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# Effect of Particle Size and Pretreatment on Cellulose Degradation of Rice Straw from Agricultural Land in Malang

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**Abstract :** Rice straw is composed of 28-36 % cellulose, 12-16 % lignin, 15-20 % ash, and 9-14 % silica with strong non-covalent and covalent cross linkages between molecules, which are very difficult to degrade. A pretreatment process is needed to degrade these components. The objective of this research is to evaluate the effect of pretreatment and particle sizes on cellulose degradation of rice straw. Rice straw pretreatment consists of no delignification, delignification with thermochemical pretreatment, and delignification with thermochemical pretreatment followed by microbial degradation, while rice straw particle sizes are 38, 53, and 112  $\mu\text{m}$ . The final composition of substrates after pretreatment is observed using SEM and FTIR. The results show that variation of particle size with thermochemical pretreatment does not alter cellulose degradation, but microbial consortium are able to increase cellulose degradation. Rice straw thermochemical pretreatment followed by microbial degradation shows that smaller sizes of particle yield more effective degradation of cellulose. The percentage of cellulose degradation at particle sizes 38  $\mu\text{m}$ , 53  $\mu\text{m}$  and 112  $\mu\text{m}$  are 71.96 %, 50.15 %, and 24.30 % respectively.

**Key words :** cellulose, rice straw, pretreatment, particle size, SEM and FTIR.

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