

## Chapter I

### INTRODUCTION

India ranks fourth in world production of potatoes and exports to USSR, Sri Lanka, Malaysia and Nepal. Its annual production is around 12 million tonnes (Anon, 1984; Anon, 1985). Potato has to be preserved over a period of time for consumption barring products from early crops. Sprouting of tubers begins after dormancy is over and impairs its nutritive value and edible quality. Early sprouting is not the only post-harvest problem but also there are other changes in potato involving qualitative and quantitative losses. Shrinkage and respiration are accentuated with the on-set of sprouting. Losses due to rotting and from pests are cumulative (Singh, 1979). It has been estimated that about 25 to 30 per cent of potato is lost every year in handling, storage and transportation (Jain, 1979). Proper post harvest technology is, therefore, necessary for minimising the losses during storage and marketing.

Storage of potatoes, intended to preserve their quality with minimum losses in quantity, is achieved by cold storage. Commercial cold storage was started in India in the thirties of this century. Since then their number and installed capacity are increasing continuously but they are so inadequate that can not store more than one-third of potatoes produced (Singh and Verma, 1979). Moreover, cold storage is vulnerable to power shortages and other problems such as fungal and bacterial attack during storage.

In order to minimise the post-harvest losses and storage constraints, one of the possible ways is the dehydration which will not only reduce the volume of storage and losses but also facilitates the dehydrated potatoes for storage at atmospheric conditions. An idea of the vast potentials of potato

as processed food can be well appreciated from the varied and wide range of products which could be developed from it to minimise the post-harvest problems. Processing could help in avoiding seasonal gluts and utilising surplus potatoes effectively. The post harvest technology of potato production has been a major research thrust for many years in the developed and affluent countries resulting in emergence of products like dried potato flour, cubes, chips, granules, French fries, etc. In India, potato chip is the only form of processed potatoes common and other forms of processed potatoes are not available. This situation indicates a high priority and plenty of scope to process the potato in certain forms to provide a cheap processed food for Indian population.

Among all the forms of processed potatoes, potato granules will best fit Indian culinary preparations as they can be made into mashed potatoes very readily by mixing with hot boiling water and can be used in the preparation of most of the common Indian dishes, like Alu Tikkia, Alu paratha, Samosa, Sewain, etc. Although the technology for the production of potato granules has been developed in the Western world for commercial production long back, no attempt has been made so far in India to manufacture potato granules either on commercial scale or at Village level. Most common commercial process for potato granules production is the 'Add-back method' wherein the desired partial dehydration is achieved by recycling a sufficient quantity of dried product with freshly cooked mashed potatoes. This method has many disadvantages, viz. the reduced out turn of machines, inflexibility of the system, etc. There are other methods such as WRRL Process, F. T. Process and solvent extraction process. To India, it seems to be more appropriate to develop a suitable, simple and direct process for encouraging new

entrepreneurs and this will generate employment opportunities in the rural sector. This will not only help in reducing the post-harvest losses, but also provide a cheap nutritious food for Indian population throughout the year.

To develop a simple direct process, it is necessary to study the different basic unit operations such as cooking, mashing, and conditioning which are critical and other operations such as washing, peeling and slicing can be done manually or with some simple devices. Drying operation can be effected by utilising solar energy or through commercially available dryers. Controlled cooking will enable the processor to control the quality of the product in its initial stages of processing requiring the optimum cooking conditions to be defined. Proper mashing method will reduce the number of broken cells in the final product. The studies on conditioning wherein the major changes in the structure of the mashed potato take place will facilitate the control of conditioning for effective granulation. With these studies on basic unit operations, it would be possible to develop a simple process for the production of potato granules and can be adopted to produce a quality product.

Since potato granule is a food product, the quality of the product needs to be evaluated in many aspects for improving the process and for acceptance of the consumer. The physical and thermal properties, such as particle size, bulk and true densities, porosity, angle of repose and specific heat will enable the processor to assess its quality in its physical terms and are necessary for effective handling, transport and storage. Also the functional characteristics such as moisture adsorption characteristics, rehydration characteristics and viscous-flow characteristics are essential to get a better picture about the product regarding its keeping quality, reconstitution conditions, and uses in fortification and modification of the product respectively. Since

texture is not the only characteristics of any food product, sensory evaluation has to be undertaken to assess other characteristics such as odour, colour, appearance, taste and overall quality and to know the level of consumer acceptance. Since the potato granules have to be stored for marketing throughout the year the study of storage characteristics of the potato granules are necessary for selection of proper packaging materials and to avoid undesirable changes during storage. All these studies on quality evaluation of the developed product will pave way for improving the production process.

In the light of these views, the present study was undertaken with the following specific objectives :

1. To study the selected unit operations, namely, cooking, mashing and conditioning for the development of a simple potato granule process.
2. To determine some physical properties, namely, average particle size, bulk and true densities, porosity and angle of repose at different moisture contents and thermal property, namely, specific heat for the quality evaluation of the potato granules samples.
3. To determine some functional characteristics, such as, moisture adsorption characteristic, viscous flow characteristic and rehydration characteristic of reconstituted potato granules samples.
4. To evaluate product quality through sensory evaluation and consumer acceptance of potato granules samples.
5. To study some storage characteristics of potato granules samples stored in different packaging materials at ambient conditions.

It is hoped that the present study will help in reducing the post harvest losses of potato crop by the proposed simple process which will provide an effective alternative for utilisation of surplus potatoes. This will also help in setting up new agro industries in rural sector by Indian entrepreneurs owing to its simplicity and adoptability.