كـليــة التـربيــة
قسم الاقتصاد المنزلي

" تأثير مستخلصات مختلفة من السماق كمضادات ميكروبية طبيعية في منتجات اللحوم "

رسالة الماجستير
مقدمة من الباحثة

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استكمالاً للحصول على درجة الماجستير في التربية
قسم الاقتصاد المنزلي تخصص (تغذية وعلوم أطعمة)

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المستخلص العربى

تأثير مستخلصات مختلفة من السماق كمضادات ميكروبية طبيعية في منتجات اللحوم

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يهدف هذا البحث إلى دراسة حبيبات السماق كإضافات مضادة للميكروبات وقد تم عمل تحليل كيميائى لمكونات السماق وعمل تفريد للدهون وكذلك تقدير الفينولات بجهاز HPLC والذى أظهر ان Gallic acid هو الفينول الأكثر تركيز. كما تم استخدام أختبار الأنتشار الصلب – التثبيط الكلى للفاعلية بالمليمتر لتحديد فاعلية كل من المستخلص الإيثانولى والمستخلص المائى لتثبيط النشاط البكتيرى لأربعة أنواع من البكتيريا (*Staphylococcus aureus, Escherichia coli, Bacillus cereus* and *Salmonella entridis*) ، ونوعين من الفطريات (*Aspergillus* and *penicillium*).

كما أشارت نتائج أختبار النتشار الصلب أن المستخلص الإيثانولى أكثر فاعلية على تثبيط النشاط الميكروبى أكثر من المستخلص المائى. وفى معظم الحالات فإن السجق المدعم بتركيزات عالية من المستخلص الأيثانولى كان له تأثير قوى فى تثبيط نشاط *Staphylococcus aureus, Bacillus cereus* عن التركيزات المرتفعة من المستخلص المائى. علاوة على ذلك فإن معدل العد البكتيرى لجميع عينات السجق أثناء التصنيع كانت مرضية.

كما أوضحت النتائج أن جميع عينات السجق المضاف إليها المستخلصات الأيثانولية والمائية والتى خضعت للفحص بعد تخزينها على درجة حرارة منخفضة ذات جودة ميكروبية مرضية. بينما حدث تثبيط قوى لأنواع الفطريات فى عينات السجق محل

الدراسة سواء أثناء التصنيع أو بعد التخزين تحت تبريد. أما من حيث التقييم الحسى فقد سجلت التركيزات العالية من المستخلص الايثانولى فى معظم الحالات تقييم حسى غير مقبول بينما كانت التركيزات العالية من المستخلص المائى مقبولة فى معظم الحالات فضلا عن وجود اختلاف طفيف بين العينة الضابطة والعينة الممزوجة بالمستخلص المائى ذات تركيزات (٤٠، ٧٠، ١٠٠). لذلك فقد أظهرت الدراسة أن حبيبات السماق تحتوى على مواد تثبط نشاط الكائنات الحية (مضادات ميكروبية) والتى تسبب فساد السجق.

الكلمات الدالة : نشاط مضادات الميكروبات – حبيبات السماق- الفينولات- السلالات البكتيرية- السلالات الفطرية- السجق – التقييم الحسى.

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LIST OF ABBREVIATIONS

A. flavus	*Aspergillus flavus*
APC	Aerobic plate count
Asp.flavus	*Aspergillus flavus*
B.cereus	*Bacillus cereus*
BHI	Brain Heart Infusion agar
BMC	Basil methyl chavicrol
BSL	Basil sweet linalool
C. albicans	Candida albicans
CFU/g	Colony forming unit per gram
Concen	Concentration
E.coli	*Escherichia coli*
EOs	Essential oils
g	Gram
g/I	Gram per liter
g/mL	Gram per milliliter
H	Hour
I.O.S	International Organization for Standardization
IDAEC	International Dietetics Association of the European Community
L.monocytogenes	Listeria monocytogenes
LP	Lipid per oxidation
MAP	Modified atmosphere packed
mg	Milligram
ml	Milliliter
MIC	Minimum inhibitory concentration

Mint	Spearmint
MIV	Minimum inhibitory volume
MTC	Maximal tolerated concentration
OH	Hydrogen Group
P. citrinium	Penicilium citrinium
Pseud.	Pseudomonas
R. glabra	Rhus glabra
R. trichocarpa	Rhus trichocarpa
R. typhina	Rhus typhina
RSC	Radical scavenging capacity
Salm.	*Salmonella*
SFE	supercritical fluid extraction
Staph. Aureus	*Staphylococcus aureus,*
TBC	Total Bacillus cereus count
TFC	Total fungal count
vol/vol	Volume/Volume
W/V	Weight/ Volume
WES	water extract of sumac

1- INTRODUCTION

One of the major advances in human history is ability to preserve food and inhibit food spoilage by preservation techniques. Food antimicrobials are compounds adder to or present in foods that retard microbial growth or kill microorganisms. Food antimicrobials should be non toxic, non allergenic, cheap and stable to any processes **(Amin *et al.*, 2008)**.

Food poisoning originating from contaminated foods by both Gram-positive and Gram-negative bacteria causes concern to society and to the industry. Spices have been used safely since ancient times as food flavoring agents and also as herbal medicines and are now mainly considered "generally regarded as safe" **(Fazeli *et al.*, 2007)** .

Meat is considered a high nutritional value as is contain proteins, fats, vitamins, minerals, etc. Meat is an important and vital means to build a health body for continuity of the activity **(Aljdela and Hamida, 2005)**.

With the magnificent scientific progress and technology, the technology of food industry has become one of the fields of great importance internationally. In Egyptian markets a lot of meat products are spread like sausage, burger, kofta ,…… etc **(Elena *et al.*, 2009).**

Traditional meat products preservation such as refrigeration cannot ensure the quality and safety of meat products. Therefore, the use of alternative preservation methods such as chemical preservatives is become valuable. It should be noted that, in meat products some synthetic chemical compounds such as sodium nitrate, sodium or potassium sorbate are used. The previous compounds have a high effective and stability for preservation. But, the recent researches indicated that, those compounds aren't safe enough to consume by peoples because they can cause some danger diseases such as cancer and toxins **(Licensee guidance, 2009)**.

Therefore, there is a clear need for new methods of preserving meats products using natural additives such as Sumac *(Rhus coriaria L.)* as antimicrobial additives, because they are rich sources of biologically active compound **(Gulmez *et al.,* 2006).**

The fruit extracts of Sumac *(Rhus coriaria L.)* have been reported to contain high levels of polyphenols, gallic acid, anthocyanins, hydrolysable tannins ***(*Kosar *et al.,* 2007; Abbass *et al.,* 2012)**, tannic acid, ellagic acid, catechin, essential oils ***(*Saxena *et al.,* 1994*;* Olteanu, 1997)**, gallotannins **(Fang *et al.,* 2009)** and malic acids **(Ali and Oya 2007 *;Kossah et al., 2009; Bassam et al., 2005).*** Those components have shown possess strong antimicrobial activities ***(*Nasar and Halkman, 2004; Fazeli *et al.,* 2007; Candan and Sokmen, 2004; Bozan *et al.,* 2003*)***. Tannins are also toxic to fungi, bacteria and viruses and inhibit their growth **(Scalbert, 1991; Cowan, 1999)**. Sumac is rich in water-soluble tannins, and the antimicrobial activity of tannins is well documented. This property of tannins may be important for meat processors **(Chung *et al.,* 1998 ; Gulmez *et al.,* 2006**)

Sumac is a wild bush that grows in all Mediterranean areas, including Egypt, Syria and Palestine. Sumac is an Arabic spice used in wide spread in Arabic kitchen. In Palestine, Sumac is well known spice, popular and has been utilized extensively in many different meals **(Bassam *et al.,* 2005)**.

Due to lack information about the effect of Sumac *(Rhus coriaria L.)* on bacterial and fungal activity. This study was conducted in order to study the antimicrobial effect of water and ethanoilc extracts of Sumac *(Rhus coriaria L.)* against some gram positive and negative bacteria and some fungi that common isolated from meat products. Moreover, study the effect of addition Sumac *(Rhus coriaria L.)* on the microbiological quality of some meat products.

2- AIM OF STUDY

This study aim, in general, at finding safe methods to resist the microbial activity of pathogenic bacteria *(Staph. Aureus; Bacillus cereus; E.coli; S. entridis)* and some moulds to extend the shelf life of meat products by using some Sumac *(Rhus coriaria L.)* extractions at different concentration.

The current study have five specific aims:

Firstly, to investigate the pure extractions activities with some pure pathogenic types of Gram negative, gram positive bacteria and fungi to evaluate their effectiveness when there is no direct contact with food.

Secondly, to check the effectiveness of selected Sumac *(Rhus coriaria L.)* against total aerobic plate count and total fungal count presented in some meat products.

Thirdly, to check the effectiveness of selected Sumac *(Rhus coriaria L.)* against some pathogenic types of bacteria presented in meat products.

Fourthly, to investigate the effect of different storage temperature and various duration of times on microbial profile for some meat products treated with Sumac *(Rhus coriaria L.).*

Fifthly, to evaluate the overall acceptability of meat products fortified with different concentrations and extractions of Sumac *(Rhus coriaria L.).*

3- REVIEW OF LITERATURE

3-1: Sumac *(Rhus coriaria)*

Definition and Properties of Sumac

Sumac (Rhus coriaria L). (Anacardiaceae), commonly known as sumac, is a deciduous shrub growing up to 3 m in height in Mediterranean region, North Africa, Southern Europe, Iran and Afghanistan **(Kurucu *et al.,* 1993 , Ali *et al.,* 2011).**

Sumac grows wild in the region extending from the Canary Islands to the Mediterranean and southeastern Anatolian region of Turkey. The ground spice is used as a condiment and sprinkled over kebobs, grilled meats, soups, and some salads **(Wetherilt and Pala, 1994; Metin *et al.,* 2001; Nasar and Halkman, 2004; Gulmez *et al.,* 2006) .**

The acidic tasty of R. *coriaria* fruits is made into a condiment and sour drink in the Middle East dishes. Its sour taste is derived form the citric and malic acids found in its juice. In Palestine, R. coriaria is a well-known spice, popular and has been utilized extensively in many different meals, such as in zater (dukka) which is a blend of sumac, thyme and citric acid with seasame seeds; almusakhan which is composed from fragmented chicken, small fragments of onions and sumac, as well as in salads and others **(Bassam *et al.,* 2005) .**

The name sumac is given also to the commercial preparation of the dried and ground leaves of the Sicilian or tanners' sumac (R.*coriaria*) of southern Europe, long used in making leather. Sumac is known as any shrub or tree of the genus Rhus **(Ali and Oya, 2007)**

Sumac is the common name for a genus (*Rhus*) that contains over 250 individual species of flowering plants in the family *Anacardiaceae* **(Rayne, 2008)**. These plants are found in temperate and tropical regions