

## Chapter VI



### CONCLUSION AND RECOMMENDATION

#### 6.1 Conclusion

Pineapples used in this experiment should be in a proper state of maturity in order to give high yield of juice extracted and good in color, flavor, and taste. To prevent browning of the extracted juice, pasteurization was done immediately. Acetobacter aceti culture was difficult to maintain and easy to be contaminated by undesirable microorganism. Before the processing of acetic acid fermentation, the sterile shavings were completely activated by passage several times with the Acetobacter culture and during this period, the rate of trickling and air flow rate was often checked. Sanitation of all parts of the generator by autoclaving, washing with 90% ethyl alcohol and boiling water was very important in order to prevent contaminations.

On the experiment of the fermented vinegar production, pineapple juice was supplied as raw material with some modification of its constituents. The juice has been adjusted the sugar level to 18<sup>o</sup> - 20<sup>o</sup> Brix, pH to 4.5, and adding with 0.5% dipotassium hydrogen phosphate. Inoculum of the high alcohol producing strain of S. ellipsoideus was used in the amount of 5%. The alcoholic fermentation was completed within 3 - 4 days which attained 11.0 percent of alcohol by volume. The results

showed that S. ellipsoideus was very suitable for this alcoholic fermentation and its suitable supplement was dipotassium hydrogen phosphate. Other supplement compound, diammonium hydrogen phosphate, gave poor yield and some defects on color and odor of the pineapple juice and also the fermented liquor.

The second step, the alcohol in fermented pineapple juice was oxidized to acetic acid by Acetobacter aceti. The generator, using in this experiment, consisted of a cylindrical glass column which had 4 "in diameter and 48" in its length. Bamboo shoot shavings have been chosen for packing the column in order to provide maximum surface exposure for a volume of acetic acid culture, fermented juice, and air. The results showed that total acidity was increased with the numbers of recycling, reaching the maximum level after the fifth cycle, followed by a decrease in the sixth cycle. Maximum acid production was achieved following the fourth cycle when the vinegar stock was supplemented with phosphate and acetic acid. The yield of acetic acid was decreased when excess aeration was used. High flow rate of fermented liquor took a longer time of fermenting time than low flow rate because of its shorter resident time in the column. The product from this experiment gave an appreciable flavor, color and taste but the solution was not clear and about 0.1% of non-volatile acid which was the same value of the fermented juice.

## 6.2 Recommendations.

According to unexpected errors during this work, the further investigation should have been done to modify some parts of equipment and experimental techniques as follows:

1. The generator should have cooling system or temperature control system with an attachment of a condenser over the top of a column in order to tap the vapor of acetic acid.
2. Minimum providing of air flow rate and air bubble size which will give the highest yield of acid should be investigated.
3. Transparent materials to make a column will give more advantages, if there is any contamination during the fermentation.
4. Automatic control of recirculation or continuous process should be established.
5. The mixed culture of acetic acid producing bacteria should be introduced in acetic acid fermentation instead of pure culture.