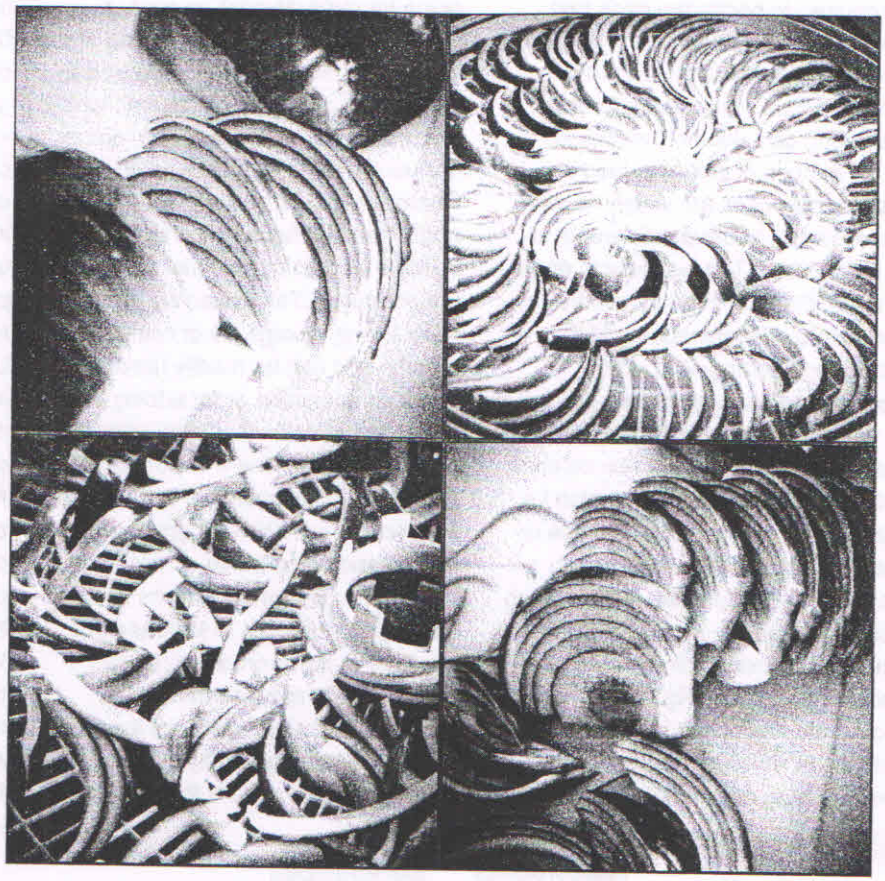
Onion offers a huge potential for value creation through processing. Advances in the field of processing makes it possible to produce different value added products from onion.The byproducts of onion from the food industry can also be converted into different value added products, explain **Kalyani Gorrepati, A.A. Murkute** and **Jai Gopal.** Research efforts are being directed towards finding means and ways to reduce the cost of processing.



Value added products from onion

ONION (Allium cepa) is one of the oldest vegetables. Cultivation of onion is known to the mankind for more than five thousand years and is presently cultivated in more than 140 countries. It is an important constituent of human diet. The world per capita consumption of onions is 6.2 kg per year (National Onion Association, 2013). Onion is also an important constituent in the preparation of herbal medicines. Onions have been used for centuries in several societies against parasitic, fungal, bacterial and viral infections. The naturally occurring organo-sulfur compounds in onion helps to lower the blood pressure levels and is also known to lower the risk of cardio-vascular diseases & cancer. Onions also have anti-inflammatory and anti asthmatic properties (Corzo-Martinez et al., 2007). It is a popular home remedy for medical conditions like nausea and is also an antiseptic for cuts and burns.

The world's onion production in the year 2011 was 853.75 lakh tons of which India's share was 159.30 lakh tons (FAO, 2013). Ironically about 50% postharvest losses not only fluctuates markets but disturbs value chain. Onion is a perishable crop and bulbs can be stored only for 5-6 months in ambient storage. At the Directorate of Onion and Garlic Research, Pune, it has been observed that the postharvest losses in onion could be reduced to 25-30% after six months storage (Murkute and Gopal, 2013). Nevertheless there are meager value chain options to manage the dip of prices during glut. Thus proper utilization mechanism of onion

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is required to bridge the gaps that currently exist in the value chain. Interestingly, the onions which don't meet the quality standards for fresh marketing can also be processed. While the use of onion for food and medical purposes are widely known, lesser known to the public are its alternative uses. The byproducts of onion from the food industry can be converted into different value added products (Stintzing et al., 2001).

Value addition of onion

Advances in the field of processing makes it possible to produce different value added products from onion i.e minimally processed ready to use or ready to cook fresh onions, onion paste, dehydrated onion flakes, onion powder, onion oil, onion vinegar, onion sauce, pickled onion, onion wine and beverage etc. (Fig. 1). Minimally processed onions are peeled and/or cut onions which retain its freshness. Availability of minimally processed onion for ready to cook or ready to use purpose obviates the peeling and cutting of onions before food preparation thereby reducing the overall food preparation time. Alternatively, onions are used by way of frozen onion rings where the raw onions are sliced into rings, freeze dried and stored in a suitable packaging material under low temperatures. The frozen onion rings have a long storage life of twelve months and can be readily used for direct consumption or for adding to soups and dressings. Onion paste is another product where the onion is grounded yet retaining its freshness. Preparation of minimally processed onions and onion paste entails optimization of proper preservatives and packaging materials to increase the shelf life of these products. Dehydration of onions reduces the bulk to transport and also increases the shelf life of onions significantly due to less moisture, which arrests the growth of microorganism (Mitra et al., 2012). Dehydrated onion flakes can be processed into onion powder by proper grinding. Onion powder dissolves very easily and reconstitute quickly compared to onion flakes. Onion powder incorporates the flavour of onion in a variety of foods. It is successfully used in the preparation of baked products like pizza and bread, and also for spicing up grilled chicken. Use of suitable packaging techniques is important to increase the shelf life of dehydrated onion flakes and powder as these are very hygroscopic in nature. An age old practice to preserve the onions is by means of a process called pickling. Most widely used pickling for onions are vinegar based pickling and oil based pickling. While vinegar based pickling is popular in the United States and Europe, oil based pickling is widely adopted in Asia and Africa. Onion oil is another flavouring substance which is widely

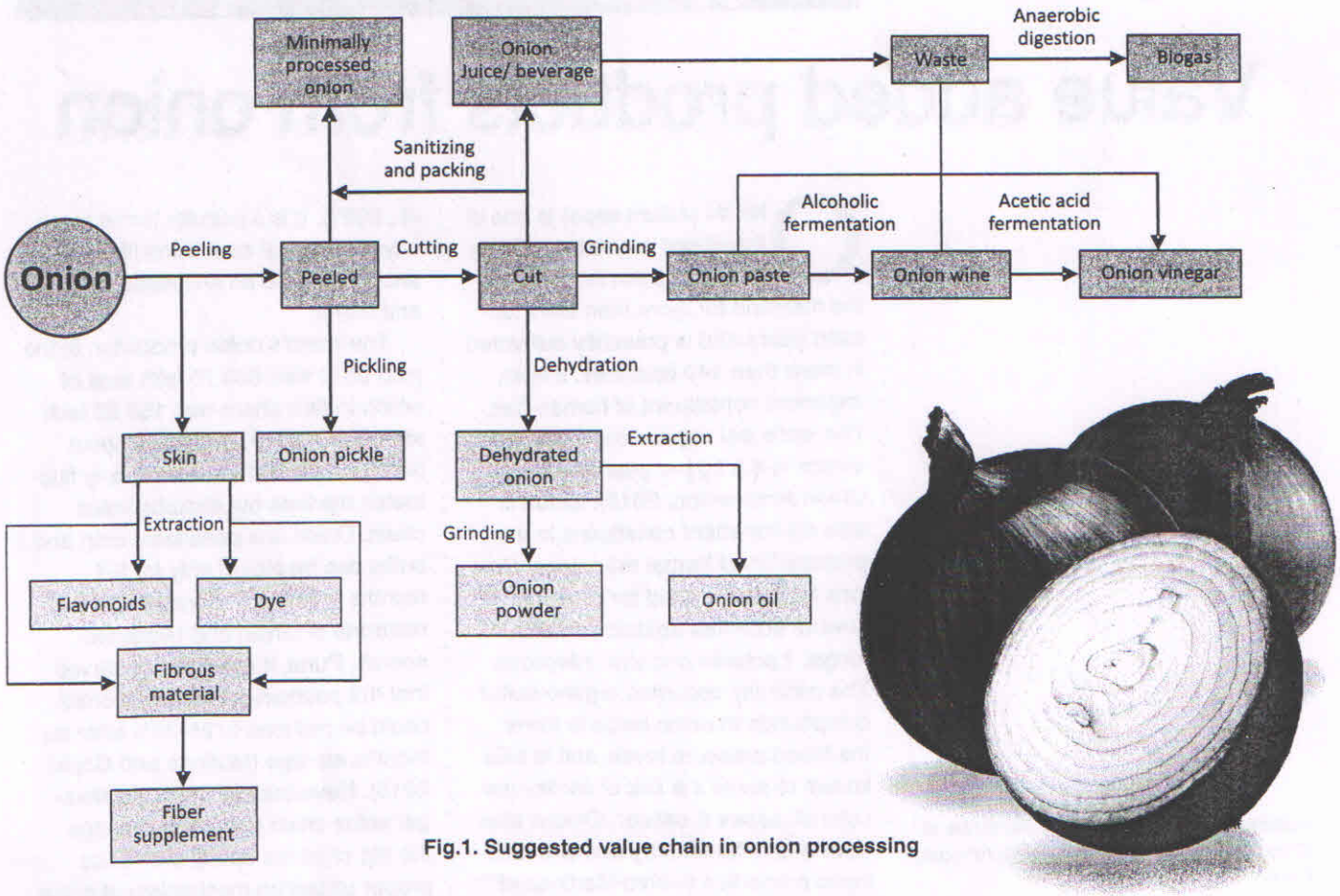
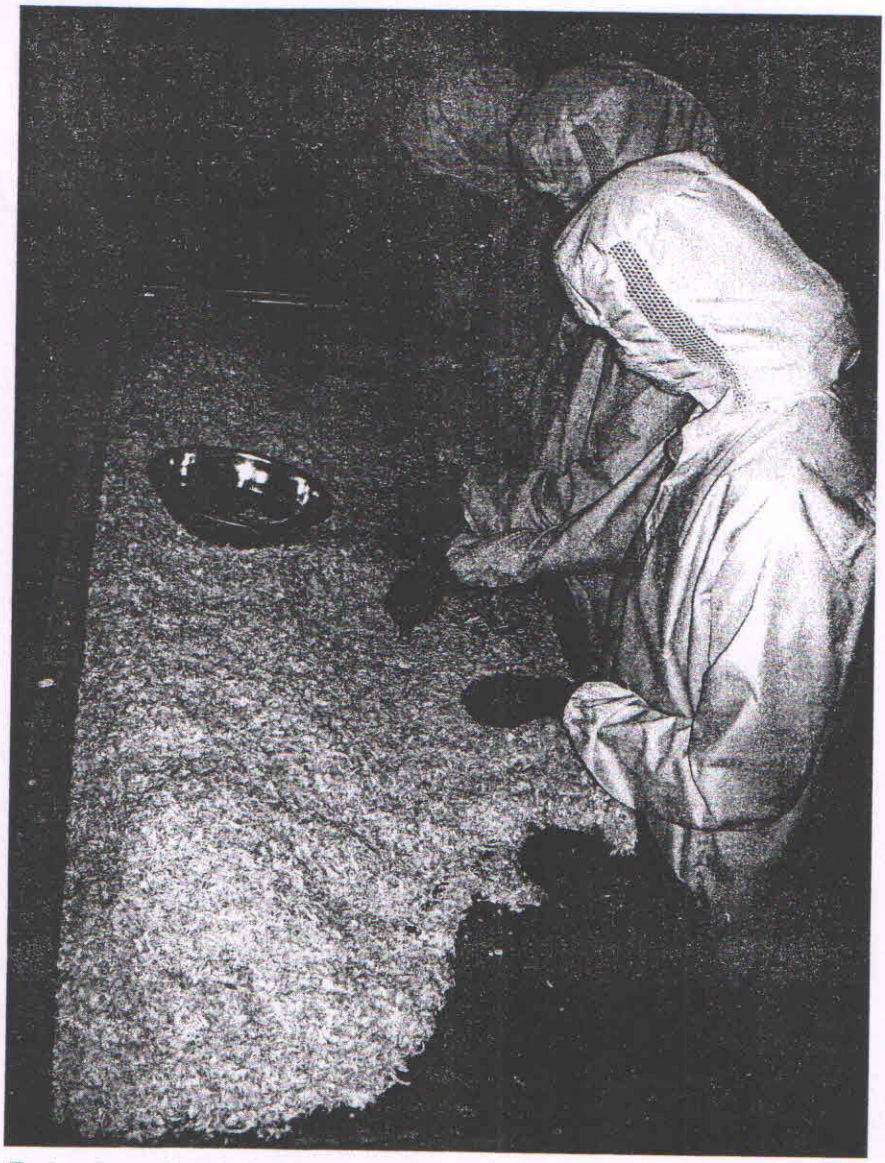


Fig.1. Suggested value chain in onion processing



Dehydrated onion flakes can be processed into onion powder by proper grinding. Onion powder dissolves very easily and reconstitute quickly compared to onion flakes.

used in the seasonings of processed products. Onion oil is also used as a natural food preservative in some food products. Onion oil can be extracted by different methods like distillation, solvent extraction, super critical fluid extraction etc. The onions can also be processed into onion vinegar, onion wine, onion beverage and onion sauce. Onion salt is another common ingredient in the spice mix and also it can be used in place of table salt to offer a refreshing new taste to the household.

Waste processing

The scale leaves in an onion bulb finds its way into the food chain as an edible part whereas the dry skin, outer layers, roots and stalks are considered inedible and are subjected to disposal and waste. The skin of an onion bulb was found to be a rich source of fiber. After harnessing the colour from the dry skin by decolouration, the resultant product is converted into a fibrous material which can be used as a fiber supplement. The same fibrous material can be used as a thickening agent and an exemplary use is in making soup. The colour extracted from onion skin can be used as a natural dye (Vankar et al., 2009). The dry skin of onion is found to contain flavonoids. Onion essence which is used as a flavouring agent can also be extracted from the skin of an onion bulb. Other resultant materials like outer layers, roots and stalks can be anaerobically digested in a bio-digester to produce alternative energy sources like bio-gas. Through this it becomes possible to localize the power sources besides reducing our dependence on conventional sources of energy.

Conclusion

Onion offers a huge potential for value creation through processing. Research efforts are being directed towards finding means and ways to reduce the cost of processing. In the midst of the ongoing resource crisis the way forward will be to develop and deploy zero-waste agricultural resource models where production, processing, distribution and consumption are seamlessly connected to ensure that there is less and less impact on the environment. Appropriate interventions from Government and other stake-holders are necessary to remove infrastructural bottlenecks so as to create an integrated onion value chain encompassing all the stages from farm to fork.

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