Introduction:

The food legumes being economical sources of protein, calories, certain vitamins and minerals are an essential component of the diet of 700 million people of the world (Khan 1987). However, the significant role they play in the diets of the many developing countries appears to be limited by their scarcity caused mainly by their present low yield, consequent cost and certain defects in their nutritional and food use qualities (Elias and Bressani 1974 ; Khan and Ghafoor 1978).

Food legumes have several indirect beneficial effects on agriculture. They improve soil fertility and rotation of grain legumes with cereals increases the yield of cereals and reduces the weed, disease and insect problems (Borlaug 1972). Some medicinal

properties of chickpea have been reported. Seeds are astringent and antibilious. When roasted, the grain is considered to be aphrodisiac. Fried seeds are diuretic. Hypocholestrolaemic effects and diabetic management have also been associated with chickpea (Chopra et al 1956).

In Pakistan, cereals constitute the bulk of average diet and are known to be limited by lysine (Khan and Eggum 1978; Khan 1981). On the other hand legumes are rich source of lysine but are limited by sulphur amino acids (Khan et al 1979; Khan 1980; Khan et al 1987). Legumes are mostly consumed together with cereals, so that surplus of one amino acid in one food makes good the deficiency of the limiting amino acid in the other food. Such combinations of cereal and legume have been reported to meet the protein requirement of various age groups (Khan et al 1976; Khan et al 1977; Khan and Eggum 1978; Khan and Eggum 1979; Khan et al 1979).

The position with regard to the production of legumes in general and chickpea and groundnut in particular, is not happy at present. As a result

of the emphasis laid on improving the crop yield of cereals, legume production has not only remained stagnant but actually has suffered a set-back in terms of per capita availability. Recently, however, more attention has been paid to develop high-yielding, disease and insect resistant legume cultivars and to improve the economy of their cultivation.

The present paper deals with the utilization of chickpea and groundnut in Pakistan and to identify areas for further research and development to improve their utilization in the diets.

Area and Production Trends:

Ecologically, Pakistan can be divided into three legume producing regions (Fig. 1). The northern region has a high rainfall where both rainfed conditions and surface irrigation facilities are available. The central region has highly fertile soils but the climate is mostly semi-arid where crop production is mostly aided by surface irrigation. Legumes are also grown under rainfed conditions in some area of this region. In the southern region rainfall is scanty and agriculture is totally under irrigated conditions.

Area and production of chickpea and groundnut are presented in Table 1. In case of chickpea the area sown and production remained static except in 1980-81 to 1982-83 and 1987-88. Blight and the weather conditions were the major causes of these fluctuations and planted areas and production declined by 33 and 31% respectively during the last ten years. On the other hand groundnut is mainly grown as a cash crop and all produce is consumed as roasted nuts. The crop is mostly cultivated under rainfed conditions and on river receded lands of the country. About 92% of the total area under groundnut lies in the province of Punjab, 7% in NWFP and 1% in Sind (Khan and Qayyum 1986). Comparing area and production of 1978-79 to that of 1987-88, there is 45% and 15% increase respectively. The present yield is still lower than the potential yield obtained at the research stations.

Table 2 compares the total area under chickpea, total production and yield of 1970 with the figures of 1986 for the major chickpea producing countries of the world. Out of some 50 countries that grow chickpea, only eight countries produce nearly 95% of the total. In 1986, India and Pakistan

alone accounted for 85% of the total area and 80% of total world production. Over 16 years the world area under this crop increased by only 2.6% and gains in production and yield were 11 and 8% respectively. In Pakistan, the average yield has declined (2%) and the marginal improvement (1.6%) in production is surely due to increased area.

Availability:

According to the National Nutrition Survey (1988), the per capita consumption of pulses in Pakistan is 15.7 Kg/annum. Legumes contribute on national basis 8% of protein, 8% of calories and 7% of iron intake in the average Pakistani diet. The per capita availability of chickpea during 1987-88 was 3.04 Kg/annum and the per capita availability of groundnuts during this period was 0.45 Kg/annum.

Processing of Chickpea:

Chickpea are subjected to primary processes such as dehulling, splitting, grinding, puffing, parching and toasting before consumption. The main

effect of processing on chickpea are to improve their appearance, texture, culinary properties and palatability and to decrease dry matter content and alter the bio-availability of nutrients (Kurien 1987).

Dehulling:

The chickpea seeds are dehulled to prepare dhal. This process involves the following three steps.

a) Pretreatment to loosen the seed coat from cotyledons.

b) Splitting and

c) Dehusking

Dehulled seeds are easily digested and efficiently utilized by the body. The traditional household and commercial milling techniques are inefficient, and yield 63 and 70% dhal respectively (Malik 1980). The yields of dhal at home scale and commercial levels are higher in India as shown in Table 3. Household processing of chickpea into dhal reduced protein, calcium, iron, phosphorus, thiamine, riboflavin and niacin by 11-14, 40-50,

46, 5, 19-28, 26 and 30% respectively (Pushpamma et al 1983). In order to improve milling out-puts and quality and to reduce processing costs, there is an urgent need to develop loosehusked chickpea varieties and to improve the milling technology.

Puffing:

Puffing of chickpea improves the flavour, modifies the texture and helps in dry or wet grinding (Kurien et al 1972). For puffing, the seeds are soaked in water and then toasted with heated sand at 200-500^{o}C for one to two minutes. The roasted chickpea is gently rubbed against a coarse surface to break the husk which is removed by winnowing. Not all chickpea cultivars are used for puffing and the processors prefer those grown in specified agro-climatic tracts which are known to give superior products with good aroma (Kurien 1984). Puffing is also influenced by husk content and grains with 12-14% husk contents were found to be good for puffing (Kurien 1987). There is a need to study the factors affecting puffing of chickpea and to develop methods of increasing puffing expansion.

Grinding:

Whole chickpea or dehusked seeds are ground dry to a flour, known as Baysen. The eating quality of many chickpea flour-based products depends on flour composition, degree of fineness of grinding, mesh grades and cooking conditions (Kurien et al 1972). The traditional processing methods need further improvement to provide improved nutrition and better consumer appeal to the products.

Traditional Uses of Chickpea:

Table 4 summarizes the chickpea products and their processing conditions. Chickpea is used in many forms, from the fresh green seeds to the dried whole, dhal and flour. Traditional methods of processing chickpea-based products include boiling, roasting, frying and puffing.

Green immature chickpeas are used as vegetable. They are mixed with meat or vegetables to make curries, mixed with rice to cook Palau and also used as snack after shelling the roasted pods.

The most common method of processing whole chickpea is boiling either in the open pan or in the pressure cooker. The seeds are usually soaked overnight in water before they are cooked in order to reduce the cooking time. Sometimes baking soda is also added to further reduce the cooking time. Seed size is important since it affects processing operations such as cleaning, decortication and sugar coating. In general, the larger seed is considered to be of better quality and is also preferred for consumption. The kabuli types are preferred to the desi types. The mean cooking time of dry desi and kabuli chickpeas were 125 and 114 min., it reduced to 38 and 33 min. when soaked overnight in water and it was further reduced to 29 and 23 min. respectively when soaked with 0.5% sodium bicarbonate (Khan 1988). Boiling in pressure cooker takes 10 min. Puffing is another method of processing whole chickpea. This is largely a commercial process. Puffed chickpea is light and ready to eat.

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