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Journal Name:	European Journal of Nutrition & Food Safety
Manuscript Number:	Ms_EJNFS_29627
Title of the Manuscript:	“Phytochemical composition and antioxidant activity of fermented Moringa oleifera leaf powder”
Type of the Article	Original research papers

General guideline for Peer Review process:

This journal's peer review policy states that **NO** manuscript should be rejected only on the basis of '**lack of Novelty**', provided the manuscript is scientifically robust and technically sound.

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PART 1: Review Comments

	Reviewer's comment	Author's comment (if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)
Compulsory REVISION comments		
Minor REVISION comments	<p>These results could serve as a scientific base for the use of <i>Moringa oleifera</i> species.</p> <p>There were revealed the literature data with information concerning effects of lactic fermentation correlated with their chemical composition.</p> <p>But the paper could require some corrections such as: Standardization of the references. Bibliographic indices should be placed at the end of the sentence. It must be improved English language.</p> <p>Conclusions must be rebuilt clearly and concretely, specifying the concrete results obtained by authors.</p>	<p>1 Introduction :</p> <p>Protein malnutrition affects populations in most of the southern countries, like Madagascar. In this country, in 2012-2013, the proportion of the population living below the national poverty line was 71.5% and in the extreme poverty was 52.7%. This poverty results in a diet consisting of low-cost roots and tubers with intakes of 477g / day / person [1]. Malnutrition is caused by low household income, and by ignorance and lack of exploitation of edible and available natural resources. <i>Moringa oleifera</i> is a plant that grows in the wild or that serves hedge for homes in coastal areas and it is relegated to the back by the highlands population. But in the South, <i>M. oleifera</i> leaves are a new food resource, an important source of protein, vitamins and minerals which helps to fight against malnutrition [2, 3, 4, 5]. <i>M. oleifera</i> is also used in traditional medicine and is known to be rich in antioxidants, especially polyphenols and flavonoids which can prevent degenerative diseases. Among other to use to struggle against malnutrition, <i>M. oleifera</i> serves for enriching different food in proteins and minerals [3, 6, 5]. It serves as a nutritional</p>



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		<p>supplement for example in biscuits and in traditional dishes [7, 8, 9].</p> <p>Technological processes are searched to improve the bioavailability of nutrients and to increase the energy density of food [10]. It's possible to name the case of lactic fermentation improves the organoleptic properties of food and health and conservation [11, 12]. The organisms implicated are the lactic bacteria such as <i>Lactobacillus plantarum</i>. It is used for example in the fermentation of corn pastes, sauerkraut lemon and others foods based on wheat [13, 14, 15].</p> <p>All over beneficial effect nutritional and health benefits of <i>M. oleifera</i> leaves, and in order to increase protein intake, we determined the effect of fermentation on powders leaves by <i>Lb. plantarum</i> and <i>Weissella cibaria</i> on nutritional composition, on antioxidant capacity as well as on the organoleptic properties especially the food color. Indeed, color as well as texture are important factors to determine sensory quality and acceptability of the consumers for food products. These parameters are needed to improve the process of incorporating the powders of <i>M. oleifera</i> leaves in food [3].</p> <p>Conclusion rebuilds: The aim of this study was to determine the effects of lactic fermentation of Moringa oleifera leaf powder at young and mature stage of development. This is to improve the</p>
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		<p>organoleptic quality of <i>Moringa oleifera</i> leaf powder. The work was performed in the laboratory of high School of Engineering in the Indian Ocean Reunion (ESIROI). The fermentation was performed by <i>Lactobacillus plantarum</i> (DSM 2601) and <i>Weissella cibaria</i> (27A) inoculated at 10^6 CFU / g. The fermentation was performed at 25°C over 5 days. An acidification of fermented products (4 <final pH< 5), a high protein content in mature leaves fermented over 120 hours (T120-Ma), or over 48 h (T48- Ma), by <i>W.cibaria</i>, a high protein content in mature leaves fermented over 120h (T120-Ma) and in young leaves fermented over 120 h (T120-I) by <i>Lb.plantarum</i> was observed.</p> <p>The results of ANOVA on fermentation by <i>W.cibaria</i> (27A) and <i>Lb.plantarum</i> (DMS 2601) on the nutritional leaves of <i>M.oleifera</i>, showed there was no significant effect on the $\alpha=0,05$ fermentation times and stage of leaves maturity for contents of reducing sugar and proteins. But there is a significant effect of fermentation and maturation stage leaves on the pH of the product threshold at $\alpha=0.05$.The fermentation by <i>Lb. plantarium</i> (DMS 2601) showed there was an effect of the fermentation time on the content of phenolic compounds.</p> <p>Principal component analysis (PCA) showed that there is a negative correlation between the protein content and the content of phenolic compounds. By the fermentation process, the organoleptic characteristics of the <i>M.oleifera</i> leaves powders whose color is to be improved, which is an asset in the process of incorporation of <i>M.oleifera</i>. Lactic fermentation</p>
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		<p>of <i>M.oleifera</i> leaves is a method of increasing protein intake of the food and the fight against PEM target populations.</p> <p>References:</p> <ol style="list-style-type: none"> 1. Fao, banque de données Faostat ; 2013-2014. French. 2. Saint sauveur A, Broin M. Moringa et autres végétaux à fort potentiel nutritionnel : L'utilisation des feuilles de <i>Moringa oleifera</i> contre les carences alimentaires : un potentiel encore peu valorisé. Accra, Ghana, 16-18 novembre 2006. French. 3. Harimalala Andriambelo N, Rasoarahona F, Razanamparany LJ. Nutritional Quality of Fruit Pastes Enriched with <i>Moringa Oleifera</i> Leaves". International Journal of Applied Science and Technology. 2014; 4 (5) 4. Busina M, Patrick J, Masika A. H. and Voster M. Nutritional characterization of Moringa (<i>Moringa oleifera</i> Lam.) leaves. African Journal of Biotechnology. 2011; 10: 12925-12933. 5. sengev ai, abu oj, gernah di. Effect of <i>Moringa oleifera</i> leaf powder supplementation on some quality characteristics of wheat bread. Journal Food and Nutrition Sciences. 2013; 4:
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		<p>270-275.</p> <p>6. Vongsak B, Sithisarn P, Mangmool S, Thongpraditchote S, Wongkrajang Y, Gritsanapan W. Maximizing total phenolic, total flavonoids contents and antioxidant activity of <i>Moringa oleifera</i> leaf extract by the appropriate extraction method in Industrial Crops and Products. 2013; 44: 566-571</p> <p>7. owusu d, oduro i, ellis wo. Development of crackers from cassava and sweet potato flours using <i>Moringa oleifera</i> and <i>Ipomoea batatas</i> leaves as fortificant. American Journal of Food and Nutrition. 2011; 1 (3): 114-122.</p> <p>8. Dachana KB, Rajiv J, Indrani D, Prakash J. Effect of dried <i>Moringa oleifera</i> LAM) leaves on rheological, microstructural, nutritional, textural and organoleptic characteristics of cookies. Journal of Food Quality. 2010; 33: 660-677</p> <p>9. Tete-Benissan A, Quashie ML, Lawson-Evil K, Kokou K. and Gbeassor M. Récupération nutritionnelle chez les sujets malnutris VIH positifs et VIH négatifs après utilisation de feuilles de <i>Moringa oleifera</i> Lam. Journal of Animal and</p>
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		<p>Plant Sciences. 2012; 15: 2184-2199.</p> <p>10. Noumo Ngangmou T, Tatsadjieu Ngoune L, Montet DF, Mbofung CM. Effect of pure culture fermentation on biochemical composition of <i>Moringa oleifera</i> Lam leaves powders. Food and Nutrition Sciences. 2013; 4: 851-859.</p> <p>11. Bousmaha L, Ouhssine M, Yachoui EI. Fermentation du citron par inoculation microbienne. Journal Afrique Science. 2006 ; (02)1 : 83 – 93</p> <p>12. Messens W, De Vuyst L. Inhibitory substances produced by bacilli isolated from sourdoughs- review International Journal Food Microbiology. 2002 ; 72: 31-43</p> <p>13. Louembe D, Keleke S, Kobawila SC, Nzouzi JP. Bactéries lactiques de la pâte fermentée de maïs au Congo. Journal Tropicultura. 2003 ; (21) 1 : 3-9</p> <p>14. Xiong T, Peng F, Liu Y, Deng Y, Wang X, Xie M. Fermentation of Chinese sauerkraut in pure culture and binary co-culture with <i>Leuconostoc mesenteroides</i> and <i>Lactobacillus plantarum</i>. Journal Food Science and Technology. 2014; 59: 713-717.</p> <p>15. Bradet C, Guiraud J. Etude des mécanismes physico-chimiques et biologiques responsables du pouvoir</p>
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		<p>de panification de l'amidon fermenté de manioc. Thèse de Doctorat, Université de Montpellier ; 1994. French.</p> <p>16. Sposina Sobral Teixeira R, Sant'ana Da Silva A, Santana Ferreira- Leitão V, Pinto Da Silva Bon E. Amino acids interference on the quantification of reducing sugars by the 3, 5-dinitrosalicylic acid assay mislead carbohydrase activity measurements. Carbohydrate Research. 2012; 363: 33-37.</p> <p>17. Colin-Henrion M. De la pomme à la pomme transformée : impact de procédé sur deux composés d'intérêt nutritionnel. Caractérisation physique et sensorielle des produits transformés. Thèse de Doctorat. Université d'Angers ; 2008. French.</p>
<p><u>Optional/General</u> comments</p>		