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QUALITY COMPARISON OF *MONDIA WHYTEI* AND VANILLA YOGURT

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Abstract
The study was conducted to evaluate and compare the quality of Mondia whytei and Vanilla yogurt. Fresh samples of Mondia whyei roots were harvested from Kakamega, Kenya, washed, peeled, dried for use. Starter culture, Vanilla flavor were bought from a local Sigma Aldrich chemical distributor Several samples of Mondia whytei and Vanilla yogurt were prepared and analyzed for Nutritional, physico-chemical, microbiological and organoleptic properties. The research work of the project was conducted in the Food Processing workshop at Jomo Kenyatta University, Kenya. Fresh milk was analyzed for quality and pasteurized for use in the manufacture of the yogurt.Mondia whytei yogurt had an initial low PH of 4.5 and high Total Titrable Acidities (TTA) of 0.936 compared to Vanilla yogurt PH of 4.82 and TTA of 0.729. Mondia whytei fortified yoghurt had high percentage of both macro and micro elements (Fe, Cu, Ca, Zn, K, Mg, Mn), protein and Vitamin C. Mondia whytei yogurt had more acceptable flavor compared to Vanilla yogurt. Microbiological analysis found significant variation in total viable count between Mondia whytei and Vanilla yogurt. Plain Vanilla yoghurt had a significant higher total count and had a shorter shelf-life. This shows that in addition to providing a pleasant flavor, fortifying yoghurt with Mondia whytei root extracts significantly increases the nutritional value.

Keywords: food processing, yoghurt, nutrition, pyhtochemical analysis

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1. INTRODUCTION

Yoghurt consumption has increased spectacularly during the last decade (Kroger, 1995). Product quality and consumer satisfaction are fundamental to the successful and repeated sale of dairy products. The future of yoghurt depends very much on the quality we put into it (Kroger, 1995).Yogurt is one of the most widely distributed dairy products. Yogurt in different forms with diverse local is made throughout the world. (Tarakci and Erdogan, 2003). The use of yogurt dates back many centuries, although there is no accurate record of the date when it was first made. (Kurt, 1981).The uniqueness of yogurt is attributable to the symbiotic fermentation involved in its processing. Its manufacture involves the use of specific starter culture a mixer culture of *Lactobacillus bulgaricus* and *Streptococcus thermophilus* (Kroger, 1995). Yogurt is a coagulated milk product that results from the fermentation of lactic acid in milk by *Lactobacillus bulgaricus* and *Streptococcus thermophilus*. It has a mildly sour and pleasant flavor. Today, yogurt is usually made by fermenting milk with mixed culture of *Lactobacillus bulgaricus* and *Streptococcus*. Product quality and consumer satisfaction are important for increasing the sales of various types of yogurt products (Tarakci and Erdogan, 2003). Quality assessment encompasses specifications, sampling, testing procedures and recording or reporting. Vanilla flavored yoghurt is the most popular yoghurt type in Kenya. Ultimately, the consumer is the final judge of quality (Hussain *et al* 1996).
Mondia whytei (hook.f.) skeels Asclepiadaceae belongs to the milky-weed family. It grows in forests, bush land and waste land and is a deciduous canopy-climbing liane (Kokwaro, 1993). The leaves are green soft and have hairy in entire margin. *Mondia whytei* is distributed in the tropics. The roots are the valuable part of the plant

and are eaten fresh or as a dried powder (Shitanda, 2007).The roots are boiled in porridge to treat stomach ache, stop vomiting as well as a flavoring agent and an appetizer. The roots are given to lactating mothers to enhance milk production (Mukonyi *et al.* 2004). *Mondia whytei* roots are also used to treat rheumatism, Gonorrhea and as an aphrodisiac (Kokwaro, 1993). It is also used to manage ringworms, heartburn, kidney complication, allergies, indigestion, Asthma, foot and mouth, disease and diabetes (Msonthi, 1991).

2. MATERIALS AND METHODS

The research work of the project was conducted in the Food Processing workshop at Jomo Kenyatta University. Fresh milk was analyzed for quality and pasteurized for use in the manufacture of the yogurt.

Collection of samples

Fresh samples of *Mondia whyei* roots were harvested from Kakamega, washed, peeled, dried for use. Starter culture, Vanilla flavor were bought from a local Sigma Aldrich chemical distributor.

Product Analysis

Total Titratable Acidity

Acidity was measured by potentiometric method according to the BS 7142-5, 1997.

PH

The pH of *Mondia whytei* and vanilla yogurt was determined by using a Digital PH meter. The PH meter was standardized using PH 4.0 and pH 7.0 buffer solutions. PH was measured over several days.

Total solid

Total solids were determined by following formula, % Total solids (wt/wt) = wt. Of dry sample/ wt. of wet sample* 100 (Suzanne, 2003b)

a) Nutritional Composition

Qualitative and quantitative determination of macro and micro elements was performed using spectrophotometric methods at JKUAT. The samples digested using the wet method for macro and micro- elements analysis using the Kjedhals digestion blocks). The standard stock and working solution for the elements analyzed were prepared using analar salts Shimadzu atomic absorption spectrophotometer and flame emission spectrophotometer (pyunicam) in JKUAT was used for analysis of both macro and micro-elements.

Proteins

Analysis for total protein content was performed using the combustion method. Nitrogen –carbon analyzer (sumigraph NC-90A) coupled with a Shimadzu gas chromatograph. For total protein determination dried sample was combusted in stream of oxygen using the analyzer and the percentage nitrogen content determined. Percentage protein was computed for each sample by multiplying nitrogen content by a factor of 6.25.

Microbiological analysis

The microbiological analysis of *Mondia whytei* and Vanilla yogurt was carried out for total viable count as described by David and Fankhauser (2005).

Organoleptic evaluation

All the samples of *Mondia whytei* and Vanilla yogurt were evaluated by ranking method for sensory characteristics and overall acceptability by sampling using questionnaires for ages (20 – 40) years of the population of Jomo Kenyatta University using the method described by BS 5929-6 (1989).

Statistical analysis

The data was statistically analyzed according to John (1995a, b). Students' T-test was applied to compare the samples of *Mondia whytei* and Vanilla as described by Daniel (2002). Significant differences were determined at (P= 0.05%).

3. RESULTS AND DISCUSSION

Total titratible acidity

The total tirtatable acidity of *Mondia whytei* and vanilla yogurt is shown in Fig 1. The average TTA of freshly prepared *Mondia whytei* yogurt was 0.936 percent with a standard deviation of 0.03. The average TTA acidity of Vanilla yogurt was 0.729 with a standard deviation of 0.01. These results are in line with findings Tarakci and Erdogan (2003) in which acidity increased over the storage period. Guler and Mutlu (2005). Figure 1 and 2 shows variation of TTA of *Mondia whytei* and vanilla yogurt with time.

PH

The PH of *Mondia whytei* and vanilla yogurt is shown in Figure 1 and 2. In both cases, PH decreases during storage. The PH for fresh *Mondia whytei* yogurt was 4.5 compared with 4.82 for Vanilla yoghurt. These results are in line with findings of Varnam (1994) who reported yogurt PH as 4.50 – 4.90. *Mondia whytei* had a low PH than Vanilla yogurt, possibly due to the low total viable count of *L. acidophilus* bacteria. Nighswonger *et al.* (1996) also reported declining counts of L. acidophilus in yogurt over the storage period.

Quality Comparison of *Mondia whytei* and vanilla Yogurt

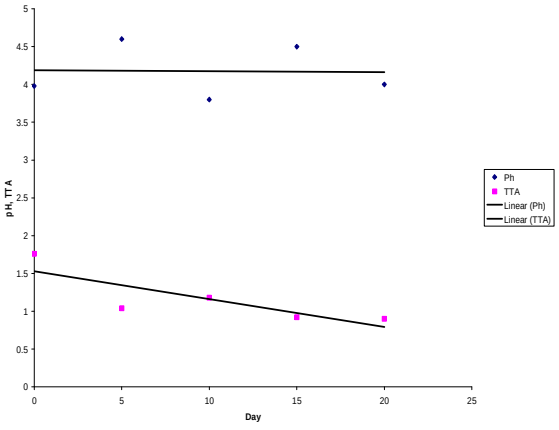

Figure 1. TTA, PH Curve for Mondia yoghurt variation with time at Room temperature

The total solids content of *Mondia whytei* and vanilla yogurt is shown in Table 1. The average total solids content of *Mondia whytei* was 19.2 with a standard deviation of 0.006. While the average total solids content of vanilla yogurt was 17.75 of with a standard deviation of 0.035. These results are in line with findings of Muhammad *et al*. (2005) who reported the highest range of total solids in yogurt was 17.1%, but in case of *Mondia whytei* yogurt these results are significantly different.

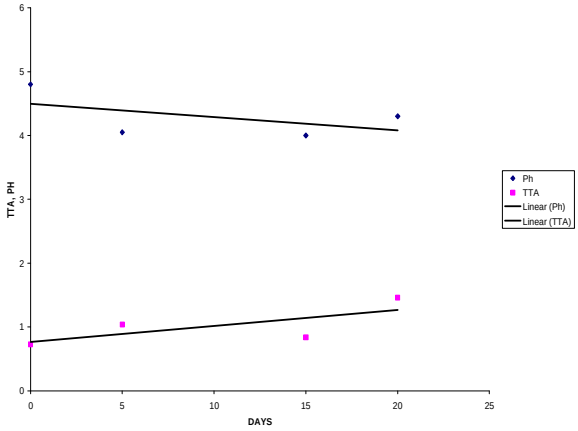

Figure 2. TTA, PH Curve for Vanilla yoghurt variation with time at room temperature

Table 1: Physio-chemical analysis of fresh *Mondia whytei* and Vanilla yogurt

Product	TTA%	PH	Total Solids
Mondia	0.936	4.5	19.2
Vanilla	0.729	4.82	17.75

Table2: Nutritional Analysis

Sample	Fe (ppm)	Cu (ppm)	Ca (ppm)	Zn (ppm)	K (ppm)
Mondia	138.62	7.51	636.05	73.4	16040.23
Vanilla	32.80	2.73	567.11	50.19	12350.72

Sample	Mg (ppm)	Mn (ppm)	Fat (%)	Protein (%)	Vitamin C(mg/10g)
MMMondia	190.44	18.02	2.05	3.19	32.92
Vanilla	164.9	3.57	1.45	2.1	32.9

Microbiological analysis

Total viable count

The total viable count of *Mondia whytei* and vanilla yogurt is shown in Table 2. The average total viable count of *Mondia whytei* yogurt was 4.04 x 108 with a standard deviation of 0.93. The average total viable count of Vanilla ranged was 4.6 and standard deviation 1.22. These results are in line with findings of Lopez *et al*. (1997) who reported log aerobic mesophilic count from < 1.0-5.38 and from 4.87-6.67 per ml in natural yogurt.

Table 3: **Serial Dilution Analysis of *Mondia whytei* and Vanilla yoghurt**

Product	Total Viable Counts		
	$*10^4$	$*10^5$	$*10^6$
Mondia	>80	47	31
Vanilla	>300	168	68

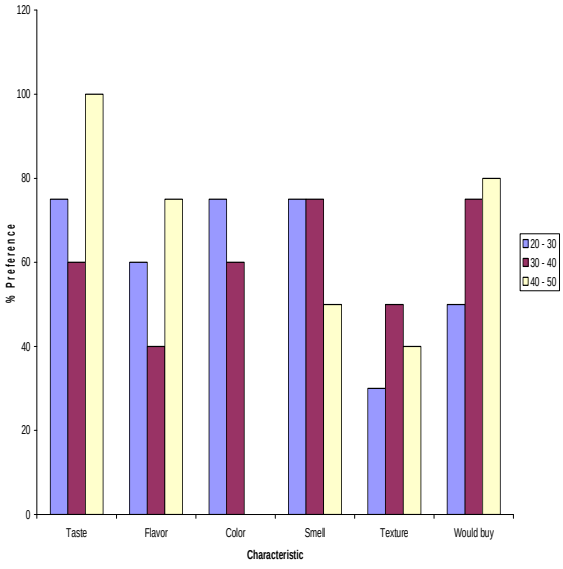

Figure 3. Organoleptic evaluation

4. CONCLUSION

The addition of *Mondia whytei* not only adds a pleasant flavor but also improves the shelf-life and nutritional characteristics of yoghurt. Other beneficial health benefits include good a antioxidant and help in the control of stomach upsets.

5. ACKNOWLEDGMENTS

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6. REFERENCES

[1] Bourlioux, P. and P. Pochart, 1988. Nutritional and health properties of yogurt. World Rev. Nutr. Diet.,56: 217-58.
[2] BS, 1741-5.2, 1990. Methods for chemical analysis ofliquid milk and cream.
[3] BS, 7142-5, 1997. The methods for analysis of milk based products.
[4] BS, 5929-6, 1989. Methods for sensory analysis of food.Part 6: Ranking.
[5] Daniel, B., 2002. First steps in statistics. Sage Publications London, Pp: 71-73.
[6] David, B. and Fankhauser 2005. Pour plate technique for bacterial enumeration. Unvi. Of Cincinnati Clermont College, Batavia OH 45103, pp: 1-3.
[7] Debbie, L. Barnes, Steven, J. Harper, Floyd, W. Bodyfelt and M.R. McDaniel, 1991. Prediction of consumer measures of sweetness and sourness. Dairy Sci., 74: 3746-3754.
[8] Hussain *et al* **1996** Quality Comparison of Probiotic and Natural Yogurt 12
[9] FAO, 1977. Lab. Manual F.A.O. Regional dairy Mutlu, B. Guler and A.M. Serdar Akin, 2005. Effects of development and training center for near east Philippines.
[10] Guler, A. and B. Mutlu, 2005. The effects of different incubation temperatures on the acetaldehyde content and viable bacteria counts of bio-yogurt made from ewe's milk. Int. J. Dairy Tech., 58: 174- 179.
[11] John, 1995a. Statistics for food science. I. J. Nutr. And Sci. 4: 19-23.
[12] John, 1995b. Statistics for food science. II J. Nutr. And Sci., 5: 29-34.

[13] Kon, S.K., 1959. Milk and milk products in human nutrition. F.A.O. Nutr. Stud., 17.
[14] Kroger, M., 1976. Quality of yogurt. J. Dairy Sci., Vol: 59: 344-350.
[15] Kurtz, A., 1981. Sut. Teknolojisi. Ataturk Universitesi Yaymlari, No: 573 Ataturk Universitesi Basim Evi.
[16] Lopez, M.C., L.M. Medina, M.G. Cordoba and R. Jordano, 1997. Evaluation of the microbiological quality of yogurt ice cream. Alimentaria, 35: 39-45.
[17] Muhammad, B.F., M.M. Abubakar and E.O. Oyawoye, 2005. Effects of culture concentration and inoculation temperature on physicochemical, microbial and organoleptic properties of yogurt. Nig. Food J., 23: 156-165.
[18] Msonthi, J. D (1991). A novel phenolic glycoside from roots of Mondia Whytei skeels. Bull Chem. Soc. Ethopia , 107 – 110.
[19] Mukonyi, K.W, Lwande, W (2004). Phytochemical and Nutritional Values of Mondia Whytei. Paper presented at the 2nd Kenya Forestry Research Institute, Scientific Conference, November 2004, Kefri, Muguga
[20] Shitanda, D., Mukonyi, K.W. and Wamalwa, L (2007). Characterization of Kenyan Grown *Mondia whytei* roots and their Potential Use. Paper presented at the International Agricultural Engineering Conference, Bankok, Thailand, 3-6 December, 2007.