EFFECT OF CARBON SOURCE ON GIBBERELLIC ACID PRODUCTION BY SOLID STATE FERMENTATION USING *GIBBERELLA FUJIKUROI*

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Introduction. Solid-state fermentation (SSF) is gaining interest due to its potential advantages in manufacturing several products such as enzymes, secondary metabolites in high yield at high concentration and with high specificity (1). Fungi in particular are applied in SSF, since with the absence of freely flowing water; conditions are close to their natural habitats. There are agricultural residues such as wheat, sorghum, and rice that represent large renewable resources for available substrates (2).
The objective of this work was the study of effect of carbon source from vegetable oils on gibberellic acid production (GA_3) in a solid-state fermentation process using sorghum as support and an orthogonal experimental array for its optimization.

Methods. *Gibberella fujikuroi* strain CDBB H-984, conserved in potato glucose slants at 4°C and sub-cultured every month, was used in this experiment (culture collection of lab of Biotechnology and Bioengineering, ITC, Mex). The fungus was cultured on potato dextrose agar (PDA) slants at 28°C for 7 days. A 500 ml Erlenmeyer flask containing 250 ml of medium was inoculated with spores and mycelium (IMS) taken from the slants and incubated on a rotatory shaker at 280 rpm and 28°C for 38 h. 100 g of sorghum was packed into a 500 ml Erlenmeyer flask and humidified with 250 ml of culture medium. The flask was inoculated with 1:10 volume of IMS/support weight and incubated on a rotatory shaker at 280 rpm and 28°C for 7 days. At the end of fermentation time the support was extracted with ethyl acetate and analyzed the gibberellic acid in a HPLC (3). An orthogonal experimental design L_9 (3^4) in duplicate was used to investigate the effect of carbon source on GA_3 production.

Results. Carbon sources used were corn oil, safflower oil and a mixture of glucose-corn oil. The culture medium composition with a mixed carbon source gave the highest production of GA_3. The analysis of variance indicated that sulfate was the parameter that affected most the GA_3 production, followed by carbon source, ammonium and phosphate. The optimal culture medium composition to achieve 87.03 mg GA_3/Kg of support was glucose 50 g/L, corn oil 80 g/L, NH_4Cl 5 g/L, KH_2PO_4 7 g/L, Mg SO_4 1.5 g/L.

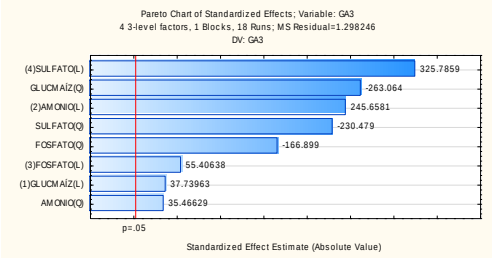

Fig.1 Main effects of the variables in the solid-state fermentation process.

Table 1. Analysis of variance for experimental design L_9 (3^4) in the solid-state fermentation process.

Factor	Var.:GA3; R-sqr=.99997; Adj:.99995 4 3-level factors, 1 Blocks, 18 Runs MS Residual=1.298246; DV: GA3				
	SS	**df**	**MS**	**F**	**p**
Gluc-Corn	91691.0	2	45845.5	35313.4	2.97E-18
Ammonium	79979.4	2	39989.7	30802.9	5.50E-18
Phosphate	40148.6	2	20074.3	15462.6	1.22E-16
Sulfate	206755.0	2	103377.5	79628.6	7.67E-20
Error	11.7	9	1.3		
Total SS	418585.7	17			

Conclusions. Using a mixed carbon source in the solid-state fermentation gives a higher GA_3 production due the inductive effect of corn oil. Results obtained in this study provide good expectations of this fermentative technique as alternative to achieve high concentrations of GA_3.

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