

EFEK FERMENTASI GROWOL MENGGUNAKAN *EFFECTIVE MICROORGANISM-4* (EM-4) TERHADAP INDEKS DAN AKTIVITAS PREBIOTIK TEPUNG GROWOL

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INTISARI

Latar belakang: Fermentasi spontan berpotensi menghasilkan growol dengan indeks dan aktivitas prebiotik yang tidak konsisten akibat variasi mikroorganisme selama proses fermentasi. Oleh karena itu, modifikasi fermentasi growol menggunakan *starter* terkontrol berupa *Effective Microorganism-4* (EM-4) diharapkan mampu menghasilkan produk growol dengan indeks dan aktivitas prebiotik yang lebih stabil serta terstandarisasi.

Tujuan penelitian: Penelitian ini bertujuan mengevaluasi skor indeks dan aktivitas prebiotik tepung growol hasil fermentasi menggunakan EM-4 terhadap *Lactobacillus rhamnosus* (*L. rhamnosus*) serta selektivitasnya dibandingkan dengan *Escherichia coli* (*E. coli*).

Metode penelitian: Penelitian ini menggunakan desain *experimental laboratory* dengan rancangan acak lengkap (RAL). Fruktooligosakarida (FOS) digunakan sebagai kontrol prebiotik pembanding dan glukosa sebagai kontrol non-prebiotik sumber karbon sederhana untuk menggambarkan pola pertumbuhan bakteri yang tidak bersifat selektif. Pengujian dilakukan secara *in vitro* menggunakan kultur tunggal bakteri probiotik *L. rhamnosus* dan bakteri enterik patogen *E. coli*. Jumlah bakteri dihitung berdasarkan metode *total plate count* (TPC) dengan menanam hasil pengenceran serial pada media selektif yang sesuai, kemudian dinyatakan sebagai Log CFU/mL. Skor indeks prebiotik dihitung berdasarkan rasio pertumbuhan *L. rhamnosus* pada substrat uji dibandingkan dengan kontrol glukosa. Sementara skor aktivitas prebiotik dihitung berdasarkan perbandingan pertumbuhan *L. rhamnosus* dan *E. coli* pada substrat uji terhadap kontrol non-prebiotik glukosa selama waktu inkubasi 24 jam untuk menggambarkan selektivitas substrat terhadap bakteri probiotik. Data dianalisis menggunakan uji One Way ANOVA atau Kruskal Wallis, dilanjutkan dengan uji *post-hoc* Tukey atau Mann Whitney.

Hasil: Skor indeks dan aktivitas prebiotik tepung growol hasil fermentasi EM-4 terhadap *L. rhamnosus* pada inkubasi 24 jam menunjukkan perbedaan signifikan antar perlakuan. Skor indeks prebiotik pada konsentrasi EM-4 0%; 2,5%; 5%; 7,5%; dan 10% berturut-turut sebesar 1,012; 1,006; 0,817; 0,722; dan 0,501, sedangkan untuk skor aktivitas prebiotik masing-masing sebesar 0,764; 1,140; 0,741; 0,768; dan 0,079. FOS sebagai kontrol prebiotik menunjukkan skor indeks dan aktivitas prebiotik sebesar 0,936 dan 0,872.

Kesimpulan: Tepung growol hasil fermentasi menggunakan EM-4, khususnya pada konsentrasi 2,5% berpotensi dikembangkan sebagai pangan fungsional sumber prebiotik karena memiliki skor indeks dan aktivitas prebiotik yang paling optimal.

Kata kunci : aktivitas prebiotik; *effective microorganism*; growol; indeks prebiotik; tepung growol

EFFECT OF GROWOL FERMENTATION USING EFFECTIVE MICROORGANISMS-4 (EM-4) ON THE PREBIOTIC INDEX AND ACTIVITY OF GROWOL FLOUR

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ABSTRACT

Background: Spontaneous fermentation may produce growol with inconsistent prebiotic index and activity due to variations in microbial composition during the fermentation process. Therefore, modification of growol fermentation using a controlled starter, namely Effective Microorganism-4 (EM-4), is expected to produce growol with more stable and standardized prebiotic properties.

Objective: This study aimed to evaluate the prebiotic index and activity scores of growol flour fermented using EM-4 on *Lactobacillus rhamnosus* (*L. rhamnosus*) and to assess its selectivity compared with *Escherichia coli* (*E. coli*).

Method: This study employed an experimental laboratory design with a completely randomized design (CRD). Fructooligosaccharides (FOS) were used as a comparative prebiotic control, while glucose served as a non-prebiotic control and a simple carbon source to represent non-selective bacterial growth patterns. In vitro assays were conducted using single cultures of the probiotic bacterium *L. rhamnosus* and the enteric pathogenic bacterium *E. coli*. Bacterial populations were quantified using the total plate count (TPC) method by plating serial dilutions onto appropriate selective media and expressed as Log CFU/mL. The prebiotic index score was calculated based on the growth ratio of *L. rhamnosus* on the test substrate relative to the glucose control. Meanwhile, the prebiotic activity score was determined by comparing the growth of *L. rhamnosus* and *E. coli* on the test substrate relative to the non-prebiotic glucose control during a 24-hour incubation period to describe substrate selectivity toward probiotic bacteria. Data were analyzed using One-Way ANOVA or the Kruskal Wallis test, followed by Tukey or Mann Whitney post-hoc tests.

Result: The prebiotic index and activity scores of EM-4 fermented growol flour toward *L. rhamnosus* after 24 hours of incubation showed significant differences among treatments. The prebiotic index scores at EM-4 concentrations of 0%, 2.5%, 5%, 7.5%, and 10% were 1.012, 1.006, 0.817, 0.722, and 0.501, respectively, while the corresponding prebiotic activity scores were 0.764, 1.140, 0.741, 0.768, and 0.079. FOS, as the prebiotic control, exhibited prebiotic index and activity scores of 0.936 and 0.872, respectively.

Conclusion: Growol fermented using EM-4, particularly at a concentration of 2.5%, has potential to be developed as a functional food source of prebiotics due to its optimal prebiotic index and activity scores.

Keyword : effective microorganism; growol; growol flour; prebiotic activity; prebiotic index