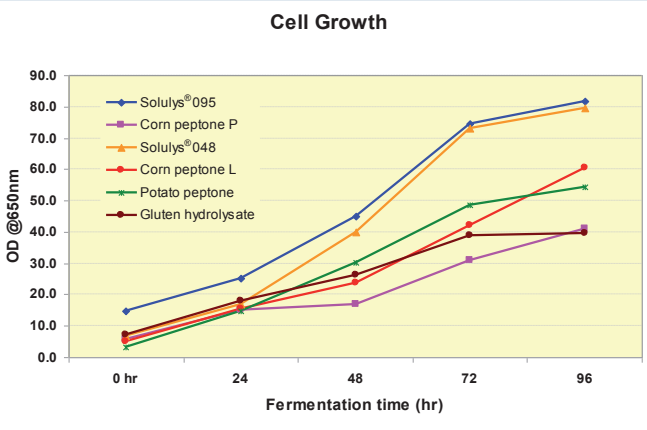


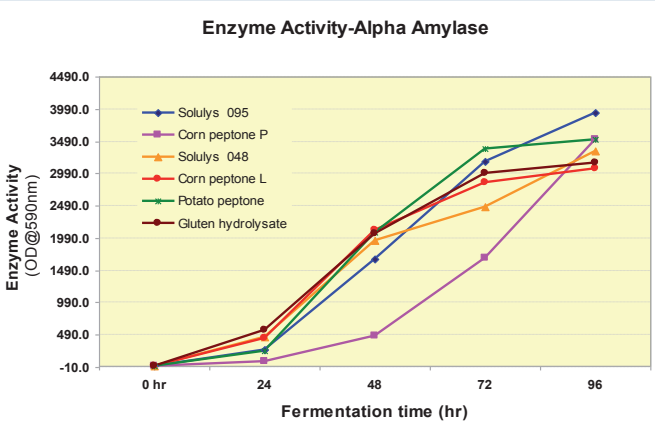




Study II: SOLULYS® vs. Corn peptone, Potato peptone







CONCLUSION

SOLULYS® demonstrated almost two times the effectiveness in both cell growth and enzyme productivity compared to commercial CSL and an industrial yeast extract;

SOLULYS® is very comparable in performance to typically utilized corn peptones, potato peptones, and soy flours.

In conclusion, it is clearly noted from this example that SOLULYS® is an excellent, cost-effective nutrient source in fermentation applications, and can be an excellent alternative to yeast extract, peptones, and soy flour.

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