# STUDIES ON THE UTILIZATION OF SOME AGRICULTURAL WASTES

Thesis
Submitted in partial fulfilment of the
requirements for the degree of
Ph.D.
in
Food Science and Technology

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1970

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Thanks to God.

Thanks to my mother and father for their delicious advices, hoping God will help me to make them happy.

Thanks to my wife for her good wishes to me.

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# INTRODUCTION

Still in recent times, the realization that the shortage of food problem had not been solved merely by adequate utilization of a proper portion of protein, fat, and carbohydrate, lead to the successful search for other sources. Some trials were practised in the field of food synthesis and other had more focus intention on the utilization and disposal of wastes.

Agricultural wastes, that related to food factories, had become an important factor from the economic stand point as well as a serious sanitary problem that need to be studied. At present time, such efforts have been made for converting this refused materials into valuable products.

However, it is not always an easy procedure to dispose wastes, sometimes a long drawn-out study is required to ascertain, how profit will be gained from this process.

It must be taken into consideration that agricultural wastes are particularly bothersome because they are so variable in their properties and considered to be one of the most suitable medium for the activity of micro-organisms and insects. So, the problem of wastes and their treatment is affected greatly by the type and quantity of the materials that need to be treated, however, the more density it is the greater the problem.

The more important predominant agricultural wastes could be classified into two major groups, mainly of fruit and vegetable origin. The first includes the peels, cores, and trimmings of cull nuts. Pits from appricots,cherries, and peaches. Grape seeds, stems, and skins of pomace. Cull fruit from fresh fruit packing houses. Seeds kernel of mango .. etc. The vegetable origin includes the seeds, skins and trimmings of tomato. Cores and husks from corn. Vines and pods of peas. Husks and peels of onion .. etc. Other wastes related to other products as cottonseeds,corngerms, beside meat and fishary wastes.

The reduction of wastes, frequently be accomplished by provision of adequate data and analysis to obtain scientific base that may lead to segregation of these wastes or to simplify treatment procedure, prevent undesirable interaction, and to provide economic informations for the construction and operation of waste treatment plants.

Hence, solving the problem of wastes should be handled by an experienced and scientific person who must first determine the exact chemical nature of the waste in question before trials for turning it into something useful. When this is impossible, his efforts should be directed to neutrilize economically its harmful effect.

It has recently been established that mango kernels are a very good source of starch, which can easily be separated. In India it is estimated that about 140,000 tons of starch can be obtained annually from this source together with fats, proteins, and tannins as by products (Das et al., 1952). The large scale use of starch in textile, jute, paper and other industeries emphasizes the need of its extraction from this source, which at present is largely wasted.

In U.A.R., with regard to the increasing density of population and owing to the industrial expansions, beside the reclamation of new lands, the utilization and disposal of wastes becomes of greater magnitude. It should be considered as an integral part of the productions. Its utilization, for various by-products either directly or after special treatment, must be taken into consideration.

# AIM OF INVESTIGATION

The present work describes some of the advances made in the field of the utilization of wastes of cannary plants such as mango seed kernels for the production of oil, amino acids, and starch, as well as to find out the most suitable deviced technique to secure volatile onion oil from the wastes of onion dehydrating plants, and to satisfy the market demand with a new item.

Studies of the physical and chemical properties of the produced starch and extracted onion oil , were also carried out.

# REVIEW OF LITERATURE

## A. Utilization of Mango Seed Kernels:

With respect to the researches carried out on the mango seed kernels, it was found by many authors as given below that the seed kernel contains protein, fats and considered to be a good source of starch.

### 1- General composition:

As early as in 1937 Gurney announced that the kernel of mango contains 6% of crude protein. Dhingra *et al.* (1948) found that the kernel of mango contains (on dry basis) 10.7% fat, 72.8% starch 1.7% sugar, 9.5% protein, 0.11% tannins and 3.66% ash from which $P_2O_5$ was 0.659%. The protein, fat, fibre, reducing sugars, and more than 68% starch were detected in *Mangifera* seeds by Mukherjee *et al.* (1960). In 1967 Bajpai *et al.*, identified starch in the powder of the mango seed kernel and they considered it a good source of starch.

### 2- Amino acids:

The following amino acids were found by Das *et al.* (1953) as predominant acids in the mango seed kernel; cystine, aspartic acid, glutamic acid, glycine, threonine, alanine, tyrosine, histidine, argenine, lysine, proline, leucine, and phenylalanine. Studies on the amino acids content of the kernels of four mango varieties carried out by Dutta et al., in 1959 revealed that all the essential and non-essential amino acids were present in fairly balanced proportions. However, the amounts of tryptophane, tyrosine threonine and methionine were somewhat low. There was no significant difference in the quantitative distribution of amino acids in the four varieties.

3- Fatty acids and oil properties:

The type and ratio of fatty acids present in mango kernels were found to be myristic 0.69, palmitic 8.83, stearic 33.96, arachidic 6.74, and oleic 49.78% (Pathak et al., 1946). Dhingra et al. (1948) declared that the oil percentage of the mango seed kernel ranged from 6 to 12. It's constants were as follows: Saponification value 188-195, iodine value 39-48, Reichert-Meissel 0.12, unsaponifiable matter 2.3-2.9, and refractive index at 40°C 1.4604. Regarding the fatty acids, they further added that palmitic, stearic ,oleic, and linoleic were found in the ratio of 11.2, 31.2, 43.8, and 4.1% respectively.

The presence of palmitic, stearic, and arachidic were 6.5, 47.8, and 2.7% respectively. The oleic, linoleic, and linolenic were also detected by gas chromatography and their percentage were 38.2,4.4, and 0.5. Makie et al. (1961) found the privous fatty acids in the kernels of one of the Ghana mango varieties. According to Bruno et al. (1963) the proportions of the individual fatty acids of the mango seed kernel were palmitic 4.4%, stearic 42.5% oleic 44.7%, and linoleic 5.4%, but no myristic acid was found.

Lipids were extracted from the powdered seed kernel with 2:1 EtoH-$C_6H_6$ and after further treatment a yellow oil was obtained which had the following constants: refractive index at 40°C 1.45938, melting point 25°C, saponification number 192.2, saponification equivalent 291.8, iodine value 53.7, Reichert-Meissel number 0.6079, polenske number 3.7, acid number 21.4, acetyl number 1.02 and unsaponifiable matter 3.02% (Bajpai et al., 1967). They added that the oil may be edible.

4- Starch characteristics:

A complete review of the literature covering the methods which have been used to evaluate a starch characteristics will be unduly long because of the many different tests, both chemical and physical, which could be used.

a) Phosphorous in starch:

Suzuki (1957) studied the relation between the phosphoric acid content and the purity of starch. He found that the crude and purified potato, wheat, and corn starches contained 0.0477, 0.0444; 0.0604, 0.0169; and 0.0163, 0.0043 % P. respectively. Defatting of starch reduced phosphorous content of potato amylose and not that of the amylopectin. Phosphorous content decreased from amylopectin through intermediate fractions to amylose fractions, (Radomske *et al.*,1963). They further added that the phosphorous was concentrated in the B limit dextrin. All the phosphorous was found in an esterified phosphorous group. However, when the outer chains of waxy corn starch were removed by B-amylase, the phosphorous content of the dextrin increased, being doubled in the limit dextrin. Their results indicate an association of phosphorous with the $\alpha$ (1-6) linkages and the presence of an $\alpha$ (1-6) branch in amylose.

Hoelzl (1967) declared that potato starch gives a more marked staining reaction than does wheat starch. This staining reaction is based on the electroabsorptive addition of dye cations to the phosphate groups. The phosphate content of the potato starch was 0.071% and that of wheat starch was 0.063% and did not differ