MUSHROOM

The food markets in most of the developed economies are currently in the middle of a revolution. Most
households are devoting a much larger percentage of their consumer outlay on precooked and pre-packed foods generally known as “convenience foods”. The share of convenience foods in total food intake is bound to increase further with households looking for more nutritious foods and greater variety. Other factors that are accelerating the demand for pre-packed off-the shell foods include shift in eating habits, rising personal incomes and consumer spending, housewife’s desire to spend less time in the kitchen, growing sophistication of consumer taste, marked advances in food technology, transportation and distribution methods and availability and use of better marketing and advertising techniques. The conversion of increased demand for convenience foods into an effective marketing opportunity will depend upon weakening of several deterrents that are currently in operation in this area. High levels of excise duty or state taxes such as sales tax cannot be conducive to multiplication of the market for packaged foods. Also packaging materials are either not available or too expensive in relation to the value of the content and over all retail price.

Furthermore unemployment, full or disguised, places enough time at the disposal of Indian housewives to continue to attend to their family food requirements through their own kitchens. The excessive reliance on homemade foods is in part conditioned by a partial lack of trust in the quality of pre-cooked and pre-packed food products as available in the market. This distrust arises either from some individual past experience or a general distrust of all foods processed by unknown persons or from inputs of unknown quality. In short, the quality of packaged foods is, as yet, not taken for granted. But now we will start a series of new investment opportunities for the weaker sections so that they can start their business on a small-scale level with techno-economical methods utilizing their rural level resources in a very effective manner. Thus, there are at the consumption end two upward pulls on the demand for processed products. First, rural households will tend to catch up with their urban counterparts in the corresponding consumer expenditure groups. Secondly, the bottom consumer expenditure group in the rural or the urban sector will tend to catch up with the next higher expenditure group in its own strata till it reaches almost the same levels of consumption as currently experienced by the top expenditure groups. With
these two factors pulling the demand for processed items upward scope for substantially larger food market than currently experienced exists. As we know that Food Industry is in its inception stage. The Future will demand a Strong Food Industry in the Nation and will call for added vigor in Food Science and Technology. The pressing need will be concerted effort to Transfer Modern Food Technology to Small and Medium sized Enterprises.

MUSHROOM PRODUCTION

Mushroom farming is being practiced in more that 100 countries and its production is increasing at the rate of 7 per cent per annum. Production of mushroom has already crossed 5 million metric tons annually in the world and is expected to reach around 7 million metric ton in next ten years. India had been known world over for its exotic mushrooms. Total mushroom production in India was 48,000.00 tones in 2005. Punjab alone produces 20-25 per cent mushrooms out of the total production in India. There are around 38,000 mushroom varieties known to exist but only 100 of these are considered to be edible. The variety which had been exported in dried form i.e. Moral or Black mushrooms (*Morchella Spp*) commonly known as ‘Guchhi’ is collected as wild growth from coniferous forests of Himachal Pradesh, Jammu and Kashmir and Uttar Pradesh. Most acceptable varieties among cultivated type are *Agaricus Bisporus., Auricularia spp., Flemulina Velutipes., Lentinus edodes., Tramella spp., Volvariella spp., Plerotus spp*.
The Food and Agriculture Organization have recognized mushrooms as food contributing protein nutrition to the countries depending largely on cereals. In addition folic acid and vitamin B_{12}, which are absent in most of the vegetables, are also present in mushrooms. Mushrooms are praised and priced for its characteristic meaty biting texture and flavour. Mushroom cultivation is now a big industry in the industrialized countries of the west. There is a very considerable export potential for mushrooms and climatic conditions in various states offer congenial environment for cultivation, if modern technology is

adopted. It is also realized that merely producing mushroom is of no use unless these are properly preserved, keeping in view the export objectives and for internal market. Mushroom production has increased many folds during the recent past. Mushrooms have found a definite place in the food consumption habits of common masses and there is a constant demand for it throughout the year. Freshly harvested mushrooms are highly perishable because of high moisture content, metabolism and susceptibility to enzymatic browning. Its quality starts declining soon after harvesting, rendering the produce unsaleable. Hence, the development of appropriate storage and processing technology in order to extend their marketability and availability to the consumers in fresh or processed form is of great significance. Drying, canning and freezing are initially accepted methods of mushroom preservation. Drying being cheaper can be employed on commercial scale.

Food processing in India is not only far behind the developed countries of the world but is much less than developing countries like Philippines and China where value addition is 45 per cent and 23 per cent, respectively as compared with 7 per cent in India. Linked with the issue of fostering relationship between processor and farmer is the need to develop varieties that are suitable for processing. The food-processing sector has tremendous potential to promote direct and indirect employment.

MUSHROOM PROCESSING

Freshly harvested mushroom is susceptible to deterioration by the enzyme system and by the decay, which develops very fast around the bruised portion caused during handling. Due to high respiration rate, there is a build up of temperature, which very adversely affects the delicate flavour principles in mushrooms, which ultimately results in short post-harvest life. It also results in the Grey colour formation by the polyphenoloxidase enzymes which are quite active in mushroom hence the preservation and processing of mushrooms have received considerable attention over the years that's why for satisfactory results, freshly harvested mushrooms should be immediately processed by any of the following technique.

1) Short term storage
2) Long term storage

SHORT TERM STORAGE

The shelf life of mushrooms may vary from 1 day to 2 weeks at 1-4^{0}C. Low temperature is effective in short-term preservation because it retards the growth of microorganisms, reduce the rate of post harvest metabolic activities of the mushroom tissues and minimizes moisture loss. Straw mushrooms may be picked in wooden cases and transported by road, rail or sea. The case is divided into three compartments; ice is placed in the central compartment and the mushrooms are packed in the two other sections. Mushrooms may also be packed in bamboo baskets and transported by airfreight. An aeration channel is formed at the center of the basket and dry ice, wrapped in paper, is placed above the mushrooms. Storage of straw mushrooms in a closed plastic box with 95 per cent co_2 accelerates deterioration even at 15-20^{0}C, the temperature range most suitable for their storage under normal circumstances. On the other hand, mushrooms stored in a perforated plastic box at 10-15^{0}C have excellent keeping quality for up to 4 days and the loss of moisture is less than 5 per cent. When straw mushrooms are stored at 30^{0}C, under similar conditions, the veils are fully open and vegetative mycelia develop after only 2 days. In closed bags, liquefaction and microbial spoilage may occur rapidly. Straw mushroom can be stored more effectively at button stage than at any other stage. At temperatures below 10^{0}C, however, the mushrooms liquify rapidly, irrespective of type of packaging and stage of development (button or umbrella stage) due to chilling injury.

LONG TERM STORAGE

Canning, pickling, and drying processes are employed for long term storage. These processes are not always suitable for all types of mushrooms. The quality of the finished product is rarely comparable with that of fresh mushrooms.

Canning

Canning is the most common process for preserving mushrooms, particularly *Agaricus* mushrooms. Canning is divided into six basic operations: cleaning, blanching, canning, sterilization, cooling, labeling and packing. Trimming the steps immediately after harvest can reduce Browning and blemishing of Agaricus. If the mushrooms are not canned immediately before processing then, refrigeration at 15^0C along with high RH will help in retaining colour and texture. Soaking for 30 minutes prior to canning may increase canning yield. At this stage, an appropriate level of sodium metabisulphite or ascorbate is incorporated for colour retention. The mushrooms are then rinsed and blanched for 2 minutes. Blanching is used to reduce the activity of enzymes. After blanching, the mushrooms are placed in cans containing 2.5 per cent sodium chloride and 0.25–0.5 per cent citric acid. The cans are then sealed and sterilized. Sterilization methods vary according to the type of equipment used. The most commonly used method is the batch process in which the cans are placed in an autoclave and sterilized for on hour at 120-10^0C.

Drying

Mushrooms are dehydrated in India as such in the sun. The products available in the market are of sub-standard quality. Not only there is contamination with sand, but also the products are highly discoloured. But on the other hand dried mushrooms are convenient for long term storage and transportation. Mushrooms preserved by drying have a good flavour and the drying prevents deterioration. The moisture content of fresh mushrooms varies in the range of 70-90 per cent depending upon the harvest time and environmental conditions while that of dried mushrooms is about 10-13 per cent. Mushrooms can be dried by sun drying and thermal power drying. For general drying, the picked mushrooms are cut off at the basal part of the stalk and arranged in single layers on shelves and exposed to the sun or placed within a drying oven. Usually about 2-4 days under continuous daily sunshine is adequate for sun drying. This process of thermal power drying begins at a relatively low temperature. Mushrooms grown during sunny days are dried at an initial temperature of 35^0C while mushrooms grown during damp days are dried at an initial temperature of 30^0C. In addition to preserving the product, drying enhances the flavour and appearance of the mushrooms. Dried mushrooms are highly hygroscopic and are apt to absorb moisture from the air, they should be properly stored. If moisture content of the mushrooms reaches about 20 per cent, insects and molds will infest the mushrooms. The gloss of the cap surface may also fade. In addition, mushrooms may develop a white powdery surface and the gills may turn brownish from their original yellowish white. The dried mushrooms should therefore, be put into polyethylene bags, sealed, and kept in a dry, cool, and dark place. For prolonged storage, mushrooms should be packed in cartons or wooden boxes and kept at 2-5^0C in a low temperature store.

Use of chemicals

Some work has been done at the Central Food Technological Research Institute (CFTRI), Mysore, on this aspect of the preservation of mushrooms. It is reported that mushrooms in the fresh condition may be possible to preserve for about 10 days at room temperature by steeping in a solution containing 2.5 per cent common salt, 0.2 per cent citric acid, 0.1 per cent ascorbic acid, 0.1 per cent sodium bicarbonate and 0.1 percent potassium metabisulphite. The blanched mushrooms and steeped solution of (1:2) are put into clean glass containers, which are covered with lids and sealed with paraffin wax and stored at room temperature (21-28^0C). This method of preservation can be used at places where facilities for canning, freezing and dehydration do not exist.

MUSHROOM CULTIVATION: PRODUCT AND ITS USES

Mushroom a fungus fruit body has been considered a delicacy all over the world. The cultivation of mushroom under controlled condition is of recent origin in India. For climatic condition of Assam cultivation of Oyster mushroom is most suitable. It is very rich in protein and resembles meat, when we chew it. The vegetarian people like the taste of it as other soybean products.

MARKET POTENTIAL

Mushrooms are delicacy with definite food value. It has already acquired commercial status almost all over the world. Mushroom cultivation has been declared as a major thrust area by Govt. of India. Mushroom dish is a common item in all the big hotels.