

بسم الله الرحمن الرحيم

**Nutritional Composition of Six Selected Traditional
Sudanese Fruits to Develop Non-Dairy based Fermented
Carrier for A probiotic *Bifidobacterium infantis* 20088**

التركيب الغذائى لستة انواع مختارة من الفاكهة التقليدية السودانية
لتطوير منتجات مخمرة غير لبنية تحاملة بـباكتيريا الانفانتس الصديقة
(بروبيوتيك)

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Dedication

I dedicated this dissertation

To soul of my great parents Salah and Zahera.

To my aunts, uncles, sisters, brothers and all members of my big family for their kind help and support.

To my great husband and my kids for their patience and understanding.

It also goes to teachers, scientists, researchers, and all seekers for knowledge.

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LIST OF ABBREVIATIONS

GIT	Gastrointestinal Tract
WHO	World Health Organization
Log	logarithm
CFU	Colony Forming Unite
%	Percentage
g	gram
β	Beta
DP	degree of polymerization
N	Normality
TSS	total soluble solid
h	hour
MRS	de Mann_Rogosa_Sharpe
°C	degree Celsius
et al	et cetera (and company)
ANOVA	Analysis of variance
HPLC	High performance liquid chromatography
ml	milliliter

w/w weight per weigh

ABSTRACT

This study was carried out to determine the chemical composition of six selected traditional Sudanese fruits [Aradaib (*Tamarindus indica*); Doum (*Hyphaenethebaica*; Godim (*Grewia tenax*); Gunguleiz (*Adansonia digitata*); Lalob (*Balanitesa gyptiaca*); and Nabak (*Ziziphusspina christi*)] to develop probiotic fermented beverages. The results on showed that carbohydrates ranged from a minimum of 63.8% in Godim to a maximum of 80.9% in Nabak. Moreover Godim and Doum were the highest sugar and fiber content therefore, they were used for fermentation with *Bifidobacterium infantis20088*. The viable counts of the strain and physiochemical changes during fermentation and refrigeration storage were also determined. Reconstituted skim milk was used as control. The results obtained on fermentation revealed that the highest growth of *B. infantis20088* during fermentation was in Godim beverage (8×10^9) , followed by reconstituted skim milk(1.9×10^8) and then fermented Doum (1.5×10^8). That is because Godim contained the highest level of glucose as compared to skim milk and Doum fruit. In general there was significant increase in maximum viable count of each strain as

compared with its initial level in all fermented beverages. The increased viable number was accompanied by a reduction in pH and total soluble solids (TSS) by extended fermentation period. During the refrigeration storage of the fermented beverages there was no significant reduction in *Bifidobacterium infantis* 20088 of all fermented beverages. Hopefully the strain was maintained high; fulfill the number required to presence in probiotic foods, which was 7 log CFU/ml fermented product. Therefore godaim and Doum are suitable carrier to deliver *bifidobacterium infantis* 20088 to consumer at the same time the fermented beverages provide other essential nutrients such as protein, ash and fiber.

ملخص البحث

أجري هذا البحث لتقدير التركيب الكيميائي لستة أنواع مختارة من الفاكهة التقليدية السودانية (عرديب - دوم - قضيم - لالوب - قنقليز والنبق) وذلك لتطوير عصائر مخمرة بالباكتيريا الصديقة (بروباويوتك). نتائج التحليل التقريبي للثمار اوضحت ان مستوى الكربوهيدرات يتدرج من ادى مستوى 63.8 % فى القضم الى ادى مستويات فى النبق بنسبة 80.9%. بالإضافة لذلك القضم والدوم احتويا على ادى النسب من السكريات والالياف لذلك استخدمت للتخمير بنوع البكتيريا الصديقة انفانتس.

وتم حساب عدد بكتيريا انفانتس والتغيرات الفيزيوكيميائية اثناء عملية التخمير والتخزين فى الثلاجة. النتائج التى تم الحصول عليها من عملية التخمير اوضحت ان ادى نمو لبكتيريا الانفانتس كانت فى عصير القضم ثم اللبن المنزوع الدسم المعاد تكوينه ومن ثم الدوم. وهذا يعود الى ان القضم احتوى على ادى نسبة من الجلوزم قارنة باللبن المنزوع الدسم المعاد تكوينه والدوم.

وبصورة عامة هناك زيادة معنوية فى النمو الميكروبي عند اصى نمو لبكتيريا انفانتس فى العصائر المخمرة عند م قارنته بعددها عند بداية عملية التخمير. وهذه الزيادة المعنوية فى نمو بكتيريا الانفانتس كانت مصحوبة بانخفاض فى الرقم الهيدروجيني (pH) والجوامد الصلبة الذائبة الكلية مع تقدم عملية التخمير.

واثناء عملية التخزين فى الثلاجة للعصائر المخمرة ببكتيريا الانفانتس فان ذلك لم يؤدى لتخفيض معنوى لعدد البكتيريا المرغوبة. هذا العدد العالى لبكتيريا الانفانتس فى العصائر المخمرة يفى العدد المطلوب وجوده فى الاغذية التى تحتوى الميكروبات الصديقة وهى 10^7 خلية بكتيرية فى كل مل من المنتج المخمر. لذلك فان القضم والدوم ملائمان لحمل بكتيريا الانفانتس للمستهلكين وفى نفس الوقت هذه العصائر المخمرة تقدم عناصر غذائية اساسية مثل البروتينات- الاملاح والالياف.

