Comparison of chemical pretreatment methods for Bioethanol production from Solidago

*Megumi Yokoyama[1]

1. Ichikawa high school

The aim of this study is to evaluate the effectiveness of chemical pretreatment methods for producing bioethanol from Solidago, specifically comparing the use of sodium hydroxide and sulfuric acid to maximize cellulose mass and the removal of hemicellulose and lignin. The results demonstrated that sodium hydroxide is the more suitable treatment because it yielded a higher amount of cellulose residual, and achieved greater lignin decomposition compared to sulfuric acid, a finding that aligns with established empirical evidence for other plant species. While increasing the concentration of the chemical solutions led to higher cellulose mass, it did not correlate with improved lignin decomposition, suggesting that higher concentrations are not necessarily more effective. Due to the underestimation of NDF measurement, negative hemicellulose values were derived, which limited the scope of the discussion to the results of cellulose and lignin. Further examination of chemicals other than sodium hydroxide and sulfuric acid will be necessary to further optimize the pretreatment process.

Keywords: Bioethanol, Solidago, chemical pretreatment methods

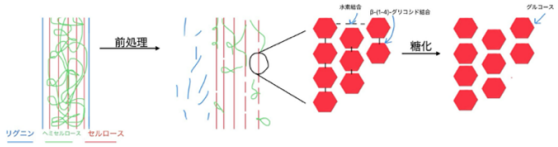

図1 バイオエタノール製造の流れ

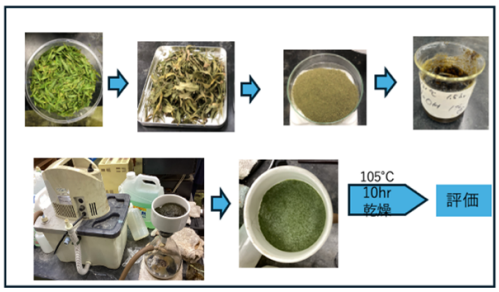

図2 実験の流れ

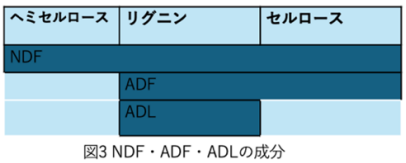

図3 NDF・ADF・ADLの成分

表 1 実験条件

	0.25mol/L	0.50mol/L
H_2SO_4	条件 1	条件2
NaOH	条件 3	条件 4

表2 処理後の ヘミセルロースの質量

溶液の種類と濃度	ヘミセルロースの質量
NaOH 0.25mol/L	-0.3343g
NaOH 0.50mol/L	-0.26455g
H2SO4 0.25mol/L	-0.239g
H2SO4 0.50mol.L	-0.3091g

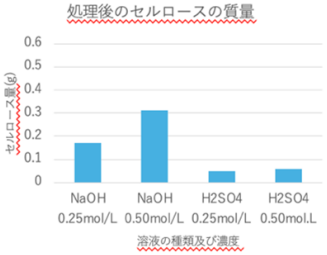

図4 処理後のセルロースの質量

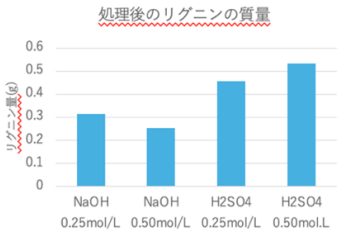

図5 処理後のリグニンの質量

