효과적인 효소 소화율을 위한 볏짚 전처리

*김 성봉, 김 준석, 이 상준, 이 자현, 강 성우, **김 승욱

Pretreatment of Rice Straw for Efficient Enzyme Digestibility

*Sung Bong Kim, Jun Seok Kim, Sang Jun Lee, Ja Hyun Lee, **Seung Wook Kim

Rice straw was pretreated with aqueous ammonia in order to enhance enzyme digestibility. Soaking in ammonia aqueous (SAA) was conducted with 15% ammonia, at 60℃. for 24 h. Optimization of both saccharification conditions and enzyme loading of SAA rice straw was carried out. Especially enzyme loading test was performed using statistical method. Moreover proton beam irradiation (PBI) was also performed to overcome the problem which inhibit the enzyme digestibility at 1-25 kGy doses with 45 MeV of beam energy. Optimal condition for enzymatic saccharification was follows; pH 4.8, 50℃, 60 FPU of enzyme activity, 1:4 ratio of celluase and β-glucosidase. Also, optimal doses of PBI on rice straw and SAA-treated rice straw for efficient sugar recovery were found to be 3 kGy, respectively. When saccharification was performed with optimal condition, glucose conversion yield was 89% of theocratical maximum in 48 h, and 3 kGy of PBI was applied to SAA-treated rice straw, approximately 90% of the theoretical glucose yield was obtained in 12 h. The results of X-ray diffractometry (XRD) support the effect of both SAA and PBI on sugar recovery, and scanning electron microscopy (SEM) images unveiled the physical change of the rice straw surface since rugged rice straw surface was observed.

Key words : Rice straw, pretreatment, soaking in ammonia aqueous, proton beam irradiation, saccharification.