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# Analysis of Problems and Prospects of Cashew Cultivation in India

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## ABSTRACT

Cashew tree, also known as the "poor man's crop," is a source of high-priced cashew nuts. India, as the world's major producer, consumer, and second largest exporter of cashews, holds a dominant position in the global cashew trade. However, the productivity of Indian cashew is significantly lower than that of its closest competitors, namely, Vietnam, Nigeria, Côte d'Ivoire, and the Philippines. India's cashew processing industry is booming as well. A cashew apple can be used to create numerous products like halwa, toffees, sweets, cashew apple powder in wheat laddu, set dhahi, masala biscuits, sweet and masala doughnuts, sponge cake, steaming kadabu, tomato cashew apple powder soup, cashew apple powder koftas, chocolates, nutrimix, sweet and hot bread spread, syrup, jam, chutney, pickle, vinegar, etc. This study comprehensively analyzed the positive and negative aspects related with the cultivation of cashew in India.

**Key words:** Cashew, Industry, Processing, Problem, Scope

Cashew (*Anacardium occidentale* L.), a native of Brazil, has adapted well to the Indian environment and is often appreciated for its nutritional value. Its delectable and nutrient-dense kernels are important aspects. It was introduced by Portuguese sailors during the 16th century on the Malabar Coast. Its transformation from a mere crop to a crop of dollars has taken lots of time in India [1]. Cashew is a tropical, evergreen, perennial tree with darkish-green leathery foliage, spreading branches and with very irregular crowns. The flowers are borne in a panicle that consists of three types of flowers name hermaphrodite (bisexual), male and sterile flowers. Cashew Native to Brazil's tropical region in the Latin American Zone, the Portuguese brought this plant to India about 500 years ago. It has adapted well to the climate in India and is at home in the coastal areas of country. After hazelnuts (29%) and almonds (20%), cashews are the most popular edible nut in worldwide trade (21 per cent). The phrase "poor man's crop and wealthy man's meal" is frequently used to describe cashews. Cashew being tropical crop can tolerate higher temperatures but is highly sensitive to frost. The ideal temperature range for successful cultivation is between 20 and 30 degrees Celsius.

Cashew thrives in climates with 1000 to 2000 mm of annual precipitation. Pests and illnesses are more likely to appear when blossoming coincides with heavy rain or high humidity [2]. For cultivation strict soil needs and performs well even on low soils; nevertheless, well-drained, rich soils provide superior yields. Clayey soils with poor drainage and soils with a pH greater than 8 are not appropriate for this crop. Cashews grow best in red sandy loam, lateritic soils with a pH range of slightly acidic to neutral [3].

## MATERIALS AND METHODS

Despite the fact that nuts are thought to be a concentrated source of energy, scientific research has shown that there is no link between eating nuts and gaining weight [4]. According to Estruch *et al.* [5] including nuts in a healthy diet has advantages over eating low-fat food, wherein the reported a 30% reduction in the incidence of mortality due serious cardiovascular disorders in people that eat a Mediterranean diet complemented by a handful of nuts each day, versus those that are recommended for ingestion a diet low in fat. The increase in TC was revealed by Mah *et al.* [6]. (Total Cholesterol and) 3.9%, as well as that LDL increases by 2.3% after cashew eating. Nut intake (28-64 g/day) against the group under control given potato chips. The delectable flavour and the nutritional. The cashew's nut's qualities have made it popular. The world's most popular and upscale snacks are nuts over.

## RESULTS AND DISCUSSION

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*Cashew's chemical makeup and applications*

About 40% of a cashew nut's weight is made up of the kernel; 60% is the shell. Crude fat makes up 49.1% of it, followed by crude protein at 36.3%, moisture at 7.2%, crude fibre at 3.2%, ash at 2.8%, and carbohydrates at 1.4%. Cashew nut shell liquid's physicochemical properties were also determined. The following was the approximate makeup (percentage): ash, moisture (7.2), (2.8), crude fat (49.1), crude protein (36.3), crude fibre (3.2), and carbohydrate (percentage difference) (1.4). The mineral content of cashew nuts (mg/100g) revealed that potassium (27.5 0.4) was the most abundant, followed by calcium (21.5 0.0), magnesium (19.3 0.1), sodium (8.2 0.2), and phosphorous (14.0 0.2). The concentrations of zinc and iron were lower. Color (yellow), refractive index (1.458), specific gravity (0.962), acid value (10.7mg KOH/g), saponification value (137mg KOH/g), iodine value (41.3mg iodine/100g), and free fatty acid (5.4mg KOH/g) were the physicochemical parameters of cashew nut oil. This is a sign that the oil is about to run out. Cashew nuts are not only tasty but also healthful. Nuts are considered a powerhouse of energy and have been a staple of the human diet since the dawn of humanity. Protein accounts for 21% of the kernel's total makeup, with fat accounting for 46% and carbs accounting for 25%. The nutritional makeup of raw cashew kernels per 100 g weight is shown in (Table 1). Oleic acid, a MUFA (Mono Unsaturated Fatty Acid), is the most prevalent fatty acid, accounting for 60.70 percent of Total Fatty Acids, followed by linoleic (17.77 percent), palmitic (10.2 percent), and stearic (8.93 percent) acids [7].

Table 1 Nutritive value of cashew kernel (per 100 g)

Principle	Nutrient value	Percent of RDA
Energy	553 Kcal	28%
Carbohydrates	30.19 g	23%
Protein	18.22 g	32.50%
Total Fat	43.85 g	146%
Cholesterol	0 mg	0%
Dietary Fiber	3.3 g	8.50%
Vitamins		
Folates	25 µg	6%
Niacin	1.062 mg	6.50%
Pantothenic acid	0.864 mg	17%
Pyridoxine	0.417 mg	32%
Riboflavin	0.058 mg	4.50%
Thiamin	0.423 mg	35%
Vitamin-A	0 IU	0%
Vitamin-C	0.5 mg	1%
Vitamin-E	5.31 mg	35%
Vitamin-K	34.1 µg	28%
Electrolytes		
Sodium	12 mg	1%
Potassium	660 mg	14%
Minerals		
Calcium	37 mg	4%
Copper	2.195 mg	244%
Iron	6.68 mg	83.50%
Magnesium	292 mg	73%
Manganese	1.655 mg	72%
Phosphorus	593 mg	85%
Selenium	19.9 µg	36%
Zinc	5.78 mg	52.50%
Phyto-nutrients		
Carotene-β	0 µg	--
Crypto-xanthin-β	0 µg	--
Lutein-zeaxanthin	22 µg	--

Source: USDA 2021-22

During the sixteenth century, Africa and India were intertwined. The major purpose of its introduction was to conserve soil as they found cashew can prevent soil erosion by its robust root system and can grow up well on waste sites. Use of cashew nuts and apples evolved significantly later, and the worldwide nut trade did not commence until the 1920s. It has gradually gained commercial importance, and many of its developing countries, such as India, Sri Lanka, Thailand, the Malay Peninsula, the Philippines, Hawaii, Tahiti, Mauritius, Seychelles, Tanzania, Kenya, Madagascar, Ivory Coast, Nigeria, Brazil, and Vietnam, benefited greatly from it [8].

*Materials and procedures**Planting supplies*

Cashew is a cross pollinated crop with a wide range of nut, apple, and seedling progenies yields. As a result, vegetative propagation has been proposed as a solution to this problem. Although air layering has proven to be effective, survival rates are poor, and it has been observed that the Plantations grown from air layers are more vulnerable to drought and have a shorter lifespan. Compared to grafted or seedling ones, they are shorter. It has also been noticed that the anchoring is Poor, especially in places prone to cyclones. Softwood grafting and epicotyl grafting have both been proven to be effective. Because it is simple to manufacture a high number of grafts in a short period of time, it has been successful. The field's percentage the rate of establishment is likewise said to be high. In most states, one of the economic activities is the production of cashew planting material. These nurseries are where the planting material grew. Within a calendar year, Farmers can buy planting material from these nurseries. It is assumed that the planting materials are obtained from legitimate and certified nurseries. The provider should include information such as the plant's age, cashew variety, rootstock utilized, and so forth [8].

*Getting the land ready*

In the case of agricultural fields, the soil should be ploughed completely and levelled. In the case of forestlands, the jungle should be cleared and the waste burned well in advance. Terrain should be terraced or bunds built on sloppy land once the jungles have been cleared. Soil trenches are constructed across the contours to provide greater moisture conservation. Land preparation costs vary based on the kind and technique of soil preparation used. Because the use of a JCB for soil work is so prevalent nowadays, the model has a provision for it [9]. Land preparation work should be done prior to the start of the monsoon season, which is between May and June.

*Layout*

Cashew trees are typically planted in a square pattern with a spacing of 7 to 9 metres. The suggested spacing is 7.5 m X 7.5 m (175 plants per hectare) or 8 m X 8 m (156 plants per hectare). High-density cashew planting at a narrower spacing of 4 m X 4 m (625 plants/ hectare) in the first year and thinning out in phases to maintain an 8 m X 8 m ultimate spacing in the tenth year is also advised. This allows for better returns in the early years [9]. In sloppy grounds, the triangle planting strategy is advised to accept 15% more plants without harming the trees' growth and development. Planting should generally be done in undulating regions.

*Geographical origins and dispersion*

Cashew is a Latin American native with a major diversity centre in Amazonia and a secondary one in Brazil's Planalto. Cashew has been found in the wild from Mexico to Peru, as well as in the West Indies. It was one among the first fruit trees

brought to the New World by early Portuguese and Spanish explorers, and it was extensively disseminated across the tropics. Cashew is derived from the Portuguese word *caju*, which is derived from the Tupi-Indian term *acaju*. The aboriginal Indians of what is now Brazil prized both the cashew nut and the so-called apple, which is the fleshy pedicel or stem of the fruit [10]. In 1578, Portuguese traders and explorers found cashew in Brazil. In the 16th century, Portuguese explorers introduced it to West and East Africa, as well as India. Cashew was seen as a viable crop for soil conservation, forestation, and wasteland development at the time. As a result, the intended goal of introducing cashews to those regions was not to produce nuts and apples (pseudo-fruits), but to aid in soil erosion prevention along the shore [11]. Cashew nuts and apples were not widely used until much later, and the worldwide nut trade did not begin until the 1920s [12]. Cashew gradually acquired commercial importance and expanded to other parts of the world after then. Many tropical countries, including East Africa (Tanzania, Kenya, Mozambique, Madagascar, and Uganda), West and Central Africa (Ivory Coast, Nigeria, and Angola), Florida, Peru, Hawaii, Tahiti, Mauritius, Seychelles, Panama, India, Sri Lanka, Thailand, the Malay Peninsula, and the Philippines, have naturalized it.

Table 2 International production: Cashew nuts, with shell production in (000) MT

2020		
Country	Production	Share (%)
Cote D'Ivoire	848.7	20.3
India	772.78	18.48
Vietnam Soc Rep	348.5	8.34
Burundi	300.91	7.2
Philippines	255.91	6.12
Tanzania Rep	232.68	5.57
Benin	190	4.54
Mali	173.21	4.14
Burkina Faso	162.1	3.88
Guinea Bissau	160.63	3.84
Total	3,445.42	

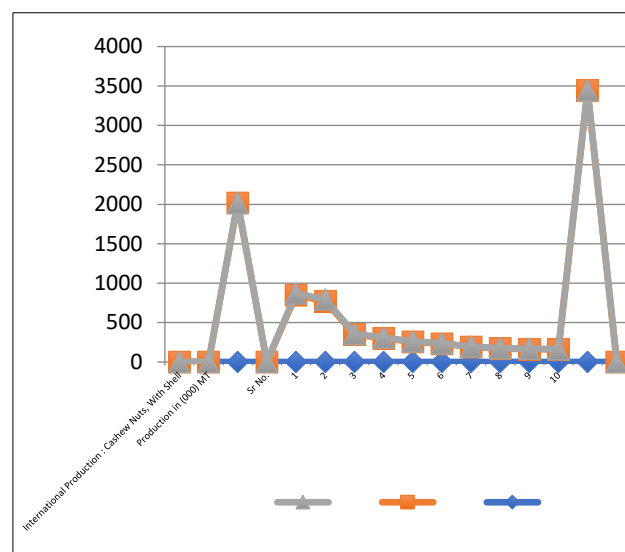
Source: USDA 2021-22

#### Production and area

The entire crop for the 2020/2021 season is predicted to be 3.8 million metric tonnes, and the crop for the 2021/22 season will be quite comparable to the previous season. The difference is around a 2% fall in crop size, owing to lower expected crops in West Africa (down 6% from 2020/21) and Vietnam (down 11%), which are partially offset by a strong crop in Cambodia (up 32 percent). The most significant declines in West Africa are expected in Côte d'Ivoire (7%), primarily owing to drought, Nigeria (8%), Ghana (9%), and Benin (9%). (13percent) for the remainder of the origins, no changes are expected USDA.

Eight states in our nation, primarily on the west and east coasts include Andhra Pradesh, Goa, Karnataka, Kerala, Maharashtra, Orissa, Tamil Nadu, and West Bengal. Additionally, a small number of areas also grow cashews of Tripura, Meghalaya, Nagaland, Chhattisgarh, and Assam. Container and vessel availability in Africa has hampered the supply of raw materials to Asian processors, while kernel exports from Asia to Europe have been halted since October last year. Shipping rates began to rise about this period and continued to do so until the first semester of 2021. Kernels were extremely impossible to get by in Europe, and they were scarce in the United States. Despite the disturbance in raw material flow into India and Vietnam owing to the local crop's harvest,

raw cashew was not in limited supply at the processing plants. However, once the nuts were processed, empty container availability was limited, bookings were tough to come by, freight rates were high, and transit durations had increased. Even after arriving, transporting the containers to warehouses became challenging due to skyrocketing freight charges in the United States and Europe. On the demand side, imports into Europe and the United States climbed by 3 to 7% in the first quarter of 2021, as cashew demand continued to rise. Prices are anticipated to stabilize, if not rise, as a result of the reduced availability of Asian kernels. After a sharp decrease in 2019 and 2020, the pricing trend appears to be beginning to show signs of recovery in 2021. Demand in India, which was hit hard by Covid-19 last year, is expected to go up in the second half of this year.



Source: USDA 2021-22

Fig 1 International production: Cashew nuts, with shell

#### Present trade and future scope

- In FY22 (through August 2021), India exported cashews worth US\$ 185.31 million, including US\$ 35.38 million in August 2021.
- The entire cashew export in FY21 was US\$ 420.17 million, and it was US\$ 40.44 million in March 2021.
- In FY20, cashew nut export revenues totaled \$566.76 million.
- Between April 2019 and March 2020, cashew exports totaled \$566.82 million.
- Cashew exports totaled US\$ 49.71 million in April 2021.
- Cashew kernels are exported from India to more than 60 nations. Its main markets include the United States, the Netherlands, Japan, Spain, France, Germany, the United Kingdom, and Middle Eastern nations including the United Arab Emirates and Saudi Arabia.

#### Cashew export promotion council of India

The Cashew Export Promotion Council of India (CEPCI) promotes cashew kernel and CNSL exports in India. The council acts as a link between cashew kernel importers and exporters who are members of the organization. It also handles export/import issues involving quality standards and contractual duties, among other things. It engages in a variety of activities, including hosting worldwide buyer-seller meetings, conducting nutritional studies on cashews, and assisting processors and cashew exporters in India with infrastructural improvements [13].



*Future scope*

Cashew nuts are edible kidney-shaped nuts that are roasted and shelled before consumption. They are high in oil and protein. The oil collected from the shell is used in the manufacture of polymers as a lubricant. The cashew market research examines production (by volume), consumption (by value and volume), and trade (by value and volume), as well as price trend analysis. When gathering statistics for production and trade, raw cashew nuts (in-shell) were examined. Cashew consumption in India is 1.6 million metric tonnes, and it is expected to grow at a CAGR of 4.0 percent during the projection period (2021-2026). India has the highest cashew consumption in the world. However, as a result of Covid-19, the price of cashew has dropped to its lowest level in the past 10-12 years.

*Processing and value addition in cashew**Growing market of cashew value added products*

The cashew nut industry's major by-products are cashew apples and value-added goods. The 573,000 MT cashew apple, which is thrown after eating walnuts, is significantly more nutritious than many fruits, and is used to make a cashew jam with apple juice, cashew jelly, and osmotic dehydration. This effort will satisfy the obvious societal health advantages, expanding global demand from farmers, entrepreneurs, and consumers, retain market share, and be economically sustainable ahead of the fast-emerging global competition.

*Increase cashew nut consumption as a healthy snack*

For many years, edible cashew nuts have been used as a snack and as one of the key ingredients in desserts and cuisines, particularly Asian foods. Cashew nuts have a higher fibre content than peanuts, which aids in weight growth by improving digestive efficiency. To address demand for this high-value nutrition, snack producers have introduced a variety of cashew-based snacks, including ready-to-drink cashew milk that works as a lactose-free milk substitute [14].

*The market of the cashew*

It is currently widely farmed in key producing nations such as Vietnam, Nigeria, and India. In the second part of the 16th century, it was brought to India for the purpose of tree planting and soil protection. Since its humble beginnings as a product aimed at reducing soil erosion, cashew nuts, like tea and coffee, have become substantial sources of foreign exchange. Cashew nuts, sometimes known as "natural vitamins," generated £ 4.1 billion in 2002 and are currently the world's most popular nut crop, encouraging health for millennia. It is grown in 9.91 lakh acres in India, yielding 6.92 lakh raw walnuts each year. On the west coast, Maharashtra, Goa, Karnataka, Kerala, Tamil Nadu on the east coast, Andhra Pradesh, Orissa, and West Bengal are the biggest producers. In non-traditional places like as the Bastar region of Chhattisgarh, Karnataka, Gujarat, and the Chorale region of Jharkhand highland parts in the northeast, it is also farmed in a small area. Raw cashew nut production will reach 25.0 lakh by 2030, and 45.0 lakh by 2050. This sector is vital to the economies of many rural and suburban Indian areas. The sector generates Rs 5.2 billion in foreign exchange in the nation on a yearly basis.

*Constraints faced by the Indian cashew industry*

- In comparison to other major growers, India's average nut production is significantly lower. This is due to the country's increased number of elderly and senile gardens, the majority of which are seedlings.

- The orchards' average performance is low because to heterozygosis.
- Because much of the cashew producing region is in a low-fertility zone, the crop has been unable to reach its full output potential.
- The dispersed land holdings impede the use of modern cashew farming technology.
- Processing a large portion of the supply, which comes from tiny holders, is a challenging operation.
- The processing business has a higher initial investment cost.
- Domestically, there are insufficient raw materials and the supply of raw materials is inconsistent.
- Domestic prices fluctuate, and the cost of imported raw nuts is greater.
- Manpower shortages due to a lack of qualified personnel.

*Prospects and future scope for Indian cashew*

- India's inbuilt strength is its diversified agro-climatic conditions, which are beneficial to a wide range of crop cultures, including cashew farming.
- The well-defined and ever-increasing local and international market for cashew and its by-products needs a significant increase in cashew farming.
- The products would gain additional weight due to the brand name of Indian cashew that has already established itself in the worldwide market.
- People's increasing purchasing power has made this luxury food more accessible than ever before, resulting in a surge in both domestic and international demand for nuts.
- Strong R&D networks across the country, capable of dealing with fresh difficulties as they arise, can help to enhance output and productivity.
- The government encourages area expansion by giving inputs and other resources. Cashew production in India is being bolstered by providing farmers with high-quality planting supplies.

## CONCLUSION

In this era of intensive agriculture and/or horticulture, small farmers are under a lot of pressure to manage their production with ever-increasing inputs. Crops like cashew may be a godsend to farmers since they can thrive with little inputs and care while yet yielding a higher profit for the producer. With the combined efforts of the government and commercial cashew enterprises, great attention is being placed on cashew farming, allowing farmers to better their living while also contributing to the national economy. Rather than paying roughly Rs 9 billion annually to buy raw cashew nuts, processing, India can create commercial cashew orchards on wastelands and export it. By implementing the advised set of practices in forest regions. This will result in exports will be stable and valuable due to stability in the supply of raw cashews. Along with the development and employment of badlands, foreign exchange can also be preserved. Around three decades ago, India had a monopoly on the global cashew kernel trade, providing 95% of the kernels. Today, the percentage has dropped to about 50%. Because the supply countries are beginning to process their own raw cashew nuts, India won't be able to sustain its leadership position in the global market by relying solely on imported raw cashew nuts. The amount of raw cashew nuts produced in the nation is much less than what is needed for domestic consumption and what could be exported.

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