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RESEARCH REGARDING ETHANOL OBTAIN BY CATTAIL RHIZOMES

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Abstract

Ethanol can be produced by means of fermentation. When yeasts are placed in an anaerobic environment, the result of their cellular respiration process is a formation of carbon dioxide and ethyl alcohol, also known as ethanol. Ethanol can then be used in a number of applications, including use as an alternative energy fuel.

INTRODUCTION

A series of experiments were carried out in order to determine the feasibility of using *Typha latifolia* (common cattails) to create ethanol for use as fuel through enzymatic breakdown and fermentation.

The cattail can be used for many things. Many artists and decorators have used the cattail as a model for their designs. The central part of the root and the lower stalk is mainly starch of the plant [1].

Fig. 1. Common cattails – *Typha latifolia*

In figure 1 is a cattail before harvest. Generally, the lower parts of the leaves can be eaten in salads. The leaves are used for weaving, for padding seams in boats and for packing material between barrels. Muskrats e on cattails [1]. When something touches the cattail head at this point of yellow pollen will "puff" out.

And finally, the cattail forms a fluffy head of seeds. These are carried away by the wind to begin anew [1].

MATERIAL AND METHOD

The first batch of cattails scheduled for distillation was start in the middle of august 2007. The experiments were dividing in two parts.

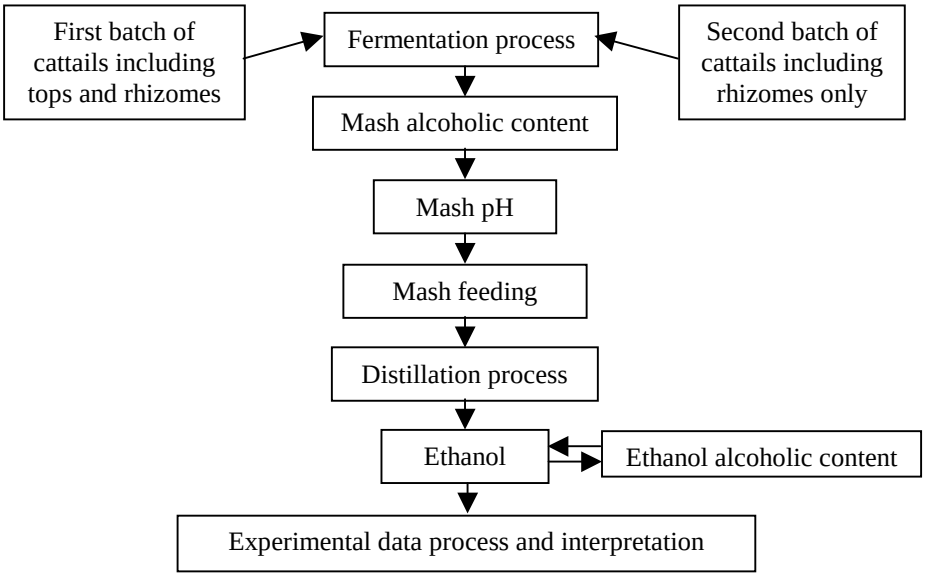
First part used the entire plant including tops and rhizomes for distillation. The cattails had been harvest with a back hoe and washed with water. A commercial enzyme (*saccharomyces cerevisiae*) was used on the initial batch [5].

The cattail feed stack was pre-rough grind. After grinding the feed stock in disposal, mash fills the fermentation tank. As the distillation process was started, it was found that with the liquid.

Second part using only the lower part of cattail plant (rhizome). These also pre-ground before going thru the disposal grinder. This batch was also started with commercial enzyme (*saccharomyces cerevisiae*) [4,5]. During monitoring of the process it was found that the fermentation started, but then stopped entirely.

Distillation plant includes two fermentation tank with agitation (from every batch) shown in figure 4, a distillation discontinuous column shown in figure 5, a condensation section and receiving tank [2,3]. The temperature is monitored with sensors and mass flow is measure with flow meters.

Method of experimental research is shown in figure 3.



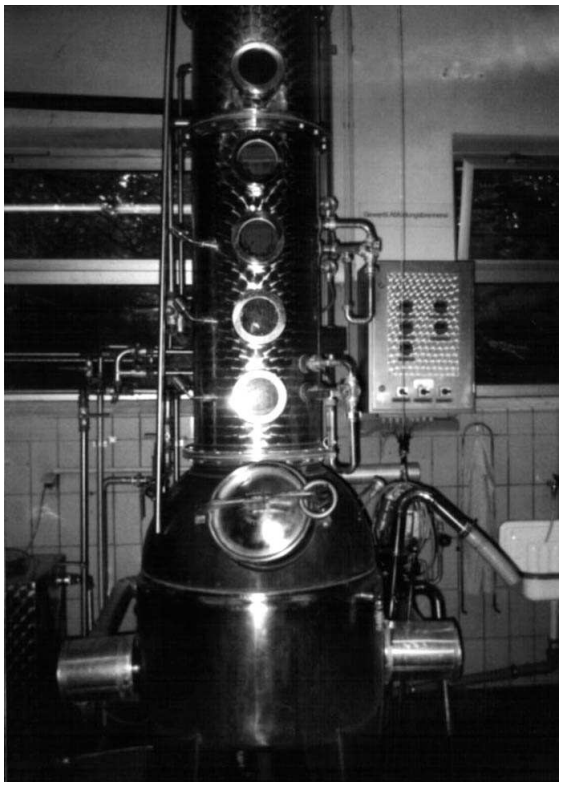


Fig.5. Distillation discontinuous column

The mash was split in two fractions, mixed with hot water and put in two fermentation tank with agitation. The quantities are from every part is: raw material 200 kg, water 500 litre at 100 ^{0}C and allowed to remain 20 minutes to kill of any wild yeast or bacteria that may have present in the sample. After 20 minutes, the temperature was brought down to 77 ^{0}C and was added commercial enzyme 14 gm. The solution was kept at constant temperature and agitated by agitation system 2 hour to saccharification period [5]. After that, the mash was kept 2 days

for fermentation period in a room at 27 ^{0}C. After fermentation period, mash analyses release next: in first fraction, alcohol content is 4.15 % and pH is 7.4; second fraction had 5.95 % alcohol content and 5.5 pH.

After the fermentation time, the solution was distilled in column. Any alcohol that came was collected for later analysis.

Alcohol quantity obtains from first mash (tops and rhizomes) was 6.53 litre of 22.5 % alcohol.

Alcohol quantity obtains from second mash (only rhizomes) was 8.82 litre of 34.2% alcohol.

CONCLUSIONS

Produce ethanol from cattails rhizomes is a feasible solution, with the proper use enzyme that increases an alcohol content of mash.

To increase alcohol content of mash is possible to use grinding of feed stock.

Feasibility of commercially producing alcohol from cattails needs a method of harvesting the cattail plant. To date, a proper harvesting machine has not been developed to successfully harvest the whole plant including the rhizome which is the main source for alcohol production.

During the experiment, all harvesting process was done by the hand because the water from the lake is in continuous evaporation process and access to plant was very easy. This would not be economically feasible in a commercial operation.

In the final analysis, the cattail to alcohol project was proven that there is an abundant supply of cattail feed stock near lakes. To develop this technology is necessary to develop harvesting techniques and the crop does not compete for land normally used in the production of accepted agricultural products.

The project also has proven that it is possible to obtain high degree alcohol from cattail plant and from this it is necessary to use more type enzymes.

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