

## Intisari

### PENGARUH KEPADATAN *Lactobacillus* sp. GMP1 TERHADAP PERTUMBUHAN *Morganella morganii* TK7 PADA METODE CO-CULTURE

Bakteri asam laktat (BAL) memiliki sifat antagonis terhadap bakteri patogen termasuk Bakteri Pembentuk Histamin (BPH). Penelitian ini bertujuan untuk mengetahui pengaruh BAL *Lactobacillus* sp. GMP1 terhadap pertumbuhan BPH *Morganella morganii* TK7 pada metode *Co-culture*. Bakteri *Morganella morganii* TK7 ditumbuhkan bersama *Lactobacillus* sp. GMP1 dengan variasi jumlah koloni  $10^4$  CFU/ml,  $10^6$  CFU/ml, dan  $10^8$  CFU/ml pada media *Tuna Fish Infussion Broth* (TFIB) kemudian diinkubasi pada suhu  $37^{\circ}\text{C}$  dengan pengamatan *Optical Density* (OD) dan jumlah koloni metode *Total Plate Count* (TPC) pada jam ke-0, 6, dan 12 untuk mendapatkan laju pertumbuhan. Uji kadar histamin dan histidin dilakukan menggunakan metode Kromatografi Lapis Tipis (KLT). Laju pertumbuhan BPH terendah terdeteksi pada penambahan  $10^8$  CFU/ml *Lactobacillus* sp. GMP1 sebesar kurang dari  $-0,320 \pm 0,156$  Log CFU/jam dengan kadar histamin kurang dari 200 ppm, pada penambahan  $10^6$  CFU/ml sebesar  $0,151 \pm 0,094$  Log CFU/ml dengan kadar histamin 627 ppm, dan tertinggi pada penambahan  $10^4$  CFU/ml yakni sebesar  $0,169 \pm 0,018$  Log CFU/ml dengan kadar histamin 827 ppm. Hal ini membuktikan adanya perlakuan *Co-culture* mengurangi laju pertumbuhan dan produksi histamin jika dibandingkan kontrol sebesar  $0,226 \pm 0,092$  Log CFU/ml dan kadar histamin 867 ppm. Selain laju pertumbuhan *Morganella morganii* TK7 yang menunjukkan angka kematian, hasil uji *Scanning Electron Microscope* (SEM) menunjukkan adanya pengaruh morfologi pada BAL yang terlihat pada perubahan ukuran sel dan terbentuknya septa setelah dilakukan *co-culture*.

Kata kunci: bakteri pembentuk histamin, bakteri asam laktat, histamin, laju pertumbuhan, *co-culture*.

## ***Abstract***

### **EFFECT OF *Lactobacillus* sp. GMP1 DENSITY ON THE GROWTH OF *Morganella morganii* TK7 IN CO-CULTURE METHOD**

Lactic acid bacteria (LAB) exhibit antagonistic properties against pathogenic bacteria, including Histamine-Forming Bacteria (HFB). This study aims to investigate the effect of LAB *Lactobacillus* sp. GMP1 on the growth of HFB *Morganella morganii* TK7 using the *co-culture* method. *Morganella morganii* TK7 was grown together with *Lactobacillus* sp. GMP1 with colony counts of  $10^4$  CFU/ml,  $10^6$  CFU/ml, and  $10^8$  CFU/ml in Tuna Fish Infusion Broth (TFIB) medium and incubated at  $37^\circ\text{C}$ . Optical Density (OD) and colony counts were observed using the Total Plate Count (TPC) method at 0, 6, and 12 hours to obtain the growth rate. Histamine and histidine levels were tested using the Thin Layer Chromatography (TLC). The lowest HFB growth rate was detected in *co-culture* with the addition of  $10^8$  CFU/ml *Lactobacillus* sp. GMP1 at less than  $-0,320 \pm 0,16$  Log CFU/hour with histamine levels less than 200 ppm, colony counts of  $10^6$  CFU/ml at  $0,151 \pm 0,09$  Log CFU/ml with histamine levels of 627 ppm, and the highest colony counts of  $10^4$  CFU/ml at  $0,169 \pm 0,02$  Log CFU/ml with histamine levels of 827 ppm. This indicate that *co-culture* treatment reduces the growth rate and histamine production compared to the control, which had a growth rate of  $0,226 \pm 0,09$  Log CFU/ml and histamine levels of 867 ppm. In addition to the growth rate of *Morganella morganii* TK7 showing cell death, Scanning Electron Microscope (SEM) tests revealed morphological effects on *Lactobacillus* GMP1, evidenced by changes in cell size and septa formation after *co-culture*.

**Keywords:** histamine-forming bacteria, lactic acid bacteria, histamine, growth rate, *co-culture*.