- E-speak button enables the app to read text for the user in different sections.

Mode of development

The design and technical content of the app is developed by ICAR- DCR, Puttur in collaboration with AICRP-cashew centres spread across the country. The financial support was provided by Mission for Integrated Development of Horticulture, Ministry of Agriculture and Farmers Welfare, New Delhi through Directorate of Cashew and Cocoa Development, Cochin, Kerala.

The app is made available through Google Play Store for public use.

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Cashew sprouts: A mineral-rich diet

Raising of cashew sprouts in sterile sand bed and coir

Cashewnut is consumed either in uncooked or cooked form and conquered a solid position in everyone's diet due to its high nutritional quality. Cashew is rich in monosaturated fatty acids (38-47%) and protein (21-28%), and supports the tissue build-up and strengthens the immune system. Apart from nutritional value, cashew nut also contains an anti-nutritional factor called phytic acid, which is a natural anti-nutritional substance that can block the absorption of minerals and possibly cause digestive issues in some persons. Cashew contains considerable amount of phytic acid (190 - 4980 mg/ 100 g DW). In general, germination, soaking in water, steaming, frying and fermentation are the common methods followed in many leguminous and cereals for the reduction of phytic acid. Among these methods, germination is an effective method and is reported to reduce the phytic acid even up to 80% and consequently increases the bioavailability of minerals and other nutrients. Raw cashewnut processing involves various

Comparison of nutritive and mineral status of cashew sprouts and cashew kernels

Biochemical/Nutrients	Cashew sprouts	Cashew kernels
Fat (%)	19-22	42-48
Protein (%)	15-18	20-24
Calorific value (cal/g)	5306	6874
Total sugars (%)	2.00	8.00
Free Amino acids (%)	1.06	0.48
Total Phenols (mg gallic acid equivalents /g)	27.71	2.05
Total Flavonoids (mg Catechin equivalents /g)	0.65	0.12
TAA (mg Ascorbic acid equivalents /g)	39.48	2.62
Phytic acid (mg/g)	0.02	0.49
Essential minerals		
Potassium (%)	0.85	0.85
Calcium (%)	0.58	0.03
Magnesium (%)	0.14	0.03
Iron (ppm)	336.94	30.4
Manganese (ppm)	10.1	2.32
Zinc (ppm)	60.62	9.1
Copper (ppm)	9.80	0.66

Cashew sprouts

75% RF + 25% CF | 5% CSP+70% RF + 25% CF | 10% CSP+65% RF + 25% CF

t15% CSP+60% RF + 25% CF | 20% CSP+55% RF + 25% CF | 25% CSP+50% RF + 25% CF

CSP extrudates prepared using different proportions of cashew sprout powder (CSP), rice flour (RF) and corn flour (CF)

steps *i.e.,* steaming, drying and roasting in which the phytic acid is not effectively reduced. Hence, to reduce the phytic acid to the maximum possible extent, the raw cashewnuts were raised in sterilised sand/coir beds under etiolated conditions for sprouting at ICAR-Directorate of Cashew Research (DCR), Puttur. Germination of the raw cashewnuts leads to a reduction in fat, calorific value and protein content. Whereas the germination increased the amino acids, phenols, flavonoids, total antioxidants, minerals such as calcium, iron, manganese, zinc and copper. Apart from the health benefits, the sprouting of raw cashewnuts is also found to be helpful to eliminate the costly processing steps involved in the extraction of the kernel from raw cashewnuts.

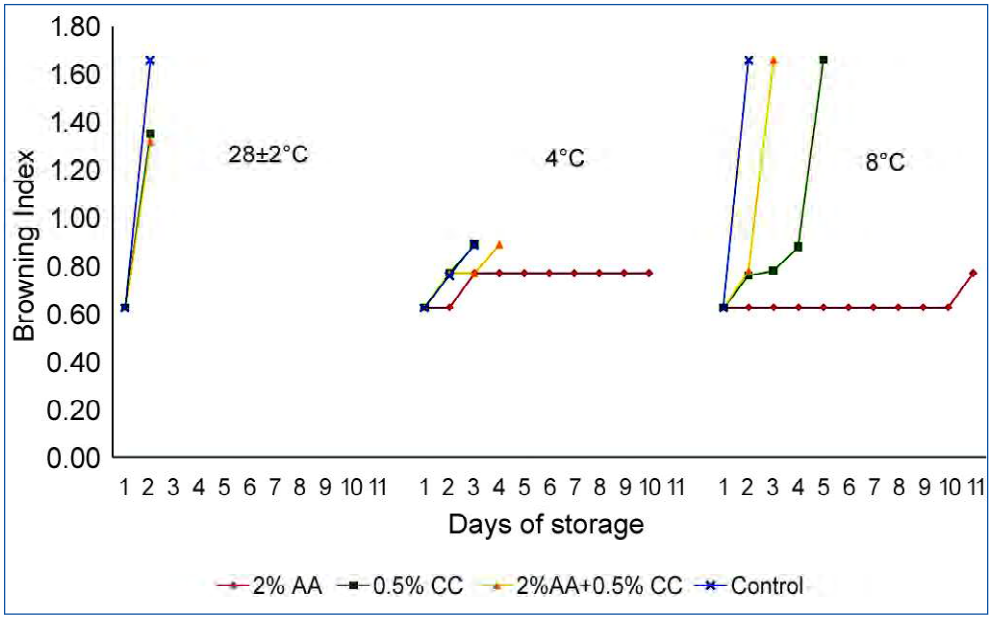
Uses of cashew sprouts and potential value-added products

Cashew sprouts have got several uses. It has been traditionally relished by people of all age groups who visit the cashew plantations during the start of the rainy season to collect the sprouts and consume it raw or for use in culinary preparations. ICAR-DCR, Puttur has developed several value-added products from cashew sprouts. Some are discussed below:

Cashew sprout extrudates

Corn flour and rice flour are the major ingredients in the extruded product preparation which are poor in minerals, proteins and fibre. Hence, to enrich the product with biominerals, protein and fibre, the mineral-rich cashew sprout powder (CSP) was added as one of the ingredients along with commercially available corn flour and rice flour. The cashew sprouts were collected and dried under 35-40ºC for 24-32 hr in a cabinet dryer, powdered using a mixer and used for this experiment. The optimised quantity of CSP ranged from 5-25% for its successful preparation along with commercially available corn and rice flour. Significant rise in nutritive and mineral content was observed with the increasing proportion of CSP.

Cashew sprout based energy drink



Browning index of treated and untreated CS pulp stored under different temperature

susceptible to browning especially after pulping. This browning behaviour of fresh sprout pulp obstructs the storage life and cause inconvenience during product development. The cashew sprout pulp was treated with chemicals such as 2% ascorbic acid (AA), 0.5% calcium carbonate (CC), and combination of both, and stored under ambient conditions (28±2ºC) and low temperatures (4ºC and 8ºC). The cashew sprout pulp treated with 2% AA stored under 8ºC and can be stored for 10 days without

Control and 2% AA treated CS pulp stored at ambient and low-temperature conditions

Cashew sprout based energy drink

The mineral-rich cashew sprout (CS) energy drink was prepared from fresh cashew sprouts. The fresh cashew sprouts were ground to a fine paste by adding water at the ratio of 1:3. The liquid phase was separated using a clean dry muslin cloth. Sugar and cardamom powder were added for taste and flavour. The milk was pasteurized using double boiling methods and filled in sterilised bottles. The cashew sprout milk contains Protein (19.63%) Potassium (0.51%), Calcium (0.7 mg/g), Magnesium (1.2 mg/g), Iron (208.87 ppm), Manganese (2.13 ppm), Zinc (49.73 ppm) and Copper (19.50 ppm).

Browning index studies for cashew sprout pulp storage

Cashew sprout is rich in phenols (27.71 mg gallic acid equivalents/g) compared to cashewnuts (2.05 mg gallic acid equivalents/g) and hence, it is highly susceptible to browning especially after pulping. This browning behaviour of fresh sprout pulp obstructs the storage life and cause inconvenience during product development. The cashew sprout pulp was treated with chemicals such as 2% ascorbic acid (AA), 0.5% calcium carbonate (CC), and combination of both, and stored under ambient conditions (28±2ºC) and low temperatures (4ºC and 8ºC). The cashew sprout pulp treated with 2% AA stored under 8ºC and can be stored for 10 days without any changes in the browning index (0.63) whereas the pulp without treatments had maximum browning index at the 2nd day of storage (1.66).

Cashew sprouts and development of cashew sprout based products is an entirely a new and emerging area of study and very first of its kind at national and international level. ICAR-DCR, Puttur had come up with the technologies for the development of microbial free cashew sprouts and their products. In addition to its health benefits, simplicity of adoption and the non-requirement of costly processing machineries can attract the processors of all kind including self-help groups to take up this venture.

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