CHAPTER I
INTRODUCTION

When human organism first became a settled agriculturist and started growing food for use all around the year, it developed an intimate knowledge and a close involvement with the food resources. With the discovery of the new world and the establishment of new trade routes, the human being became familiarized with a multitude of new foodstuffs. In addition, demographic and social changes in the human ecosystem have also contributed to the food industry's evolution. In keeping with the fast pace of modern lifestyle, there is an increase in the demand for convenient and enjoyable foods, apart from their being of nutritional value. For most of the countries, different varieties of grain and legumes have become one of the most important crops forming the daily staple for various segments of society. In fact, food legumes utilized as dry seeds for food have been often referred to as pulse or grain legumes. Since early times, Greeks and Romans have used them in festivals to hold a "Bean Feast" to worship Apollo, the sun God, responsible for ripening the offerings of the bountiful earth. The beans are known to have fed the armies of the world from ancient times to the wars of recent history.

Of thousands known phaseolus species, only a few have been extensively promoted and used. The most important economic variety of the genus phaseolus are Kidney beans (Phaseolus vulgaris). Commonly known as Rajmah in India, they are one of the neglected tropical legumes being cultivated in India since time immemorial. Legumes generally contain relatively high amount of protein (20-26%), are especially rich in lysine, an essential amino acid than other plant food stuffs and mainly used in food formulations to fortify cereal-based diets especially in developing countries to meet the demand for quality protein (Lauren et al., 2001 and Krupa et al., 2003). Legume-beans have recently undergone a renaissance of popularity among masses that enjoy this economical source of versatile and delicious nutrition. They are a traditional food in the human diet, being low in fat and rich in vitamins, complex carbohydrates, minerals and energy in diets for human
and monogastric animals. They exceed other vegetables in phosphorus, potassium, calcium and magnesium contents (Ximenez-Embun, 2004). The predominant fatty acid in beans is γ-linoleic acid, although beans also contain n-3 fatty acid, α-linolenic acid in small amounts (Messina, 1999). The chemical composition of individual species and varieties of legumes has been much differentiated. It is not only influenced by genetic differentiation but also by environmental factors, mainly courses that weather takes. In addition to contributing nutritional requirements, the low cost, protein-rich and high energy food formulations based on cereal-legume mixtures may be used as alternate resources for individuals with lifestyle diseases. Consumption of dry beans has been linked to reduced risk of heart disease, diabetes mellitus (Salmeron et al., 1997) hypertension, obesity and cancer (Geil and Anderson, 1994).

Kidney beans are renowned for medicinal uses because different parts of plants are used for the treatment of diabetes, kidney and bladder problems and rheumatism. They are consumed as mature grain, as immature seed, as well as a vegetable (both leaves and pods); leaves being also used as a potherb. The plant is used as forage and leaves and fruits have medicinal properties. Kidney bean pods are effective in lowering blood sugar level and are eaten in cooked form like vegetables. Bean pod tea is useful for dropsy, sciatica, uric acid accumulations, and loss of albumin in the urine during pregnancy. A few patients with skin diseases-acne, eczema, eruptions have also been known to be treated with decoction made from the beans (www.health-from-nature.net/Bean-common.html). Presence of vitamin A in the green pod makes them a valuable diet for children. Further, beans may also be used in the treatment of osteoporosis due to the presence of calcium in them.

Food quality deterioration arising from plant secondary metabolites which are also known as anti-nutritional factors (e.g. trypsin inhibitors, tannins, phytic acid, flatulence-causing oligosaccharides and cyanogenic glycosides) commonly seen on those part of population which are totally dependent on vegetarian based diets (Khattab and Arntfield, 2009). People have, thus, suffered out of ignorance, poverty and inadequate nutrition education, especially within the Asian societies.
Though the presence of anti-nutritional factors of kidney beans is a matter of concern (Sudha et al., 1995). However, simple home based processing method, like hot-water blanching alter the anti-nutritional effects. The most protective effect is observed when a large number of different phytochemicals are consumed with plant foods, which presumably exert cumulative or synergestic effects (Mann and Trosswell, 2008). Dietary polyphenols are known as natural antioxidants which are highly concentrated in beans. Now-a-days, they are being studied for their potential role in the prevention and treatment of a number of chronic diseases including certain types of cancer, osteoporosis, and heart disease, and also for their ability to relieve menopausal symptoms. Phenolic acid is considered to be a powerful antioxidant. It has higher antioxidant activity in vitro than that of well-known vitamin antioxidants (Tsao and Deng, 2004). Antioxidant activity is, however, only one of the many mechanisms through which polyphenols exert their actions. Polyphenols have been reported and demonstrated to exert anti-microbial (Taguri et al., 2006 and Rauha et al., 2000), anti-viral (Perez, 2003), anti-mutagenic (Lairon and Amiot, 1999), anti-carcinogenic (Aaby et al., 2004), anti-inflammatory (DosSantos et al, 2006, Parr and Bolwell, 2000), anti-proliferative and vasodilatory actions (Lule and Xia, 2005).

As for processing of kidney bean is concerned, blanching in hot water is a beneficial household method that results in antinutrient destruction and an increased bioavailability of nutrients, protein digestibility and utilization.

Food product development could be carried out by exploring on popular kidney bean recipes after household processing with the aim to increase the cooking quality, palatability and nutritional qualities as well as nutrient mobilization. Processing involves different treatments such as blanching, soaking, dehulling and germination. There are wide applications of blanched food products besides as ingredient in normal food preparation. Some of the identified uses of legumes and cereals include flour, beverage and weaning food (Giami, 2004 and Charoenthaikij et al., 2010). Soaked, germinated and blanched kidney beans can be used as salad ingredients with other vegetables including green leafy vegetables and
fruits. One of the most popular uses of kidney beans has been in the preparation of chilli and marinated bean salads. They are commonly used as a key ingredient in the preparation of fried beans, soups and appetizers. They may be a desirable alternative to grains especially wheat, for those afflicted with celiac diseases due to their gluten free nature. Anisha and Prema (2008), investigated that large scale production of kidney bean flour of different varieties after appropriate processing will be free of flatulence causing oligosaccharides. For improving protein quality, cereal and pulse combination strategies need to be applied to innovatively develop different recipes using kidney bean varieties and cereal combinations. Kidney beans have been reported to be good sources of protein, calcium and iron in the diet (Sodani et al., 2004). When diets are planned in keeping with children’s RDA for protein, calcium and iron, it can play a vital role. Protein is needed for tissue replacement and growth. Calcium is important for adequate mineralization and maintenance of growing bones in children. Likewise, iron is important for prevention and cure from high risk iron deficiency anemia especially for older infants. So development of eye appealing, handy and nutritionally rich supplementary food, for children using kidney bean varieties (after adequate processing) can prove beneficial to alleviate the problem of malnutrition and other nutritional deficiencies prevalent in vulnerable groups of the society.

Keeping in view the nutritional and therapeutic significance of kidney bean varieties along with their abundance and availability, this endeavor has been planned. It has been aimed at developing formulations by incorporating kidney bean varieties in raw and processed forms, to solve the nutritional problems of masses and treat people using this therapeutic legume. However, this all important exercise in product development was undertaken in the second phase of the study after validating the proximate principles, minerals, antioxidant and anti-nutritional factors and observing the effect of processing methods on them, in the first phase of the study. Food product development incorporating kidney bean varieties in raw and processed forms at various levels for different life stages and disease conditions along with subsequent sensory evaluation exercise has been meant to bring
deliverable outcome from this study. In all, the study endeavor has the following objectives:

- To undertake the nutritional assessment of native and processed forms of kidney bean varieties.
- To apply household adaptable processing strategy- hot water blanching for optimizing nutrient yield and antinutrients removal from kidney bean varieties.
- To develop the food products by using the native and processed kidney bean varieties, by following life span development and health promotion approaches, taking leads from traditional wisdom and nutritional knowledge.
- To undertake the acceptability trials for different food products with the help of semi-trained panels.

The given study, contemplated, planned and executed in the true spirit of an organized research work is expected to broaden the horizons of knowledge and promote applications of this food stuff with an assuring nourishing and health enhancing potential. The promising role of kidney bean varieties can help in improving the nutrition and reducing the onset of various diseases occurring due to poor quality dietary intake but also lessen the burden of non communicable diseases caused by excessive consumption of unwholesome diets and leading lopsided lifestyles.