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## Food Processing Industry of Kerala -An Empherical Analysis

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### INTRODUCTION

*The history of food processing goes back to the origin of human life. In the pre-historic period, the ability to preserve food was a major factor for survival.<sup>1</sup> Food gathering and meat processing was simple during hunting. By the starting of agriculture, food processing become complex. Tools and techniques were used to cut the crop husks and shells. Meat eating was invented by the tribes during the Paleolithic age<sup>2</sup>. About 20,000 years ago, after the invention of agriculture, the use of grinding tray as a crop processing tool spread widely<sup>3</sup>.*

Mortar and pestles were invented by fixe and they existed long before fishing, hunting and gathering period<sup>4</sup>. Invention of fire laid the foundation for food preservation. During prehistoric period food processing include various type of a cooking such as over fire, smoking, steaming, fermenting sun-drying and preserving with salt were practiced. Chinese had showed how to preserve fish on large scale by using salt<sup>5</sup>. Food preserved using this way were a common part of warrior and sailor diet. This crude processing technique remained until the industrial revolution.

Man's cooking was limited to searing and roasting with fire, for he had no containers or pot to hold his food. Ancestors used flat rocks, leaves and seashells to cook the food. The first pottery vessels known to us were made by the Japanese in the thirteenth millennium. The uses of thermal energy from the sun to evaporate water from the product and establish a stable and safe dry product were used by ancient people. Heated air used for drying the food was discovered in France around 1790s<sup>6</sup>.

Food science was actually developed from accidental discoveries and trial and error methods. Napoleon Bonaparte offered a prize to scientists to develop preserved food for the armies of France, resulted in the first canning method by Nicholas Appert in 1795<sup>7</sup>. Shortly after Appert's work, a number of scientists went through several processing techniques which resulted in many new modern techniques. Frederick Accum made the first effort to ensure safe and honest food through analytical chemistry<sup>8</sup>. History reports that Egyptians, Greeks and Romans were able to preserve a variety of foods in vinegar, brine, honey or pitch.

The history of chilled or refrigerated foods dates back to a very old time. A patent for the use of commercial refrigeration process for fish was registered in 1842<sup>9</sup>. The Parisian confectioner discovered how to prevent decay by boiling foods in sealed glass bottles<sup>10</sup>. British quickly adopted this technique and began stocking canned fish and meat followed by fruits and vegetables. At first it did not get much encouragement because of high cost and lack of efficient can openers<sup>11</sup>.

In 1860 Louis Pasteur, a chemist working with beer and wine developed the process of pasteurization. Between 1895 to 1938, there was a significant change in food science and

nutrition. Earlier in 3000 BC Egyptian outdoor bakeries provided bread for the slaves laboring on the great temples and pyramids. Grain was collected as tax and stored on the pharaoh's mills. Preparation of bread was considered as the first large scale baking operation in history.<sup>12</sup> By 600 BC in Athens, the first well organized commercial ventures appeared. The people of Athens started the production of olive oil, wine, salted fish, bread roll and ham sausage.<sup>13</sup> M. Gabins Apicius a Roman who lived about the time of Christ, gave the world its first known cook book. Even today European chef uses his recipes for preparation and processing. The need of travelers and city dwellers prompted the Roman to establish food processing on commercial scale. The first real impetus toward large scale processing came from Roman empire.<sup>14</sup> The trade men of Rome formed guilds to organize production and transportation of foods to major cities. The Roman government regulated the guilds and held light control over food production and distribution. Government introduced grading for bread.<sup>15</sup>

### **PRIMITIVE METHOD OF FOOD PROCESSING**

The extension of food supply into season when plant food are not grown or animals cannot be maintained, represent the most important contribution of food processing. Food processing help in the development of human society and the emergence of civilization i.e., it freed the human from continuous search for food.<sup>16</sup> Hunter gathers in the Paleolithic period ate roots, berries and shrubs, and trapped fish. In the Mesolithic and Neolithic periods, human made a gradual transition from food gathering to food production. Agricultural inventions opened the windows of large scale food production, enabling farmers to grow surplus of food to trade as commodity.<sup>17</sup> Humans are faced with the problem of food preservation for centuries. Ancient Egyptians and Romans were aware of the preservative effects of salting, drying and smoking. At that time food was buried along the seashore, where the salt of seawater cures or preserves the food. Native Americans placed strips of flesh over a camp fire where the meat was preserved by drying and smoking. Dried salt cod was a common food for colonial Americans. Perishable foods were stored in caves or springs in order to maintain low temperature.<sup>18</sup> The common traditional methods of food preservation are preservation of food by drying, by preservatives and by freezing.

#### **Traditional methods of food preservation**

##### **a) By drying**

This method perhaps was one of the first known. In primitive time food was exposed to direct rays of the sun for the purpose of drying it. Meat, fruits, nuts etc. dried and stored up.<sup>19</sup> Early sea expeditions survived on dried fruits, grains and meat. The first dehydrator used to dry fruits and vegetables by artificial means was introduced in France during 1795. They used to dry thinly sliced fruits and vegetables.<sup>20</sup>

##### **b) By Preservatives**

The most commonly used preservatives are salt, sugar and certain spices. Vegetables and fruits soaked in brine could be preserved for use during winter season. Salting became one main method of preserving food. In ancient Persia, the preserving power of the natural sugar on fruits

was known, but not understood. Marmalade made by cooking fruits until most of the liquid had boiled away was a favorite spread for bread.<sup>21</sup>

### c) By freezing

Natural freezing have been known to men for a long time. Dead fish found in the frozen ice were preserved. Men take the advantage of nature's ice box and caves for preserving the food. A patent for the use of commercial refrigeration processing for fish was registered in 1842.<sup>22</sup> The use of refrigeration to reduce temperature of food below the point of ice crystallization was developed by Clarence Birdseye in 1920.<sup>23</sup>

### History of canning industry in the country and state

Appert was regarded as the father of an art which has proved a boon to all mankind. In 1807 Peter Durank obtained patent in England for preserving meat, fruit vegetables in tin can. The canning industries mainly depend on 'can' as it took its name. The canning industry was established in U.S.A by Ezra Dugget in 1819<sup>24</sup>.

The first cannery in India was started in the first year of 20<sup>th</sup> century by sircar in Muzarpur, the Bengal preserving company. In 1910 Sreekissen Dutt and company started their cannery section in Calcutta. During the First World War, two firms that came up in Calcutta Bengal canning and condiment work and the Pioneer Condiment Co Ltd used modern canning machinery but closed down later<sup>25</sup>. In the 1930 a few Indians who had studied in the united State started making sweet squashes and Sharbats which will lead to setting up of few manufacturing units especially in Punjab.<sup>26</sup> There is sudden demand occurred for the production of food during the Second World War. In 1945 105.6 lakh tonnes of fruits and 45.9 lakh tonnes of vegetables were produced in India. 55% of mango, 38% of banana, 34% of onion, 8% of radish, 5% of cauliflower and tomato and other type of fruits and vegetable include in this. Unfortunately only small amount of food is preserved. The war not only raised the demand of preserved food in tins and bottles, but also dehydrate food its potatoes and onions. During that, time 134 factories produced food items supplied to defense force.<sup>27</sup> Food and cooking is the first recipe book in India.<sup>28</sup>

During Vedic times itself, people in Kerala used salt, jaggery, tamarind, honey etc used for preserving the food. In the medical treaties of Susrutha and Charaka the use of these spices and condiments were widely preferred. There is a unique ways of preserving fruits and vegetables in Kerala. Vegetable are preserved in the form of pickles. While fruits are preserved by making 'thira' i.e., on a freshly made mats these fruits used to be pressed into making a kind of paste and then it is put in the sun for drying. Successive layers were added upon the previous ones thus making a series of layers. This is dried well and preserved in big bharanies in air light condition.<sup>29</sup> Pickle making is little tricking because the quantity ingredients in pickle making cannot be accurately stated. Taste of pickle mainly depend upon experience pickling is simply nothing more than preserving fruits, vegetables, meat or fish in salt alone with or without oil or spices. There is a wide amazing range of pickles available in Kerala because of variety of raw material availability. There is also fruit pickles which are primarily vinegar based. Vinegar is made from toddy. It is said that the pickles have curative and medicinal effect too. Traditionally in Kerala, weighing or measuring pickles ingredients was not followed. They relied solely upon what they learned by trial and error method.<sup>30</sup>

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## Food Processing Industry in India

Food processing is defined as that branch of manufacturing that starts with raw animal, vegetable, or marine materials and transform them into intermediate, food stuff or edible products through an application of labour, machinery, energy and scientific knowledge.<sup>31</sup>

Food processing in India was started as a family profession. Despite the lack of training, they prepared quality foods like pickles, papads, fried, roasted and puffed cereals for local consumptions. Organized food industry was started for the British officers and settlers. During the Second World War, the number of this unit was multiplied to satisfy the needs of the troops. The products produced at that times were bread, biscuits, jams, squashes, syrups, and fruit. It is not possible to acquire adequate growth in agro-horticulture sector without establishing well organized facilities was identified only during eighties.<sup>32</sup> Processed foods provide good opportunity for export and to generate employment in rural area for restricting population migration to cities. Government encourages growth of agro-horticultural sector. As a result a separate Ministry of food processing had come in to being in 1998.<sup>33</sup>

The Ministry of food processing industries is the main central agency responsible for developing such a vibrant food processing sector, the Ministry covers the products of

- a) Fruits and vegetables
- b) Meat and meat products
- c) Dairy products
- d) Poultry
- e) Marine products
- f) Bakery and confectionery
- g) Ready to eat food
- h) Drinks and beverages
- i) Food grain milling

## Fruits and vegetable processing units in Kerala

Fruits and vegetables are also grown in the fertile soil of Kerala. Various fruits that are grown in the soil of Kerala are mango, jack fruit, pineapple, papaya, and plantain. Area under cultivation for fruits by the 14 districts in Kerala is shown in table 1

**Table 1**

**District wise area of fruits cultivation 2011-2012 (Area in hectares)**

Sl.No.	Districts	Jack	Mango	Banana	Plantain	Pineapple	Papaya	Other fresh fruits
1.	Trivandrum	5994	4389	1794	5343	199	1457	540
2.	Kollam	7520	5821	1694	4235	180	1437	437
3.	Pathanamthitta	2512	1580	1966	1576	197	642	955
4.	Alappuzha	2388	3553	455	1910	80	1041	621
5.	Kottayam	3946	2606	2521	2642	1134	1129	556
6.	Idukki	13866	5298	2901	3492	858	924	488
7.	Ernakulam	4373	44444	5669	4083	5563	1201	176
8.	Thrissur	5331	7672	2240	4898	58	1271	1364
9.	Palakkad	6972	9318	16458	8843	78	741	1260
10.	Malappuram	8405	7848	6866	2845	155	1802	944
11.	Kozhikode	10456	8574	1533	2940	197	1839	552
12.	Wayanad	7928	4378	12359	1181	25	373	340
13.	Kannur	8267	7647	2104	2809	125	1905	984
14.	Kasargod	2375	2131	509	1950	83	702	604
15.	Total	90333	75559	59069	48747	8932	16464	10396

Source: Department of economics and statistics

Table 1 exhibit that jack fruit is cultivated in large areas when compared to other fruits. Pineapple are cultivated in smaller area i.e., 8932 hectares. Idukki district cultivated Jack fruit more and Wayanad district have low cultivated area for pine apple. In Alappuzha and Ernakulam districts, mango cultivation occupies larger area of 3553 and 44444 hectares respectively. But in Kozhikode district, jack fruit occupies an area of cultivation 10456 hectares.

Kerala's soil is best suited for the growth of vegetables. Some vegetables that grow in Kerala are drumstick, cucumber, bitter gourd, snake gourd, green chilies, brinjal and amaranthus. Area wise cultivation of vegetables in the 14 districts of Kerala is shown in the following table 2

**Table 2**  
**District wise area of vegetables cultivation 2011-12(Area in hectares)**

Sl. No	Districts	Vegetables											
		Drumstick	Amaranthus	Bitter gourd	Snake gourd	Ladies finger	Brinjal	Green chilies	Little gourd	Ash gourd	Pumpkin	Cucumber	Other vegetables
1	Trivandrum	1880	155	61	79	46	54	102	23	2	12	88	156
2	Kollam	1782	137	86	32	47	67	181	102	39	46	13	203
3	Pathanamthitta	495	87	78	66	45	60	44	86	43	42	29	296
4	Alappuzha	513	188	144	141	08	90	88	112	28	36	68	344
5	Kottayam	599	47	215	125	48	77	28	249	38	40	32	464
6	Idukki	581	58	215	18	21	46	54	49	26	49	7	3868
7	Ernakulam	610	110	530	116	52	44	14	80	64	60	110	1055
8	Thrissur	1748	111	232	742	74	56	162	114	59	69	94	645
9	Palakkad	1872	147	148	217	604	211	345	66	230	263	108	2775
10	Malappuram	2098	121	561	63	68	43	100	41	135	248	220	934
11	Kozhikode	1512	122	101	19	22	9	42	14	42	50	85	158
12	Wayanad	382	54	53	7	8	18	65	14	74	157	22	387
13	Kannur	1794	160	368	7	8	18	65	53	66	59	222	280
14	Kasargod	586	61	84	23	55	36	58	70	20	23	121	155
15	Total	16452	1559	2695	959	1182	832	1322	1073	866	1154	1291.	11720

Source: Department of economics and statistics

Table 2 shows the data relating to the district wise cultivation of vegetables in Kerala. Among the vegetables, drumstick occupies an area of cultivation larger than other vegetables. Brinjal cultivated in an area of 832 hectares which is very low when compared to other vegetables. In Alappuzha and Kozhikode districts, an area of 513 and 1512 hectares are under drumstick cultivation. In Ernakulam district other vegetables are cultivated in an area of 1055 hectares.

Fruits and vegetables cultivated in Kerala are used either in fresh forms or in processed forms. Processing of fresh fruits and vegetables are done in processing units. Fruit and vegetable processing units are spread over the 14 districts of Kerala. The table 3 gives an insight into it.

**Table 3**

**District wise distribution of fruits and vegetable units in Kerala**

Districts	Number of units	Percentage
Thiruvananthapuram	33	8.20
Kollam	12	2.98
Alappuzha	19	4.72
Pathanamthitta	16	3.98
Kottayam	39	9.70
Idukki	26	6.46
Ernakulam	62	15.42
Thrissur	50	12.43
Palakkad	23	5.72
Malappuram	23	5.72
Kozhikode	57	14.17
Wayanad	2	.497
Kannur	24	5.97
Kasargod	16	3.98
Total	402	100

Source: Food safety and standard authority of India

Table 3, shows the district wise distribution of fruits and vegetable units in Kerala. A total of 402 processing units are working in Kerala. A large number of processing units are located in Ernakulam district i.e., 62. Only 2 processing units are situated in Wayanad district. Kozhikode

district comes to the second position with 57 units and with 50 units in Thrissur district in third position

Fruit and vegetable processing industries are classified into large scale, small scale, cottage sector and home scale depending upon the capacity of production. Kerala comprises of all the four categories. Data relating to the distribution of various categories of fruit and vegetable processing units in Kerala is shown in table 4

**Table 4**  
**Distribution of fruits and vegetables units in Kerala based on size**

Districts	Cottage Sector	House Sector	Small scale Sector A	Small scale Sector B	Large Scale
Thiruvananthapuram	13	13	2	5	.....
Kollam	2	8	1	.....	1
Alappuzha	6	5	1	5	2
Pathanamthitta	5	6	3	2	.....
Kottayam	17	9	8	4	1
Idukki	7	8	3	7	1
Ernakulam	19	15	9	11	8
Thrissur	14	25	4	.....	2
Palakkad	5	12	4	.....	2
Malappuram	7	14	1	.....	1
Kozhikode	20	28	3	3	3
Wayanad	2	.....	.....	.....	.....
Kannur	5	15	2	2	.....
Kasargod	4	10	.....	1	1
Total	126	168	42	43	23

Source: Food safety and standard authority of India



According to the table 4, large scale units are more in Ernakulam district with 8 units. There are no large scale units in the Thiruvananthapuram, Pathanamthitta, and Wayanad and Kannur districts. Wayanad district have units only in cottage sector. Kollam, Thrissur and Palakkad districts have no units in small scale sector B. All districts have units in cottage sector.

Fruit and vegetable processing units in Kerala mainly produce pickles, juice, dehydrated fruits and vegetables, chutney, jam, fruit pulp and squashes. Data relating to the various fruit and vegetable products that are produced in the state are shown in the table 5.

**Table 5**  
**Production of various fruit and vegetable products in Kerala**

Name of the Products	Quantity (2007)	Quantity (2008)	% increase or decrease over previous year
Canned fruits	122873	176456	43.60
Canned vegetables	26297	52633	100.14
Jam	1180232	1163421	-1.422
Fruit juice	199739	136505	-32.65
Fruit pulp	433495	737988	70.24
Squashes	860062	693095	-19.41
Fruit syrup	92198	65025	-29.47
Fruit juice concentrates	437129	22264	-94.90
Pickles	3571634	3514084	-1.6
Candied group	78931	98003	24.16
Dehydrated fruits	92255	53146	-42.39
Dehydrated vegetables	180338	355438	97.04
Vinegar	524531	418927	20.13
Freeze dried product	7794	10843	39.11
Unspecified	745113	1354860	81.83

Source: Food safety and standard authority of India

As per the table 5, there is an increase in various products produced in the 2008 compared to previous year. Canned fruits, canned vegetables, fruit pulp, candied group, dehydrated vegetables, vinegar, freeze dried products, and unspecified are the products that show increase. Canned vegetables show an increase of 100.14 per cent. Fruit juice concentrates show drastic decrease of 94.90 per cent.

Fruit and vegetable processing industry produce products not only for domestic use but also for export. Various fruit and vegetable products that are exported from Kerala are shown in the following table 6.

**Table 6**  
**Export of fruit and vegetable products from Kerala in 2008**

Name of the products	Quantity (M.T.)	Value (Lakhs)
Canned fruits	588	24487
Canned vegetables	3891	374870
Jam	52020	3219003
Fruit juice concentrates	47120	3684748
Pickle	1039908	1.01E+08
Candied	6749	777868
Dehydrated fruit products	2235	167120
Dehydrated vegetable Products	210379	56222468
Frozen vegetables	6853	544114
Vinegar	1020	19812
Non.fruit syrup	35013	3462750
Fruit dried	8810	6897704
Unspecified	324059	36639260

Source: Food safety and standard authority of India

As per the table 6, Kerala exports fruit and vegetable products. Kerala export 1039908 M.T. of pickles followed by dehydrated vegetable products. 588 M.T. of canned fruit is exported from Kerala. Kerala export 324059 M.T. of unspecified products.

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## CONCLUSION

Processing of fruits and vegetables in India holds tremendous potential to grow, considering the still nascent levels of processing at present. Though India's horticultural production base is reasonably strong, wastage of horti produce is sizeable. Processing and value addition is the most effective solution to reduce the wastage. Considering the wide-ranging and large raw material base that the country offers, along with a consumer base of over one billion people, the industry holds tremendous opportunities for large investments. The fruit and vegetable processing industry in India is highly decentralized. The prominent processed items are fruit pulps and juices, fruit based ready-to-serve beverages, canned fruits and vegetables, jams, squashes, pickles, chutneys and dehydrated vegetables. More recently, products like frozen pulps and vegetables, frozen dried fruits and vegetables, fruit juice concentrates have been taken up for manufacture by the industry.

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