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Optimization of trypsin-like protease production by lactobacillus plantarum fncc 0270 using response surface methodology

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Abstrak

The purpose of this study was to get optimum medium composition and agitation to trypsin-like protease production by
Lactobacillus plantarum FNCC 0270. The medium composition and agitation for enzyme production was optimized using
Central Composite Design and Response Surface Method with Design Expert software version 7.1.5. Fermentation was
carried out in erlenmeyer flask at initial pH 8, 37 °C, with shaker incubator at 87.5 rpm. The results of the best of enzyme
activity 1.0 mU/mL, protein levels of 0.557 mg/mL and desirability value of 0.740. Numerical optimization was performed
to approach the ideal state of the fermentation or desirability value of 1. The medium composition of fermentation used
was: 3.64% baker's yeast, 1.21% glucose, and 0.13% skim milk. The enzyme activity reached was 1.51 mU/mL and
protein levels of 0.205 mg/mL. After numerical optimization, the fermentation process was verified using 125 mL
Erlenmeyer in shaking incubator at 77 rpm, initial pH 8, 37 °C, 15 h of fermentation. The verification results showed that
the enzyme activity and protein levels was 1.273 ± 0.227 mU/mL and 0.248 ± 0.012 mg/mL, respectively.

Optimization of Trypsin-like Protease Production by Lactobacillus plantarum FNCC 0270 using Response Surface
Methodology. Tujuan penelitian ini adalah memperoleh komposisi medium dan agitasi optimum untuk produksi protease
serupa tripsin oleh Lactobacillus plantarum FNCC 0270. Protease serupa tripsin (PST) dihasilkan oleh L. plantarum
FNCC 0270 melalui proses fermentasi dengan optimasi komposisi medium dan agitasi menggunakan Central Composite
Design dan Response Surface Methode, dengan software Design Expert versi 7.1.5. Fermentasi dilakukan dalam
erlenmeyer pH awal 8 dan suhu 37 °C menggunakan shaker inkubator pada 87,5 rpm. Hasil eksperimen terbaik
menunjukkan aktivitas enzim 1 mU/mL, kadar protein 0.557 mg/mL dan diperoleh nilai desirability 0,740. Untuk

mendekati keadaan ideal atau nilai desirability 1 dilakukan optimasi melalui simulasi numerik, yaitu fermentasi dengan
komposisi baker yeast 3,64%, kadar glukosa 1,21%, konsentrasi skim milk 0,13%, dan agitasi 77 rpm, sehingga diperoleh
aktivitas enzim 1,51 mU/mL dan kadar protein 0,205 mg/mL. Setelah optimasi numerik kemudian dilakukan verifikasi
fermentasi di laboratorium, dalam erlenmeyer menggunakan shaker inkubator, agitasi 77 rpm, pH awal 8, suhu 37 °C,
selama 15 jam. Hasil verifikasi menunjukkan aktivitas enzim dan kadar protein masing-masing 1,273 ± 0,227 mU/mL dan
0,248 ± 0,012 mg/mL.