

INTISARI

Antibiotik β -laktam menunjukkan nilai pemakaian antibiotik paling tinggi di Indonesia bahkan dunia. PGA berperan penting dalam produksi senyawa kunci inti β -laktam 6-APA dan antibiotik β -laktam. Tingginya kebutuhan antibiotik belum diimbangi dengan kemandirian bahan baku obat (BBO) antibiotik dalam negeri. Dalam mendukung upaya tersebut, *review* PGA sangat dibutuhkan untuk pertimbangan dalam penerapan produksi antibiotik yang optimal. Penelitian ini bertujuan mengkaji karakter enzim PGA yang paling sesuai untuk produksi antibiotik, pengaruh mutagenesis terhadap aktivitas PGA, dan peranan PGA dalam produksi antibiotik.

Penelitian ini dilakukan dengan metode studi pustaka dari berbagai *database*. Hasil pencarian dan seleksi artikel yang memenuhi kriteria inklusi sebanyak 102 dikaji lebih lanjut dan mendalam, lalu hasil analisis disajikan dalam bentuk *narrative review*.

PGA dihasilkan oleh beragam mikroorganisme bakteri, aktinomisetes, ragi, dan jamur. Karakter PGA yang sesuai untuk industri antibiotik adalah aktivitas hidrolisis Pen G yang tinggi dan stabil pada suhu dan pH reaksi. Mutagenesis terbukti meningkatkan stabilitas pH dan suhu, aktivitas hidrolisis dan sintesis antibiotik. Sintesis antibiotik β -laktam secara enzimatik merupakan terobosan terbesar dalam kemajuan rekayasa enzim. Sebanyak 2 antibiotik golongan penisilin dan 10 antibiotik golongan sefalosporin menjadi fokus perkembangan terkini sintesis antibiotik yang berhasil dikaji. Potensi besar dari PGA dengan perannya yang sangat krusial dalam sintesis antibiotik masih memerlukan banyak penelitian untuk mencapai hasil yang lebih optimal.

Kata kunci: PGA, penisilin asilase, karakter, mutagenesis, antibiotik β -laktam.

ABSTRACT

β -lactam antibiotics show the highest antibiotic use value in Indonesia and even the world. PGA plays an important role in the production of the key β -lactam core compound 6-APA and β -lactam antibiotics. The high demand for antibiotics has not been matched by the independence of domestic antibiotic raw materials (BBO). In supporting these efforts, a review of PGA is urgently needed for consideration in the application of optimal antibiotic production. This study aims to examine the character of the most suitable PGA enzyme for antibiotic production, the effect of mutagenesis on PGA activity, and the role of PGA in antibiotic production.

This research was conducted using literature study method from various databases. The results of the search and selection of articles that meet the inclusion criteria as many as 102 were studied further and in depth, then the results of the analysis were presented in the form of a narrative review.

PGA is produced by a variety of microorganisms including bacteria, actinomycetes, yeasts, and fungi. The character of PGA which is suitable for the antibiotic industry is the hydrolysis activity of Pen G which is high and stable at reaction temperature and pH. Mutagenesis has been shown to increase pH and temperature stability, hydrolytic activity and antibiotic synthesis. The enzymatic synthesis of β -lactam antibiotics is the biggest breakthrough in enzyme engineering advancements. A total of 2 penicillin antibiotics and 10 cephalosporin antibiotics became the focus of recent developments in the synthesis of antibiotics that were successfully studied. The great potential of PGA with its very crucial role in the synthesis of antibiotics still requires a lot of research to achieve more optimal results.

Keyword: PGA, penicillin acylase, character, mutagenesis, β -lactam antibiotic.