

STUDI POTENSI SENYAWA MARMELOSIN TERHADAP PERTUMBUHAN
DAN AKTIVITAS ENZIM UREASE BAKTERI *Xanthomonas campestris*

INTISARI

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Pembuangan ekskreta ayam petelur tanpa adanya penanganan yang tepat dapat mengakibatkan cemaran udara ke lingkungan berupa bau. Hal ini karena terjadinya konversi protein pakan yang kurang efisien yakni sekitar 50 hingga 80% keluar bersama ekskreta. Tingginya konsentrasi nitrogen dalam ekskreta akan diubah menjadi amonia dengan bantuan enzim *urease* bakteri. Oleh karena itu, diperlukan adanya upaya guna mengurangi cemaran udara seperti penambahan agen penghambat enzim *urease* (IU), misalnya melalui penggunaan senyawa bioaktif marmelosin pada ekstrak buah maja. Penelitian ini bertujuan mengetahui potensi ekstrak buah maja dengan kandungan senyawa marmelosin sebagai antibakteri dan agen penghambat enzim *urease* *Xanthomonas campestris* penghasil amonia. Penelitian ini menggunakan rancangan acak lengkap (RAL) pola searah dengan perlakuan enam level ekstrak buah maja (w/v) yaitu P0 (0%); P1 (20%); P2 (40%); P3 (60%); P4 (80%); dan P5 (100%). Setiap perlakuan dilakukan pengulangan sebanyak 3 kali. Variabel yang diamati adalah aktivitas antibakteri pada media padat, aktivitas antibakteri pada media cair, viabilitas sel bakteri, dan aktivitas enzim *urease*. Data hasil pengujian aktivitas antibakteri pada media padat dan aktivitas enzim *urease* dianalisis menggunakan analisa statistik *one-way ANOVA*, bila terdapat variable berbeda karena perlakuan, akan dilanjutkan dengan uji *Duncan's New Multiple Range Test* (DMRT). Data hasil pengujian aktivitas antibakteri pada media cair dan viabilitas sel bakteri dianalisis menggunakan analisa deskriptif berdasarkan grafik dan gambar. Hasil aktivitas antibakteri antibakteri dalam media padat, media cair, viabilitas sel dan aktivitas *urease* inhibitor memberikan peningkatan penghambatan pertumbuhan *X. campestris* yang sejalan dengan peningkatan level konsentrasi ekstrak buah maja yang digunakan. Perlakuan P5 menunjukkan hasil zona penghambatan tertinggi (15,0 mm) dengan kategori daya hambat yang tergolong lemah (resisten), selisih nilai OD terendah, efek penghambatan viabilitas sel maksimum dan persentase penghambatan *urease* tertinggi sebesar 75,91% dengan nilai IC_{50} berkisar 73,65 $\mu\text{g/ml}$. Aktivitas *urease* P5 berada pada 52,12 (U/mL) dengan rerata konsentrasi amonia sebesar 15,66 ($\mu\text{mol/min/mL}$). Berdasarkan hasil tersebut dapat disimpulkan bahwa ekstrak buah maja dengan kandungan senyawa marmelosin mampu berperan sebagai antibakteri dan agen penghambat enzim *urease* bakteri Gram-negatif (*Xanthomonas campestris*).

Kata kunci: Marmelosin, *Xanthomonas campestris*, antibakteri, *urease* inhibitor.

POTENTIAL STUDY OF MARMELOSIN COMPOUNDS ON GROWTH AND
UREASE ACTIVITY OF *Xanthomonas campestris* BACTERIA

ABSTRACT

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The disposal of laying hens without proper handling, will effect in air pollution to the environment in the form of odor. This is due to the inefficient conversion of feed protein around 50 to 80% out by excreta. The high concentration of nitrogen in excreta will be converted to ammonia by catalisation of ureolytic bacterial and their *urease* enzyme. The solution of the problems are needed to reduce air pollution such as the addition of an *urease* inhibitor agent (IU) such as bioactive compound like marmelosin that be produced in maja fruit which can inhibit bacterial growth performance. This study aims to determine the potential of marmelosin compounds as an antibacterial and urease inhibitor enzyme against ureolytic *Xanthomonas campestris*. This study used a completely randomized design (*one-way ANOVA*) with 6 level of maja fruit extract concentration treatments (w/v) there was P0 (0%); P1 (20%); P2 (40%); P3 (60%); P4 (80%); and P5 (100%) with 3 replication (triplicate). The variables observed were antibacterial activity by measuring the diameter inhibitory zone on agar medium (*agar well diffusion assay*); antibacterial activity on liquid medium (*OD₆₀₀ turbidimetry*); viability of bacterial cells; and urease activity of *X. campestris*. The result data of the diameter inhibitory zone in agar medium and urease activity of *X. campestris* were analyzed statistic by *one-way ANOVA* and continued with the DMRT test. Analysis of the data used on antibacterial activity on liquid medium and bacterial cell viability presented in descriptive analysis with graphical and figure. The result data of the antibacterial activity in agar medium; liquid medium; viability cells and urease inhibitor activity gave an increase in inhibition of the growth of *X. campestris* that in line with the higher level of maja fruit extract concentration used. The P5 showed the highest inhibitory zone (15.0 mm) with the category of inhibition was *resistant* and the lowest ΔOD , the maximum inhibitory effect on viability cells and the highest percentage of inhibition at 75.91% with an IC_{50} value at 73.65 $\mu g/mL$. The urease activity unit of *X. campestris* at P5 treatment showed the best results which was 52.12 (U/mL) with an average concentration of ammonia at 15.66 ($\mu mol/min/mL$). Based on the result, it can be concluded that maja fruit extract with marmelosin compound is able to act as an antibacterial and *urease* inhibitor agent of Gram-negative bacteria (*Xanthomonas campestris*).

Keywords: Marmelosin, *Xanthomonas campestris*, antibacteria, *urease* inhibitor.