

Peningkatan aktivitas xilosa reduktase oleh khamir *debaryomyces hansenii* osmotoleran melalui mutagenesis dengan etil metan sulfonat = Xylose reductase activity improvement from osmotolerant yeast *debaryomyces hansenii* through mutagenesis with ethyl methane sulphonate / Nadiyah Solihah

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Abstrak

[Xilitol merupakan gula alkohol jenis pentitol, yang jalur metabolismenya tidak dipengaruhi oleh insulin, serta memiliki aktivitas anti kariogenik. Produksi xilitol dengan cara fermentasi dinilai lebih ekonomis dan praktis dibandingkan dengan cara lainnya. Salah satu khamir yang memiliki potensi besar untuk fermentasi xilitol adalah *Debaryomyces hansenii* osmotoleran. Proses reduksi xilosa menjadi xilitol dikatalisis oleh xilosa reduktase (XR), sedangkan proses oksidasi xilitol menjadi xilulosa dikatalisis oleh xilitol dehidrogenase (XDH). Pada penelitian sebelumnya, telah dilakukan pre-treatment kondisi osmotik tinggi pada khamir *D. hansenii*, namun ternyata kemampuan biokonversi khamir tersebut masih rendah, sehingga dibutuhkan cara untuk meningkatkan aktivitas biokonversinya. Salah satu upaya untuk meningkatkan aktivitas biokonversi khamir *D. hansenii* adalah dengan mutagenesis menggunakan etil metan sulfonat sebagai mutagen kimia. Inkubasi mutasi dilakukan selama 20, 45, dan 60 menit pada suhu 30°C dan kecepatan pengadukan 70 rpm. Mutan auksotrop diisolasi dengan media minimum, kemudian mutan yang diperoleh diuji nilai aktivitas XR dan XDH-nya. Hasil terbaik ditunjukkan oleh mutan EMS 60 (waktu inkubasi mutasi 20 menit), dengan nilai uji aktivitas XR tertinggi yang disertai dengan nilai uji aktivitas XDH terendah. Xylitol is a sugar alcohol, pentitol type, not affected by the metabolic pathway of insulin and also have anti-cariogenic activity. Xylitol production by fermentation process is preferred, because this process is more economical and simple. One of the potential yeast for xylitol fermentation is *Debaryomyces hansenii* osmotolerant. The reduction process of xylose to xylitol is catalyzed by xylose reductase (XR), whereas the oxidation process from xylitol to xylulose catalyzed by xylitol dehydrogenase (XDH). In the previous experiment, a pre-treatment of high salt concentration has given to *Debaryomyces hansenii*, but the bioconversion activity is still low, so we need some modification to increase the bioconversion activity. One method to increase the bioconversion activity of *D. hansenii* is to perform mutagenesis using ethyl methane sulphonate as a chemical mutagen. Incubation mutation done for 20, 45, and 60 min at 30°C and at 70 rpm stirring speed. Auksotrop mutants were isolated with minimum media, then the XR and XDH activity of the mutants were tested. The best result was shown by the A mutant (mutations incubation time 20 minutes), with the value of the highest XR enzyme activity and the lowest XDH enzyme activity. Xylitol is a sugar alcohol, pentitol type, not affected by the metabolic pathway of insulin and also have anti-cariogenic activity. Xylitol production by fermentation process is preferred, because this process is more economical and simple. One of the potential yeast for xylitol fermentation is *Debaryomyces hansenii* osmotolerant. The reduction process of xylose to xylitol is catalyzed by xylose reductase (XR), whereas the oxidation process from xylitol to xylulose catalyzed by xylitol dehydrogenase (XDH). In the previous experiment, a pre-treatment of high salt concentration has given to *Debaryomyces hansenii*, but the bioconversion activity is still low, so we need some modification to increase the bioconversion activity. One method to increase the

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