# PENENTUAN WAKTU OPTIMUM PRODUKSI IAA (*Indole-3-Acetic Acid*) SERTA ANALISIS EKSPRESI GEN *nthA* DAN *nthB* PADA *Serratia plymuthica* UBCF_13

**SKRIPSI**

**Oleh**

**AISYAH SALSABILLA**
**NIM. 1710212020**

**Pembimbing:**

1. **Prof. sc. agr. Ir. Jamsari, M.P.**
2. **Prof. Dr. Ir. Irfan Suliansyah, M.S.**

**FAKULTAS PERTANIAN**
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## Abstrak

*Serratia plymuthica* UBCF_13 merupakan kelompok bakteri yang dapat memproduksi hormon IAA (*Indole-3-Acetic Acid*) yang berperan penting pada proses fisiologis tanaman. Penelitian ini bertujuan untuk menentukan waktu optimum produksi IAA berdasarkan kurva pertumbuhan bakteri *Serratia plymuthica* UBCF_13 pada media YEM serta untuk mengetahui level ekspresi gen *nthA* dan *nthB*. Penelitian ini dilaksanakan pada bulan Juni sampai Agustus 2021 di Laboratorium Bioteknologi dan Laboratorium Fisiologi Tumbuhan, Fakultas Pertanian, Universitas Andalas. Penentuan waktu optimum produksi IAA dilakukan dengan perbedaan durasi kultur 24 jam, 48 jam, 72 jam dan 96 jam serta ada atau tidaknya penambahan ion logam Kalsium (Ca). Penentuan kurva pertumbuhan bakteri *S. plymuthica* UBCF_13 dilakukan dengan pengukuran nilai *Optical density* (OD) 1x3 jam dalam rentang waktu 24 jam. Selanjutnya dilakukan penyempitan durasi kultur produksi IAA menjadi 8 durasi kultur yang berbeda dalam waktu 24 jam. Lebih jauh juga dilakukan analisis ekspresi gen *nthA* dan *nthB* berdasarkan waktu terbaik dengan menggunakan Rancangan Acak Lengkap (RAL). Hasil penelitian menunjukkan bahwa bakteri *S. plymuthica* UBCF_13 mampu memproduksi IAA secara optimum pada durasi kultur 24 jam sebesar 107,84 µg/mL dengan adanya penambahan logam Ca. Berdasarkan kurva pertumbuhan fase stasioner dicapai pada kultur 9 jam, dan dianggap merupakan waktu terbaik untuk produksi IAA secara optimum (116,41 µg/mL). Analisis ekspresi gen *nthA* dan *nthB* tidak menunjukkan adanya perubahan level ekspresi gen secara signifikan.

Kata kunci: durasi kultur, ekspresi gen, *Indole-3-Acetic Acid* (IAA), kurva pertumbuhan, *Serratia plymuthica* UBCF_13

# DETERMINATION OF OPTIMUM CULTURE DURATION FOR IAA (*Indole-3-Acetic Acid*) PRODUCTION AND GENE EXPRESSION ANALYSIS OF *nthA* and *nthB* in *Serratia plymuthica* UBCF_13


## *Abstract*

*Serratia plymuthica UBCF_13 is a group of bacteria that can produce the hormone IAA (Indole-3-Acetic Acid) which plays an important role in plant physiological processes. This study aimed to determine the optimum time of IAA production based on the growth curve of the bacterium Serratia plymuthica UBCF_13 on YEM media and to determine the level of gene expression of nthA and nthB. This research was carried out from June to August 2021 at the Biotechnology Laboratory and Plant Physiology Laboratory, Faculty of Agriculture, Andalas University. Determination of the optimum time for IAA production was carried out with differences in duration of 24 hours, 48 hours, 72 hours and 96 hours and the presence or absence of the addition of Calcium metal (Ca). Determining the growth curve of S. plymuthica UBCF_13 bacteria was carried out by measuring the value of Optical Density (OD) 1x3 hours in a 24-hour period. Furthermore, the duration of IAA production culture was carried out into 8 different culture durations within 24 hours and gene expression analysis of nthA and nthB using a Completely Randomized Design. The results of this study showed that the bacteria S. plymuthica UBCF_13 produced IAA optimally at a 24-hour culture duration of 107.84 g/mL with Ca ion addition. Based on the growth curve obtained, the bacterium entered the stationary life phase at 9 hours which is considered as the best culture duration for optimal IAA production (116.41 g/mL). The nthA and nthB gene expression exhibited no significant expression level change.*



*Keywords*: *culture duration, gene expression, growth curve, Indole-3-Acetic Acid (IAA), Serratia plymuthica* UBCF_13