5. CONCLUSIONS

Ethanol production was attempted using wastes from vegetable and fruit market.

1. A process for amylase production was developed using vegetable wastes as a substrate and Aspergillus niger as a enzyme producer. Maximum enzyme activity observed as 95.5 EU/ml. Similar work was done by Mabel Salas et al. (2006) on Amylase production by Aspergillus niger in submerged cultivation on two wastes from food industries. The highest amylase activity 70.29 and 60.12 EU/mL was observed for brewery (BW) and meat (MPW) wastewaters respectively. Suganthi. R. et al. also reported similar work on amylase production by Aspergillus niger BAN 3E with an activity of 52 U/mg in Submerged fermentation.

2. A Process for Enzyme mediated saccharification was developed using amylase obtained from vegetable wastes. Theoretically, in enzymatic hydrolysis 1gm of starch gives 1.11 g of glucose. From 1Kg of vegetable waste, Maximum glucose concentration was found to be 35.7 mg/ml (0.296 Kg in total 8 lit broth). After 72 hrs, 95% of starch converted into fermentable sugars. The yield was found to be equal to 80%. Final Concentration in the broth was found to be 35.7 mg/ml. Balasubramanian. K et al. (2011) also worked on enzyme hydrolysis on fruits waste and they claimed final glucose concentration as 31.5 mg/ml after 72 hrs of incubation.

3. From the results it was observed that enzymatic scarification is
more efficient than bacteria mediated saccharification for sequential saccharification and fermentation (shown in fig 4.2.1). For the overall period of 42 hrs, final ethanol concentration was found to be 11.2 mg/ml using Aspergillus niger (NCIM-1248) and Zymonomas mobilis (NCIM-2873) for saccharification and fermentation respectively. Vincent et al. (2010) also worked on Sequential saccharification and fermentation of corn stover for the production of fuel ethanol using wood-rot fungi, Saccharomyces cerevisiae and Escherichia coli K011. For the corn stover treated with P. chrysosporium, the conversion of corn stover to ethanol was 2.29 g/100 g corn stover for the sample inoculated with S. cerevisiae, whereas for the sample inoculated with E. coli K011, the ethanol concentration was 4.14 g/100 g corn stover. While for the corn stover treated with G. trabeum, the conversion of corn stover to ethanol was 1.90 g and 4.79 g/100 g corn stover for the sample inoculated with S. cerevisiae and E. coli K011, respectively.

4. Neural network and neuro fuzzy Models were developed for amylase production process.

5. Experimental data was verified with kinetic models.

6. Kinetic parameters were estimated by validation of kinetic models (Growth Models, Substrate utilization and Product formation Models). From Monod’s model validation $\mu_{max}$ and $K_s$ values were found to be 0.765 1/hr and 80.65 mg/ml respectively. Leudeking and piret model for product formation was validated with experimental results and parameters $\alpha$ and $\beta$ were found to be
0.05035 and 33.05 respectively. Leudeking and Piret Substrate Model validation was done and its parameters \( Y_{x/s}, m_s, \mu_{\text{max}} \) were found to be 0.02322, -0.8516 and 0.4565 respectively.

7. A process for \( \alpha \) – amylase enzyme and ethanol production was developed from vegetable wastes.

REFERENCES: