A STUDY ON CASHEW MANUFACTURING PROCESS

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Abstract: *Cashew processing, using manual techniques, was started in India in the first half of the twentieth century. It was exported from there to the wealthy western markets, particularly the United States. In the 1960s, some of the producing countries in East Africa began to process nuts domestically rather than sending them to India for processing. This allowed them to benefit from the sale of both processed nuts and the extracted cashew nut shell liquid. It is interesting to note that cashew spread within these countries with the aid of elephants that consumed the cashew fruit along with it's nut. As the nut was too hard to digest, later, the undigested nut was expelled with the droppings and that resulted in the spurt of cashew plants.*

Keywords: *Cashew processing, Domestically, Cashew Fruit, cashew plant.*

1. INTRODUCTION:

Cashew is one of the most valuable and most nutritious, processed kernel in the global commodity markets and has the potential to generate employment and revenue at national and international level.1 It is a kidney shaped nut, product of Brazil, introduced by the Portuguese to Mozambique and India during the sixteenth century. The cashew tree earlier served only as a means of controlling coastal erosion before the fifteenth century. In fact, the people of this century did not know the value and importance of the cashew nut and cashew nut shell liquid. But they consumed the cashew apple and threw the cashew nuts away. The value, importance and usefulness of cashew nut was recognized during the last part of the sixteenth century, that too, only after it reached India and Mozambique from Brazil.

The cashew tree, native to Brazil, was introduced to Mozambique and then India in the sixteenth century by the Portuguese, as a means of controlling coastal erosion. It was spread within these countries with the aid of elephants that ate the bright cashew fruit along with the attached nut. The nut was too hard to digest and was later expelled with the droppings. It was not until the nineteenth century that plantations were developed and the tree then spread to a number of other countries in Africa, Asia and Latin America.

Through out these countries. Subsequently, the tree spread to a number of countries in Africa, Asia, Latin America and to the West Indies.3 The Portugese traders thus introduced the cashew tree into India and Africa to prevent soil erosion. Cashew is now widely cultivated for its kernel, fruit, cashew nut shell liquid and other products. However, it is mostly found in the coastal regions of South Africa, Madagascar, Tanzania, and in South Asia, from Sri Lanka to the Philippines. 4 The Cashew tree though in existence for a long time was indentified as a useful plant only in the early twentieth century. The earlier reports about cashew are from Brazil, French, Portuguese and Dutch observers. Thevat (1558) a French naturalist who visited Brazil during the period of French settlement, first described the plant being located in the north east.5 He saw some local people harvesting the cashew fruits and squeezing juice from them into a jar. Ganda Vo (1575)6 was the first Portuguese writer who described the cashew apple as a refreshing fruit during hot seasons and the cashew kernel as tasting better than almonds. The Tupi natives of Brazil called the cashew 'acaju' which became 'caju' in Portuguese. The Maconde tribe in Mozambique referred to it as the Devils nut.

The cashew tree and its products are known by different names in different countries and regions of the world.

Portuguese **:** Caju, Cajueiro, Pe de caju, Castanha de caju, Maca de caju.
French **:** Cajou, Acajou, Ancardier, Nox de cajou, Pomme de cajou, Amande de cajou
English **:** Cashew, Cashew tree, Cashew tree, Cashew nut, Cashew apple Cashew Kernel
Spanish **:** Maranon, Nuez de maranon

Tamil : Muntri maram, Muntri paruppu, Andi
Malayalayam : Parangiandi
Hindi : Cadju
Sinhalese : Cadju
Italian : Ana cardio, Noce of anacardio, Mandorlad anacardio
Dutch : Acajou, Kashu
German : Acajuban, Kashunuss
Swatili : Mkanju, Korosho
Somali : Bibbo, Bibs
Indonesia : Jambu mente, Jambu mete

Thus, it is evident that the value, importance and popularity of cashew tree and cashew kernel, cashewnut shell liquid are now known throughout the world. Therefore, cashew attracts not only producers and consumers world wide but also provides better scope for research. Cashew (Anacardium occidentale L.), often referred to as „wonder nut", is one of the most valuable processed nuts traded on the global commodity markets and is also an important cash crop. It has the potential to provide source of livelihood for the cashew growers, empower rural women in the processing sector, create employment opportunities and generate foreign exchange through exports. The term "Cashew" has originated from the Brazilian name "Acajaiba" and the Tupi name "Acaju" which the Portuguese converted into "Caju" and is commonly known as "Kaju" in India. It is known as "Paragi Andi" in Kerala meaning foreign nut, "Lanka Beeja" in Orissa assuming its introduction from Sri Lanka and "Mundri" indicating the shape of the nut in Tamil Nadu. Cashew is cultivated mainly in the Asian, African and Latin American zones.

2. OPERATIONAL DEFINITIONS OF CONCEPTS:

CASHEW: It is one of the most important nutritious food items introduced to India by Portuguese about four hundred years ago. It is a kidney shaped nut. It is the only raw material for the cashew industry obtained from the cashew plant. Its kernel contains fat, protein, carbohydrates, minerals and vitamins. As it is a delicious food, it attracts, the people of all countries. So it occupies an important place in almost all functions and celebrations and also is used to please and honour the guests and very important persons. It is the source of employment income and foreign exchange.

3. SCOPE OF THE STUDY:

The present study is mainly concerned with Process of cashew industry. It analyses the efficiency of process in cashew Shelling, Peeling and Grading in the industries of Andrapradesh District. The study also examines the problems faced by the cashew Manufacturers. The study also aims to cover the cashew production, export, import and processing in India.

4. OBJECTIVES OF THE STUDY:

The specific objectives of the study are:

- To analyze the trend of cashew production, its processing method in India.
- To list out the profile of cashew industry and the socio-economic conditions of cashew processing.
- To examine the variables determining the efficiency of cashew Industry.
- To analyse the perceptions on the problems of cashew processing in the study area.

5. LIMITATIONS OF THE STUDY:

This study suffers from the following limitations.

- The Technolgy is an element & important factor in determining the efficiency of labourer but this study could not adequately deal with that.
- Technology efficiency varies from industry, to industry person to person and even from quality of cashew nuts. Hence, it is not easy to measure the efficiency of Skilled labourer in relation to their socioeconomic status.

6. THE IMPORTANCE OF CASHEW:

Cashew is held with great esteem in many customs and cultures. Its value can be estimated from a question that appeared on the household census in Mozambique that asked whether the house owned any cashew trees. Cashew is known by many names. In Mozambique, the Maconde tribe refer to it as the "Devil's Nut". It is offered at wedding ceremonies as a token of fertility and is considered by many to have aphrodisiac properties. The cashew tree and its products are known by the following names in other parts of the world.

7. REVIEW OF LITERATURE:

Balasubramaniam (1979)26 in his study entitled "Import Promotion of Cashew Nut into Japan" has examined the reasons for drastic fall in the exports of cashew kernel. He has found that poor cashew crops, reduction in the inflow of raw cashew nuts from East African countries, relatively high price of raw material and consumer resistance to the resultant higher price of cashew kernel are main reasons for falling of exports.

Balan Pillai (1986)32 in his study entitled "Economic Impact of Collective Bargaining on Cashew Industry in Kerala" has analysed the prospect of cashew industry. His study is on the economic impact of collective bargaining on cashew industry in Kerala. In this study, he has examined the extent to which collective bargaining of the laborers could be held responsible for the decline of the cashew industry in Kerala. He has found that both market forces and industrial relations forces as the relevant factors for the decline of the industry. It is observed from the study that collective bargaining is only a major step towards solving the economic issues of cashew workers.

Dayanandan (1991)38 in his study entitled "The Kerala State Cashew Development Corporation – An Evaluation Study" has made an evaluation on the performance of the Kerala State Cashew Development Corporation. The study points out that the financial position of the corporation remains poor on account of high operating cost, heavy borrowings and huge interest
burden. It is observed from this study that the corporation has failed to procure adequate quantity of raw nuts to ensure work round the year for its factories.

Emam Beevi A.J, (1976)25 in her study entitled "The Impact of Minimum Wage Legislation on Cashew Industry" has examined the impact of minimum wage act in Kerala. It is observed from the study that the initial effect of minimum wage law has resulted in an increase in wage rates in processing units which come under the factory act. She has found that the average daily earnings of workers increased as a result of the average fixation of minimum wage. But the annual average earning has decreased owing to the diversion of processing activities from Kerala to Tamil Nadu and resulted in reduction of the number of working days in Kerala.

Russel (1969)24 in his study entitled "Cashew nut Processing" has analyzed the different stages of processing involved in the extraction of kernel from the raw cashew nut. The study depicts the importance of drying before storing the raw nut. The study also states the merits in manual and mechanical methods of shelling. It stresses on the effective utilization of by products for increasing the income of the cashew processing industry.

Kannan (1983)28 in his study entitled "Cashew Development of India – Potentialities and Constraints" has analyzed major issues involved in the cultivation, distribution, processing and marketing of cashew and examined the prospects of development of cashew industry in India. The major finding of the study is that the general policy of promoting exports without adequate
appreciation of the industry with its linkage with the processing and the cultivation of crop in the agricultural sector. The study has revealed the high level of profitability in the industry and the low level of wage. He has also found that the workers in Kerala have experienced erosion of quantum of employment owing to the diversion of the processing activity to Tamil Nadu.

8. TRADITIONAL METHODS OF CASHEW PROCESSING:

GENERAL PROCESSING : Cashew processing methods have improved considerably over the years. Difficulties in shelling cashew nuts are due to the irregular shape of the nut, the tough leathery outer shell and the CNSL within the shell that must not be allowed to contaminate the kernel during its removal from the shell. An early method used to remove the CNSL in cashew producing countries was to burn the raw nuts for a short period in order to burn the shells and the CNSL without affecting the taste or appearance of the kernel. This was a delicate operation requiring an experienced processor to gauge the length of time required for burning. Kernels produced using this method are only suitable for either home consumption or for the local market.

CASHEW PROCESSING IN ASIA: India is the main cashew processing country in Asia. The highly skilled workforce and low labour costs in India allowed it to have a virtual monopoly on the manual processing of cashew for many years. Raw cashew nuts were traditionally shipped from Africa to India for processing, because of the reputation of the high quality of processing in India.Cashew production and processing provides employment to over 500 000 people in farms and factories. Over 95 percent of these workers are women from the poorer sectors of society. In Mozambique, cashew production and processing used to be the fourth most lucrative business, providing incomes for millions of peasant growers and over 10 000 processors.

TRADITIONAL PROCESSING IN INDIA : The traditional practice in the south Arcot region of India was to spread the nuts out on flat rocks in the sun, to allow them to dry until the shell became brittle. The kernel could then be removed from the shell by striking the nut with a wooden batten to split the shell along the natural line of cleavage. The cashew kernel was removed from the shell without becoming contaminated by the CNSL. Use of this method was made possible by the suitability of humidity and climate condition in that particular region of India. Shells are further processed to obtain the CNSL. An alternative method of removing the kernel from the shell is to subject the nuts to very low temperatures, thus causing the shell to become brittle. Following this, the nuts are mechanically cut along the natural line of cleavage and the kernels removed. The shells are then further treated to remove the CNSL. This method of kernel removal has been commercially adopted.

OPEN PAN ROASTING : Open pan roasting is used by traditional cashew processors in India. This roasting technique is very simple with minimal equipment requirements. It however requires skill and judgement in order to prevent the nuts from burning. The roasting pan is an open circular mild steel dish, measuring 600 to 675 mm (2 to 2.5 feet) in diameter, supported over an open fire. Between 1 and 1.5 kg of raw nuts are placed on to the heated pan at a time. The nuts are heated on the pan, with constant stirring, in order to prevent burning (Figure 6). As the nuts heat up, the CNSL is exuded onto the pan and eventually ignites, producing clouds of thick black smoke. After heating and burning for about two minutes (judged by experience) the pan is dowsed in water and the nuts are thrown off and allowed to cool, during which the shells become brittle and can be readily removed from the nut.

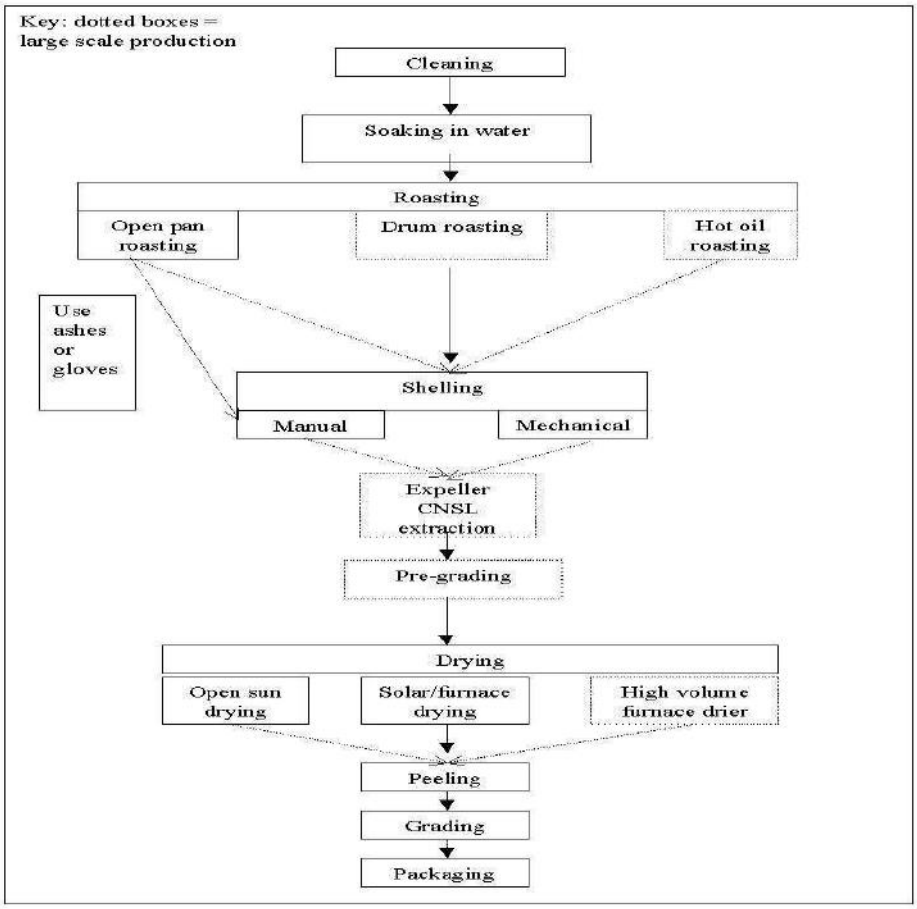

Fig.1 process

- **PRE-HEATING AND PEELING :** After extracting the kernel from the shell, the testa, which is a thin reddish coloured skin covering the kernel, must be removed. Removal of the testa is facilitated by drying through slight heating. Care must be taken not to overheat the kernels as they become scorched and discoloured. Traditionally the kernels are heated on either a metal plate or open pan over an open fire. The kernels are tossed over the heat to avoid roasting and burning. An alternative and preferable method is to use a mechanical drier maintained at 55 to 60°C. The kernels are loaded into the drier and dried for three to four hours until the nuts give the appropriate sound when rattled together. Although investment in a mechanical drier is costly, mechanical drying gives a higher quality cashew kernel. The testa is scraped off the kernel using a small blunt knife. Any burnt or discoloured spots are also scraped off the kernel with the knife. Care must be taken when peeling not to scratch the surface of the kernel as this can trigger off enzymatic browning and reduce the quality of the kernel.

- **GRADING :**The peeled kernels are divided into wholes, splits and broken pieces. They are stored in bulk in cardboard cartons or polythene bags. The dried kernels are further graded into sizes 180W, 240W and 320W according to the size of the nut. This process is carried out by experienced graders.

- **DRYING :** Kernels are dried to a final moisture content of five per cent, using either a mechanical drier or oven. It is important to ensure that the drying temperature is not too high as this would cause roasting and discoloration rather than just drying of the kernels. Trained processors examine the kernels for the correct level of dryness by observing the colour and texture and shaking a few nuts together to hear the correct sound.

- **GRADING : PACKAGING :** The type of packaging used is largely dependent on the target market. For the local market, kernels are packed in bulk and sealed in polythene bags. For the export market they are packed and flushed with nitrogen. Regardless of the target market, cashews must be packed in airtight containers so as to avoid the absorption of moisture from the air. They must be stored away from sunlight in order to prevent oxidative rancidity.

- **TRADITIONAL MANUAL SHELLING :** In the manual shelling process, the nuts are placed on a flat stone and cracked with a wooden mallet. The sheller requires a few basic pieces of equipment, namely cans for shelled kernels and shelled pieces, a shelling mallet, a striking point and a supply of wood ash to dust both the cashews and the fingers of the sheller. The working area should be kept clean to prevent the ash and spilled CNSL from contaminating the extracted kernels. This is quite easily achieved by organizing the work area and following an accepted routine.

  Although this is a labourious routine, efficiency can be improved if attention is paid to ergonomic details, such as the positioning of the pile of nuts in relation to the striking point. The nuts for shelling and the tin for receiving must be correctly positioned so as to avoid wasting effort in reaching from one to the other. The raw and cleaned nuts must also be separated in order to avoid contamination of the extracted kernels. If the sheller is right-handed, the pile of nuts for shelling should be placed on the left hand side. The nut is picked up in the left hand and struck with the mallet on the right hand. The kernel is removed and deposited in the receiving can in the centre or on the right hand side.

The shell pieces are brushed aside into a pile. The hands and striking point have to be regularly coated in wood ash to keep the kernels clean. Shelling is a technique that can be relatively easily learnt. Strength is not required for breakage of the shell. Correct positioning of the nut and the ability to hit the nut in the correct position, so as to allow its breakage is most important. If the nuts have been properly roasted and are correctly positioned on the striking platform, they will easily break down the natural line of cleavage when struck at the broad end.

The convex side of the nut should be placed in contact with the striking platform, with the plane of cleavage at right angles to the surface of the striking post. Occasionally, a nut will require more than one strike in order to open the shell, but this technique comes with practice. An average sheller can open one nut in about six seconds or ten nuts per minute. In an eight hour working day, this amounts to about 4 800 nuts or about 5 kg of kernels.

At an extraction rate of 24 percent, this quantity corresponds to about 21 kg of raw nuts per day or about 7 tonnes per year. Experienced shellers in India can produce around half as much again, with a quality of 90 percent

whole kernels. A good sheller will produce a high percentage of clean, unbroken kernels, whereas a poor sheller will produce a larger quantitiy of dirty broken kernels (FAO, 1969).

For optimum shelling efficiency, the raw roasted nuts should be delivered close to the sheller, such that he does not have to keep moving to fetch them. The nuts should be delivered in small manageable quantities, since large piles of unshelled nuts act as a psychological barrier to the sheller and lower the quality of shelling.

QUALITY CONTROL IN SHELLING : The success of a cashew processing operation is largely dependent on the proportion of whole kernels produced in the shelling operation. Quality control and inspection are therefore critical in ensuring that shellers produce kernels of the highest quality. The critical period for quality control in the shelling operation is the start and the end of the day, but in particular the latter when the sheller may be rushing to complete the day' s work.

SEVERAL POINTS MUST BE MONITORED: The discarded shells must be inspected for completeness of removal. An inspector should aim to inspect approximately one in ten discarded shells for kernels, wholes and pieces that are being discarded with the shell, partially shelled nuts and unshelled nuts.

The inspector should also inspect the extracted kernels and pieces for cleanliness and to make sure there are no pieces of shell included. At the end of the day the quantity of shelled kernels should be weighed to assess the productivity of each sheller. If shellers are paid on a piece-rate basis, then the individual amounts are weighed separately. The percentage extraction, which is the ratio of kernels to raw roasted nuts, is calculated. Shellers need to be made aware of the quality of their work. They should be rewarded for high standards and penalized for work that is below par.

At the end of the day the work place needs to be cleaned and tidied in preparation for next day's work. Processors may be required either by factory inspectors or health authorities to provide the shellers with gloves. Gloves are not, however, the most suitable form of protection against CNSL, in that they are cumbersome, become dirty and eventually perish from contact with CNSL. Wood ash is much more effective and has been successfully used for over half a century. The new processor may take a little while to get used to applying wood ash to his/her hands. Coconut oil is also used to protect the hands from CNSL. Shelled kernels have a moisture content of over 6 percent, which makes them susceptible to fungal attack. It is imperative that they be dried immediately after shelling.

MANUAL PEELING : Manual peeling is performed by gently rubbing with the fingers. Those parts still attached to the kernel are removed with the use of a bamboo knife. One person can peel about 10 to 12 kg of kernels per day. It is important that the kernels are not cut or damaged during the peeling process. The use of knives increases the likelihood of the kernels becoming damaged, but it is also essential that all of the testa be removed. Gentle scraping of the testa with a blunt knife is the most effective way of removing it. Peeled kernels can be separated into different grades with the use of a peeler. At the most basic level, the kernels are separated into white wholes, scorched wholes, white pieces, scorched pieces, browns and refuse. However, the more experienced graders are able to separate the kernel into a larger number of categories. It is preferable that grading is carried out at the time of peeling as this cuts down on handling of the brittle kernels. There is, however, the opportunity for further grading subsequent to peeling.

9. CONCLUSION:

The cashew nut production in Indian states has been gradually increasing from 1990-91 to2009-10. But sometimes a negative trend and rapid declining have also been noticed over the study period because of poor crop husbandry and rampant disease spread to endamic level which causes completely collapse the production process. Problems due to major pests of cashew and the supply of quality planting material require attentions of research and development departments. Massive area expansion programme and rejuvenation of old cashew orchards of seedling origin, coupled with supply of quality planting material may have the potential to alter the cashew production, processing and exim scenariof not only these four states but also the whole country. The policy initiatives towards promotion of cashew growers‟ cooperatives (for procurement of raw nuts, supply of inputs, credit and infrastructure, small scale processing, value addition and marketing), and cashew apple processing will definitely widen the perspective of cashew growers.

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