

INTRODUCTION

Cereal and legume grains were part of the daily food in most regions of the world, long before the knowledge on selection of nutritious foods was available to man. The production of grain legumes is as old as agriculture (Roberts, 1976). Depending on the climatic conditions of the area, certain types of legumes have become more dominant than the others. Legumes are an important class of foods in the diet of populations living in the tropics and subtropics rather than of those in temperate regions. It is replaced partly or totally by animal foods in temperate regions owing to the availability of animal foods. Legumes have been looked upon as one of the promising sources of protein the world over chiefly due to their high protein content.

The most important aspect of legumes in human nutrition seems to be their potential to balance cereal based diets. Unless a judicious combination of cereals and pulses is selected, vegetable protein cannot compete with animal protein in nutritional quality. The proportion of legumes consumed with cereals is more important than the mere combination for efficient supplementation of cereal protein. Since cereals are comparatively economical,

and the availability is also more, there is a tendency to choose a higher proportion of cereals and a lower proportion of pulse than is required.

The need for increased production of cereals was felt much earlier than of legumes to build the calorie gap. The 'green revolution' is a result of efforts made in that direction. Quantitative and qualitative improvements were achieved in cereals by the introduction of several high yielding varieties. In view of this, a part of the land used for the cultivation of pulses during the years 1964-73 was shifted to the production of cereals. As a result, the per capita consumption of pulses dropped slightly from an already low level of consumption. This impact was viewed seriously both by scientists and administrators. Consequently, interest in legumes has been renewed in this decade all over the world, particularly in the developing countries.

An indication of this renewed interest is the fact that the Protein Advisory Group of the United Nations held a conference in 1972 entirely for "Nutritional improvement of grain legumes by breeding" for upgrading human nutrition. Improvement in productivity, adaptability and yield stability of legumes was emphasised as priorities for stepping up the production. It was also recommended

to aim at cultivars with better nutritional and cooking quality (PAG, 1973). The Latin American Nutrition Society at its recent conference in 1973, discussed the nutritional aspects of common beans and legumes as animal and human foods and made several recommendations for future research on legumes (Jaffe, 1973). Perspectives for the development of high yielding varieties of chickpea and pigeonpea in the semiarid tropics were discussed at an International Workshop on grain legumes held at Hyderabad, India in 1975 (ICRISAT, 1975). As a result of these efforts to increase production, several high yielding varieties of legumes have been released (Swaminathan and Jain, 1973).

In order to increase the production of protein per unit area and time, relay cropping was developed. The high yielding and short duration varieties which can fit into multiple cropping pattern was developed. Since breeding programmes can produce wide variations in the content of both nutrients and toxic factors, careful nutritional testing is required for the new varieties released. At present, it may not be necessary to breed for better quality, but it is important not to breed against it. Though qualitative factors in legumes assume secondary importance, they certainly deserve due consideration as they are staple foods of populations living in developing countries.

Even though legumes have twice as much proteins as cereals, the digestibility of legume protein is limited compared to cereal proteins. The benefit of breeding for higher protein content is lost if the digestibility is poor. Large variance in digestibility and biological value has been cited in the literature (Kuppuswamy, 1958; Patwardhan, 1962). Processing is a precondition for consumption of dry legumes. Processing, in addition to improving the palatability, enhances the digestibility and destroys the toxic factors. Methods of processing selected for each species are a matter of habit. All legumes may not require the same heat treatment to enhance the nutritional quality. Processing time is dependant on temperature, method of processing and variety. Destruction of amino acids and vitamins at high processing temperatures continue to be problems in any food.

The most traditional and common methods of cooking pulses are boiling and roasting. Pressure cooking has partially replaced boiling in urban communities. Fermentation and germination are also practiced occasionally. Isolating and concentrating the protein from legumes is another way of utilizing legumes as it reduces the bulk of high protein foods and facilitates incorporation into ready-to-eat foods and preparations that require short cooking periods. The effect of processing on the protein

quality of legumes may not be uniform in view of the variation in size and composition of legumes. It is desirable to use a process that optimizes nutritional benefits of the legume since excessive heating is as undesirable as inadequate heating. Thus the processing methods studied were the methods commonly practiced in Indian homes. In order to take maximum advantage of the nutrients in the high yielding varieties being introduced, it is necessary to possess full information about the nutritive value of processed legumes.

Therefore an attempt was made to evaluate the digestibility and utilization of carbohydrates and proteins of processed pulses for growth and maintenance both by chemical and biological methods. As the presence of antinutritional factors is associated with inhibition of enzymes, the impact of processing on the level of these inhibitors was attempted. Since flatus is associated with legumes, studies on flatulence effect were also included.

The legumes selected were red gram (*Cajanus cajan*), black gram (*Phaseolus mungo*), green gram (*Phaseolus aureus*) and bengal gram (*Cicer arietinum*) as they are popularly used in Indian dietaries particularly in Andhra Pradesh.

High yielding varieties of legumes will soon

replace the old varieties which are uneconomical to the farmer. The data available on the nutritional quality of legumes are mostly on the older varieties. Since the high yielding varieties are produced to a large extent and consumed today, it was felt necessary to investigate the nutritional quality of the legumes currently in use. The varieties of red gram, green gram and bengal gram selected for study were fairly new and high yielding. Black gram, though not a new variety was also high yielding. All these four varieties are cultivated throughout Andhra Pradesh and have not so far been tested for their nutritional quality.