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**Title of The Mini Project : “ A STUDY ON CASHEW NUT  
PROCESSING”**

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## **ACADEMIC YEAR 2023-2024**

### **DECLARATION**

We hereby declared that this project work entitled “ STUDY ON THE CASHEW NUT PROCESSING” Has been prepared by us under the guidance of Mr. Deepak Kumar ,Assistant Professor and HOD of Management Administration, Sri Sharada College Basrur. We also hereby decide that this project work has not been submitted by us fully or partially for the award of any degree, diploma, title or recognition earlier.

Date:

Students:

Signature of the

Ramya

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## INTRODUCTION

India is among the largest cashew-producing countries in the world. The cashew industry has large economic significance as it employs more than 10 lakh people on farms and factories in rural areas. The cultivation of cashews in India covers a total of 0.7 million hectares of land, and the country produces over 0.8 million tonnes (MT) annually. Between 2019-20 and 2021-22, India's cashew nut production grew from 0.70 million tonnes (MT) to 0.77 million tonnes (MT). In India, cashew cultivation is spread along the coastal regions of the peninsula. Cashew is mainly grown in states like Maharashtra, Kerala, Karnataka, Tamil Nadu, Andhra Pradesh, Goa, Orissa, West Bengal, and some parts of the North-Eastern region. According to data published by the National Horticulture Board (NHB), Maharashtra stands first in annual cashew nut production during 2021-22 at 0.20 million tonnes (MT), growing from 0.19 million tonnes cashew nut produced in 2020-21.

Besides the vast scale of cashew production, India is also known for pioneering cashew processing and exporting cashew kernels across the globe. The cashew processing industry was earlier concentrated in Kollam (Kerala), Mangalore (Karnataka), Goa, and Vettapalam (Andhra Pradesh), but now it is spread across many states of India. Over the years, India has emerged as the global processing hub for the cashew industry. Cashew (*Anacardium occidentale* L.) belongs to the family Anacardiaceae and is a native of Brazil. The family comprises of about 60 genera and 400 species of trees and shrubs with resinous bark, and grows most abundantly in the tropics in both eastern and western hemisphere (Ohler, 1979). Several other important fruits and nuts such as mango (*Mangifera indica* L.), the Pistachio nut (*Pistacia vera* L.) and various species of Spondias such as Otaheite apple (*S. cytherea*), Hog-Plum (*S. mombin*) and Spanish





plum or red mombin (*S. purpurea* L.) belong to this family. According to Baily (1949), the genus *Anacardium* contains eight tropical American species. Parente (1972) names 10 species but Peixoto (1960) names twenty different species several of which had edible peduncles such as *A. nanum*, *St. Halaire*, a very early bearing small shrub, *A. subterraneum* Liais, a small shrub with its trunk almost completely underground containing water reserves; *A. microcarpum* Ducke, a small tree from sandy savannas, *A. spruceanum* Benth. a large tree and the largest species of the genus *A. giganteum* Hancock which grows in Amazon forest. However, as per the latest working list of all plant species, the *Anacardium* genus comprises of 20 species (Anonymous, 2010). The cultivated species *A. occidentale* L. is andromonoecious, with male and hermaphrodite flowers in the same inflorescence and the phenomenon is almost similar in all the species of the genus *Anacardium* (Damodaran, 1977). Within the species *A. occidentale* also, there is a wide variation in colour, size and shape of the apple, as well as in size and shape of the nuts. The time of flushing, flowering varies among different types. There are also differences in leaf size and leaf shape and numerous other characters. Origin and distribution: Brazil is the original home of cashew. The earliest reports of cashew are coming from French, Portuguese and Dutch observers (Johnson, 1973). The presence of cashew in other continents is to be attributed to man's intervention. The Portuguese discovered cashew in Brazil and spread first to Mozambique (Africa) and later into India (De Castro, 1994). Cashew was introduced to India by Portuguese during 16th century. Molecular studies have shown the possibility of its introduction repeatedly over a period of time but at a single location i.e. west coast (Archak, et al, 2009). Presently, the cashew plants in wild state as well as in well managed orchards are seen in Maharashtra, Goa, Karnataka and Kerala along the west coast, Tamil Nadu, Andhra Pradesh, Orissa and West Bengal on the east coast. To a limited extent, the crop is also seen growing in Chhattisgarh, Gujarat, Assam, Arunachal Pradesh, Meghalaya, Tripura, Manipur, Nagaland and Andaman and Nicobar Islands (Singh, 1998). After the establishment of National Research Centre for Cashew (NRCC) at Puttur, Karnataka in 1986 (upgraded to Directorate of Cashew Research in 2009), the germplasm collection through vegetatively propagated material started and since then, a coordinated approach was brought in the cashew germplasm collection by organizing joint survey teams consisting of scientists of NRCC and the centers of All India Coordinated Research Project on Cashew (AICRP on Cashew) of the respective States (Bhaskara Rao and Swamy, 2000).

The germplasm survey and collection were carried out in cashew growing states namely, Karnataka, Kerala, Maharashtra, Goa, Tamil Nadu, Andhra Pradesh, Jharkhand, Orissa and West Bengal. The non-traditional areas such as Garo Hills (Meghalaya), Bastar (Chhattisgarh), Gujarat, Dadra & Nagar Haveli and Andaman & Nicobar Islands were also surveyed for germplasm collection. So far, 542 accessions have been collected and conserved in the National Cashew Field Gene Bank (NCFGB) at the Directorate. Similarly, Regional Cashew Gene Banks (RCGBs) have been established at AICRP Centers which are



maintaining a total of 1726 accessions. Efforts of conservation and utilization at the ICAR-Directorate of Cashew Research, Puttur, Karnataka For systematic characterisation of cashew germplasm, the collected scion material of the accession is grafted onto a suitable root stock and each grafted accession is then grown in the field gene bank. Recommended agronomic practices are adopted and observations are recorded on 3 selected plants in each accession after 10th year of planting and after obtaining 6 annual harvests for 68 characters following “Cashew Descriptors” (IBPGR, 1986).

So far 506 clonal accessions out of 542 accessions have been evaluated and 478 are conserved in a conservation block by planting 4 plants per accessions at a closer spacing of 4 m x 4m. The information on first set of 56 accessions planted in 1986 has published in the “Catalogue of Minimum Descriptors of Cashew Germplasm Accessions-I”, 1997. The second set of 97 accessions planted in 1987 and 1988 have been documented in the “Catalogue of Minimum Descriptors of Cashew Germplasm 7 Accessions-II”, 1998. The third set of 102 accessions planted in 1989 and 1990 have been included in the “Catalogue of Minimum Descriptors of Cashew Germplasm Accessions-III, 2000. These are the first efforts made in characterisation of clonal accessions of cashew in the world where 255 accessions have been characterised and catalogued (Swamy et. al 1997, 1999 and 2000). Recently, fourth catalogue containing information on 108 accessions planted during 1991-97 and fifth catalogue containing information on 115 accessions planted during 1998-2003 have been published (Nayak et al, 2014; Nayak et al, 2015). The germplasm accessions which are unique and have potential (verified / verifiable) attributes of scientific/commercial value are registered in NBPGR, New Delhi Development of cashew germplasm database management system A robust Decision Support System (DSS) has been developed recently for cashew with 478 accessions and 68 characters to manage and better utilize the germplasm resources. In the module, it is possible to select accessions based on multiple character combinations with information such as frequency distribution, images and pie diagrams. This is expected to help all the stakeholders involved in cashew research, production and processing for selection and subsequent utilization of suitable germplasm accessions. The module can be accessed a Genetic Architecture of Cashew Germplasm The variability and genetic architecture was assessed deploying 13 important quantitative



characters of 478 cashew germplasm accessions evaluated and conserved in National Cashew Field Gene Bank, Directorate of Cashew Research, Puttur (Mohana et al, 2017). Considerable variability was observed for all characters (Table 1) and the highest CV was observed for sex ratio followed by cumulative yield per plant and apple weight. The lowest CV was observed for shelling percentage followed by shell thickness. Frequency distribution patterns showed highly positively skewed distribution for characters such as nut weight, sex ratio, apple weight and apple to nut ratio. Genetically, it is evident that decreasing alleles are in excess and dominant for these characters. Whereas tree spread, kernel weight and cumulative yield per plant showed moderately positively skewed distribution indicating decreasing alleles are in slight excess and dominant. Flowering intensity showed moderately negatively skewed distribution indicating the presence of increasing alleles in slight excess and their dominant nature. Tree height, shell thickness, flowering duration, shelling percentage and leaf area showed approximately symmetric distribution indicating increasing and decreasing alleles are in equal proportion and the dominance is ambi-directional.

Cashew (*Anacardium occidentale* L) is a member of family Anacardiaceae which also has mango and pistachio. It is a fast growing; ever green perennial tree well suited to the wet / dry tropical climate. The tree has a long productive life, perhaps up to 50 years, however in poor conditions the economic life of tree would be reduced. The main product of cashew is nut containing a kernel. Cashew fruit also known as cashew apple and cashew nutshell liquid (CNSL) are the other products. The nut when processed gives the kernel which is the economic product because of its taste and nutritional value. The cashew apple has various uses; it can be eaten as fresh fruit, or processed into juice and other products like jam, jelly, cider, pickles etc. Feni, a popular liquor is produced from cashew apple in the state of Goa. CNSL oil is a by-product obtained during the processing of raw cashew nuts from the spent shells of the nuts and is used in friction linings, paints, varnishes and other industrial applications. Although cashew is native to Brazil, it has spread to many tropical countries of the world. Top five cashew producing countries are Côte d'Ivoire, India, Vietnam, Cambodia and Nigeria (Sources: Global Cashew Council and International Dried Fruit Council, INC 2022). The major export markets for the kernel are USA, Europe, Canada, Japan and Australia. China is also emerging as a major market. India has become a largest consumer of cashews in the world and hence has potential domestic market. The production of cashew in India 7.43 lakh tonnes from an area of 11.05 lakh ha with productivity of 672.4 kg / ha (FAO 2019). Whereas the requirement is 17 lakh tonnes per year. Thus there is shortfall of more than 50% in raw cashew nut production and hence India imports raw nuts from African countries. There is also threat for the import because nowadays African countries also thinking of processing cashew. The productivity is low particularly in Karnataka, Goa, Tamil Nadu, Andhra Pradesh and Odisha. The main factors for low productivity in these states are the large plantations under seedling origin and poor management practices. This kind of situation



demands adoption of scientific strategies for increasing the domestic production in the light of declining import from cashew producing 16 countries due to various reasons. Cultivation of high yielding varieties is the most important step in improving the productivity of cashew.

#### **Development of high yielding cashew varieties:**

So far 61 varieties in India have been released for cultivation as a result of evaluation of germplasm collection and hybridization and selection. These varieties have been released from different research centers of SAUs and DCR (formerly NRCC). Among them 34 are selections and 27 are hybrids (Table 1). Out of these varieties, salient features of popular varieties are presented below.

#### **Varieties released from AICRP (Cashew) Center, Bapatla, Dr.YSR Horticultural University, West Godavari, BPP 8 (H 2/16) :**

It is a hybrid (H2/16) derived from the cross Tree No.1 x Tree No.39 and released in 1993 for general cultivation in Andhra Pradesh. It has been performing well in Orissa and West Bengal also. This variety is superior to all the other six varieties developed from Bapatla. The variety has mean yield of 14 kg/tree with better nut size (8.2g). Shelling percentage (29%) of this variety is also better than the rest of the varieties released from Bapatla so far. Kernel grade is W 210 (export grade).

#### **Varieties released from AICRP (Cashew) Center, Vridachalam, TNAU, Tamil Nadu VRI-3 (M 26/2):**

This is a selection from seedling progeny of a high yielding tree collected from a village Edayanchavadi in South Arcot District of Tamil Nadu and was released in 1991. It has 12.1% perfect flowers. The average yield of this variety is about 10 kg/tree, thus the increase over VRI-2 and VRI-1 being 35 to 39% respectively. The nut size is medium with 7.2g nut weight and shelling percentage of 29.1%. The kernel grade conforms to W 210 export grade. This variety is picking up fast among farmers of not only of Tamil Nadu but also of other states.

#### **VRI (Cw)-5:**

It is a hybrid developed from the cross M 26/2 (VRI-3) x M 26/1. This was released in the year 2007. The canopy type is compact and branching habit is spreading. The average yield of this variety is about 13.2 kg/tree. The nut size is medium with 7.2g nut weight and shelling percentage of 30.5%. The kernel grade is W 210. The apple colour is pink with yellow tinge and the shape is round and the apple weight is ranging from 50.0 to 53.5 g. This is recommended for all the cashew growing districts of Tamil Nadu.





### **Varieties released from AICRP (Cashew) Center, OUAT, Bhubaneswar, Odisha Bhubaneswar-1:**

It is a selection from seedling progeny of WBDC V (Vengurla 36/3), a collection from Regional Fruit Research Station, Vengurla and released in 1989. Flowering season is from January to March with medium duration of 70 days. It has cluster bearing habit with about 12 fruits per bunch. This variety has average yield of 10 kg/tree with small nut size (4.6g nut weight). The shelling percentage is high (32%) with kernel grade of W 320. It has been found suitable for cultivation in the sandy and laterite soils of the East Coast.

### **Jagannath (BH 6):**

It is a mid-season flowering (Jan-Mar) variety having bold nuts with 8.6 g nut weight. The variety gives an average nut yield of 2.1 t/ha (10.5 kg/tree) and possesses high shelling percentage (32.5 %).

### **Balabhadra (BH 85):**

It is an Early flowering (Dec-Feb) variety having bold nuts with 7.4 g nut weight. The variety gives an average nut yield of 2.0 t/ha (10.0 kg/tree) and possesses high shelling percentage (30.0 %).

### **Varieties released from AICRP (Cashew) Center, Jhargram, BCKV, Kalyani, West Bengal**

**Jhargram-1** It is a selection from T.No.16 originally collected from Bapatla. It was released in the year 1989. It has a medium compact canopy and intensive branching habit. It has on an average, 6 fruits per bunch and yield of 8.5kg/tree with small nut size (5g nut weight). Shelling percentage is 30 and kernel grade is W 320.

### **Bidhan Jhargram-2:**

It is selection made from seedling plantation of H-2/15 of Regional Research Station, Bidan Chandra Krishi Viswa Vidyalaya, Jhargram, West Bengal. The variety has mid-season flowering habit with 3-4 fruits per panicle. Apple is golden yellow with a weight of 63g and a mean juice content of 68.9 per cent. The average nut weight is 9.2g with a kernel weight of 2.85g and high shelling (32%). The kernel grade is W 180. The variety can yield 13.5 kg/tree in 7th harvest.

### **Varieties released from AICRP (Cashew) Center, Vengurla, KKV, Dapoli, Maharashtra:**

Based on the evaluation of selections from germplasm and hybrid progenies in varietal evaluation trials conducted at Regional Fruit Research Station, Vengurla, the Konkan Krishi Vidyapeeth (KKV), Dapoli 19 has released the following seven varieties for cultivation in Maharashtra. These varieties have been



found to perform well in Goa also. Vengurla-1 and Vengurla-4 are doing well in Uttar Kannada district of Karnataka also. Varieties such as Vengurla-4 and Vengurla-7 are in great demand from farmers.

#### **Vengurla-4:**

This is a hybrid variety with the parentage of Midnapore Red x Vetore 56 and was also released in 1981. It is a cluster bearing type and with percentage of perfect flowers of 35 and fruit set of 6%. The yield of nuts is 17.2 kg/tree. The nut weight is 7.7g and shelling percentage is 31. The colour of the apple is red. Kernel grade is 210 (export grade).

#### **Vengurla-7 :**

Hybrid 255 evolved at Regional Fruit Research Station, Vengurla under Konkan Krishi Vidyapeeth, Dapoli was recommended for release under the name "Vengurla-7" in the XIII Biennial Workshop of AICRP on Cashew held in November 1997. Vengurla-7 is a hybrid developed from the cross Vengurla-3 x M 10/4 (VRI-1). The percentage of perfect flowers is very high (40%). Average yield is 18.5 kg/tree. It is a bold nut type with nut weight of 10g and shelling percentage of 30.5. Kernel grade is W 180. The colour of apple is yellow with apple weight of 60g and with juice content of 75 per cent. Average weight of kernel is 2.9g. This this variety is recommended for the Konkan region of Maharashtra and adjoining cashew growing regions of Goa and Karnataka.

#### **Vengurla-9:**

This is hybrid released in year 2015 in AGM -2015 of AICRP-Cashew. It is a cross between V-4 and VRI-1 (M10/4). It is middle to late season variety with 111 days of flowering duration and is bunch bearing variety with intensive branching. The nuts weight: is 8.9 g with 112 nuts per kg. It gives high yield (7.24 kg/tree) and has shelling percentage of 29.35%. The apple colour is reddish yellow and apple weight: is 69.71 g.



## CHAPTER-2

### CASHEW INDUSTRY IN JAPTHI



Shree Krishnakrupa Cashews Private Limited is a Private incorporated on 17 June 2021. It is classified as Non-govt company and is registered at Registrar of Companies, Bangalore. Its authorized share capital is Rs. 30,000,000 and its paid up capital is Rs. 30,000,000. It is involved in Manufacture of other food products

Shree Krishnakrupa Cashews Private Limited's Annual General Meeting (AGM) was last held on N/A and as per records from Ministry of Corporate Affairs (MCA), its balance sheet was last filed on 31 March 2022.

Directors of Shree Krishnakrupa Cashews Private Limited are Jayaprakash Anand Shetty and Sonali Chandrakanth Shetty.

Shree Krishnakrupa Cashews Private Limited's Corporate Identification Number is (CIN)

U15400KA2021PTC148533 and its registration number is 148533. Its Email address

is skkcashews@gmail.com and its registered address is 1-288A, Japthi Village, Ullur Road, Japthi Post, Kundapura Taluk Udupi Udupi KA 576211 IN. The longest serving director currently on board is Jayaprakash Anand Shetty who was appointed on 17 June, 2021. Jayaprakash Anand Shetty has been on



the board for 2 years and 11 months. The most recently appointed director is Shruthi Jayaprakash Shetty, who was appointed on 12 February, 2024. Jayaprakash Anand Shetty has the largest number of other directorships with a seat at a total of 1 companies. In total, the company is connected to 0 other companies through its directors.

JAYAPRAKASH ANAND SHETTY



SHRUTHI JAYAPRAKASH SHETTY

The krishnakrupa industry which gives many facilities to their employees . like PF, Scholarship, bonus ,health facilities , vehicle facilities , and also provides healthy food facilities. The owner namely jayaprakash shetty gives satisfaction level of salaries to their employees .They have a good Infrastructure facilities and treat their employees in a good manner. They have trained employees in their industry and the industry have good safety and security to their employees . many employees work here with different places. They also give room facilities to the workers who came from other states. Many females workers are there. They have a good relationship with their workers.

<b>CIN</b>	<b>U15400KA2021PTC148533</b>
<b>Company Name</b>	SHREE KRISHNAKRUPA CASHEWS PRIVATE LIMITED
<b>Company Status</b>	Active
<b>RoC</b>	RoC-Bangalore
<b>Registration Number</b>	148533
<b>Company Category</b>	Company limited by Shares
<b>Company Sub Category</b>	Non-govt company
<b>Class of Company</b>	Private
<b>Date of Incorporation</b>	17 June 2021
<b>Age of Company</b>	2 years, 11 month, 7 days





## CASHEW NUT PROCESSING



Cashew is a versatile tree nut and a precious gift of nature to mankind. The world production of raw cashew nut is to the tune of 37.5 lakh MT in the last fiscal year and about 32 countries contributed to this global production. Cashew nut took deep roots in the entire coastal region of India after the introduction of cashew during 16th century by the Portuguese. Beginning as a poor man's crop, it ends up as the rich man's favorite snack-food all over the world. World demand for cashew kernels has been rising steadily for several years in the past conferring significant price increase, the processing of cashew remains still a highly profitable industry. Cashew, one of the most important commercial crops in India, produced 6.13 lakh MT of raw nuts from an area of 9.23 lakh ha (DCCD, 2010). Cashew kernel exported from India reached an all time high of Rs 2,906 crores by exporting 1.08 lakh MT of kernels during the year 2009-10, accounting 60 per cent of global share. Cashewnut processing Industries Cashewnut processing industries have a simple organizational structure and mostly under private management i.e., either proprietorship or partnership. About 67 % of the processing units are categorized under "Labour oriented", 18% follows mechanization partially and 15% are fully automated. Total employees' strength of these units varied from 50 to 400. Among the women force deployed, 90-95% is employed primarily is shelling, peeling, grading and packaging. Men labourers are involved in drying, stacking, roasting/steaming, kernel drying and packing. The State Government fixes labour wages and it differs from state to state.

**Structure of raw cashewnut** :The raw cashew nut is the main commercial product of the cashew tree, though yields of the cashew apple are eight to ten times the weight of the raw nuts. The by-product CNSL obtained either during or after processing of the raw nuts has industrial and medicinal applications. The



skin of the edible kernel is high in tannins and can be recovered and used in the tanning of hides. The Pseudo-103 fruit of the cashew tree can be made into a juice with high vitamin 'C' content and fermented to give a high proof spirit

**Raw cashewnut procurement :** Cashewnut is a seasonal crop, harvesting of nuts in India starts from March to June. While procuring raw cashewnuts, normally following quality tests are conducted to assess the quality and to fix up the price.

**Visual test:** Size and colour of the nuts to check the maturity

**Counts:** Number of nuts per kg and ratio of cashew kernels obtained by shelling a kilo of raw cashewnuts.

**Floating test:** A random sample (2kg) is put in a vessel containing water. After continuous stirring floaters are collected and counted. Mostly immature nuts, due to its lower density than water, improperly filled nuts and deteriorated nuts float.

**Cutting test :** A random sample of 2 kg is cut open using hand cutting tool. Based on the kernel appearance i.e. white, shriveled dotted or rejects, the percentage of good kernel is calculated.

**Cashewnut processing:** It can be defined as the recovery of edible kernel from conditioned raw nut by manual or mechanical means. In India, the processing is mostly manual and it consists of steaming / roasting, shelling, kernel drying, peeling, grading and packing. Grading of raw cashewnuts before processing reduces broken kernel. Conditioning of raw cashewnuts is to make the shell brittle and to loosen the kernel from the shell. Three methods are being followed in India, they are: (i) Drum roasting; (ii) Oil bath roasting and (iii) Steam boiling.

**Drum roasting:** In this process, the nuts are fed into an inclined rotary drum which is heated initially to such an extent that the exuding oil ignites and burns, thus charring the shell. The drum maintains its temperature because of the burning cashewnut shell liquid (CNSL) oozing out of the nuts. Roasting generally takes about 30-45 sec and the drum is rotated manually. The shell becomes brittle and rate of shelling and the outturn of whole kernels reported to be highest among the three methods of roasting.

This method is adopted in the factories where hand and leg operated shelling machines are used. The nuts after steam conditioned in a twin bottle type steaming unit for 20-25 minutes at 85 - 100 PSI. This process helps to loosen the kernel and make it amenable for shelling operation.



**Oil bath roasting** :Though it is an outdated method, few processing industries in Kerala and Karnataka are still following it. In this method raw nuts are passed for 1-3 minutes through a bath of heated CNSL maintained at a temperature of approximately 190-200°C by means of screw or belt conveyor. The roasting equipment consists of a rectangular vessel, 2-3 feet wide and 3 feet deep, with a flat bottom. The whole assembly is embedded in brickwork furnace which uses spent cashew shell as fuel.

**Shelling conditioned nuts:**Nuts after roasting are shelled manually in most of the units in Kerala and Tamil Nadu. Manual shelling is requiring dexterity, wherein nuts are knocked 2-3 times on each of the long edge by a wooden mallet taking care to see that the whole kernels are released without damage or breakage as far as possible. The outturn will be 90 per cent of whole kernels. Individual workers' output is about 15-20 kg per 8 h working day. Workers smear ash or clay on their hands to avoid contact of corrosive shell oil with the skin. Due to air pollution, certain restrictions are imposed for this process.

The mechanical shelling gadget consists of two blades, between which the raw nut is inserted. The gap is adjustable and therefore it will be advantageous if the raw nuts are pre-graded on the basis of size. The pedal of the shelling unit is operated in such a way that nut it is held between two blades and lifting the lever by hand will split open the nut without damaging the kernel inside. Intact kernel is then scooped out by means of sharp needle. The output per worker per 8 hours shift in this method is estimated to be 14-22 kg of kernel. Semi- mechanized and automated shelling machines have been introduced in the line of processing to increase operational capacity.

**Kernel Drying** :The kernels after separation from the shells are dried to reduce the moisture and loosen the adhering testa. The most commonly used drier is 'Borma dryer'. Kernels are placed in trays with wire mesh bottom and loaded into metal chambers. Indirect hot air from furnace and blower assembly helps to dry out the kernel moisture. Each tray can hold 10 kg of material to a depth of 5-7 cm, temperature ranging from 70-100°C will be prevailing inside the whole chamber. In order to get uniform drying, the position of trays is changed at intervals of 10-30 min. The normal duration of heating is 6-12 h. Recently developed cross- 107 flow dryer has the capacity ranging from 250 – 1000 kg in a 8 h shift works at 80°C. The moisture content of the dried samples will be in the range of 1-2 per cent (d.b).

**Peeling:** Peeling is the operation of removal of the testa from the kernels. As the kernels are quite brittle after removal from the dryer, it needs to be cooled for 24-48 h for moisture infusion. A slight pressure applied through the fingers separates the testa. Sharp bamboo sticks or stainless-steel knife are also used to remove the adhering testa. The average peeling capacity is 7-10 kg/person/day. Pneumatic peelers are the recent introduction for bulk production which ranges from 60 kg to 250 kg per h.



**Grading and conditioning :** Kernels are graded on the basis of specification prescribed by Govt. of India under the export (quality control and inspection) Act 1963, which recognizes 23 different export grades of kernels. The kernels are conditioned before packing in sealed tins. If the kernels are too dried at the time of packing, they are liable to breakage during transport by land and sea. If the moisture exceeds limit of 5 per cent, kernels become susceptible to microbial and oxidative spoilage.

**Packaging of kernels:** Cashewnuts are subjected to rancidity and very quickly go stale. Therefore, packing should have low permeability of oxygen and moisture. Method of packing should involve either vacuum or inert gas inside the packing. Bulk of cashewnuts is packed in tin containers weighing 25 lbs. Tins kept on vibrating platforms are filled with kernels through a chute. After filling and weighing the tins are evacuated filled with CO<sub>2</sub> with the help of "VITAPACK" machine and sealed. At present, flexible packaging (Mould vacuum packaging) with nitrogen as inert gas is followed by majority of the cashew industries as tin container packaging is not accepted in the international trade.

## CASHEW GRADING

Choosing the right type of cashew is crucial for making sure you get the most bang for your buck. There are a number of cashew grades and sizes available, and each one has its own features and benefits. If you are looking for the best cashews, you will want to consider the grade, number of nuts per pound and the quality of the nut. Based on their shape, size, and color, cashew kernels are sorted into white/scorched wholes, pieces, splits, butts, etc.

The Government of India Act says that there are 33 grades of cashew kernels. Only 26 grades are available on the market and are exported. These are:

- \* W-180 is the "King of Cashews," because they are bigger and cost more.
- \* W-210 nuts are called "Jumbo" nuts by most people.
- \* W-240 is an attractive grade that costs a fair amount.
- \* W-320 Cashew kernels with the number W-320 are the most popular and easiest to find around the world.
- \* W-450 is the most popular low-cost whole grade because it has the smallest and least expensive white kernels.

Scorched wholes are another type of cashew kernels. They have a brownish color because they are roasted for a longer time. They are the same size, shape, and color as white kernels, and they have the same nutritional value. Butts, splits, and pieces cost less and are great for cooking, making sweets, and making savory snack.





## IMPORTANCE OF CASHEW NUTS:

Cashew nuts or Kaju are technically not nuts but seeds. The scientific name of cashew nuts is *Anacardium occidentale* L., which belongs to the family Anacardiaceae. It is a popular ingredient in various Indian dishes and dairy alternatives like cream and cashew milk. They have a rich nutty flavour. Cashew nuts grow on evergreen trees, native to Brazil, which later expanded to South American countries. The Portuguese introduced cashew nuts in India and Africa in the 16th century. A single-seeded nut in a hard grey shell grows at the bottom of the cashew apple (a soft and juicy fruit). There are 33 varieties of cashew nuts identified, out of which only 26 varieties are marketed. The W-180 variety is known as the “king of cashews”. As for the nutritional composition, cashew nuts are rich in tocopherols, phytosterols, phenolic lipids and several bioactive compounds, all of which have several benefits on human health. Let us find more exciting facts about cashew nuts.





**Nutritional Value of Cashew Nuts:** Cashew nut contains various nutritional components that are given as follows.

<b>Nutritional components</b>	<b>Value per 100g</b>
Carbohydrates	<b>30 g</b>
Protein	<b>18 g</b>
Fats	<b>44 g</b>
Fibre	<b>3.3 g</b>
Calories	<b>553 kcal calorie</b>
Sugars	<b>5.9 g</b>
Sodium	<b>12 mg</b>
Iron	<b>6.68 mg</b>
Calcium	<b>37 mg</b>

#### **Properties of Cashew Nuts:**

**Scientific literatures have found that cashew nuts show numerous properties as those mentioned below:**

- They might show antioxidant properties.
- They may be anti-inflammatory in nature.
- They may be analgesic.
- They might also have antidiabetic activity.
- They may have anti-cancer activity.
- They may be cardio-protective.



## **Potential Uses of Cashew Nuts for Overall Health:**

Some of the potential benefits of cashew nuts are described below.

### **1. Potential Uses of Cashew Nuts for the Heart**

Consumption of cashew nuts may exert a cardio-protective effect. Mahboobi et al. conducted a systematic review in 2019 to assess the effects of cashew nut consumption on blood pressure and cardiovascular risk factors. This review supported the fact that consumption of cashew nuts may improve triglyceride levels and systolic and diastolic blood pressure. However, no significant effect was seen on other risk factors like HDL-C, total cholesterol, etc. Thus, consuming cashew nuts may help normalize blood pressure and triglyceride levels. However, more studies are needed to support these claims.

### **2. Potential Uses of Cashew Nuts for Cancer**

Cashew nuts are rich in proanthocyanidins, a flavonol that is associated with cancer cell replication. Additionally, the presence of copper and other minerals may help reduce the risk of colon cancer. Thus, this may indicate consumption of cashew nuts may exert an anti-cancer effect. However, we need enough studies to support these claims.

### **3. Potential Uses of Cashew Nuts for Pain and Inflammation**

Proinflammatory cytokines like TNF-alpha and IL-6 are involved in the process of pathological pain. Cashew nuts are known to exert an anti-inflammatory and analgesic effect by inhibiting the formation of inflammatory cytokines and blocking proinflammatory cytokines. Additionally, cashew nuts show radical scavenging property which can help in protecting cells from damage. This indicates that the consumption of cashew nuts may help reduce inflammation and pain. However, more human studies are needed to support these claims

### **4. Potential Uses of Cashew Nuts for Formation of Haemoglobin**

Haemoglobin is a protein which allows red blood cells to carry oxygen. Iron and copper are essential micronutrients for the formation of haemoglobin. Cashew nuts are rich in iron and copper and thus may aid the formation of haemoglobin. Additionally, consumption of cashew nuts may help in managing blood disorders. However, scientific evidence supporting these claims is limited, and we need more studies to ascertain these findings.

**5. Potential Uses of Cashew Nuts for Improving Vision:** Cashew nuts contain zeaxanthin, an antioxidant known to protect the macula of the eyes from external damage and improve eyesight. Thus, this may indicate that the consumption of cashew nuts can help



improve vision. However, scientific evidence supporting these claims is limited, and we need more studies to support these claims.

## **6. Potential Uses of Cashew Nuts for Improving Brain Function**

Cashew nuts may help in improving brain function. Chemobrain is a term for the adverse effects of chemotherapy-induced brain deterioration. There are no drugs which are available to cure the weakening of the brain caused due to chemotherapy. Studies have shown the beneficial effect of cashew nuts on neurochemicals linked to brain functions. Akomolafe et al. conducted a study in 2022 to assess the effects of cashew nuts consumption on cisplatin-induced brain harm in rats. This study showed that cashew nuts could be used as a functional food to manage cisplatin-induced neurotoxicity. This indicates that the consumption of cashew nuts may help improve brain function. However, we need more studies to ascertain these claims.

## **7. Other Potential Uses of Cashew Nuts**

- May help manage diabetes.
- May help in strengthening bones.
- May help improve brain function.
- May help in managing weight.
- May provide nourishment to hair.
- May help prevent blood disorders.
- May help prevent blood disorders.





## **METHODOLOGY:**

**Primary data** was collected through questionnaires and seeking information from owner through employees and oral discussion .

**Secondary data** was collected through the industrial website and other ready documents.



## **OBJECTIVES**

- Extension of our knowledge behind subject
- Understanding importance of cashew nut processing
- To utilize best technology
- To know about different machinery in factory



## Analysis and Interpretation

- 1. Moisture Content:** Moisture content is analyzed at different stages to ensure it is within acceptable limits. High moisture can lead to mold growth, while too low moisture can affect texture.
- 2. Kernel Quality:** Quality is assessed based on the appearance, size, and absence of defects or contamination. Premium grades fetch higher market prices.
- 3. Yield Efficiency:** The efficiency of shelling and peeling processes is analyzed to maximize yield. High yield indicates efficient processing with minimal waste.
- 4. Contamination and Safety:** Regular testing for contaminants such as aflatoxins and pesticide residues is crucial. Ensuring nuts are free from harmful substances is vital for consumer safety.
- 5. Market Analysis:** Market trends and demands are analyzed to determine the best grades and packaging methods. Pricing strategies are influenced by the quality and grade of the nuts.

## Interpretation

**Efficiency Metrics:** High yield and low waste in processing indicate effective techniques and equipment.

**Quality Metrics:** High-grade kernels with minimal defects reflect good harvesting, drying, and processing practices.

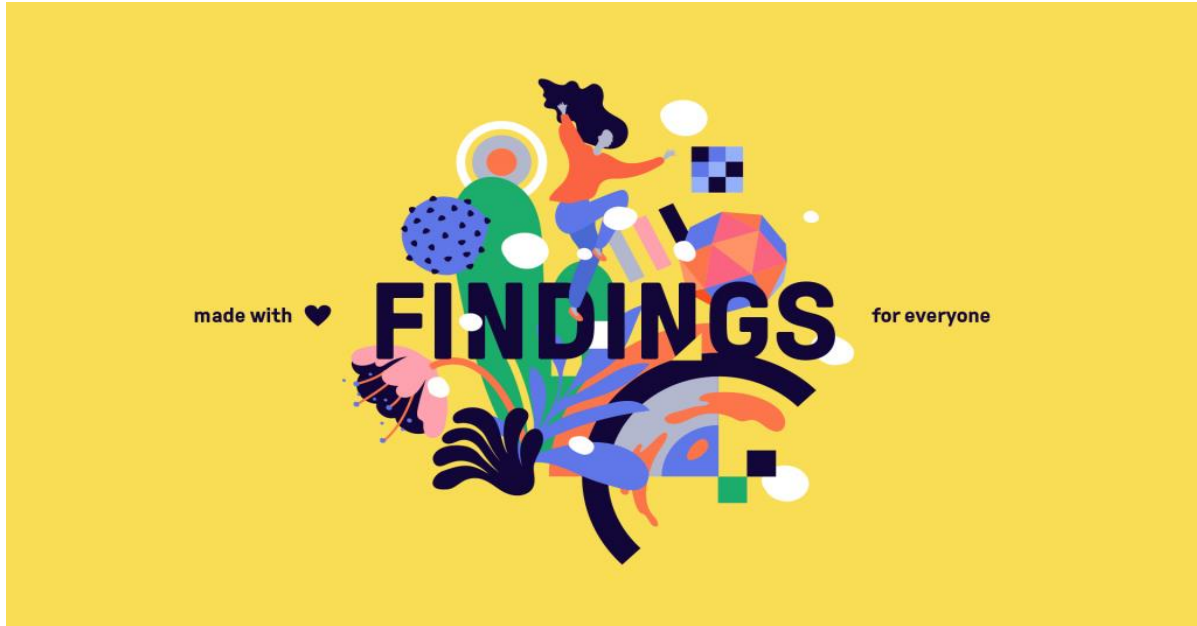
**Safety Metrics:** Low levels of contaminants and proper moisture content signify adherence to health standards.

**Economic Metrics:** Higher market prices for premium grades indicate successful processing and quality control strategies.

By continuously monitoring and analyzing these factors, cashew nut processors can optimize their operations, ensure high-quality products, and achieve better market outcomes.



## CHAPTER 3

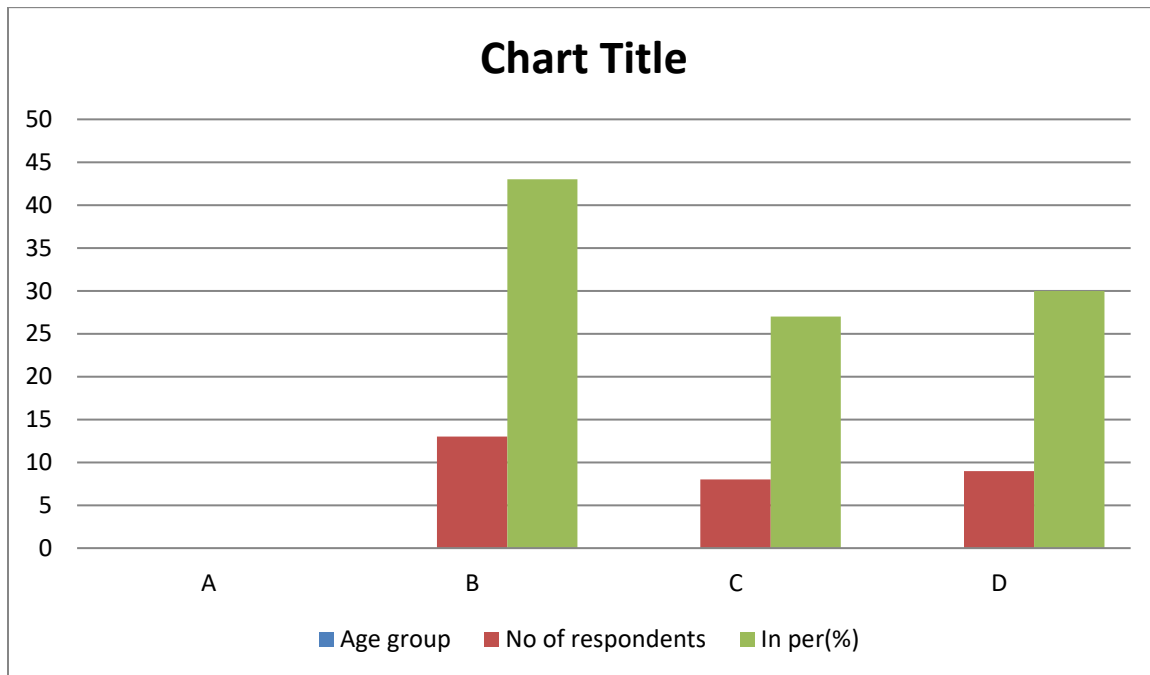






**1. Age of group workers:**

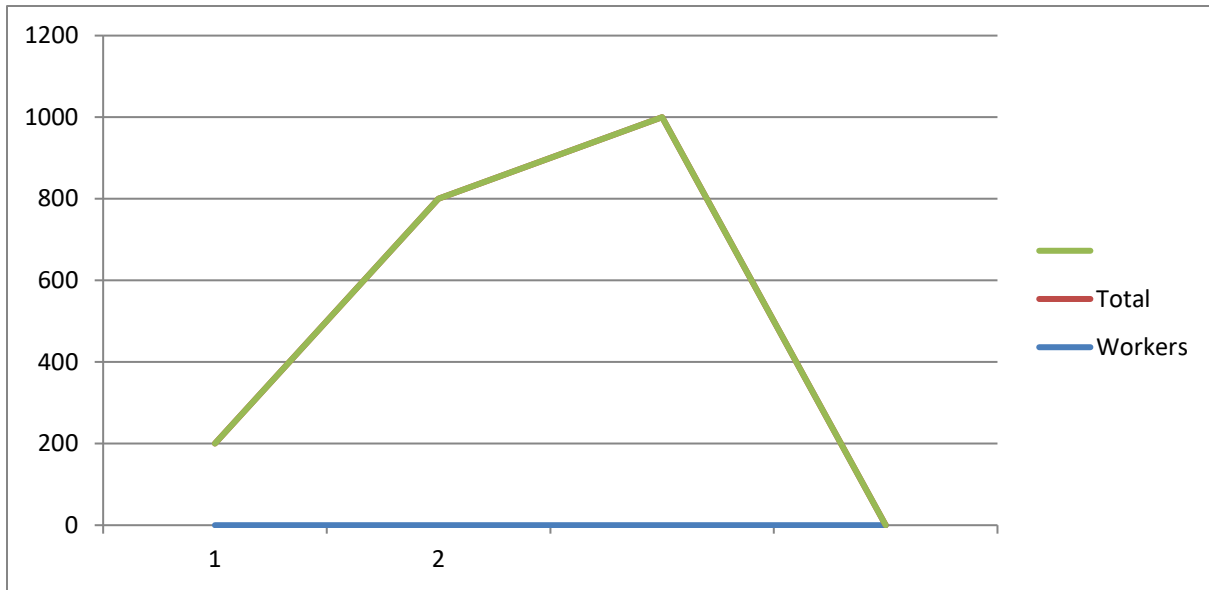
	<b>Age group</b>	<b>No of respondents</b>	<b>In per(%)</b>
<b>A</b>	Below-20 years	0	<b>0</b>
<b>B</b>	20 to 30 years	13	<b>43</b>
<b>C</b>	30 to 40 years	08	<b>27</b>
<b>D</b>	Above 40 years	09	<b>30</b>
	Total	30	<b>100</b>



From the above table it is clearly shows that out the 100 respondents interviewed , labors belongs to age group below 20 years are about 43% of respondents are belongs to age group of 20 to30 years is about 27% 30-40 years. And 30% of respondents belong to the age group of above 40 years so that respondents above age of 40 years are there.

**2. Total Number of Workers**



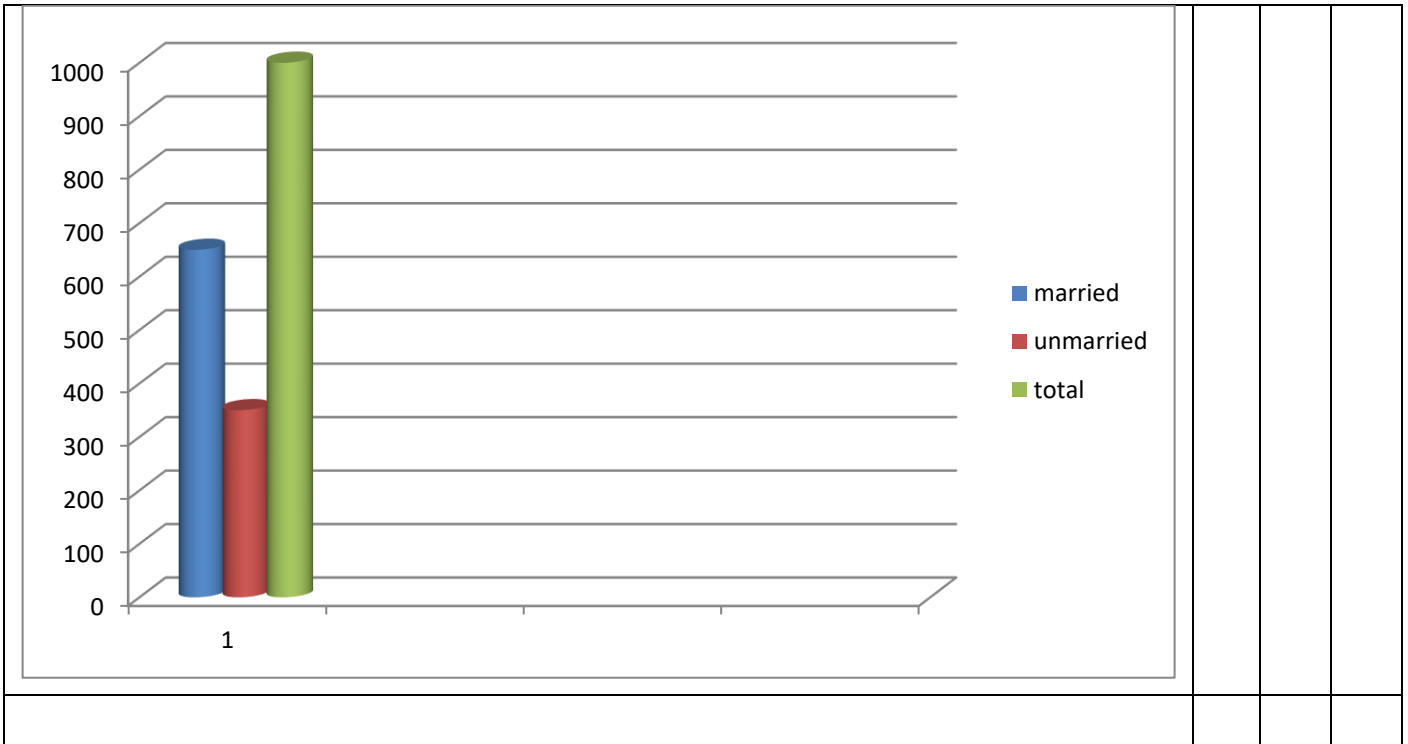


In the above table shows that total number of male workers are 200 . and female workers are 800 the total number of workers are 1000.

### 3. EMPLOYEES MARITAL STATUS:

MARRIED	UNMARRIED	TOTAL
600	300	1000



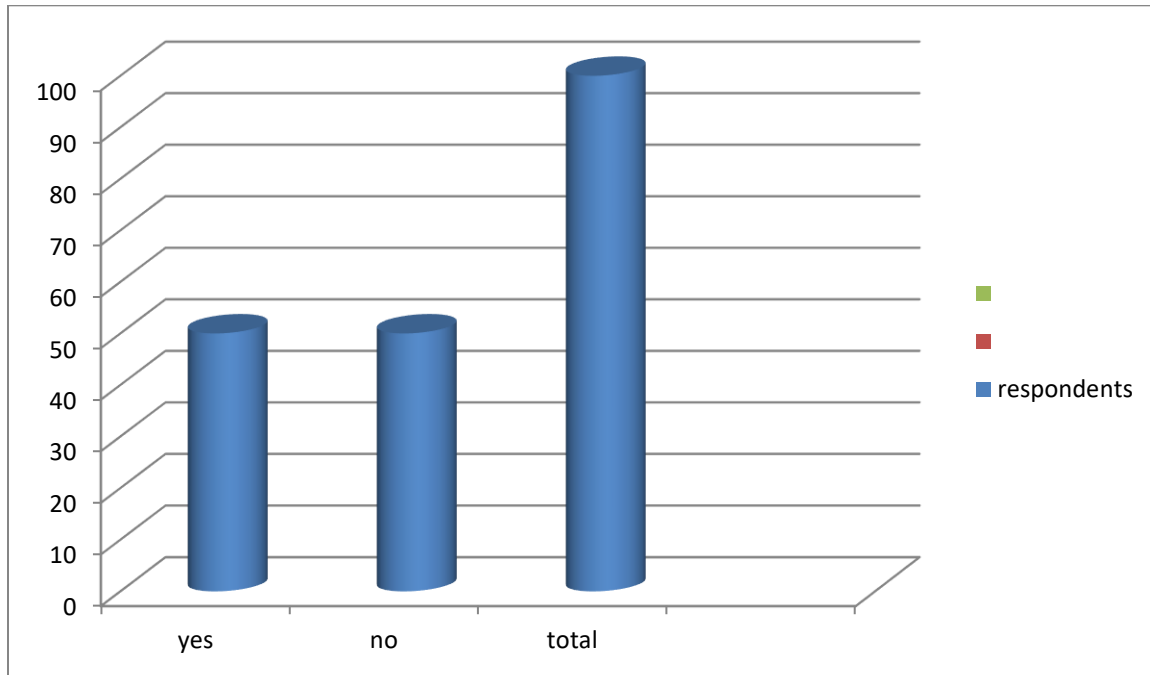


In the above diagram shows that the marital status of the employees . total number of married employees 600 and unmarried employees 300.

#### 4. EMPLOYEES SATISFACTION:

SL NO	OPTIONS	NO OF RESPONDENTS
1	YES	50
2	NO	50
	Total	100





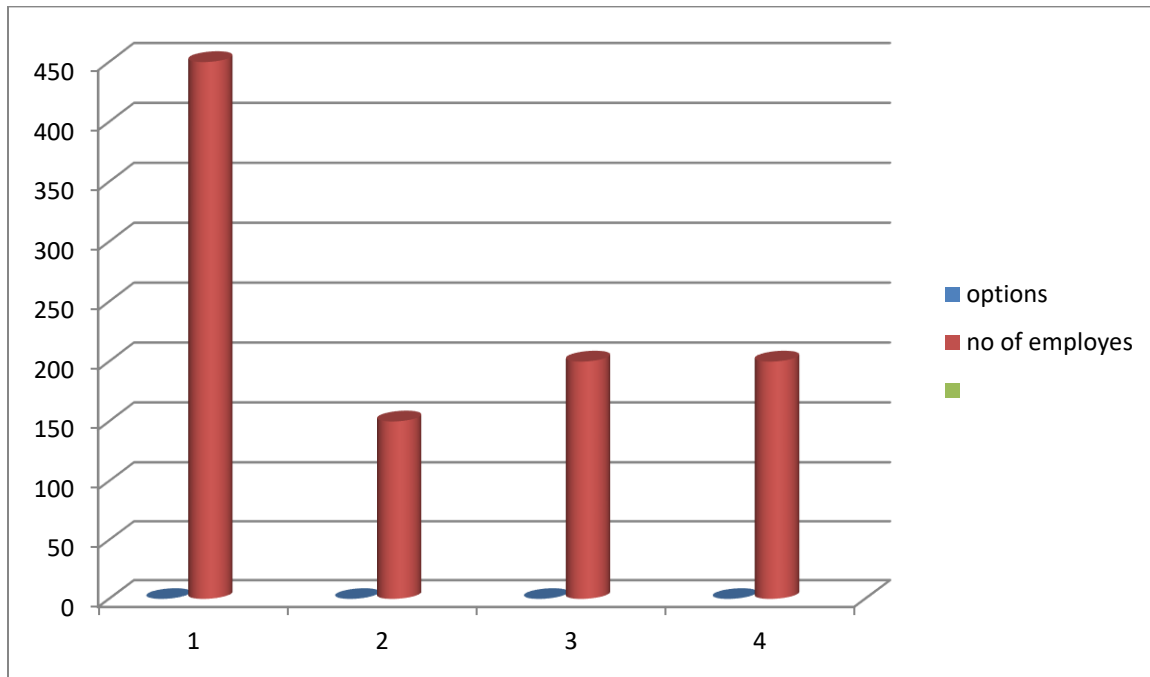
In the above table no of 50 respondents were satisfied with the work environment and 50 were feel better about the working environment.

#### 5. OCCUPATION OF EMPLOYEES

SL NO	OPTIONS	No of employees
1	Uneducateed	450
2	Highschool	150
3	Primary	200
4	Others	200
5	Total	1000







In the above table shows that 450 were uneducated and 150 were highschool level. And 200 were primary and 200 were others.



## ACKNOWLEDGEMENT

The mini project report has been a remarkable and insightful journey that could not have been realized without the unwavering support and commitment of many individuals to whom we our gratitude . With a heartfelt appreciation and a mind fortified by determination . We have been inspired to complete this academic endeavour. We extend our heart full thanks to Mangalore University for allowing us to pursue mini project work.

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Finally we wish express our deep gratitude to all individuals who have played a part directly or indirectly in completing this work. The encouragement and backing we have received from various source were essential in our journey.



## LEARNING OUTCOMES OF THE PROJECT:

- We can understand the procedure of a holl cashew which converting to the cashew nut
- The machineries related to the grading and packaging.
- Understanding the stages of kernals.
- Facilities which given to the employees.
- Maintenance of machinery in a good manner.
- Benefits of cashew nuts and kernals.



## **Conclusion**

**The** Krishnakrupa cashew industry which gives fully information about the Kernals and nut processing. It started since 2021 running successfully till now. It gives many employment oppourtunities . They export their goods for many countries. They sell high qualified cashew nuts with highly secured manner. They earn more profit . They have also staffs about 10 – 12 members who were well graduated. Totally this industry will help to the people and also have good network with other countries.





## Reference

- <https://cashew-machine.org/cashew-grades>
- <https://cashew-machine.org/cashew-kernels>
- <https://www.zaubacorp.com>
- Google
- Wikipedia



## Chapter 4

### Questionarie

**1.Name :** JAYAPARAKSH K SHETTY

**2.SEX:** MALE

#### **3. EDUCATION QUALIFICATION:**

a) up to 7 standard

b)up to sslc

c)puc

**d)degree/diploma**

#### **4. MARRIED /UNMARRIED**

MARRIED

#### **5)Which year was factory established**

2021

#### **6. WORK EXPERIENCE OF EMPLOYEES**

- 1-5
- 5-10
- **2-3**



**7.The total no of workers**

a)500

b)700

**c)1000**

**8.Age group of workers:**

**a)20-60**

b)20-40

c)30-50

**9.Number of years of service of the factory**

**a)1 to 2 years**

b)1 to 4 years

c)1 to 5 years

**10. Is Workers are satisfied with the working condition**

**a) YES**

b) NO

**11.Do you have work daily**

**a) YES**

b) NO