Chapter I

INTRODUCTION

Protein deficiency exists in about 60% of the populated areas of the world particularly the tropical countries in Asia and Africa. This will become more and more difficult to supply the necessary protein by conventional agriculture. Consequently, food-containing proteins from unconventional sources will become increasingly important. So much attention has been given to the production of single cell protein (Mateles and Tannenbaum, 1968; Tannenbaum, 1971; Worgan, 1973; Lipinsky and Litchfield, 1974; Tannenbaum and Wang, 1975). Single cell protein (SCP) has become a widely accepted term for microbial cell material intended for use as food or feed. The general advantages of microbes over plants and animals as protein producers have been summarized (Synder, 1970; Tannenbaum, 1971; Kihlberg, 1972). Some of the advantages are freedom from climatic influences, rapid mass doubling times and simple nutritional requirements. The production of this microbial protein can be based upon the raw materials which are locally available in large quantities, such as industial wastes, agricultural wastes, fruit processing wastes ranging from milk whey to molasses, wood hydrolyzates and potato starch wastes (Bunker, 1963; Dabbah, 1970; Tannenbaum and Wang, 1975).

Among microorganisms considered as potential food sources, yeasts have attracted perhaps the greatest interest. It represents the only sort of microbial protein that has, in the past, been used as food to an extent worth considered. Yeasts are the traditional microorganisms for the production of bread, wine, beer, and fodder. They are usually considered harmless and to be our allies (Ribbon, 1968; Dabbah, 1970; Peppler, 1970). So yeast may be one of the few types of microbial protein that could, in the near future, be used as food or feed in the world food situation. The species most commonly used in the production of food yeast are Candida utilis (formerly Torula utilis, commonly called Torula yeast). They have been found the most suitable for the production of food yeast from waste liquors. The acceptability of Torula yeast by Food and Agriculture Organization (FAO) as food and feed supplement made it more valuable (Jarl, 1969; Dabbah, 1970; Kihlberg, 1972; Worgan, 1975).

Over the years, interest has remained high in the utilization of sugar or starch-containing plant materials as substrates for microbial protein production (Ghose, 1969; Sundhagul, 1972; Worgan, 1973). In Thailand, one industry which contributes significantly to water pollution is pineapple processing. Approximately 1000 cubic meters of waste water are being produced daily from each canned pineapple factory (Anonymous, 1976). The wastewater disposed during the canning processes can be collected for use as substrate for yeast as it contains sugar

(Collins, 1960). Hence, it would be very beneficial to utilized this wastewater for yeast protein production and simultaneous decrease its pollution load.

This study was undertaken to determine the growth of C. utilis for protein production on pineapple juice. The experiment was divided into two parts. Investigation of the desirable composition of medium for growth of the yeast was first studied with the emphasis on the yeast yield and protein content. Pineapple juice was used as a natural carbon source for the yeast supplemented with various sources of nitrogens such as peptone, urea, and ammonium sulfate, and other nutrient materials, i.e. phosphorus and growth factors. The first part was carried out in shake flasks apparatus. The other part was undertaken to investigate the effect of aeration and agitation on the yeast yield, protein content, sugar consumption, and chemical oxygen demand (COD) reduction of the selected medium in a stirred-vessel fermenter.