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Research article

EFFECT OF SEMI-DENSED POLYETHYLENE STORAGE ON ORGANOLEPTIC AND CHEMICAL CHARACTERISTICS OF FLOURS FROM SOAKED ,MALTED AND THEIR BLEND OF MILLET GRAINS (PENNESITUM GLACUM)

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Abstract

The study was focused on common and available packable polyethylene bags which could be reached by home makers and process marketers to elucidate its effects on flour from soaked, malted and blended flour from millet grains through its chemical and organoleptic quality characteristic.Pearl millet has high lipase activity hence short shelf life.The storage study was for ninety (90) days and it was discovered that storage using common semi – dense polyethylene packages decreased significantly its organoleptic qualities like aroma, overall acceptability and flavor on malted flour which were not accepted by panalist , except for color for all the flours.Flour storage in semi densed (SDPE)polyethylene bags increased the chemical activity of the flour hence lipase activity , having P^H (6.7-5.8) ,TTA(0.5-0.8) and TBA (0.1-0.8)with the control dovtailling at 90 days of storage .There was significant rise in moisture content (5.6-6.7)between the storage period using (SDPE)bags which does not support maximum shelf life stability but could assist home makers, market – processors and small scale producer of millet flour for considerable period of time compared to days and week of their stay during usage in food processing and culinary approaches.

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Keyword: Storage ,semi-densed polyethylene package, malted flour ,soaked flour,organoleptic ,chemical.

Introduction

Pearmillet(pennisetum glacum) is a native cereal in Africa and also in some Asian countries .millet is processed in many ways involving dehulling and then milling into products like flours ,grits and dehulled whole grains which are used to prepare staple food like cooked whole grians ,thick and thin soups and porridges .By means of processing approach millet anti – nutritional factor such as tannin which affects bioavialability of essential nutrients are reduced Rostango(1972).Acccording to Nkama and Gbenvi (2001) ,steeping ,malting ,roasting can achieve anti-nutritional factors reduction

Millet flour product have various application in food and In homes poongodi et al (2009),Rao and Murahkrishna (2001).The flour product are used for soup porridge in Benue state called *Enyiokwolla* and are readly enjoyed Ocheme and chima(2008).Due to it grain neutricauetical functionalities ,its sugar had been reported to reduce diabetes Mathanghi and sudha (2012),Amuradha et al (2009).Millet flour for thin or thick soup porridge production have been observed not to stay long after processing even at home due to it millet flour tendency to turn rancid FAO (1995) ,Deep et al (2012).T he various phytochemicals causing redox activity might have surfaced during processing ,this might also be responsible for it limited application at home and for culinary purposes thereby limiting its application on other food systems .Millet flour availability in a convienent form will reduce the labour involved in the production of its products and also ensure it availability of the flour products.

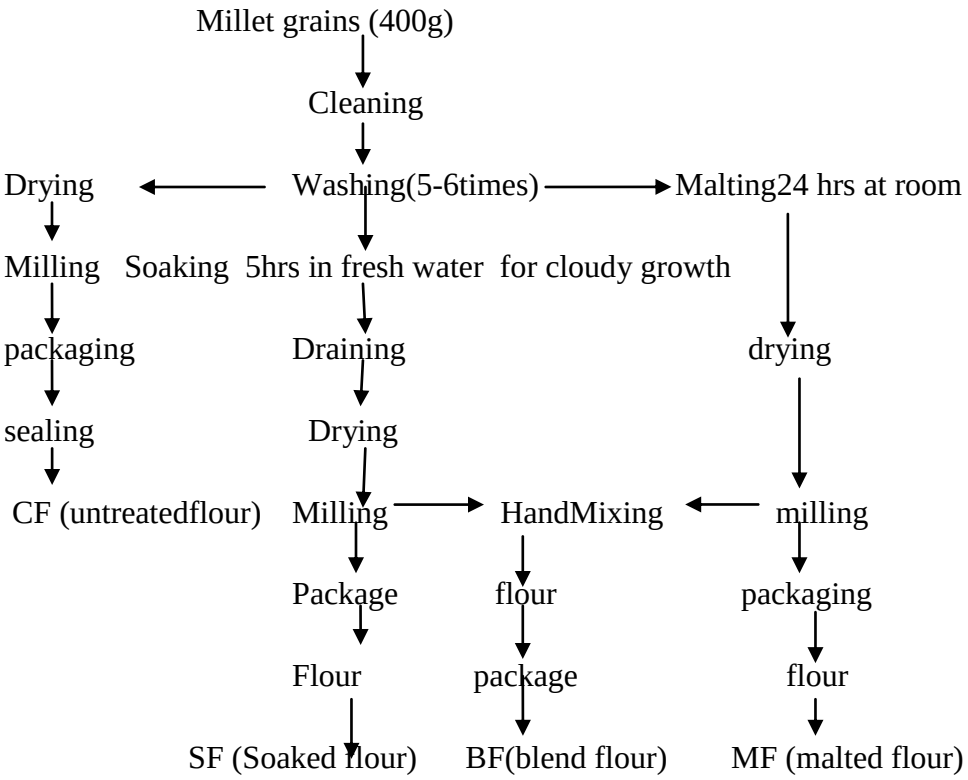
Storage in (SDPE) bages is a common packaging material which is very affordable with undefined head space ,however reported to prolonge shelf stay of food products Deep et al (2012).packaging with (SDPE) bages are more favourable to rhombus ,wood clay pot and underground Vogel and Graham (1979),Pushpamma and ChittermmaRoa (1981) .The temperature variaton on flour products from millet grain could result in either hydrolytic or oxidative rancidity ,trigering free – radical reaction ,distabilizing flour quality and shelf stay .The semi –densedpolythylene package under sealed condition could prevent free radical build up hence prolonging it stay beside microbial proliferations. This study tends to produce flour from soaked ,malted and their blend ratios and extending them using sensorial and chemical via packaging in (SDPE) at room temperature to acertain the much stabilty and deviation from its supposed flour sensorial and chemical properties.

MATERIALS AND METHODS

Peamillet (pennesitumglacum) was purchased from federal college of education ,Agricultural depatment farm. 400g of the millet grains were used for the soaking and malting .150g of the grain were soaked and also 150g portions were also malted.The flour from each soaked and malted portions were blended finally at 60% and then thoroughly mixed befor packaging in SDPE and sealing using electric sealer .The package flour in the bages were kept on

shelves at ambient temperature of 37^{-}+1 Oc for (90) days were flours were drawn periodically for chemical and organoleptic evaluations.

Fig 1 below showed how the millet grais were processed .The control flour, that is the (untreated flour),Soaked flour ,Malted flour and Blends



Organoleptic analysis

The senory evaluation of the flour were carried out by panalist of twenty (20) semi trained judges drawn from the staffs at federal college of education kontagora for different sensorial analysis.A nine point hedonic scale of like extremely to dislike extremely were used .The values were subjected to ANOVA ,according to (steel and torris 1978)and the significant difference determined at T =0.05)

Chemical Analysis

The **P^{H}** determination was by (vasconcelos et al 1990).Total titratible acidity was by (pearson 1976).Thiobabituric acid TBA was by (Pearson, 1976)

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Storage Stability

Sample of 50g were packed in SLDPE bages and then stored at ambient condition (37+_2 oc)45-50% RH)for the storage study. The sample were drawn and evaluated for change in aroma ,taste ,colour ,P^H, TTA ,TBA and moisture content.

RESULTS

Effect of SDPE storage bages on organoleptic quality of soaked ,malted and blends of millet grain flours in days

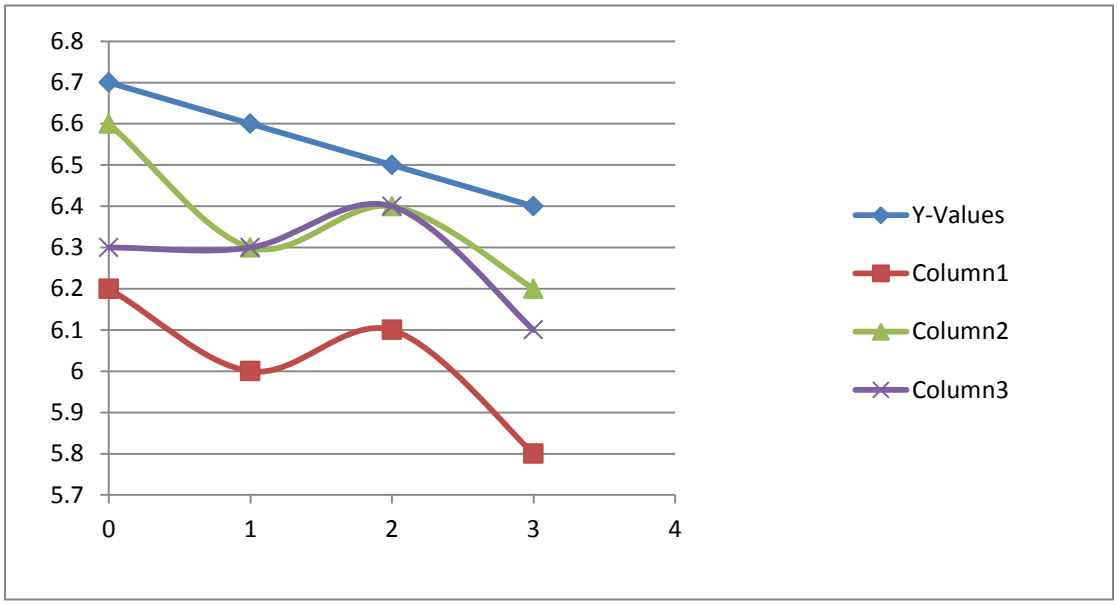
Table 1: 0DAYS 30DAYS 60days 90days

Sample	colour	Aroma	Taste	Overral	colour	Aroma	Taste	Overral	colour	Aroma	Taste	Overral	colour	Aroma	Taste	Overral
				Acceptab				acceptab								acceptabacc
CF	7.1a	7.3a	6.8a	7.2a	7.7a	7.5a	6.4b	6.7a	7.8a	7.3a	6.2a	7.1a	6.7a	7.5a	6.1a	6.8a
SF	7.3a	6.9 b	6.9 a	7.1a	6.5 b	6.7b	6.3 c	6.7 a	6.5b	6.5 b	6.2b	6.7b	6.3b	6.6b	6.0 a	6.3b
MF	5.9c	6.2 c	6.3c	5.9c	6.2c	6.6c	6.7a	6.7a	6.4b	6.5b	6.5a	6.7b	5.4c	6.5b	5.8b	6.4b
BF	6.6b	6.7b	6.6b	6.6b	5.3 d	6.7b	6.4b	6.4b	5.3c	6.5b	6.2b	6.3c	5.0c	6.5b	5.9b	6.0c

Scores are based on 9 point hedonic scale .means in the same column not followed by the same superscript are not significantly different at (T=0.05)

FIGURE (A) Effect of SDPE storage packagingof millet flour on chemical charactristics of soaked ,malted and blends of millet flours

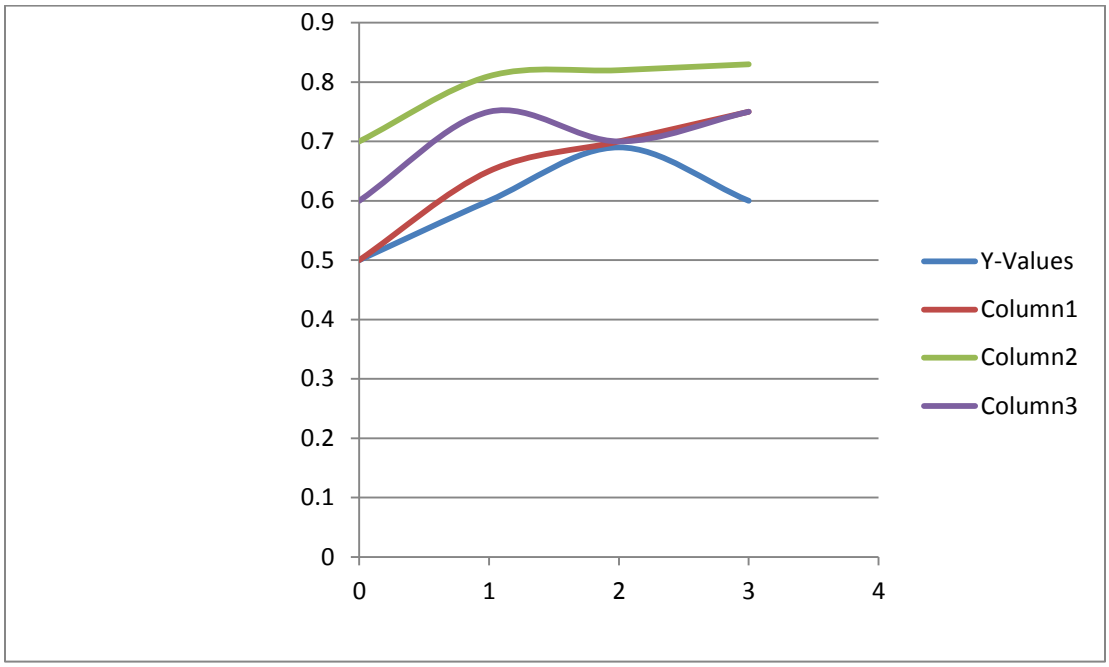
FIGURE$_1$ GRAPH OF P^H % OF SOAKED ,MALTED AND BLENDS OF MILLET FLOUR IN SDPE BAGE



Y –VALUES = control flour(CF) . COLUMN 2=malted flour (MF)

COLUMN 1 = soaked flour(SF) .COLUMN 3=blended flour(BF)

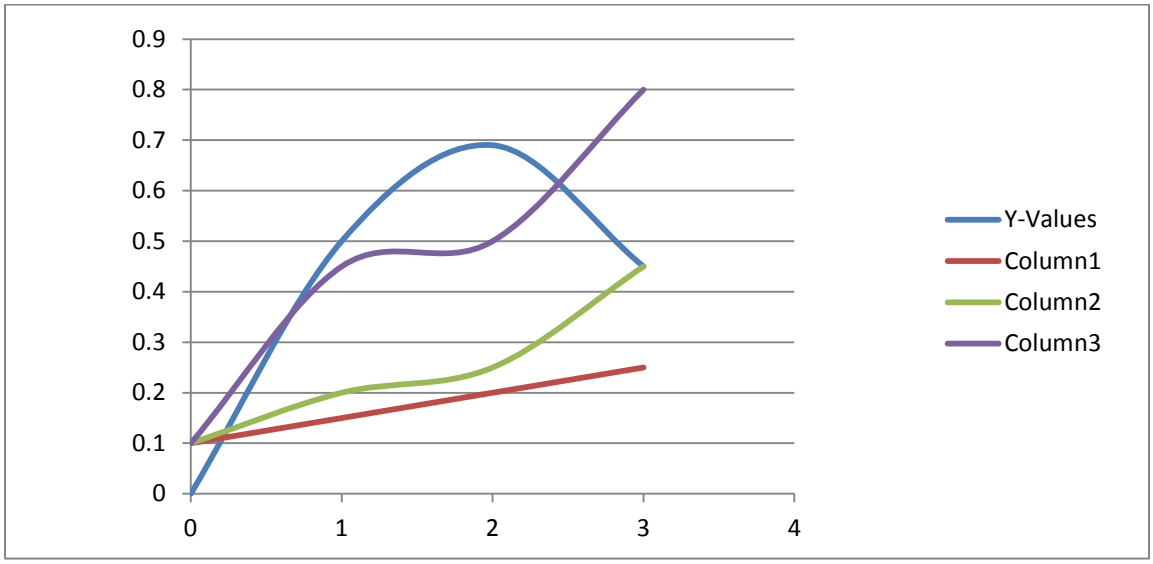
FIGURE$_2$ GRAPH OF TTA % OF SOAKED ,MALTED AND BLENDS OF MILLET FLOUR IN SDPE BAGES



Y –VALUES = control flour(CF) . COLUMN 2=malted flour (MF)

COLUMN 1 = soaked flour(SF) .COLUMN 3=blended flour(BF

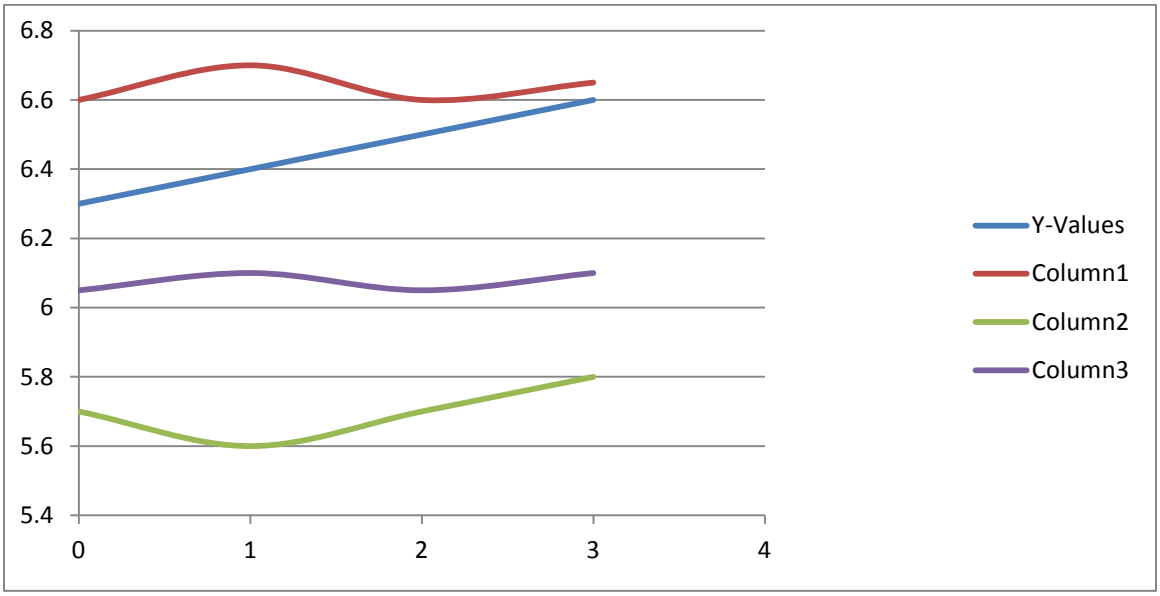
FG$_3$ GRAPH OF TBA m/KG OF SOAKE D ,MALTED AND BLENDS OF MILLET FLOUR IN SDPE BAGES



Y –VALUES = control flour(CF) . COLUMN 2=malted flour (MF)

COLUMN 1 = soaked flour(SF) .COLUMN 3=blended flour(BF)

FG_4 GRAPH OF MOISTUR CONTENT %OF SOAKE D ,MALTED AND BLENDS OF MILLET FLOUR IN SDPE BAGES



KEY

Y –VALUES = control flour(CF) . COLUMN 2=malted flour (MF)

COLUMN 1 = soaked flour(SF) .COLUMN 3=blended flour(BF)

DISCUSSION

Table one above showed results on organoleptic analysis of stored flour for ninty(90) days in a semi densed polyethylene bags of soaked ,malted and blended milled grain flours.Panelst preferred the soaked ,malte and the blend flour for their overral accceptability as the storage periods increased .The controlled flour competed favourably with the 30 days and 60 days storage duration in SDPE bage storage but not significant at 90 days.

This was observed for soaked flour .The blended flour showed less preference by panelist at 60 days and 90 days respectivelyof stored studies.The malted flour were not accepted for zero days and 90 days respectively.There were no significant difference in the aroma of the flour which followed suit for tast rating.The preference for aroma in soaked and malted flour maybe due to primary fermentaton that might have taken place during soaking and malting respectively.The characteristic colour ,aroma and taste from the control flour sample followed similar trend .panelist accepted the malted flour for aroma and taste.The organoleptic scores indicated that panelist acceptance of the prepared flour decreased as storage days increases. The controlled flour sample had a panelist ranged value of 7.7

and gradually reduced for all characteristics synergisticallyto 5.2,5,4and 5.0.The taste were observed to be bitter and colour darker as the flour continue to age which might be due to residual tannin breaking down oe been used up .The cause may be due to undefined head space in the SDPE packaging ,uncertain phytochemicals of the processing millet grains.

Figure A above having figure one to four showed the chemical properties of flours graphically.The PH values of the controled flour soaked ,malted and their blends are shown on the graphs . The P^H , an indication of microbial proliferation and loads,were high with increased storage period in SDPE .The flours for all samples tends to acidic conditions. The soaked ,malted and the blends flour tends to show some build up of P^H at 60days of storage study befor dovtailling .This might be due to material equilibration. According to Ashworth and draper (1992) ,malting results in bacterial build up , contamination and osmotic diarrhea due to starch hydrolysis into simple sugars.

Figure 2 showed also titratible acidity of periodic storage flour in semi densed polyethylene bags.The graph indicated that the TTA increased with storage days indicating increasing rancidity with storage days in SDPE packages.This confers that this package allow permeation of solutes or ions in or out of the material flour. This was not observed in the control flour that tends to began to reduce after 60 days of staorgae due to secondary metabolite buiding up Thiam (1977).This might be the reason to why malting and soaking which induced partial breakdown of storage component like protein and vitamins leaching was not observable in the control flour Ashwort and Draper (1992).The increase in TTA with storage peiod was also obseved by Chaudharyand Kapoor (1984).The TBA values depicts fat content or residual fat in the flour are shown in figure three .The result revealed that thiabaubetoric acid increased with storgaeperiods.This might be due to hydrolytic changes associated with the action of lipolytic enzyme Thiam(1977).The controlled flour showed increased TBA values upto 60days before dovtailling .A dissimilar trend were observed for malted and soaked flour which showed gradual rise in fat content .The blends of flour showed a very maximum amylaptic activity due to blends of soaked and malted flour Ashworth and Draper (1992) .These TBA phenomenon of the flours were in agreement with the values reported by Deep et al (2012) on 30 days storage period of pearl millet in microwave oven treatment

The mosture value graph showed a fairly constant trends as days of storage increased ,depicting low material permeability at this storage temperature.The undefined head space might be the cause of the high TBA and TTA resulting in fairely unstable shelf stay but considerable better for home users and culinary practices. The controlled flour moisture values increase may be due to unmodified properties of the starch unlike flours from soaked ,malted and the blends.

Conclusion

Semi-density polyethylene bag storage of soaked ,malted and blends flour result in significant reduction in P^H ,TTA and TBA . The P^Hobserved value could help in control of microbial load in the flour,however the TTA and TBA showed increased values with storge periods ,revealing that SDPE cannot disrupt lipase activity ,saokng , malting and blends flour could only be used for upto one to two months of keep before detoriation sets in .soak , malted and

blends flour were significantly accepted for aroma and taste .These studies would be beneficial to researcher ,millers ,process –marketers as well as in culinary practice and endevour,as it would help store flour usage for considerable long days without significant change in overal chemical and organoleptic quality.It would encourage millet flour utilization and frontier to future application in food processing and technology.

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