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Quality Parameters of Salad Cream from Four Local Varieties of Millet Starches in Nigeria

*Nwosu, Amarachi. M.,
Eke-Ejiofor, J.*



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Nwosu, Amarachi. M.

Eke-Ejiofor, J.

Department of Food Science and Technology, Rivers State University,
Nkpolu, P.M.B. 5080, Port Harcourt, Nigeria.

Corresponding Author's: E-mail: dualbasic@yahoo.com

Abstract

Purpose: The study was carried out to evaluate the proximate, rheological and sensory properties of Millet based salad cream in comparison with the conventional salad cream. **Methodology:** Starches were extracted from four different local varieties of millet, comprising two varieties of pearl millet, namely Gero and Maiwa (*Pennisetum glaucum*), Tamba-Finger millet (*Eluesine coracona*) and Acha-Fonio millet (*Digitaria exillis*) using dry and wet milling processes for the purpose of making salad cream. Standard analytical methods were used in measuring the pH values, proximate composition and viscosity. A 9-point Hedonic scale was used to evaluate the sensory characteristics of the salad cream.

Findings: Values obtained for pH varied between 3.10 and 3.62 while the sample used as control had a pH of 3.07. Millet starch-based salad cream as well as the control sample had moisture content above 40 %, while protein and fat content ranged from 1.90 % to 4.49 % and 24.41 % to 33.74 % respectively. The control sample had protein content of 4.11% and fat content of 31.89 % in that order. Total available carbohydrate was highest in the samples tested (18.38 %) and 15.33 % in the control sample. Ash content was significantly ($p < 0.05$) different in the samples and the control; sample values ranged from 1.38 to 1.81 % while the control was 1.29 %. Fibre was not detected in all the samples including control sample. Meanwhile, there was significant ($p < 0.05$) difference in Energy (Kcal) and Energy (KJ) in the Millet starch based salad cream and the sample used as control with Millet starch based salad cream having Energy (Kcal) and Energy (KJ) in the range of 287.19 to 331.88 Kcal and 1190.0 to 1374.2 KJ respectively. The control sample had 364.77 and 1510.4 Energy (Kcal/KJ). The viscosity of dry and wet milled millet starch-based salad cream ranged from 0.006-0.033 mls. The control sample value was 0.006 and 0.004mls respectively. All salad cream samples exhibited a non-Newtonian behaviour. Sensory analysis result showed no significant ($p > 0.05$) difference in colour, taste, texture among Millet starch based salad cream, however, there was significant ($p < 0.05$) difference in the colour, taste, texture attributes in the control sample. The mean scores of colours, appearance, flavour, taste, mouth feel, texture and overall acceptability of the salad cream samples prepared from the four different local varieties of millet starches compared with a commercial salad cream shows Colour range of 4.30 – 8.50. Appearance ranged from 3.13 – 8.10. Sample Wmg had the least score of 5.00 in the taste attribute while the highest value was observed in Wmm (8.16). Highest score for Mouthfeel was observed in Wmm sample (7.43) with Wmg having the least score of (5.40). Average score for texture range from 4.80 to 7.53. The sample Wmm had the highest value (7.87) for Overall acceptability while Wma had the least value of 5.11. Sample Wmm (wet milled Maiwa) was preferred by the Panellist over the control sample, this means that comparable salad cream can successfully be produced from Millet based starch.

Keywords: *Salad cream, Millet Starches, Proximate, Viscosity, Sensory.*

INTRODUCTION

Millet is part of the essential diet for households in the world's poorest countries. Top consuming countries include: India, Nigeria, Niger and China (Bouis, 2000). Millet is a source of dietary calcium, iron, manganese, and methionine an essential amino acid missing in the diets of people who live on starchy foods such as cassava, plantain, yam and corn meal. The use of Millet is varied, including in cereals soups, the whole grain may be ground, cooked, baked or fermented in various forms to produce baby food and other nutritious foods. (Jideani *et al.*, 2017). In addition several potential health benefits such as preventing cancer and cardiovascular diseases, reducing tumour incidence, lowering blood pressure, risk of heart disease, cholesterol and rate of fat absorption, delaying gastric emptying, and supplying gastrointestinal bulk have been reported (Truswell 2002; Gupta *et al.*, 2012).

There are many varieties of millet, some of which are Finger, Pearl, Fonio, Foxtail, Little, Barnyard, Proso, Kodo. The various millet species can be divided into two broad categories; pearl millet and small millet. All other varieties of millet fall under small millets with the exception of Proso millet. The varieties of millet considered in this work are the pearl millet, namely Gero and Maiwa (*Pennisetum glaucum*), Tamba-Finger millet (*Elusine coracana*) and Acha-Fonio millet (*Digitaria exilis*)

One of the conditions favouring stability of salad cream includes use of a thickening agent. The presence of starch in salad dressing serves as a gelling agent, binding agent, thickening agent and a stabilizer. The modified food starch develops viscosity and protective colloid characteristics that help to prevent the breakdown of the blend during various processing steps (Degee and Savage, 2001).

Salad cream is a readymade creamy non-Newtonian white dressing with a flowing consistency often consisted of "hard-boiled eggs mash with cream, mustard, salt and vinegar", it is a creamy, pale yellow condiment based on an emulsion of oil in water. It can be prepared with various ingredients of which modified starches serves as the (thickener) base raw material. Sugar spices, flavouring and colouring may also be included (Flanders and Judith, 2003) Salad Cream formulations have high levels of oil and water at low pH. Water levels are increased in low-fat versions. Modified starches manage the water to provide the best viscosity, which will pour from a bottle at cold temperatures. Method of production includes mixing all dry ingredients with eggs and milk and slowly whisking in vinegar. The mix is then cooked over low heat until it becomes thick, like a white sauce. It can be canned by putting it in a jar and processing in a hot water bath, cooled and Kept for 2-3 days in the refrigerator. Salad cream has a sharper taste, and is less sweet often prepared for eating with mixture of raw vegetables. The inclusion of salad cream in vegetable salad improves the taste of the vegetables thus more vegetables could be consumed for more health benefits apart from other the nutritional benefits of the cream (Schweizer, 2012).

Materials

Sugar, salt, egg yolk, mustard paste, vinegar, Olive Oil, water and Millet grains of four different local varieties (from where starches was obtained) were purchased from Bori-camp mami market in Port Harcourt, Obio Akpor Local Government Area of Rivers State, Nigeria.

Chemicals

All chemicals used for this study were of analytical grade obtained from the Biochemistry Laboratory, Department of Food Science and Technology, Rivers State University Port Harcourt, Rivers State, Nigeria.

Methods

Table 1: Recipe for the Production of Millet Starch-based Salad cream

Ingredients	Quantity
Starch	50g
Sugar	30g
Salt	3g
Mustard paste	30g
Egg yolk	15g
Olive oil	40ml
Water	250ml

Source: Eke-Ejiofor and Beleya (2015)

Procedure for Salad Cream Production

Salad Cream was prepared by mixing together measured quantities of starch, sugar, salt, mustard paste, vinegar and water. The mixture was heated under a gentle heat for 3 minutes with continuous stirring to obtain slurry. The mixture was then allowed to cool before adding the egg yolk and blending while adding oil in small portion until a free flowing and consistent paste was formed.

Salad Cream Analysis

Determination of pH

5g each of the Salad Cream sample was weighed into a beaker containing 25ml of distilled water. The mixture was allowed to stand for 30 minutes with constant stirring. The electrode attached to the pH meter (Orion model 720A, USA) was inserted into the mixture, and read as shown on the screen of the pH meter. This was done according to method describe by Onwuka, (2005).

Viscosity Determination

The viscosity of the different salad cream samples was obtained in triplicate with the aid of a consistometer. Readings were taken per sample and result recorded.

Proximate Analysis

Moisture, ash, crude protein, fibre and fats were estimated by the method described by AOAC (2012). Carbohydrate content was calculated by difference, (100- sum of the values for moisture, crude protein, crude fibre, crude fat and crude ash). Energy (Kcal) and Energy (KJ) was also calculated.

Sensory Evaluation of Millet Starch Based Salad Cream

Coded samples of the Salad Cream were presented to twenty (20) semi-trained panellists comprising members of the public in Rumuigbo, Obio-akpo LGA, Rivers State Port Harcourt, Nigeria for sensory evaluation. They were presented with coded samples of Salad Cream and water to rinse their mouths after tasting each of the Salad cream samples. The samples were presented in a randomized manner such that the control sample was unidentified. The organoleptic attributes evaluated include: colour, appearance, flavour, taste, mouthfeel and texture using a 9-point hedonic scale as described by Iwe (2010). The degree of likeness was expressed as follows: Like extremely-9, Like very much -8, Like moderately-7, Like slightly-6, Neither like nor dislike-5, Dislike slightly-4, Dislike moderately-3, Dislike very much-2, Dislike extremely-1

Statistical Analysis

All tests were conducted in triplicates. Analysis of variance (ANOVA) and comparison of means by Tukey multiple comparison range tests (significance level of 95%) were performed using the statistical package in MINITAB 16 (computer software package). Data was reported as means and standard deviations and significance accepted at $P < 0.05$ level of probability.

RESULTS

Table 2 shows the proximate composition of salad cream from four different varieties of millet starches compared with a commercial salad cream used as control sample.

The pH of tested salad cream ranged from 3.10 to 3.62 while that of control sample was 3.07.

Proximate composition of the salad cream showed that dry milled Acha (Dma) had the highest moisture content of 50.79% while the least value was found in the control sample 47.38%. Ash content was more in wet milled Tamba (Wmt) 1.82%, followed by dry milled Acha (Dma) 1.72% while the least ash content was found in the control sample (1.29%). Fat and protein content were highest in dry milled Acha (Dma) 33.75% and wet milled Maiwa (Wmm) 5.69% respectively. The least fat content was recorded for dry milled Tamba (Dmt) 24.41% and the least protein content was recorded 1.90% in wet milled corn (Wmc). No value was recorded for fibre in both treatment and the control.

Viscosity of millet starch-based salad cream presented in Table 3 varied from 0.004 to 0.027 m^2ls while the control sample was 0.002 m^2ls .

The mean scores of colours, appearance, flavour, taste, mouth feel, texture and overall acceptability of the millet-based salad cream samples compared with a commercial salad cream is shown in Table 4. Colour of different salad cream ranged from 4.30 – 8.50. Appearance ranged from 3.13 – 8.10. Wet milled Gero (Wmg) had the least score of 5.00 in the taste attribute while the highest value was observed in Wet milled Maiwa (Wmm) 8.16. Mouthfeel was rated highest in wet milled Maiwa (Wmm) sample 7.43 and the lowest score was given to wet milled Gero (Wmg) 5.40. Texture ranged from 4.80 and 7.53. The highest value observed for Overall acceptability was in wet milled Maiwa (Wmm) 7.87 while the least value was in wet milled Acha (Wma) 5.11.

Table 2: Proximate Composition of Millet Starch Based Salad Cream

Sample	pH	Moisture (%)	Ash (%)	Fat (%)	Protein (%)	Fibre (%)	Carbohydrate (%)	Energy (Kcal)	Energy (KJ)
Control	3.07	47.38 ^d ±0.00	1.29±0.00	31.89 ^{ab} ±0.00	4.11 ^{abc} ±0.00	0.00±0.00	15.33 ^{abcd} ±0.00	364.77 ^a ±0.00	1510.4 ^a ±0.00
Dmc	3.25	49.02 ^c ±0.84	1.46 ^a ±0.08	26.22 ^{bc} ±1.07	3.22 ^{bc} ±0.17	0.00±0.00	17.07 ^{ab} ±0.14	317.16 ^{bcd} ±8.40	1315.2 ^{bcd} ±34.4
Dma	3.62	49.97 ^a ±0.57	1.72 ^a ±0.13	33.74 ^a ±0.17	2.38 ^{bc} ±0.09	0.00±0.00	13.970 ^f ±0.43	329.13 ^{ab} ±3.71	1356.6 ^{abc} ±15.6
Dmm	3.19	48.11 ^a ±0.48	1.38 ^a ±0.02	26.34 ^{bc} ±0.93	2.87 ^c ±0.45	0.00±0.00	17.29 ^{cde} ±0.02	293.72 ^{bcd} ±6.51	1215.4 ^{cd} ±26.5
Dmt	3.23	49.83 ^c ±2.06	1.50 ^a ±0.02	24.41 ^{bc} ±1.27	3.03 ^{bc} ±0.15	0.00±0.00	18.30 ^{ab} ±2.65	314.36 ^{bcd} ±4.80	1303.1 ^{bcd} ±21.3
Wmt	3.19	47.09 ^{ab} ±0.02	1.81 ^a ±0.00	26.33 ^c ±0.71	4.49 ^{ab} ±0.05	0.00±0.00	18.38 ^{bcd} ±1.36	287.19 ^d ±6.22	1190.0 ^d ±24.9
Wmm	3.10	45.93 ^{ab} ±1.61	1.42 ^a ±0.26	28.84 ^{abc} ±0.53	5.69 ^a ±1.25	0.00±0.00	6.71 ^{ef} ±0.16	309.20 ^{bcd} ±9.19	1278.1 ^{bcd} ±38.4
Wmc	3.41	48.77 ^{cd} ±0.26	1.51 ^a ±0.12	28.40 ^{bc} ±1.19	1.90 ^c ±0.38	0.00±0.00	15.89 ^{abc} ±0.42	326.81 ^{abc} ±7.53	1353.4 ^{bcd} ±30.5
Wma	3.22	50.79 ^{cd} ±1.03	1.53 ^a ±0.10	29.04 ^{abc} ±2.48	3.18 ^{bc} ±0.85	0.00±0.00	14.44 ^{abcd} ±0.48	331.88 ^{ab} ±17.03	1374.2 ^{ab} ±69.3
Wmg	3.54	46.83 ^c ±1.06	1.60 ^a ±0.02	27.41 ^{bc} ±1.27	3.42 ^{bc} ±0.15	0.00±0.00	16.30 ^{ab} ±2.65	314.36 ^{bcd} ±4.80	1303.1 ^{bcd} ±21.3
Dmg	3.42	45.09 ^{ab} ±0.08	1.71 ^a ±0.03	25.32 ^c ±0.71	4.40 ^{ab} ±0.05	0.00±0.00	15.38 ^{bcd} ±1.36	287.19 ^d ±6.22	1190.0 ^d ±24.9

Means with different superscript in the same column are significantly ($p < 0.05$) different

Key:

Dmc = Dry milled Corn	Wmc = wet milled Corn
Dma = Dry milled Acha	Wma = wet milled Acha
Dmg = Dry milled Gero	Wmg = wet milled Gero
Dmm = Dry milled Maiwa	Wmm = wet milled Maiwa
Dmt = Dry milled Tamba	Wmt = wet milled Tamba

Table 3: Viscosity of Millet Starch Based Salad Cream

S/N	Sample Name	Sample Code	Viscosity (m ² ls)
1	Heinz	Control	0.002
2	Maiwa	Dmm	0.027
3	Tamba	Dmt	0.006
4	Gero	Dmg	0.007
5	Acha	Dma	0.006
6	Corn	Wmc	0.004
7	Maiwa	Wmm	0.013
8	Tamba	Wmt	0.033
9	Gero	Wmg	0.014
10	Acha	Wma	0.005

Means with different superscript in the same column are significantly ($p < 0.05$) different

Key:

Heinz = Control sample

Dma = Dry milled Acha

Wma = wet milled Acha

Dmc = Dry milled Corn

Wmc = wet milled Corn

Dmg = Dry milled Gero

Wmg = wet milled Gero

Dmm = Dry milled Maiwa

Wmm = wet milled Maiwa

Dmt = Dry milled Tamba

Wmt = wet milled Tamba

Table 4: Sensory Evaluation of Millet Starch Based Salad Cream

Sample	Colour	Appearance	Flavor	Taste	mouth feel	Texture	Overall acceptability
Heinz	7.10 ^b ±0.10	7.20 ^b ±0.10	7.26 ^b ±0.11	7.53 ^b ±0.15	7.10 ^b ±0.10	7.33 ^a ±0.11	7.25 ^b ±0.03
Dma	4.30 ^e ±0.10	3.13 ^e ±0.15	7.00 ^{bc} ±0.10	6.53 ^d ±0.15	5.60 ^d ±0.10	6.73 ^b ±0.15	5.56 ^e ±0.05
Wma	4.46 ^e ±0.20	5.56 ^c ±0.25	6.70 ^{cd} ±0.20	7.10 ^c ±0.10	6.30 ^c ±0.10	5.33 ^d ±0.28	5.91 ^d ±0.01
Dmt	3.10 ^f ±0.10	5.10 ^d ±0.10	6.56 ^d ±0.11	7.06 ^c ±0.05	6.53 ^c ±0.15	6.26 ^c ±0.11	5.85 ^d ±0.04
Dmm	6.70 ^c ±0.17	7.33 ^b ±0.20	6.50 ^d ±0.17	7.06 ^c ±0.11	6.46 ^c ±0.15	5.36 ^d ±0.15	6.77 ^c ±0.01
Dmg	5.70 ^c ±0.17	5.33 ^b ±0.20	6.50 ^d ±0.17	5.06 ^c ±0.11	6.47 ^c ±0.15	5.32 ^d ±0.15	6.72 ^c ±0.01
Wmc	5.36 ^{cd} ±0.10	4.68 ^f ±0.00	6.03 ^b ±0.20	5.88 ^c ±0.00	6.12 ^a ±0.04	5.22 ^d ±0.05	5.11 ^e ±0.20
Wmg	4.90 ^d ±0.00	5.70 ^c ±0.00	4.90 ^e ±0.00	5.00 ^e ±0.00	5.40 ^d ±0.00	4.80 ^e ±0.00	5.70 ^e ±0.10
Wmm	8.50 ^a ±0.10	8.10 ^a ±0.10	7.50 ^a ±0.10	8.17 ^a ±0.15	7.43 ^a ±0.05	7.53 ^a ±0.15	7.87 ^a ±0.02
Wmt	4.39 ^{cd} ±0.10	5.00 ^f ±0.00	6.01 ^b ±0.20	5.84 ^c ±0.00	6.13 ^a ±0.04	4.99 ^d ±0.05	5.18 ^e ±0.20

Means with different superscript in the same column are significantly ($p < 0.05$) different

Key:

Heinz = Control sample

Dma = Dry milled Acha Wma = wet milled Acha

Dmc = Dry milled Corn Wmc = wet milled Corn

Dmg = Dry milled Gero Wmg = wet milled Gero

Dmm = Dry milled Maiwa Wmm = wet milled Maiwa

Dmt = Dry milled Tamba Wmt = wet milled Tamba

Discussion

The pH of millet-based salad cream ranged from 3.19 to 3.62 in the dry milled samples and 3.10 to 3.41 in the wet milled samples with the control having the lowest pH of 3.07. This may be due to inclusion of vinegar of a given concentration (Albert *et al.*, (2005). The pH value is in agreement with the result reported by Eke-Ejiofor and Kin-Kabari (2010): Ashaye and Elizabeth (2010). pH is an important factor affecting growth of micro-organisms in food because it affects microbial enzyme activity and stability of cellular macromolecules. In addition, pH affects the sensory properties of many foodstuffs; it is a clue to the keeping quality of food products. This applies not only to taste, but also to consistency of food. Spoilage of salad cream is a problem for the food industry. Although some spoilage can be attributed to species of *Bacillus* and *Lactobacillus*, the primary spoilage organisms are species of *Zygosaccharomyces*, especially *Z. bailii* (Depree & Savage (2001). Both spoiled and unspoiled dressings typically have a pH range of 3.4–4.2, thus suppressing most bacterial growth.

The moisture content of the salad cream did not significantly ($p > 0.05$) differ amongst the samples and the control. Moisture value ranged from 45.93% in wet milled Maiwa (Wmm) to 50.79% in wet milled Acha (Wma). The amount of water used during salad cream preparation could be the reason for the high moisture content. Eke-Ejiofor and Owuno (2014) reported moisture content of 57.84 and 64.88% in cassava and potato starch-based salad cream. High moisture content means short shelf life.

Percentage ash content varied between 1.29% in the control sample and 1.81% in wet milled Tamba (Wmt). This is close to 1.62% and 1.83% reported in cassava-based salad cream by Eke-Ejiofor and Owuno (2014). Ash content measures the amount of minerals present in food. Different values reported are related to the disparity in millet grains used; (Ashaye *et al.*, 2001).

The fat content which ranged from 24.41 to 33.74% in the dry milled samples and 26.33% to 29.04% in the wet milled process was almost the same as the amount reported by McCane and Widdowson (1987) with an average of 31 % but higher than 17.39 and 21.08% obtained by Eke-Ejiofor, (2015) with three leaf yam-based salad cream. Fat is needed by man as a source of energy and fatty acids, and a transport medium for assimilation of fat-soluble vitamins A, D, E, and K, which serve to insulate and act as a shock absorber to the body. Salad creams are high-fat emulsions.

The protein content of the millet-based salad cream ranged from 1.90– 5.69% with wet milled Corn (Wmc) having the lowest amount of 1.90%, this is significantly ($p < 0.05$) different from the value 4.11% obtained in the control sample and 5.69% in wet milled Maiwa (Wmm). The protein content reported by McCane and Widdowson (1987) was 1.5% this is low when compared with the result of millet based salad cream analysis. Eke-Ejiofor and Owuno (2014) reported no significant ($p > 0.05$) difference in all the samples of cassava and potato starch-based salad cream.

There were significant ($p < 0.05$) differences between the carbohydrate contents of some of the millet based salad creams. However, wet milled Maiwa (Wmm) recorded the least value of 6.72 % and while dry milled Tamba (Dmt) had the highest value of 18.38%. Eke-Ejiofor (2015) reported Carbohydrate content of 13.99 and 37.18 % with sweet potato three leaf yam and cassava starch salad cream. Carbohydrates are important nutrients for health. They are one of the body's sources of energy (Calories). The low carbohydrate content of the millet based salad

cream indicates low calorie for weight gain which has a nutritional benefit. Nevertheless, calorific values indicate reasonable amount of energy and will give energy when consumed.

In this study, the energy content of the salad cream ranged from 287.19 to 364.77kcal/100 g. This does not compare to USDA (2014) data which reported that mayonnaise should contain approximately 700 kcal (2900 kJ)/100 g of energy content, this study showed lesser amount of energy content. However, most salad creams energy content provided a wide range in between 270-648 kcal/100 g which is comparable to the result in this study.

The rheological property of millet based salad cream is presented in Table 2. The highest viscosity was observed in wet milled Tamba (Wmt) starch-based salad cream; while the least viscosity was found in Heinz used as control. The Results obtained showed that the control salad cream was thinner and less viscous than the millet-based salad cream in this study. This observation could be due to the differences in variety and origin of the crops or modification before preparation. Viscosity is a measure of the resistance to the flow of a fluid and is one of the major functions of salad cream stabilizers, which is related to suspension of particulates, emulsion stability and pourability. All the millet based salad cream exhibited a non-Newtonian behaviour

Evaluation of sensory attributes of millet based salad cream in terms of colour, appearance, flavour, taste, mouth feel, texture and overall acceptability, shown in table 3 differed ($p < 0.05$) significantly in colour and appearance with average scores of 3.10 - 8.50 % and 3.13 - 8.10 % respectively. The results showed greater acceptance for wet milled Maiwa (Wmm) based salad cream in terms of the colour and appearance over other millet-based salad cream including the control sample. The appearance and colour were evaluated to change from dark brown to creamy depending on the millet variant. The dark colour may be due to Maillard reaction between reducing sugar and protein (Akubor, 2004).

Preference for flavour was also highest in wet milled Maiwa (Wmm) with a score of 7.50 while the least preferred flavour was observed in wet milled Gero (Wmg) salad cream which had a score of 4.90%. Flavours are the primary factors that determine the acceptability of any product which has the highest impact as far as the market success of a product is concerned.

There was significant ($p < 0.05$) difference in the scores for taste attributes, with wet milled Maiwa (Wmm) having highest acceptance with 8.17 core and wet milled Gero (Wmg) having the lowest score of 5.00. This result indicates that the panellist choice for taste was more for wet milled Maiwa (Wmm) salad cream than the other millet-based salad cream and sample used as control.

According to the panellist the first choice in terms of mouthfeel, is wet milled Maiwa (Wmm) with a score of 7.43 and the least preferred millet-based salad cream was the wet milled Gero (Wmg) with a score of 5.40. Mouthfeel showcases sensations of smoothness in the mouth.

Scores for texture was also significantly ($p < 0.05$) different between wet milled Maiwa (Wmm) and the other samples, wet milled Maiwa (Wmm) had the highest score of 7.53 while wet milled Tamba had the lowest score of 4.99. Texture attributes of food products is a vital determinant of acceptability.

In the overall acceptability rating, wet milled Maiwa (Wmm) millet-based salad cream had the highest score of 7.87; wet milled Acha (Wma) salad cream had the least score of 5.11 while the control sample was scored 7.25. This means that wet milled Maiwa compared favourably with

the standard and can be used as a replacement for gums and other very expensive imported thickeners used in salad cream making.

CONCLUSION

Salad creams were successfully prepared from four different local varieties of millet starches. This study showed that millet starch is a good source and available raw material for the production of salad cream of high nutritional qualities in terms of nutritional composition, functional properties and sensory evaluation. The wet milled Maiwa compared favourably with the commercial salad cream (Heinz) used as control in terms of nutritional and sensory attributes such as colour, appearance, flavour, taste, mouthfeel, texture and overall acceptability. Therefore, this work recommends the inclusion of millet starches especially wet milled Maiwa in our salad cream for weight loss and as an alternative to the expensive and high calorie conventional salad cream. This study therefore paves way for enhanced utilization of millet grains in Nigeria, to improve our nutritional wellbeing.

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