

Post Harvest Technologies for Commercialization



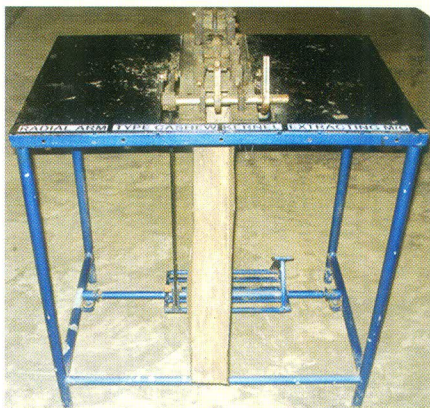
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Radial Arm type Cashew Kernel Extracting Machine (Patent no.272371)



Preparation of cashew kernels for trade and export is an intricate procedure compared to that of other edible nuts. Shelling has been the greatest problem in processing and the contributing factors are

irregular shape of nut, brittle nature of kernel and the presence of Cashew Nut Shell Liquid (CNSL). To overcome the problems of operator's drudgery, lower qualitative efficiency and inferior production rate, radial arm type cashew kernel extracting machine was developed. In this kernel extractor, single operation enables splitting of steam treated cashewnuts between two horizontally mount blades specially shaped to suit the contour of the raw nut. Constant onward movement of blades penetrates unto inner edge of shell, protecting the kernel damage. Simple locknut and bolt assembly is provided to adjust the gap between the holder and splitting blade. Operating in sitting posture reduced drudgery. Besides, qualitative efficiency and production rate experienced in the existing shelling unit is improved. The operational capacity and quantitative efficiency worked out as 9.3 kg h^{-1} and 88.1 % respectively.

Dual mode dryer for raw cashewnuts



Direct sun-drying and the use of solar driers depend on the intensity of the solar energy to heat up the air and effect drying. Most of the horticultural crops

are usually at the peak of their yield when the rain has fully set. Raw cashewnuts are normally sun dried immediately after harvest to reduce the moisture to safer level. Early set of monsoon in Southern states and coincidence of rains and harvest in cashew growing regions of North-Eastern hills of India affect the quality of the nuts. This period is characterized by low sun energy and high relative humidity and in turn prolongs drying period. Moreover, heating up the air using electricity, wood or fossil fuel for drying agricultural commodities is discouraged now-a-days. In view of the problem aforesaid, a dual mode dryer for raw cashewnuts was developed. Dual mode dryer consisted of three major components viz., drying chamber, aspirator and heat exchanger. Time required to reduce its moisture level from initial moisture content of 20.4 % to safer level of 8.0 % (d.b) is in the range of 2.84 to 4.51 h irrespective of source of power, size of the nuts and position of the tray inside the dryer. Quantity of cashew shell cake required per batch is 2.1 to 3.0 kg h⁻¹. Cost of drying raw cashewnuts per kg is Rs 0.44 per kg

Radial Arm type Cashew Kernel Extracting Machine (Patent no.272371)



Kernels obtained by drum roasting mode of processing are very much preferred in certain countries for its taste and flavour. Highly skilled personnel are engaged in drum

engaged in drum roasting operation i.e. for feeding the nuts, rotating the drum, controlling the fire beneath drum and to pull out roasted cashewnuts from outlet of drum. Feed rate, temperature of furnace, resident time of nuts being roasted while passing along the slope of perforated drum and rotation per minute (RPM) of the drum are the

deciding factor to maximize white whole kernels extraction after shelling. Roasting parameters are fixed by trial and error method by experience and invariably affected the end product quality in terms of whole kernel to broken ratio and appealing quality in the existing mode of processing. Mechanized roasting machine with optimized process parameters yielded better results. Continuous type rotating drum roasting machine consisted of three major components viz., revolving type roasting cylinder, bucket elevator and smoke outlet. Chimney is designed appropriately to develop suction pressure to leave smoke generated during roasting process. This roasting machine could be operated by 1.0 hp 3-phase electric motor and its estimated output is 135 to 160 kg h⁻¹.

Concentric drum type rotary sieve grader for raw cashewnuts



Size grading of raw cashewnuts prior to processing is the first step in mechanization. Graded cashewnuts reduces work load in subsequent process of shelling, peeling and grading to achieve the goal of

maximizing whole kernel recovery. Amidst, growing problem of labour scarcity faced by cashew processing industry in India, size grader for raw cashewnuts is of immense help to machinery manufacturer and processors to greater extent. Size of the raw cashewnuts indicates its maturity and it is considered to be criteria in the prevailing standards to fix up the price. A motorized concentric type rotary sieve grader consists of a buck elevator, concentric rotary sieve drums and drive mechanism. Blinding of nuts inside the sieve wholes can be prevented by rotary motion due to gravitational fall. Hopper bottom facilitate in collecting the graded nuts just below each concentric rotary drum. This grader is operated by a 2.0 hp electrically

powered motor. The effective width of the nut is used as criteria to size grading. The ratio between number of sieve holes available per unit length and the nuts entry implies that individual nuts gets around 17 times opportunity to register the sieve holes. Five different sizes of nuts can be segregated using this grader and its capacity is estimated as 550 kg h^{-1} .

Hydraulic type cashew apple juice extractor



Preparation of alcoholic beverage from cashew apple is restricted in all cashew growing states in India except Goa. Due to its short shelf life and the presence of astringency, cashew farmers are unable to get additional revenue through this by product. Juice needs to be extracted from cashew apple immediately after harvest and addition of preservative extend the shelf life of the juice extracted which can be transported to distant places

for further processing. Non alcoholic products such as juice, squash, syrup and jam are simple to prepare and gradually gaining commercial importance. Moreover, cashew apple powder prepared after extraction of juice and drying, is blended with animal feed for nutritional enrichment. Cashew apple juice extractor is a 2-ton load hydraulic ram and piston type unit. It consisted of a power pack unit (fluid regulation), Stainless steel disk type compressor, fruit loader with outlet and drive mechanism. A lock and release mechanism is provided for easy loading of perforated cylindrical fruit container for every batch. It can be used for extracting juice for any type of fruits and can be operated by women folk. As this processing facility requires less investment, it encourages starting up of rural agro industries and in turn improves rural economy. Juice could be extracted to up to 80 to 85 % during the first pass and around 60 to 65 % of the residual juice available in the second pass. It is observed that clear juice can be extracted from the juice extractor as the vertical compressive force through hydraulic ram and piston is applied over the fruit body uniformly. The juice extractor is installed on movable trolley and hence it can be transferred to farm, for juice extraction.

Updraft gasifier for cashew shell cake



Cashewnut processing relies on thermal energy to carry out the desired operations to achieve high processing efficiencies during material conversion processes. The gasification of

biomass into useful fuel enhances its potential as a renewable energy resource. Cashew shell cake (CSC) is the byproduct of cashewnut processing industry and huge quantity of this material is utilized inefficiently and causing extensive pollution to the environment by the direct combustion. A cashewnut shell cake based updraft gasifier suitable for applications needing thermal requirement in the range of 10 to 12 kW is developed and it consists of a reactor serving as gasifying media, blower, ash outlet and gas burner. CSC is loaded in the updraft gasifier and lit through ignition port provided at the bottom. When smoke emanates from top layer of the shell cake, it is closed with a lid after filling water in the annular space to avoid leakage of producer gas through lid. Blower is operated and air velocity is regulated to provide controlled environment inside reactor. Producer gas generated from cashew shell cake passed through conduit and reaches the burner. Average flame temperature of gas generated is found to be 487°C and protocol for operating gasifier with CSC is developed.

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