HYDRODYNAMIC CAVITATION DIGESTED WHEAT STRAW AND BIOGAS PRODUCTION FROM THE RESIDUE

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ABSTRACT

The stems of herbaceous plants in large quantities are available in Hungary. The hydrodynamic cavitation device allows the availability of basically chemical free, or mild environmental friendly breakdown of pre-treated agricultural wastes and byproducts, thereby increasing the yield of fiber and biogas production.The production of paper making fibers and biogas by using a hydrodynamic cavitation device was investigated. Initially, wheat straw was retted by alkaline pre-treatment for softening the carbohydrate matrix and then the fibers were disintegrated using the hydrodynamic cavitation device. The organic rich effluent fraction was further enzymatic hydrolysed and fermented to produce biogas.

CONFERENCE

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INTRODUCTION

Cavitation (the formation, growth, and implosive collapse of gas or vapor-filled bubbles in liquids) can have substantial chemical and physical effects.

Hydrodynamic cavitation is observed when large pressure differentials or shear forces are generated within a moving liquid and is accompanied by a number of ***physical*** and ***mechanical*** effects, and the latter one being most notable from a technological viewpoint.
- formation of OH radicals and H_2O_2
- shock wave formation

/K. Suslick et al. J.Am.Chem. So 1997/

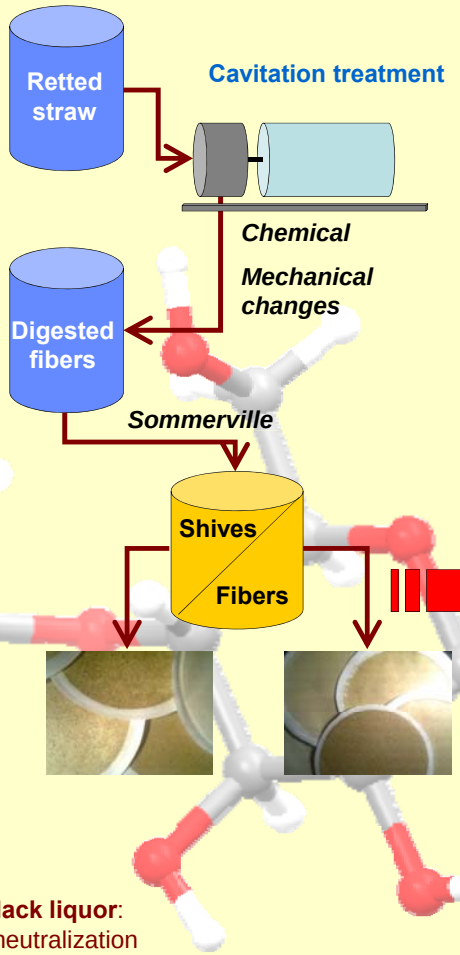
MATERIALS AND METHODS

-Straws, stalks, lignocellulose content agricultural residues

- Chopped straw retting in 0.3 M alkaline solution for several days

Fractionation, tests (Sommerville, Tensile)

TECHNOLOGY



Black liquor:
- neutralization

-rich with soluble fractions and lignin

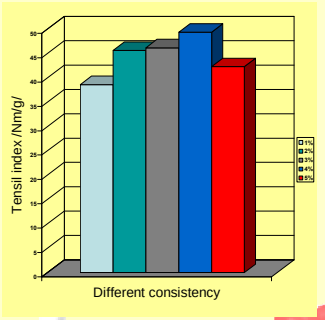
-fermentation

-10% higher biogas production – liquid phase digestion

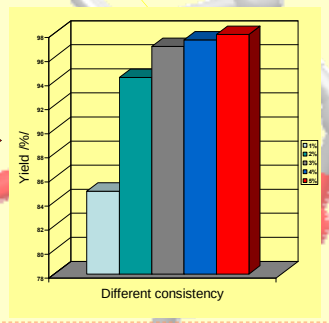
- reduced fermentation time

RESULTS

Changes of tensile index:



Changes of yield (accepted fiber fraction) after Sommerville classification:



CONCLUSION

High yield pulp, and enhanced biogas

Low energy consumption

Acceptable fibers for packaging paper

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