

### Covering Letter

To,  
The Editor

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Dear Sir,

We intend to publish review article entitled “Updates on agro based food processing industry in India” in your esteemed journal as a review article. On behalf of all the contributors I will act and guarantor and will correspond with the journal.

Thanking you,

Yours' sincerely,

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# Updates on agro based food processing industry in India

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**Abstract**-Food processing is a large sector that covers activities such as agriculture, horticulture, plantation, animal husbandry and fisheries. Agro based food processing is defined as a set of techno-economic activities, applied to all the products, originating from agricultural farm, aqua cultural sources, livestock and forests for their conservation, handling and value-addition to make them usable as food, feed, fiber, fuel or industrial raw materials. In the food processing various steps included such as backing, drying, fermentation, malting and other packaging techniques but it should be reasonable so that economic cost will not much increase, are discussed. There are many advance techniques also used in this new era that is much effective in the case of production and to maintain hygiene because it is also a big problem in the food processing. Sometimes, pesticide which is used against pest needed dissipation of residue part of pesticide from crops which make it hazardous for human and animal, for this we can use prodrug type substances for pest control. For the specific food processing, we can use the recombinant enzyme which isolate by various methods and used for increasing production. Agro based industries are so much beneficial for our country because it has less investment cost and give beneficial products. We use waste material as a substrate and that waste material give valuable product and help in economy of country, are described.

**Keywords:** Food safety, Agrobased.

## 1 INTRODUCTION

Agriculture is an important sector in the Indian economy. Worldwide India ranks second in farm output. Agriculture and allied sectors like forestry and logging accounts for nearly 1/5th of the Growth domestic product (GDP) in worldwide (Dilottie report, 2010). The sector employs ~60% of the total workforce and plays a significant role in the economic development of India like agro processing. It can be defined as set of techno and economic activities carried out for conservation and proper handling of agricultural to produce usable material such as food, fiber, fuel or industrial raw material (Kachru, 2010).

Agro-food is a subset of agribusiness that refers to industries involved in the production, processing and inspection of solely food products made from agricultural commodities. It cuts across various industries and constitutes the aggregation of many commodity sub-sectors such as grain, dairy, coffee, fruit, vegetables, cotton, etc (Jaffee et al., 2003).

The Confederation of Indian Industry (CII) has estimated that the food processing sector has the potential of attracting US\$ 33 billion of investment in 10 years and generate employment of 9 million person-days (A brief report on Food Processing Sector in India, Aug 2012). There are clear indications that agro industries are having a significant global impact on economic development and poverty reduction, in both urban and rural communities.

The scope of the agro-processing industry includes all operations from the harvesting to packaging, quantity,

quality and price of desired product. Foods are freshest and at optimum quality at the time of their harvest or slaughter (Garbutt, 1997).

To maintain this quality, the foods can be preserved by cold, heat, chemical preservatives, or combinations of these methods. Cold usually means refrigeration or freezing while heating involves many processing methods, such as pasteurization, commercial sterilization, and drying and adding preservative ingredients (Garbutt, 1997).

Agro-processing is now regarded as the sunrise sector of the Indian economy in view of its large potential for growth and likely socio economic impact specifically on employment and income generation. In total percent of country GDP 14% provide by the agro based sector (Kachru, 2010).

Although India is one of the largest producers of Agricultural products, the processing of these produce is extremely low. The level of processing in sectors such as Fruits and Vegetables is as low as 2% - the level of processing in developed countries in Fruits and Vegetables is well over 50% (Dilottie report, 2010). Agro Processing converts harvested or raw foods into forms that are more easily stored and consumed, and sometimes into a form that may be more desirable. For example, wheat is processed into flour, which is used to make bread and pasta. Strawberries can be processed into freeze-dried berries for use in cereals or cooked to create strawberry preserves (Garbutt, 1997).

According to the Food department of India internal

transformations of the food processing sector of developing countries are increasingly seen as strategic from the point of view of export earnings, domestic industry restructuring and dietary issues (Wilkinson, 2004).

There is urgent need to provide the facilities which facilitate them setting up of economically viable units and they should be equipped with latest technologies and skills by organizing different entrepreneurial motivational and skill oriented programs frequently (Shehrawat, 2006). Now agriculture community cannot rely only to traditional methods in producing their agriculture output, but major problems and obstacles can be overcome by using Information and Communication Technology (Hassan, 2009). To maintain hygienic condition is also a major step for food processing. In developing countries, one tenth of the children under five years of age die due to dehydration. The dehydration is mainly caused by too many of severe incidences of diarrhoea. The main cause for getting diarrhoea is the ingestion of food not having the appropriate standard regarding the hygienic condition (Sahlin, 2003).

Modern advancement in food processing industry

For increasing production we can use various techniques which give us desired product in huge amount for that purpose following are included:

#### **Pesticide residue dissipation**

Food safety is an area of growing worldwide concern on account of its direct bearing on human health. The presence of harmful pesticide residues in food has caused a great concern among the consumers (Kaushik et al., 2008).

However, their excessive use or misuse especially in the developing countries, their volatility, long-distance transports eventually results in widespread environmental contamination and acute health problem (Ecobichon, 2001). Food processing treatments such as washing, peeling, canning or cooking lead to a significant reduction of pesticide residues (Elkins, 1989).

#### **2.1 Food processing enzymes**

Enzymes naturally present in the human diet have not been associated with toxicity and are considered intrinsically safe; it is commonly used in food processing and in the production of food ingredients (Olempska-Beer et al., 2006).

Enzymes traditionally isolated from culturable microorganisms, plants, and mammalian tissues but they are often not well-adapted to the conditions used in modern food production methods so, the use of recombinant DNA technology has made it possible to manufacture novel enzymes suitable for specific food-processing conditions (Short, 1997).

Such enzymes may be discovered by screening microorganisms sampled from diverse environments or developed by modification of known enzymes

using modern methods of protein engineering or molecular evolution (Olempska-Beer et al., 2006).

#### **2.2 Nanotechnology in agro processing**

Nanotechnology has been described as the new industrial revolution and both developed and developing countries are investing in this technology to secure a market share (Persad et al, 2005).

A recent study from the Helmut Kaiser Consultancy predicts that the nanofood market will surge from 2.6 billion USD to 20.4 billion USD by 2010. The report suggests that with more than 50% of the world population, the largest market for nanofood in 2010 will be Asia lead by China (Joseph and Morrison, 2006).

Agro processing sector has experienced expansion during last 5 decades, starting with a handful of facilities which were mainly operating at domestic/cottage level and covering role of R&D, export trends, SWOT analysis and thrust areas for future for achieving greater role of this sector in the national economy (Kachru, 2010).

## **2 EXPANSION IN THE FIELD OF AGROBASED INDUSTRY**

In the starting of the twenty century, common agro processing industries used hand pounding unit, water power driven flour mills, bullock driven grannies and crusher etc (Royal Commission, 1928).

But gradually modernizations occur and we use drill and other modern techniques for agro based processing. After independence, several entrepreneurship development programs have been started to develop the skill, knowledge, and competence among the entrepreneur (Chatterjee, 1992).

These development programmes launched by the Government and non-government agencies, the entrepreneurs are encountering a number of problems for establishing economically viable small-scale agro-processing units like lack of physical facilities like, communication, transport and storage, lack of quality control measures, selection of products, non-availability of right type of raw material, lack of managerial competence, poor linkage with marketing bodies, lack of trained workers, low scale of production, improper communication with other developmental agencies (Shehrawat, 2006).

#### **3 Agro processing based industry**

Agro-processing industries, or simply agro-based industries, can be described as industries that add value to agricultural raw materials, both food and non-food, through their processing into marketable, usable or edible products, while enhancing the income and profitability of the producers. The Agro-processing industry can be classified based on raw material or final product (Kachru, 2010).

#### **3.1 Rice processing industry**

India produces more than 200 million tonnes of different food grains every year. The major grains such as rice, wheat, maize, barley and jowar (great millet), bajra (pearl millet) are produced in the country.

Rice is grown in various region of India and approx 65% population of India are dependent on it. Rice milling industry are oldest and largest industry of country. District Karnal & adjoining areas are called the rice Bowl of the country especially due to production of long grain aromatic Basmati rice (Kapur, 2003).

In this various process included paddy dehusking many type of stabilizer are used for furnish rice production. Starting with 20.6 Million Ton (Mt) of rice production during 1950-51, the country has come a long way to produce about 89.48 Mt of rice in the year 1999-2000 (Kachru, 2010). At world level total rice production is 381.05 Million Ton in 2002-03 with India contribution of 20.2% and china leading the world by producing 31.96% (Kapur, 2003). Rice and wheat form the major part of government operated procurement system and storage. In the month of March 2001, the total stocks of rice and wheat in Food Corporation of India (FCI) and other government owned godowns were about 35 million tonnes for the public distribution system, for processing industry and for future use (Kachru, 2010).

### 3.2 Wheat processing industry

Wheat production occurs at higher level in our country it is important grain for country people. It is mainly processed for flour, suji, maida and dalia. In the 1950- 1951 the country produced 6.5 Mt of wheat, that has increased to 76 Mt by the year 2000-2001. India has emerged as the second largest producer of this cereal in the world (Kachru, 2010).

Wheat contains 12% bran, 3% embryo and 85% flour. There are various processing step used in industry for cleaning, handling, grading, drying, storage of wheat (Kachru, 2010). Wheat is now used in the form of biscuits, bread etc. About 15% of annual production of wheat is converted in to wheat product (FPI report, 2004).

### 3.3 Fruit and vegetable

In the year 2000-2001, the country produced about 45 millions tonnes of fruits and 80 millions tonnes of vegetables. It was next to China in production of vegetables and topped in production of fruits (Kachru, 2010). Fruit and vegetable processing is equally divided equally between the organized and unorganized sector, with the organized sector holding 40% share.

The government expects the processing in this sector to grow to 10% in 2010 and 25% total produce by 2025 (FPI report, 2004). Fruit and vegetable used in the form of vegetable oil, jam, jelly etc (Kachru, 2010).

## 4 FOOD PROCESSING TECHNIQUES

The processing of food commodities generally implies the transformation of the perishable raw commodity to value added product that has greater shelf life (Chin, 1997). Food processing techniques implies the set of methods and techniques used to transform raw ingredients into food or to transform food into other forms for consumption by humans or animals either in the home or by the food processing industry (Naik, 2009).

### 4.1 Baking

Baking is the technique of prolonged cooking of food by dry heat normally in an oven (Kaushik, 2009). It is primarily used for the preparation of cake, bread and pasteries. In this step research has been done in respect to contamination and they found that the pesticide residue levels detected were 11.48 ppm in fresh potatoes while residues were 0.22 ppm and 0.19 ppm in microwave-baked and oven-baked potatoes, respectively (Habiba,1992). During the process the water contained in the tissue could entrain pesticide molecules (co-distillation) while heat causes evaporation and degradation (Sharma et al., 2005).

### 4.2 Fermentation

Fermentation is a simple process during which the enzymes hydrolyze most of the proteins to amino acids and low molecular weight peptides, mostly sugar fermented primarily to lactic acid, alcohol and carbon-dioxide (Pardez, 1991).The fermentation process in meat products reduced the pesticide residues by 10% and 18% of DDT and lindane after 72 h from an initial level of 5 and 2 ppm, respectively (Arab, 2002). At the beginning of the fermentation step, the food is vulnerable to contamination since it does not have any acidity (Shalin, 1999).

### 4.3 Drying

Drying is the oldest method of preserving food and it has fundamental importance in most sectors of food processing. Drying can impact on food properties and the micro-structural changes. According to research, oven drying increased the dissipation of pesticide residues by 26% this could be attributed to photodegradation (Cabras et al., 1998). As compared with other methods, drying is quite simple. Drying of grapes lead to 64.2-71.9% losses of methamidophos possibly due to evaporation of the pesticide during the process (Athanasopoulos et al., 2005).

### 4.4 Freezing

Commercially frozen food is stored at -10°F to 20°F. Freezing halts bacterial growth, but freezing does not eliminate bacteria. If processed carefully, a frozen food product will maintain quality in color, texture, and flavor for a long shelf life (Garbutt, 1997). In a study it was found that when tomatoes contaminated at level of 1 ppm were frozen the reduction of residues were 5.28%, 7.02%, 5.74%, 28.5%, 26.6% and 26.2% after six days and 10.6%, 16.3%, 13.0%, 32.6%, 28.2% and 31.4% loss after 12 days with HCB, lindane, p,p- DDT,

dimethoate, profenofos and pirimiphos-methyl, respectively (Abou-Arab, 2002).

#### 4.5 Thermal processing

Thermal processing is a application of heat to food commodities is commonly done through ordinary cooking, pressure cooking, microwave cooking, frying, sterilization and canning (Kaushik et al., 2008).

#### 4.6 Nano technology

Nanotechnology has been described as the new industrial revolution and both developed and developing countries are investing in this technology. Nanotechnology techniques or tools are used during cultivation, production, processing, or packaging of the food. Application of nanotechnology include: smart packaging, on demand preservatives and interactive foods. They are also hopeful of enhancing the nutritional quality of food through selected additives and improvements to the way the body digests and absorbs food (Dunn, 2004). These technologies provide heat resistance property, developing active antimicrobial and antifungal surfaces, and sensing as well as signaling microbiological and biochemical changes (Joseph and Morrison, 2006).

#### 4.7 Molecular technique

Analysis of specific nucleic acids in food allows the determination of the presence or absence of certain constituents in complex products or the identification of specific characteristics of single food components (Vollenhoffer, 1999). DNA-based detection methods for genetically modified food and food-borne pathogens have been developed recently (Koinetzny and Greiner, 2003).

PCR-based methods are also increasingly used for the detection of ingredients and contaminants in food products. DNA is isolated directly from the food products followed by direct identification of the ingredient or contaminant by a species-specific PCR (Stephen and Vieth, 2004). DNA-based methods offer many advantages over protein-based methodologies (Stave, 2002).

#### 4.8 Radiation processing

Radiation processing method offers a very effective alternative to food security and food safety (Sharma, 2010). Gamma rays, X-rays source are recommended in codex general (IAEA, 2002). A draft notification approving irradiation on food-class basis has been published by the Indian Ministry of Health under PFA Act Rules in 2007. Radiation processing can be used for storage of bulk and consumer packed commodities for retail distribution and stocking (Kume et al., 2009).

Treatment of Food Processing Wastes

Bioconversion of food processing wastes is receiving increased attention with the realization that waste component represent an available and utilizable

resource for conversion to useful products. Liquid wastes are characterized as dilute streams containing sugars, starches, proteins, and fats. Solid wastes are generally cellulosic, but may contain other biopolymers. The greatest potential for economic bioconversion is represented by processes to convert cellulose to glucose, glucose to alcohol and protein, starch to invert sugar, and dilute waste streams to methane by anaerobic digestion. Microorganisms and individual enzymes can be employed to carry out the conversions efficiently and under gentle conditions (Carroad and Wilke, 1976).

## 5 CONCLUSION

In the agro processing various method used like baking, fermentation, drying, and other preservative method like freezing, thermal processing etc but it may effect economical aspects, for the removing contamination biosorption technique used that can be remove heavy metal from aqueous solution and against the pest we use pesticide, herbicide but it can remaining in the processing technique that is harmful to us for this we can use probiotic substance which will active only specific condition, which is present only in specific microorganism ex. BT cotton. The pesticide residue in food commodities can be influenced by storage, handling, and processing.

For the production of desired product in required amount enzyme play important role these enzyme can be produced with the help of recombinant dna technology (Olempska-Beer et al., 2006). Nano technology also play important role for the economy of desired product antimicrobial coating and dirt repellent improvement in ensuring the safety and security of packaged food. Nanocid is a nanotechnology product that is a powerful antibacterial product which has potential application in the food industry (Joseph and Morrison, 2006).

## 6 FUTURE SCOPE

The agro industry is regarded as an extended arm of agriculture. The development of the agro industry can help stabilize and make agriculture more lucrative and create employment opportunities both at the production and marketing stages. The broad-based development of the agro-products industry will improve both the social and physical infrastructure of India. Since it would cause diversification and commercialization of agriculture, it will thus enhance the incomes of farmers and create food surpluses and with the help of advance technique of food processing enhance product shelf life.

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