

Formulation and Standardization of *Cassia auriculata* Tea powder recipe using natural preservatives and Flavoring agent

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Abstract: In this study the effects of herbs on tea powder formation and its standardization were investigated. Flowers show most antioxidant activity in all assay systems due to higher phenolics and flavonoids content. The aqueous powder from leaves, flowers and seeds of *Cassia auriculata* herb were used in the preparation of tea powder using natural preservatives. The edible flower is Non-toxic and innocuous with health benefits when consumed in human diet. Tea powder method was formulated, standardized and prepared using *Cassia auriculata* leaves, flowers and seeds. The *Azadirachta indica* (neem leaves) was used as a natural preservative and *Ocimum tenuifloru* (holy basil) is used as flavouring agent. The acceptability responses of the semi panelists were encouraging for 30 days interval period upto 90 days. Accordingly, it was found that the product was accepted by the consumers. The sensory quality of *Cassia auriculata* tea powder was acceptable till the storage period of 90 days in room temperature. Formulation and Standardization of indigenous *Cassia auriculata* tea powder was prepared without adding any artificial preservatives. The *Cassia auriculata* can be very well utilized for preparation of tea powder and the product scored as good. Include this herb in your daily diet in the form of tea to revitalize the entire biological system.

Key Words: *Cassia auriculata*, health benefits, natural preservatives, tea powder and sensory evaluation.

1. INTRODUCTION:

Cassia auriculata L. (Family: Caesalpiniaceae) is an ethno botanically important shrub with attractive yellow flowers and commonly known as “Avaram” in Tamil (Thulasi et al., 2012 (1)). The medicinal values of these plants lie in bioactive phytochemical constituents that produce definite physiological actions on the human body (Akinmoladun et al., 2007 (2)).

The flower, leaves, stem, root, and unripe fruit are used for treatment, especially in Ayurvedic medicine. People use *Cassia auriculata* for diabetes, eye infections (conjunctivitis), joint and muscle pain (rheumatism), constipation, jaundice, liver disease, and urinary tract disorders (Joshi, 2000 (3)). According to Chauhan et al., 2009 (4) and Raj et al., 2012 (5), they stated that some reports are available on their antidiabetic, acute toxicity, hyperlipidemic, cardioprotective, antioxidant, antimicrobial and hepatoprotective activities. *Cassia auriculata* were found to possess antidiabetic activity (Jalalpure et al., 2004 (6)) and controls dyslipidemia, cardiovascular risk associated with diabetes (Javekar and Halade, 2006 (7)).

2. LITERATURE REVIEW:

Problem statement

The number of people with diabetes in India has increased from 26 million in 1990 to 65 million in 2016 (Tandon et al., 2018 (8)). According to the 2019 National Diabetes and Diabetic Retinopathy Survey report released by the Ministry of Health and Family Welfare, the prevalence was found to be 11.8% in people over the age of 50 (Sharma, Neetu Chandra, 2019 (9)). Likewise, dyslipidemia is the most important atherosclerotic risk factor. Review of population-based studies in India shows increasing mean total cholesterol levels. Recent studies have reported that high cholesterol is present in 25–30% of urban and 15–20% rural subjects (Farzadfar et al., 2011 (10)).

Objectives:

The following ideas are the specific objectives of the study:

- To find the functional and nutraceutical properties of *Cassia auriculata* herbs
- To explore how *Cassia auriculata* herbs are used as alternatives to many diseases
- To formulate and standardize the indigenous *Cassia auriculata* tea powder recipe using natural preservatives and flavoring agent.

Nutritional Composition

Table.1 Nutritional composition of Cassia auriculata for 100 gms

Major components	Fresh Cassia auriculata (per 100g)
Energy (K cal)	412.6 Kcal
Moisture (%)	9.74%
Protein (%)	23.83%
Lipid (%)	6.68%
Total ash (%)	4.95%
Crude fibre (%)	8.93%
Oxalate ($\mu\text{g}/\text{mg}$)	1.38
Phytate ($\mu\text{g}/\text{mg}$)	0.12
Tannin ($\mu\text{g}/\text{mg}$)	3.02
Phenol ($\mu\text{g}/\text{mg}$)	1.11
Saponins (%)	0.0037

From the above table 1, According to Mahindra et al., (2020 (11)), it was found that Cassia auriculata has total energy 412.6 Kcal, 9.74 per cent of moisture, 23.83 per cent of protein and 6.68 per cent of lipid, total ash was 4.95 percent, and crude fibre was 8.93 per cent 100 g. The mineral analysis showed that nitrogen, potassium and phosphorus were the predominant elements present in the seeds. Calcium, zinc, sodium, magnesium, copper, and iron were also detected in appreciable amounts. The anti-nutritional factors analyzed were Oxalate (1.38 $\mu\text{g}/\text{mg}$), Phytate (0.12 $\mu\text{g}/\text{mg}$), tannin (3.02 $\mu\text{g}/\text{mg}$), Phenol (1.11 $\mu\text{g}/\text{mg}$) and Saponins (0.0037%).

Chemical Components:

The bioactive phytochemical constituents in medicinal plants include flavanoids, phenolic compounds, tannins, anthracene derivatives and essential oils (Edeoga et al., 2005 (12); Krishnaiah et al., 2009 (13)).

Traditional Uses

Leaves and fruits: Leaves and flowers of Cassia auriculata are used for treatment of diabetes in sacred grove of Pallapatty village (reserved forest), Madurai district, Tamil Nadu (Ganesan et al., 2009 (14)). The tea prepared from the leaves of Cassia auriculata is used in chronic fever and fruits are used for the treatment of intestinal worm as an antihelminthic drug (Joshi, 2000 (3)). Ratnam and Raju (2005 (15)) described that the Eastern Ghats tribals of Andhra Pradesh, make pills from ground leaves and fruits, which are given orally with limewater for three days for the treatment of leucorrhoea. It was observed that tribals of Southern India prepare paste from leaves in vinegar, and applied the paste on skin for various skin diseases (Jeeva et al., 2007 (16); Kingston et al., 2009 (17)). Ratnam and Raju, (2008 (18)) observed in Gundla Brahmeswaram Wild Life Sanctuary Andhra Pradesh, the tribals dropped the juice of fresh macerated leaves into ears in case of scorpion bite. The tender leaves are mixed with lime juice and given for the treatment of stomachache (Nagnur et al., 2009 (19)).

Flowers: The Andhra Pradesh tribal people prepare food stuffs from the flowers of Cassia auriculata (Reddy et al., 2007 (20)). In Kancheepuram district of Tamil Nadu, the dried flower powder mixed with milk (goat) are taken orally to prevent leucorrhoea (white discharge) (Muthu et al., 2006 (21)). The Cassia auriculata flowers are used for the treatment of spermatorrhoea (Joshi, 2000 (3)). Flowers of Cassia auriculata are mixed with whole plant of Enicostema axillare (Indian Whitehead) and fruits of Cuminum cyminum (Cumin seeds), given to cattle along with grass for three days to prevent heat diseases (Ganesan et al., 2008 (22)).

Other parts: Cassia auriculata is an amazing rejuvenating herb that has multitude health benefits. The different parts of plant have been used for various ailments in Ayurveda treatment. Roots are useful in urinary tract infections and cures skin diseases, tumours and asthma. The Bark powder of Cassia auriculata is used for fixing teeth and decoction for chronic dysentery. Decorticated seeds in fine powder form and paste are valuable local applications to purulent ophthalmia and conjunctivitis (Joshi, 2000 (3)). The Valaiyan community of Piranmalai hills, Tamil Nadu flora tribal uses different part of Cassia auriculata in the treatment of body heat and cuts (Sandhya et al., 2006 (23)). The tribals of the Chittoor district of Andhra Pradesh used various parts of the plant for the treatment of skin diseases, asthma, conjunctivitis and renal disorders (Vedavathy et al., 1997 (24)). The Tribal's used to mix stem decoction with garlic and powdered pepper and give to cattle as purgative in Southern districts of Tamil Nadu (Rajendran et al., 2008 (25)). The Eastern Ghats Tribals of Andhra Pradesh uses whole plant and roots orally in the form of pills with pinch of red soil for three days for Leucorrhoea (Ratnam and Raju, 2008 (18)).

Health Benefits

Anushia et al., (2009 (26)), revealed that this plant showed antibacterial and antioxidants activities. According to Joy et al., (2012 (27)), this plant and its parts are useful in treatment of various disorders in human being viz. diabetes, liver toxicity, fungal infection, microbial infection, inflammation, pyrexia, etc. It is also useful in treatment of ulcers, leprosy and liver diseases. Cassia auriculata is an amazing rejuvenating herb that has multitude health benefits. It is also extensively used for treating urinary problems, managing diabetes, preventing infections, promoting digestion and so forth (Kumar et al., 2002 (28)).

Medicinal Uses

The Cassia auriculata plant has been reported to possess antipyretic (Rao K.N., Vedavathy S., 1991 (29)), hepatoprotective, antiperoxidative and antihyperglycemic (Pari L., Latha M., 2003 (30)) and microbicidal activity (Prakash S.K., 2006 (31)). It has antiviral and anti spasmotic activity (Kalaivani et al, 2008 (32)). The C. auriculata plant is used in the traditional system of medicine for female antifertility, leprosy, worm infestation, diarrhoea, disease of pittam (Daisy et al., 2013 (33)). The C. auriculata plant has been extensively used as healing agent for rheumatism (Kirtikar and Basu, 2006 (34)) and conjunctivitis (Pari and Lata, 2002 (35)). The various parts of the C. auriculata plant were reported to exert a beneficial effect to alleviate the symptoms of diabetes (Deshpande Harshal A., et al., 2013 (36)).

The flowers: The flowers are used to treat urinary discharges, diabetes, nocturnal emissions, and throat irritation (Kirtikar and Basu, 1935 (37)). In managing Diabetes, especially the flowers are found to have admirable hypoglycaemic property. It plays a vital role in alleviating the blood sugar level of the body. The production of insulin from the β -pancreatic cells becomes active in consuming this wonder herb. Cassia auriculata helps to reduce the breakdown of starch into glucose and provides relief from various diabetic symptoms like frequent excessive thirst, hunger, urination and other symptoms.

The Bark: The Bark is used in skin conditions; bark as astringent (Prakash Yoganandam G. et al., 2014 (38)) is useful in checking secretion or haemorrhage. The abundance of antimicrobial, anti-bacterial, and antiseptic properties, make it the ultimate solution to ward off various infections and worm infestations. The bio-active components in the herb helps in boosting immunity and enhances healing. They also restore the disordered processes of nutrition (Nalla Sharada, et al., 2012 (39)).

The Leaf : The Leaf extract has a protective action against alcohol induced oxidative stress to the cells as evidenced by the lowered tissue lipid peroxidation and elevated levels of the enzymatic and non-enzymatic antioxidants and experimentally induced alcohol related liver damage. The leaf extracts also show emollient effect (Kalaivani et al, 2008 (32)).

The seeds: The seeds of tanner's cassia find their application in purulent ophthalmia i.e., inflammation of the eye or conjunctiva. They should be finely powdered and blown into the affected eyes (Nalla Sharada et al., 2012 (39)). Seeds are astringent, sour, cooling, constipating, depurative, aphrodisiac, anthelmintic, stomachic, alexeteric, useful in diabetes, chyluria, ophthalmic, dysentery, diarrhoea, swellings, abdominal disorders, leprosy, skin diseases, worm infestations, chronic purulent conjunctivitis (Pai Aruna et al., 2011(40)).

The Roots: The Roots are used in skin diseases and asthma (Prakash Yoganandam G. et al., 2014 (38)). The roots are astringent, cooling, alterative, and depurative and alexeteric, and are useful in skin diseases, leprosy, tumors, asthma and urethroroea (Pai Aruna et al., 2011 (40)).

Leaves, Flowers and Fruits: Leaves, Flowers and Fruits are antihelmintic and contains the potent anti-microbial property; its leaves and petals are both mildly astringent in taste. It is used extensively for preventing and treating urinary bladder distension, renal stones, and painful urination. The herb also possesses strong anti-spasmotic and anti-inflammatory properties which helps to prevent bacterial infections in the urinary tract and thereby reducing inflammation and pain while urinating. It also checks the flow of extra amount of urine and helps in absorption of required amount of fluids in the kidneys and intestines (Nalla Sharada, et al., 2012 (39)).

Pharmacological and medical applications: It is found that flowers, leaves and seeds of Cassia *auriculata* have a wide range of pharmacological benefits.

Precaution

Kheem Singh Dahiya (2016 (41)), strongly insisted to avoid using Cassia as herbal medicine during pregnancy, breast feeding and at least 2 weeks before a planned surgery.

3. MATERIALS AND METHODS:

It presents the methodology of unit operations including various materials required for preparation of Cassia auriculata, tea powder using natural preservative and flavouring agent. The "Formulation and acceptability studies of

tea powder prepared from indigenous *Cassia auriculata*” were conducted in the ICAR-Krishi Vigyan Kendra-Tirunelveli (Tamil Nadu). A brief description of methodology is presented below:

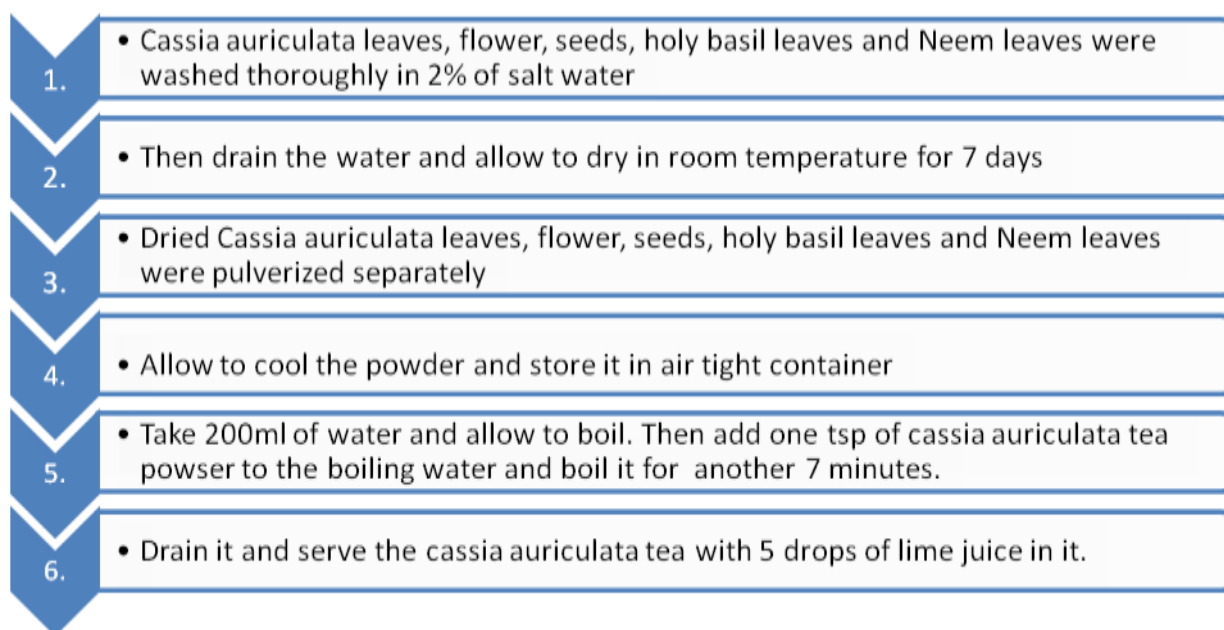
Raw materials: *Cassia auriculata* fresh flowers, leaves and seeds were collected along with *Ocimum tenuifloru* (basil leaves) and *Azadirachta indica* (Neem leaves) from the farm of ICAR-KVK-Tirunelveli, Tamil Nadu. The *Cassia auriculata* flowers, leaves, seeds, basil leaves and neem leaves were cleaned and dried in shade for 7 days at room a temperature of 20- 25° C.

Table-2: Requirement of raw materials for tea powder preparation of 100 grams

S.No.	Ingredients	Quantities
1	All parts of <i>Cassia auriculata</i> – flowers, leaves and seeds dry powder	70gms
2	<i>Ocimum tenuifloru</i> (Holy basil) dry powder - Flavoring agent	20 gms
3	<i>Azadirachta indica</i> (Neem leaves) dry powder – Natural Preservative	10 gms

Table 2 describes about the requirement of raw Materials for tea powder preparation of 100 grams.

Steps in preparation of *Cassia auriculata* tea powder



Cleaning and washing: The selected flowers, leaves, seeds of *Cassia auriculata* and basil and neem leaves were washed thoroughly in 2% salt water. The ingredients were washed thoroughly in water preferably in running water to remove insects, dust etc. The water from the ingredients was drained using a strainer for 2 hours.

Drying: The drained flowers, leaves, seeds of *Cassia auriculata*, basil leaves and neem leaves were spread in polythene sheets (60-70 microns) in the shade. The leaves, flowers, seeds of *cassia auriculata*, neem leaves and basil leaves were dried separately in room temperature of 20- 25° for 7 days.

Pulverizing: Dried *Cassia auriculata* leaves, flower, seeds, holy basil leaves and Neem leaves were pulverized separately and allowed to cool.

Preparation of Bottling: The cooled tea powder is sieved and transferred to airtight container.

Bottling: The freshly prepared *C. auriculata* tea powder is pale yellow in colour, flaky in appearance, has holy basil leaves aroma, and has a rough texture. Bottling was done in a sterilized container.

Preparation of Cassia auriculata Tea: Take 200 ml of water and allow to boil. Then add one tsp of Cassia auriculata to the boiling water and boil it for 7 minutes. Drain and serve the Cassia auriculata tea with 5 drops of lime juice in it.

Sensory Evaluation: The acceptability of the prepared Cassia auriculata tea powder was evaluated using Organoleptic Evaluation with five-point hedonic scale by 25 semi trained panel members. According to Lawless and Heymann (2010 (42)), sensory science has been defined as “a scientific method used to evoke, measure, analyze, and interpret those responses to products as perceived through the senses of sight, smell, touch, taste and hearing” .

Table 3 – Sensory evaluation score

I. Scale used		II. Sensory evaluation
5-point Hedonic scale		
Points	Attributes	Evaluate each of these
5	Excellent	1–Colour & Appearance
4	Good	2 –Aroma
3	Average	3 –Taste
2	Poor	4-Texture
1	Very Poor	5-Overall acceptability

Table 3 describes the Sensory evaluation score of Cassia auriculata tea powder by using 5 points Hedonic scale and its attributes.

4. DISCUSSION:

Organoleptic Evaluation was done using five-point hedonic scale by semi trained panel members from the product developed from Suvai-KVK, Tirunelveli.

5. ANALYSIS:

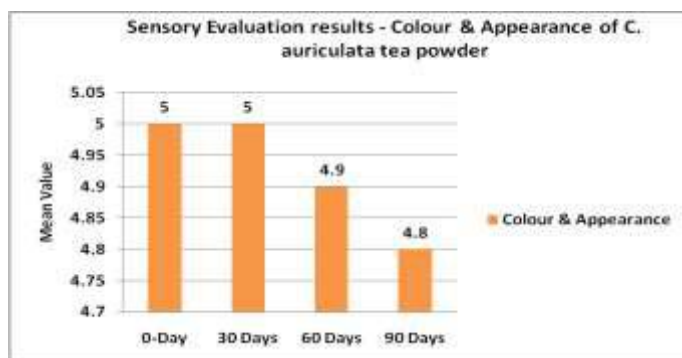
Table 4 - Mean Sensory Evaluation results

Mean Sensory Evaluation results					
Evaluation Intervals	Colour & Appearance	Aroma	Taste	Texture	Overall acceptability
0 Day	5	4.5	4.6	4.8	4.7
30 Days	5	4.4	4.5	4.7	4.6
60 Days	4.9	4.3	4.5	4.6	4.6
90 Days	4.8	4.3	4.4	4.5	4.5

Cassia auriculata tea powder from Suvai-KVK was evaluated

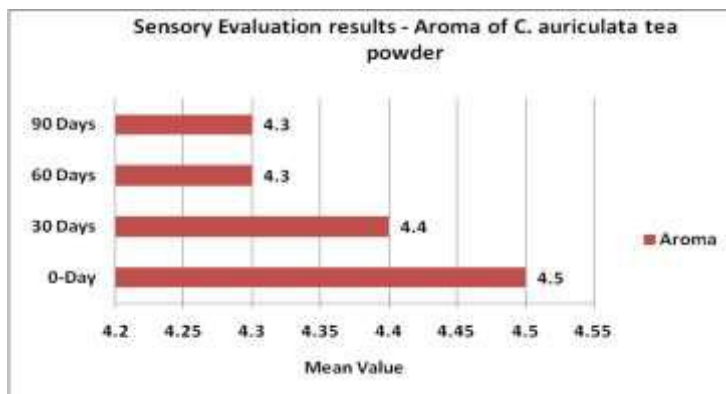
Table 4 depicted about the mean sensory evaluation results of Suvai-KVK -Cassia auriculata tea powder.

Figure -1 – Mean Sensory Evaluation results - Colour & Appearance of C. auriculata tea powder



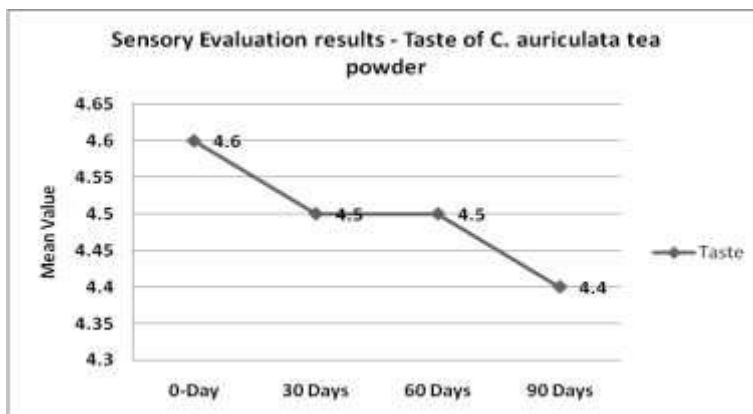
In figure-1, the mean value of sensory evaluation results from the responses of the 25 semi trained panelists for a period of 90 day with respect to the **colour and appearance** is illustrated in a bar graph. The results were encouraging in the sense that, the product scored good, mainly due to retaining its natural colour & appearance.

Figure -2 – Mean Sensory Evaluation results - Aroma of C. auriculata tea powder



In figure-2, the mean value of sensory evaluation results from the responses of the 25 semi trained panelists for a period of 90 days with respect to the **aroma** of the product is illustrated in a bar graph. The results were very encouraging, and the product scored good, due to its ability to retain the original aroma of the added flavoring agent (Basil leaves) throughout the period of evaluation

Figure -3– Mean Sensory Evaluation results - Taste of C. auriculata tea powder



In figure-3, the mean value of sensory evaluation results from the responses of the 25 semi trained panelists for a period of 90 days with respect to the **taste** of C auriculata tea powder is illustrated in a line graph. Encouraging results were observed as the product maintained its original taste even at the end of the evaluation period of 90 days.

Figure -4 – Mean Sensory Evaluation results - Texture of C. auriculata tea powder

In figure-4, the mean value of sensory evaluation results from the responses of the 25 semi trained panelists for a period of 90 days with respect to the **texture** of C auriculata tea powder is illustrated in a line graph. Appreciable level of change in the texture was not evident during the evaluation period of 90 days.

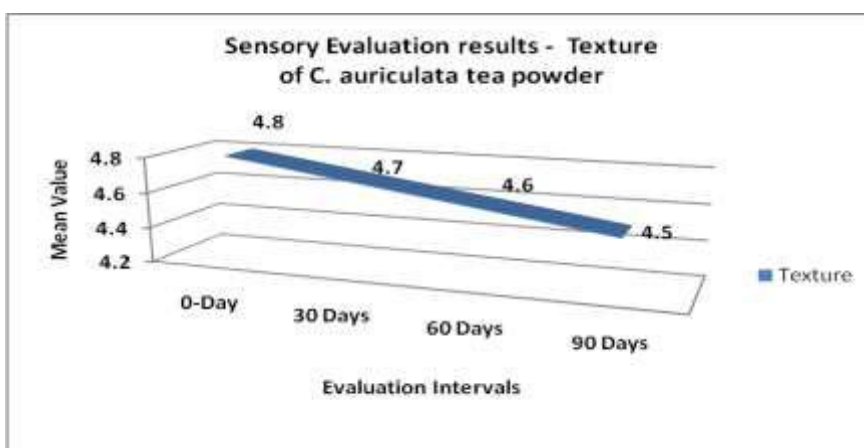
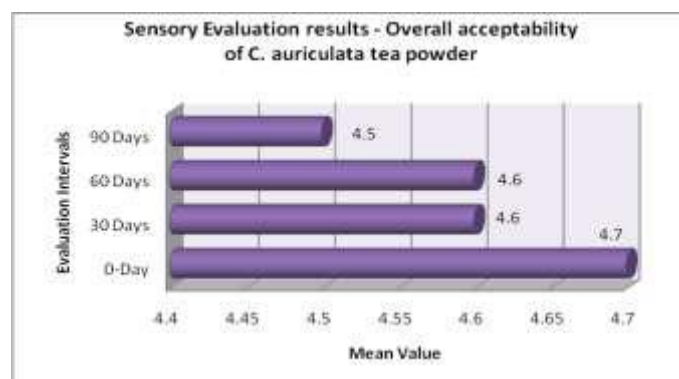


Figure -5 – Mean Sensory Evaluation results – Overall acceptability of *C. auriculata* tea powder



In figure-5 the mean value of sensory evaluation results from the responses of the 25 semi trained panelists for a period of 90 days with respect to the **overall acceptability** of *C. auriculata* tea powder is illustrated. The panelists found the product highly acceptable throughout the evaluation period of 90 days.

6. FINDINGS AND RECOMMENDATIONS:

The *C. auriculata* has the functional and Nutraceutical compounds. As an amazing rejuvenating herb, it has multitude health benefits and enormous traditional uses against various diseases. Include this herb in your daily diet in the form of tea to revitalize the entire biological system.

7. RESULT AND CONCLUSION:

The value-added product, tea powder was prepared from *Cassia auriculata*. From the results of the study it can be concluded that the *C. auriculata* tea powder without any added chemical preservatives, can be consumed safely for up to 3 months from the date of preparation. The acceptability rating of the semi trained panelists has conclusively shown that the product retains its original properties without any deterioration for a period of at least 90 days. The product is very cost effective even within reach of poorer section of the people.

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