

Lorena Pedraza Segura^a, Javier Larragoiti Kuri

^a Departamento de Ingeniería y Ciencia Químicas, Universidad Iberoamericana, Prolongación Paseo de la Reforma 880, Ciudad de México, Distrito Federal, 01219, MEXICO. lorena.pedraza@ibero.mx

Introduction

The influence of media components, and process variables on xylitol production was evaluated using a Plackett-Burman design.

After discriminating the variables with lower effect, a linear model was built; this model showed to accurately predict the experimental response.

This study's objective was to identify the most influential variables on xylitol production for further optimization.

Methods and materials

Plackett-Burman experimental design of 8 runs was employed to determine the influence of independent variables in the production of xylitol by *Candida guilliermondii*. A total number of 7 variables were selected for this study. Each variable is represented with two levels, high (+1) and low (-1) as shown in Table 1.

A total of 8 experiments were done in duplicate



HPLC was used for analyzing substrate and product concentration.



Methods and materials

Table 1. Values for the Plackett-Burman design.

Variable	Parameter	-1	+1
A	pH	6	6.5
B	Agitation speed (rpm)	125	175
C	C/N ratio	15	20
D	Yeast extract (g/L)	1.5	3
E	Trace element solution (mL/L)	2	3
F	KH ₂ PO ₄ (g/L)	1	2
G	MgSO ₄ (g/L)	0.1	0.3

Results

Plackett-Burman experiments showed a wide variation in xylitol production. This variation reflected the importance of optimization to attain a higher yield of conversion.

After calculating the effect of each parameter it was determined that pH, agitation speed and yeast extract were the most influential variables in xylitol production. The trace element solution and C/N ratio did not represent an important impact on xylitol synthesis.

Using the overall response average and the effect for each parameter, a linear model was built; the least influential effects were not used in the model. The experimental average responses for each run are shown in Fig 1.

Table 2. Effect of each parameter.

Variable	Parameter	Effect
A	pH	0.0963
B	Agitation speed	-0.0546
C	C/N ratio	-0.0037
D	Yeast extract	0.0524
E	Trace element solution	0.0315
F	KH ₂ PO ₄	0.0150
G	MgSO ₄	0.0317

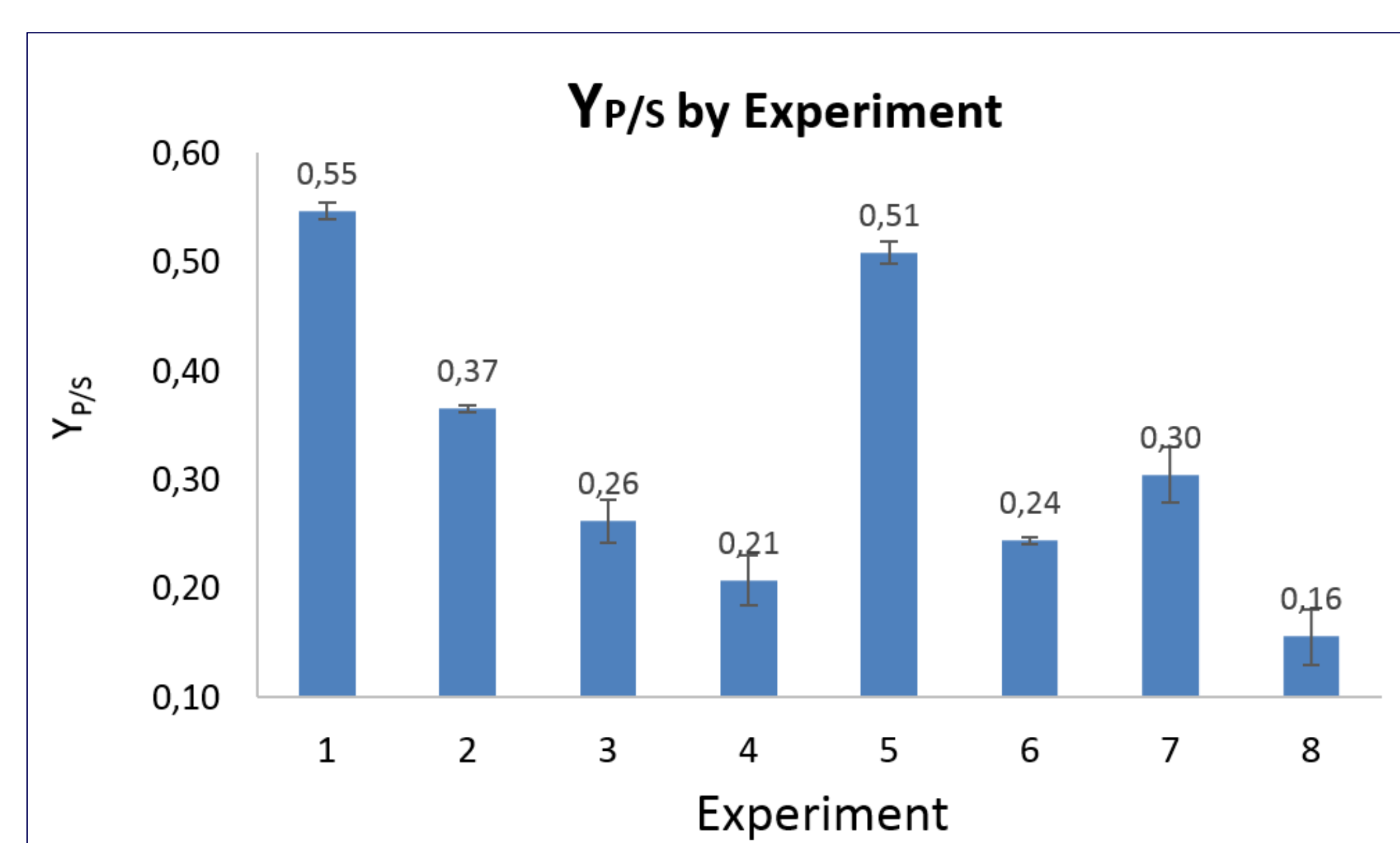


Fig 1. Xylitol conversion by experiment, the experimental error is shown for each value.

References

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Conclusions

The screening done by Plackett-Burman design was proved to be efficient. The linear model obtained shows to predict the experimental response with an experimental error of 4×10^{-4} . Further work is needed in order to optimize the media used for xylitol production.

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