



Organoleptic evaluation and shelf-life study of tender Jowar

Renuka Meti

Department of Food Processing & Nutrition, Akkamahadevi Womens University, Vijayapur, Karnataka, India

Abstract

The present study was undertaken to study the microbial contamination during storage of tender jowar and to develop value added products followed by organoleptic evaluation of developed products. Tender jowar is like tender corn can be marketed and explored for it is nutritious underutilized millet. The Tender Jowar (TJ) fresh grains were stored at deep freezer and maintained the temperature of -26°C , for one year to study the microbial contamination. The fresh seeds were removed periodically and evaluated for microbes count. The results of yeast and molds count were within the permissible limits and were within the permissible limits of FDA. Hence the microbial load of the tender jowar was within the acceptable limits during their storage. The organoleptic evaluation of developed products were well accepted for all the recipes. Hence tender jowar can be a very good fast food like tender corn which has entered the food market.

Keywords: organoleptic evaluation, microbial, permissible

1. Introduction

Jowar (Sorghum) is one of the most important cereal crops in the world and is one of the four major food grains of India. It is staple food for millions of poor rural people in Asia and African countries. Sorghum and other millets are the most drought tolerant cereal grains crops and require little input during growth but as with other crops yield better with good husbandry (ICRISAT / FAO, 1996). This crop is hardy & quite resilient to agro climatic adversities and play important role in marginal agriculture more common in hilly & semi-arid region as important source of food grains as well as highly value added fodder. Sorghum is also a potentially important source of nutraceutical such as antioxidant and cholesterol lowering waxes.

Enhancement of food & nutritional security of rural people, largely depend on these crops. These crops also play an important role in contributing to livelihood security.

The use of sorghum not only provides farmers with market for their products but also save foreign exchange, which would otherwise be regained to import cereals (John Taylor *et al.* 2006).^[4] Particularly in the developed countries there is growing demand for gluten free foods and beverages from people with celiac disease and other intolerances to wheat who cannot eat products from wheat, barley or rye.

However no scientific evidence is available on tender jowar. Tender jowar which is highly seasonal and available only for a limited period.

The association of food and microbes can be dated long before history. Foods are not only of nutritional value to those who consume them but often are ideal culture media for microbes. These use food as a source of nutrients for their growth. They may influence the quality, availability and quality of our food. Some foods we can't think without microbes. Therefore human has decided to prevent certain microbes in some extent. Microbes and food both are interrelated and

indispensable to each other. Food acts as a good substrate for microbes by providing essential growth requirements for microbes. Some microbes are beneficial through the fermentation process but some are harmful that causes dreadful disease in consumers by deteriorating the food. Predicting the growth and behavior of microbes in food has long been an aim in food microbiology research. Many different type of convenient foods are available in the market today like a packet of frozen green peas, suppose if one could get a frozen tender jowar in the nearby malls? How about going for its taste? Hence the present study has under taken to explore tender jowar as ready to eat foods just like tender maize with the following objectives to develop the value added products, to standardize the products to evaluate the developed products and keeping quality of TJ.

2. Materials and Methods

Procurement of sample

The sample was procured directly from the local farm near by Dharwad city, the TJ was plucked directly from the fields separated from the stalk and de husked then carried to the research centre under zero degree temperature with ice cubes, the time taken for transportation was thirty minutes. The sample was immediately cleaned; outer husk was further removed mechanically and kept under deep cold storage for analysis and for storage studies. The different basal ingredients required for preparation of recipes were also collected from the local market of Dharwad city.

Collection of sample for microbial analysis

The jowar samples were collected from the storage and aseptically transferred to sterile plastic bags were directly transported to the laboratory under cold condition (4°C) as per FDA/BAM (2003, chapter 1) and were analyzed within 24hours.

Microbiological analysis: Pre enrichment of Tender Jowar

The pre enrichment of tender jowar was carried out as per the FDA/BAM (2003), chapter 1. The samples were homogenized with stomacher in butterfields phosphate buffer dilution. 25gm of the sample in 225ml of butterfields phosphate buffer and incubate for 24±2 hours at 38 °C.

Total Microbial Count (TMC)

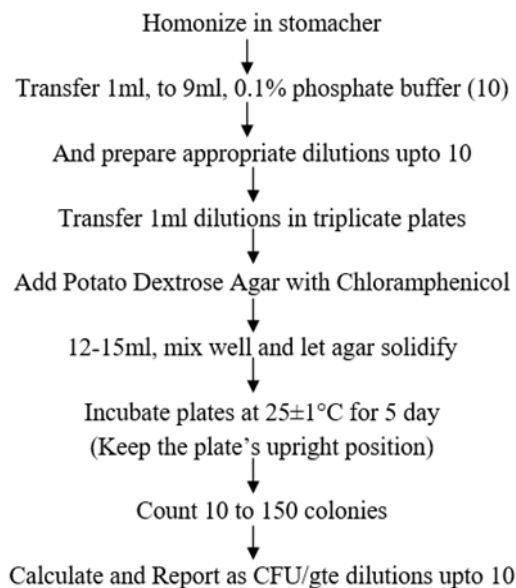
The TMC was carried out as per the FDA/BAM (2001, chapter 1). The fig 1 shows the flow chart of TMC. The pre enriched samples were serially diluted. Aliquots of different dilutions were spread on the plate count agar and plates were incubated at 35°C±1°C for 48± 2 hours. After incubation morphological and staining studies were carried out.

Yeast and Molds Count

The yeast and molds count was carried out as per FDA/BAM (2001, chapter 180). The pre enriched samples were serially diluted and spread on the yeast extract Chloramphenicol dextrose agar. The plates were incubated at 25±1°C for 3 to 5 days. The colony count, morphological study was carried. The fig 2 shows the flow chart of yeasts and molds count.

Flow chart for yeast and mould analysis

25gm to 50gms sample +225 to 450 ml in phosphate buffer diluents (10⁻¹)



Organoleptic evaluation

Organoleptic evaluation was carried out using trained and untrained 20 members of age group between 21-25 years as prescribed by Amerine (1965). The data obtained was analyzed statistically by completely randomized design (CRD) as per the procedure given by PANSE and SUKHATOME

(1967).

Methods of evaluation

Scientific methods of evaluation of food are gaining importance in assessing the acceptability of food products so in the present study two evaluation methods adopted i.e. subjective and objective evaluation.

Subjective evaluation

In the present study subjective evaluation is also known as organoleptic evaluation was used. Distinction among foods difference / preferences is obtained by senses. Preference testing is valuable in developing new foods and in evaluating quality. Difference testing is used to test the sensitivity of judges and to determine whether as inexpensive ingredient like jowar could replace as expensive ingredients. Hence in the present study acceptance preference test is used as preference test and score cards as descriptive test.

Acceptance preference test

Acceptance preference test is used to find out whether the product will be used by consumers and also shows their preferences for the sample being tested. Only one food is given to consumer panel. The consumer panel is made up of untrained, in experienced judges of young wives and young professionals and students of Dharwad city were selected.

Descriptive tests

Descriptive tests describe the sensory attributes of tender jowar in exact words. Food samples are individually evaluated by judges with the help of score cards with numerical values as given below.

Table 1 gives the composition of ingredients in different recipes.

Score card for organoleptic evaluation

Name of the recipe	Colour appearance	Flavor	Texture	Taste	Over all acceptability
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Development of recipes

Seven different recipes developed for the present study are were Tender jowar cutlet, tender jowar wada, tender jowar roasted pops, tender jowar masala puri, crazy jowar (Chaat 1 pepper lime), crazy jowar (Chaat 2 –chilli amchur) crazy jowar (Chaat 3 – chaat masala and lime). Chaats were selected because of its high acceptability and liked by all the age groups. The recipes were prepared using different processing methods such as roasting, sautéing, boiling & pressure cooking and deep fat frying. The ingredients and method of preparation of recipes is indicated in table -1.

Table 1: The ingrediaents used and method of preparation of TJ

S. No.	Name of the recipe	Method of processing	Main Ingredients	Quantity
1	TJ-cut	Shallow frying	TJ, Potato, carrot	TJ 80%, others 20%
2	TJ-wada	Deep frying	TJ, Basen flour	TJ 80%, others 20%
3	TJ-Rp	Roasting	TJ	TJ 100%
4	TJ-MP	Sauting	TJ	TJ 100%

5	TJ-chat-1	Mixing	TJ	TJ 100%
6	TJ-chat-2	Mixing	TJ	TJ 100%
7	TJ-chat-3	Mixing	TJ	TJ 100%

Organoleptic evaluation

The recipes were evaluated by the panel of 20 untrained members from the faculty and students of Shri Sathya Sai Home Science College, as well as local people of Dharwad city. The score card was formulated to give due weightage to all parameters like colour, appearance, texture and taste. The judges were instructed to sip water before and after tasting each product. The quality characteristics of each sample were recorded with the help of 9 point hedonic rating scale.

3. Results and discussion

Results-Microbial studies

The results of total microbial count were illustrated in the Table 2. The results showed that the bacterial population are within the FDA permissible limits. The gram staining of bacterial colonies showed the presence gram +ve streptococci. The results of yeast and molds count were illustrated in the table 4. The results of yeast and molds count are within the FDA permissible limits. Hence the microbial load of the tender jawar are within the acceptable limits at receiving as well as during their storage.

Table 2: Observation chart for bacterial isolation

Colony characters/isolates	Isolate I	Isolate II
General Observation		
Sample	PCA	PCA
Culture Media	Crushed	Dissolved
Incubation time	48hrs	48hrs
Incubation Temp.	37 °C	37 °C
Dilution factor	10 ⁻⁶	10 ⁻⁵
Macroscopic Observation		
Number of colonies	1	1
Size in mm	1 m	1 m
Colour	Cream	Cream
Surface	Smooth	Smooth
Margin	Circular	Lowbite
Elevation	Flat	Flat
Microscopic Observation		
Magnification	40 X	40 X
Shape	Cocci	Cocci
Arrangement	Chain	Chain
Gram staining	+ve	+ve
Other		

Table 3: Observation chart for fungal isolation

Colony characters/isolates	Isolate I	Isolate II
General Observation		
Sample	Yeast	Yeast
Culture Media	Crushed	Dissolved
Incubation time	5 Days	5 Days
Incubation Temp.	27° c	27° c
Dilution factor	10 ⁻²	10 ⁻⁶
Macroscopic Observation		
Number of colonies	1	1
Size in mm	1 m	1 m
Colour of colonies- Front	White	Cream
Back	Cream	White
Surface	Smooth	Smooth
Margin	Round	Round
Elevation	Flat	Flat
Microscopic Observation		
Magnification	10 X	10 X
Septation		
Conidia		
Genera	Aspergillus	Aspergillus
Other		

Organoleptic evaluation

The results of the organoleptic evaluation of different tender jowar recipes are given in table 4 & 5.

The products developed were organoleptically acceptable. All the recipes scored excellent (5) for appearance and colour except for tender jowar cutlet with scored very good (4) for colour and tastewise tender jowar cutlet, tender jowar wada, tender jowar roasted pops, crazy jowar chaat1 and 2 scored excellent (5) and crazy jowar chaat 2 and tender jowar masala puri scored very good. Texture of the product showed a slight

variation with excellent score (5) for tender jowar roasted pops, crazy tender jowar chaat 1,2&3 were as scored very good (4) for tender jowar cutlet and wada and good (4) for tender jowar masala puri.

Hedonic rating scale revealed that all the seven recipes liked very much by the evaluators. Except TJ chat-3. Fifty percent and more than 50 percent of consumer liked all the product very much were as 60 percent consumers liked extremely TJ roasted pops.

Table 4: Organoleptic evaluation scores of the Tender Jowar (sorghum) products

SL. No.	Recipes	Appearance	Colour	Taste	Texture
1.	Tender, Jowar Cutlet	5	4	5	4
2.	Tender, jowar Wada	5	5	5	4
3.	Tender, Jowar Roasted Pops	5	5	5	5
4.	Tender, Jowar masala Puri	5	5	4	3
5.	Crazy Tender Jowar (Chat 1, Pepper Lime)	5	5	5	5
6.	Crazy Tender Jowar (Chat 2, Chillin Amchur)	5	5	4	5
7.	Crazy Tender Jowar (Chat 3, Chat masala & Lime)	5	5	5	5

Scores: Excellent-5, Very good – 4, Good – 3, Fair – 2, Poor – 1.

Table 5: Hedonic rating scale of the Tender Jowar (sorghum) products

Sl. No.	Recipes	Like extremely	Like very much	Like mode rarely	Like slightly
1.	Tender Jowar Cutlet	20.0	65.0	-	-
2.	Tender Jowar Wada	10.0	60.0	30.0	-
3.	Tender Jowar Roasted Pops	60.0	-	30.0	10.0
4.	Tender Jowar Masala Puri	10.0	50.0	40.0	-
5.	Crazy Tender Jowar (Chat1. pepper Lime)	5.0	55.0	40.0	-
6.	Crazy Tender Jowar (Chat 2, Chilli Amchur)	10.0	50.0	30.0	10.0
7.	Crazy Tender jowar (Chat 3, Chat Masala & Lime)	30.0	25.0	35.0	10.0

4. Summary and Conclusion

The present study was under taken with the main objective to study the various processing methods and quality evaluation of TJ.

Tender jowar would be explored, so tender jowar can be commercialized same like Tender corn which has already entered the global market.

Tender jowar is neglected despite its nutritive value & therapeutic use. It is one of the underutilized nutritious minor millets. In developing countries, like India with rapid urbanization and changes in social & cultural practices have modified the food habits of the community. The ever increasing market for convenient foods, may be tinned, canned, chilled, frozen or preserved presents a whole range of complex operation in food processing.

5. References

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