Economic development through solar drying technologies

PROCESSING FOOD INDUSTRY: Processing of vegetables into durable products during surplus production and seasonal super-abundance can go a long way in reducing the post harvest losses. Sri-Lanka is a producer and consumer of vegetables.

The processing food industry and export market of vegetables can be an instrument of diversification for generating income and employment for small and marginal farmers.

Processing of various vegetables is picking up in other countries in the SAARC region. The processed form of vegetables can be exported easily and in turn help to earn much needed foreign exchange.

Vegetables are an important constituent of diet and provide significant nutrients depending upon their nature especially vitamins, mineral and fibres. Some vegetables like carrots, cauliflower are highly seasonal and are usually available in plenty in some seasons of the year.

In the peak season, the selling price becomes too low leading to heavy losses to the grower and also there is an unnecessary stock in the market resulting in the spoilage of large quantities.

Because of its seasonal nature of availability, a need was felt to preserve the vegetable over a period of time to use it during off seasons. Preservation of vegetables can prevent the huge wastage and make them available in the off-season at remunerative prices.

In recent food technology literature, processing and preservation of numerous vegetable products have been reported. Because of its seasonal nature of availability, efforts were made since from the past to extend the shelf life of vegetables by dehydration, in order to use it during off seasons.

Various drying methods such as hot air, freeze microwave, infrared and fluidized bed drying have been practiced for dehydration of vegetables. These
technologies need sophisticated equipment and skill training, the adoption of which appears difficult at field/rural level.

Though mechanical dryers, powered by electricity or fuel, help in producing quality products in mass scale, they are seldom adopted by small-scale entrepreneurs and farmers of most developing countries, due to heavy installation costs involved and large operating cost because of it being energy intensive process.

To save the energy and thereby reducing the operation cost, use of a solar collector in conjunction with mechanical dryer (convective dryer) could give synergetic effect i.e. producing quality dried product at low cost. Solar energy is fast becoming an important alternative source of energy as it can be tapped at selectively low cost.

The use and application of solar energy therefore, cannot be under emphasized. Development of a solar assisted convective dryer will help in drying a variety of fruits and vegetables under controlled conditions at relatively lower cost and is expected to be well adopted at farmers level, as well as fruits and vegetable drying industries.

Drying and dehydration technology:

Drying and dehydration technology would be one of the best practices towards increasing the consumption of the population under the current insufficiency in vegetable consumption. Besides, the precooked and dehydrated convenience items, which are ready to eat, will serve people, in highly urbanized cities, in many ways. The lower-mass, compact size and stability of dried foods make them ideal in any situation.

The principal of using drying as a preservative method is that enzymes responsible for the breakdown of foods or the growth of microorganisms are inhibited when the amount of available water is very low. During the past few decades, considerable efforts have been made to understand some of the chemical and biochemical changes that occur during dehydration and to develop methods for preventing undesirable quality losses.

Longer shelf life, product diversity and volume reduction are the reason for the popularity of dried fruits and vegetables, and this could be expanded further with improvements in product quality and process applications.

Solar drying technologies developed in other countries:
Solar drying relies, as does sun drying, on the sun as its source of energy. Solar drying differs from sun drying in that a structure, often of very simple construction, is used to enhance the effect of the insolation.

Compared with sun drying, solar dryers can generate higher air temperatures and consequential lower relative humidities, which are both conductive to, improved drying rates and lower final moisture contents of the dried crop. As a result the risk of spoilage is reduced, both during the actual process and in subsequent storage.

Development of solar drying technologies in Sri-Lanka

It has been reported that there has been very little actual penetration of solar drying technology so far in Sri-Lanka. In the initial phase of their dissemination, identification of suitable areas for using solar dryers would be extremely helpful in providing the required momentum for their market penetration.

One of the possible areas of immediate intervention in this direction appears to be the solar drying of cash crops such as tobacco, tea, coffee, small cardamom, chilli powder, coriander, ginger, turmeric powder, pepper, onion flakes and garlic flakes etc.

For such crops, even with the capital intensive nature of solar dryers, the unit cost of solar drying is expected to be a small fraction of the selling price of the final dried product.

An initiative by Sri-Lankan scientists has to be started estimate the potential of solar crop drying and the useful energy required for drying of different cash crops, the fraction of the total production of different cash crops which can be dried by solar dryers, and solar collector area required for this purpose has to be estimated.

The amounts of different fuels that would be saved by solar drying and the Co2 emissions mitigation potential of solar drying of crops in Sri-Lanka is also an important study.