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PREPARATION OF VEGAN MILK FROM CERALS (*Vigna unguiculata*) AND STANDARDISATION OF VEGAN CURD

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ABSTRACT

The consumption of plant-based milk substitutes has spread rapidly around the world due to its numerous positive health effects on the human body. Individuals with cow's milk allergy, lactose intolerance, and hypocholesterolemia prefer these beverages. Consumers have tended toward a plant-based diet which includes cereal, legumes, seeds, nuts, fruits, and vegetables because of varied reasons such as an aversion to animal cruelty, a desire for a healthy lifestyle, and environmental awareness. Cowpea (Vigna unguiculata) is often referred to as the poor man's meat as it is a significant source of protein, minerals, and vitamins for the rural poor who have limited access to protein from animal sources such as meat and fish.

INTRODUCTION

Over the last 50 years, the daily intake of protein has increased in high-income countries, particularly coming from meat, eggs, milk and dairy products, increasing from 39 to 52 g per capita between 1961 and 2011. Cow's milk has been widely consumed around the world for hundreds of centuries and acts as an important source of protein. It also acts as a wholesome complete food providing all the major nutrients like fat, carbohydrates and proteins. Further, researchers have shown that the consumption of bovine milk can help the human body by providing wide range of host-defence proteins (Hettinga et al. 2011; van neerven et al. 2012). This is because various beneficial anti-microbial effects are observed in both human and bovine milks. Firstly, the presence of various pathogens like *Salmonella* spp. and *Escherichia coli* O157:H7 in milk has been associated to cause wide spread disease outbreaks around the world (Oliver et al. 2009). Secondly, the cow's milk allergy is one the most wide spread allergy among infants and children (Vanga et al. 2015). According to the latest reports, 2.2–3.5% of the infants are allergic to cow's milk followed by peanuts and tree nuts (Gray et al. 2014; Sicherer and Sampson 2014; Vanga et al. 2015). But recent studies conducted on a large scale have shown that about 35% of these infants outgrow their allergenicity towards milk by the age of 5–6 years; and this may further increase to 80% by the time they reach 16 years (Gray et al. 2014; Santos et al. 2010; Skripak et al. 2007). Another issue widely associated with consumption of cow's milk is 'lactose intolerance'. The intolerance is due to the absence or deficiency of the enzyme lactase in the digestive tract and is widely observed in 15–75% of the adults (Bahna, 2002; Scrimshaw and Murray, 1988). Few studies showed that 80% of people from African origin and 100% people of Asian and American Indian origin are lactose intolerant (Swagerty et al. 2002).

Cowpea (*Vigna unguiculata* (L.) Walp.) is one of the most important food and forage legumes in the semi-arid tropics that include parts of Asia, Africa, Southern Europe, Southern United States, and Central and South America. It is truly a multifunctional crop, providing food for man and livestock and serving as a valuable and dependable revenue-generating commodity for farmers and grain traders. Seeds of cultivated cowpea types weigh between 80mg and 320mg and range in shape from round to kidney-shaped. Cowpea is of major importance to the livelihoods of millions of people in less developed countries of the tropics. It is consumed in many forms. Young leaves, green pods, and green seeds are used as vegetables, and dry seeds are used in various food preparations. With 25% protein (on dry-weight basis) in its seeds and tender leaves.

The bulk of the diet of the rural and urban poor in Africa consists of starchy food made from cassava, yam, plantain and banana, millet, sorghum, and maize. The addition of even a small amount of cowpea ensures a nutritional balance and enhances the protein quality by the synergistic effect of high protein and high lysine from cowpea and high methionine and high energy from the starchy foods. Trading fresh produce and processed cowpea foods and snacks provides rural and urban women opportunity for earning cash income. Similar to other pulses, the storage proteins in cowpea seeds are rich in the amino acids lysine and tryptophan when compared to cereal grains, but low in methionine and cysteine when compared to animal proteins. Total seed protein content ranges from 23% to 32% of seed weight. Cowpea seeds are also a rich source of minerals and vitamins and among plants have one of the highest contents of folic acid, vitamin B necessary during pregnancy to prevent birth defects in the brain and spine. High amounts of calcium, iron, and zinc are desirable from a nutritional standpoint. The objective of the present study is to develop technology of cowpea based milk production and to analyse its chemical composition and basic quality properties in terms of storage.

METHODOLOGY

1. Sample Collection:

Vigna unguiculata was purchased in the local grocery shop and branded curd or dahi purchased in the dairy shop.

2. Isolation Of Microbial Culture

Microbial culture was isolated using pure culture techniques. The isolated culture was stored in the MRS Agar (De Man, Rogosa and Sharpe agar).

3. Preparation *and comparison* of vegan milk from *Vigna unguiculata*

Soak about 150 g of *Vigna unguiculata* in sufficient amount of water so that they are completely dipped in it. Take out swollen *Vigna unguiculata* and grind them to a very fine paste and filter it through a muslin cloth. Clear white filtrate is *Vigna unguiculata* milk. Take 50 ml of *Vigna unguiculata* milk in the beakers and heat at 50°C respectively. Add ¼ spoonful curd to the beakers. Leave the beakers undisturbed for 8 hours and curd is formed. The quality of curd and taste to be observed.

4. Formulation OfVeganYogurt:

Vegan yogurt, or curd prepared *Vigna unguiculata* using milk, yogurt bacteia, mainly *Lactobacillus bulgaricus* and

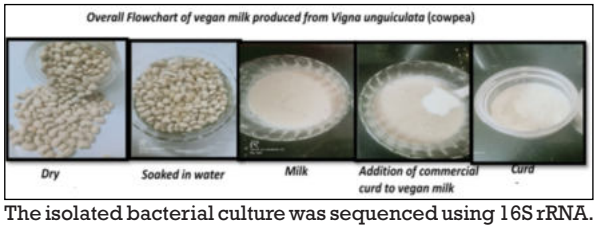
streptococcus thermophilus and sometimes additional sweetener, like fructose, glucose, or raw sugar. It is suitable for vegans, as the bacteria for shop-bought vegan yogurt are usually not grown on a dairy base. The Qualitative parameters checked in TNAU.

5. Genome Characterization Of Isolated Microbial Culture From Curd

The isolated bacterial culture is to be sequence with standard protocol. The obtained sequence to be analyze with standard protocols and phylogenetic tree to be constructed (Eden et al., 1991).

RESULT AND DISCUSSION

Nowadays, consumers are increasingly demanding for products fortified with probiotic bacteria (Stanton, Ross, Fitzgerald, & Van Sinderen, 2005). The vegan milk was prepared using *vigna unguiculata* and inoculated with curd for fermentation. The result was shown in fig 1.



The isolated bacterial culture was sequenced using 16S rRNA. The sequence of size about 710 bp was submitted in the NCBI database and the accession number was assigned for the bacterial sample Mz930379.

> MZ930379 |
ATTGTACGTGTTAGGGCCCTTTCCGGGGCTTAGTGCCGCAGCTAACGCATTAAGCACTCCGCCTGGGGAGTACGACCGCA
AGGTTGAAACTCAAAGGAATTGACGGGGGCCCGCACAAGCGGTGGAGCATGTGGTTTAATTCGAAGCAACGCGAAGAACC
TTACCAGGTCTTGACATCCCGATGCTATTCCTAGAGATAGGAAGTTTCTTCGGAACATCGGTGACAGGTGGTGCATGGTT
GTCGTCAGCTCGTGTCGTGAGATGTTGGGTTAAGTCCCGCAACGAGCGCAACCCCTATTGTTAGTTGCCATCATTAAGTT
GGGCACTCTAGCGAGACTGCCGGTAATAAACCGGAGGAAGGTGGGGATGACGTCAAATCATCATGCCCCTTATGACCTGG
GCTACACACGTGCTACAATGGTTGGTACAACGAGTCGCGAGTCGGTGACGGCAAGCAAATCTCTTAAAGCCAATCTCAGT
TCGGATTGTAGGCTGCAACTCGCCTACATGAAGTCGGAATCGCTAGTAATCGCGGATCAGCACGCCGCGGTGAATACGTT
CCCGGGCCTTGTACACACCGCCCGTCACACCACGAGAGTTTGTAACACCCGAAGTCGGTGAGGTAACCTTTTAGGAGCCA
GCCGCCTAAGGTGGGATAGATGATTGGGGTGAAGTCGTAACAAGGGTAACCGTAGGGTGTGATCCTGGCTCAGTACAGT

The vegan curd was checked the quality parameters and result was recorded in the table 1a &b. Functionality in these beverages may be to addresses different needs and lifestyles- to boost energy, fight ageing, fatigue and stress, target specific diseases and the sector is still expanding. In recent years, these changes and developments have led to newer products in the beverages sector. One such major functional requirement is milk alternatives to answer problems of cow milk allergy, lactose intolerance, calorie concern and prevalence of hypercholesterolemia (Valencia-Flores et al. 2013)

Table 1a. Parameters Analyzed In Cow Milk

S.NO	PARAMETERS	RESULTS
1	Acidity (%)	0.18
2	TSS	0.18
3	Protein	4.58
4	Fat	5.82
5	Carbohydrate (%)	4
6.	Crude fibre	-

Table 1b Parameters Analyzed In Vegan Curd

S.NO	PARAMETERS	Results	
		BLACK EYED COWPEA	METHOD OF ANALYSIS
1.	Acidity (%)	0.87	DGHS method
2.	TSS(Brix)	8.2	Refractometer method
3.	Carbohydrate (%)	8.3	IS 1656 2006
4.	Protein (%)	5.71	Kjeldahl method
5.	Fat (%)	0.22	Socs-plus method
6.	Crude fiber (%)	0.10	IS 12711:1989 Reaff 1994

CONCLUSION

The development of cowpea milk in future it will meets the current trends towards an increased consumer demand for healthier products. People also choose plant-based milk substitutes for several health-related reasons. Over the past decade, major research emphasis in all sections of food product development is to address the changing needs and to meet the present demands of consumer by creating newer alternative of health foods. Increasing urbanization has accelerated these demands; concerted research effort in functional and speciality beverage for newer products is the recent trend. In today's world, beverages are no longer considered simply as thirst-quenchers; consumers look for specific functionality in these drinks, which forms a part of their lifestyle.

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