

بسم الله الرحمن الرحيم

﴿وَمَا يَسْتَوِي الْبَحْرَانِ هَذَا عَذْبٌ فُرَاتٌ سَائِغٌ شَرَابُهُ وَهَذَا  
مِلْحٌ أُجَاجٌ وَمِن كُلِّ تَاكُلُونَ لَحْمًا طَرِيًّا وَتَسْتَخْرِجُونَ حِلْيَةً  
تَلْبُسُونَهَا وَتَرَى الْفُلْكَ فِيهِ مَوَاجِرَ لِيَبْتَغُوا مِنْ فَضْلِهِ وَلِعَلَّكُمْ  
تَشْكُرُونَ﴾

صدق الله العظيم

سورة فاطر الآية (12)

## **Dedication**

**To my father for his continuous encouragement and  
....guideness**

**....To my mother for her kind help and blesses**

**To my husband for his patient, kindness and full  
....support**

**...To my brothers and friends**

**....To everybody who helped me to complete this work**

**Reem**

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## ABSTRACT

*Clarias lazera* (garmout) fish was selected for this study and smoked with different types of sawdust (mosky (*Pinus strobus*), talh (*Acacia seyal*), mesquite (*Prosopis chilensis*)) to evaluate the microbial safety, nutritional value and

general acceptability of smoked fish to assess its shelf life under refrigeration storage for four weeks. Twenty kgs of *Clarias Lazera* fish were used. Fish samples were carefully handled throughout the preparation process; they were cleaned up, eviscerated and divided into four portions, one portion kept without treatments (control), the rest three samples were immersed in 10% salted solution, washed with tap water to remove salt traces then dried for one hour under direct fan to release the liquids inside the fish. After that, the three samples were smoked with different sawdust as follows: one portion smoked with (mosky) sawdust, the second portion smoked with (talh) sawdust and the third portion smoked with (mesquite) sawdust for two hours and each packed under vacuum in polyethylene and stored under refrigeration for four weeks. Proximate analysis including (moisture %, ash %, fat % and protein %) were carried out before and after smoking process. Total bacterial count, *Salmonella* spp., *Staphylococcus* spp., Coliform bacteria and Yeasts and Moulds were checked before smoking and every week during the refrigeration storage for four weeks. Sensory evaluations were also done after smoking process. The results of the study revealed that there is a significant difference in moisture, protein and fat content among the different studied smoked samples. Moisture and ash tend to decreased after smoking process while protein and fat contents increased after smoking. Smoking with different types of sawdust completely eliminated *Salmonella* and coliform bacteria. During the refrigeration storage detected species were within the acceptable limits for fish, while some .increments occurred after storage

Sensory evaluation indicated the acceptability of consumers for the smoked products, and smoked fish with (mesquite) sawdust were the top of preference .followed by samples smoked with (talh) and (mosky) sawdust

## **Abstract in Arabic**

ملخص البحث

إستخدم سمك القرموط *Clarias lazera* لإجراء هذه الدراسة حيث تم تدخينه بأنواع مختلفة من النشارة (نشارة خشب الموسكى ((*Pinus strobus*، نشارة خشب الطلح (*Acacia seyal*) ونشارة خشب المسكيت (*Prosopis chilensis*)) لمعرفة السلامة الميكروبيولوجية والقيمة الغذائية ومدى القبول العام لأسماك القرموط المدخنة والتي تم تخزينها فى الثلاجة لمدة أربعة أسابيع. تم استخدام 20 كيلوجرام من أسماك القرموط وأخضعت للعمليات المختلفة من نظافة وإزالة أحشاء. ثم غمرت فى محلول محلى تركيزه 10%، لمدة نصف ساعة ثم غسلت بالماء الجارى لإزالة الملح الذائب وتركت لتجف تحت هواء المروحة المباشر لمدة ساعة وذلك للمساعدة فى حجز السوائل داخل عينة السمك. ثم قسمت الى أربعة أجزاء، جزء ترك من غير معاملة والأجزاء الثلاثة الأخرى أجريت عليها عملية التدخين بواسطة أنواع مختلفة من نشارة الخشب كالآتى: عينة دخنت بواسطة نشارة الخشب، والثانية بواسطة نشارة الطلح والثالثة بواسطة نشارة المسكيت لمدة ساعتين ثم غلفت بأكياس البولى إيثيلين تحت التفريغ وحفظت فى الثلاجة لمدة أربعة أسابيع. التحاليل الكميائية أجريت قبل وبعد عملية التدخين وتشمل ( تقدير الرطوبة %، تقدير الرماد %، تقدير الدهون % وتقدير البروتين). أما العد الباكترى الكلي والسالمونيلا والعد الكلي لبكتريا الإستاف وبكتريا الكلو فورم و الخمائر والأعفان أجرى الكشف عليهم قبل عملية التدخين ثم إسبوعياً أثناء فترة الحفظ لمدة أربعة أسابيع.

النتائج التى تم الحصول عليها أوضحت أن هناك إختلاف معنوي فى نسب الرطوبة والبروتين والدهون فى عينات الدراسة بالمعاملات المختلفة. الرطوبة حدث لها إنخفاض ملحوظ بعد عملية التدخين بينما البروتين والدهون حدثت لهما زيادة ملحوظة. التدخين بالأنواع المختلفة من النشارة أدى الى التخلص من بكتريا الكلو فورم والسالمونيلا.

و كانت كل الإختبارات الميكروبيولوجية التي تمت دراستها في الأسماك الطازجة والمدخنة ضمن الحدود المسموح بها للأسماك الغذائية، و قد حدثت بعض الإختلافات بعد التخزين.

و قد أوضح التقييم الحسي قبول المستهلك لمنتجات الأسماك المدخنة، كما نالت المنتجات السمكية المدخنة بنشارة أخشاب (المسكيت) درجات تفضيل أعلى لدى المستهلك تليها الأسماك المدخنة بنشارة أخشاب (الطلح) وأخيراً الأسماك المدخنة بنشارة أخشاب (الموسكى).