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## **Application of Sage Essential Oil as Anti-Food Spoilage Microorganisms in Some Meat and Poultry Products**

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**ABSTRACT**

# **Application of Sage Essential Oil as Anti-Food Spoilage Microorganisms in Some Meat and Poultry Products**

**By**

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## **Abstract**

The present study was carried out to determine the effect of adding natural Sage essential oil in minced beef meat, minced chicken meat and chicken fillet meat on their microbiological profiles, also to evaluate the effect of this oil on the shelf-life of the products under study during preservation by refrigeration. Twenty three compounds of the *Salvia Officinalis* L. essential oil were determined by gas chromatography-mass spectrometry. GC/MS analyses revealed that the major compounds of the Sage essential oil (%) were Eucalyptol (44.49), Trans-Caryophyllene (18.19), Sabinene (6.57),  $\alpha$ -Pinene (5.30) and Camphor (4.81). These compounds as the main constituents (79.36%) of Sage essential oil. The microbial load of minced beef meat, minced chicken meat and chicken fillet meat samples were significantly reduced by SEO 0.75% (v/w) as compared to microbial loads with the same samples without addition of Sage essential oil.

Gram – negative bacteria as *E.coli* was less susceptible than gram–positive bacteria as *S.aureus*. SEO has minimum inhibitory concentration (MIC or bacteriostatic concentration) of 1.0% (v/v) for *E. coli* and 0.50% (v/v) for *S.aureus* whereas it was 0.75% (v/v) for *Aspergillus flavus* in vitro, whereas SEO has minimum bactericidal

concentration (MBC or bactericidal concentration) of  $>1.0\%$  (v/v) for *E.coli* and  $0.75\%$  (v/v) for *S.aureus* while it was  $\leq 1.0\%$  (v/v) for *Aspergillus flavus* in vitro. A higher concentration is needed to achieve the same effect in the product samples. At concentration of  $\leq 0.75\%$  (v/w) SEO significantly reduced the mean value of all investigated microorganisms except *E.coli* which needed  $< 1.0\%$  (v/w) as a (MIC). Regarding to *S.aureus*, the concentration of  $> 0.75\%$  (v/w) was adequate to kill all the cells of *S.aureus*, whereas the concentration of  $> 1.0\%$  (v/w) was a (MBC) for *E.coli*. In respect of shelf – life from a microbiological point of view, the results indicate that SEO  $0.75\%$  (v/w) extended the shelf – life of the naturally contaminated minced beef meat, minced chicken meat and chicken fillet meat samples from 3 and 4 days to 7 days at  $4^{\circ}\text{C} \pm 1$  according to the microbiological examination and sensory evaluation. The microbial load values were not reached to unsatisfactory or unacceptable limits at  $4^{\circ}\text{C} \pm 1$  up to 7 days of preservation. Neither color nor appearance of the treated samples were affected with the addition of SEO, except the samples gained a strong, warm, spicy taste and herbaceous and camphoraceous scent. Indeed, it is usually desirable. Generally; the treated samples with  $0.75\%$  (v/w) Sage essential oil were more acceptable than other.

**Keywords:** Sage essential oil, Beef and poultry products, Beef and poultry preservative, Food microbiology, Aflatoxins.

# CONTENTS

	Page
<b>LIST OF TABLES</b>	11
<b>LIST OF FIGURES</b>	13
<b>LIST OF ABBREVIATIONS</b>	14
<b>1- INTRODUCTION</b>	17
<b>2- AIM OF STUDY</b>	22
<b>3- REVIEW OF LITERATURE</b>	24
3.1. Food Preservation	24
3.1.1The Most Important Kinds of Spoilage in Meat	26
3.2. Essential Oils .	28
3.2.1.Historical Use of Essential Oils :	29
3.2.2.Current use of EOs.	30
3.2.3. Antimicrobial activity of essential oils .	31
3.3. Uses of salvia officinalis essential oil .	33
3.3.1.Antioxidant activity of salvia officinalis EOs	33
3.3.2. Antimicrobial activity of Salvia Officinalis EOs.	37
<b>4 - Materials And Methods .</b>	41
4.1 Materials .	41
4.1.1. Sage Essential Oil.	41
4.1.2. Beef Meat	41
4.1.3. Chicken Meat	41
4.1.4. Chicken Fillets Meat	41
4.2 Methods .	41
4.2.1. Analyses of the essential oil .	41

	Page
4.2.1.1. Gas Chromatograph.	41
4.2.1.2. Gas Chromatograph – Mass Spectrometry	42
4.2.2. Sampling Of Minced Beef And Chicken Meat	43
4.2.3. Sampling of Chicken Fillet Meat .	43
4.3. Microbiological analyses .	44
4.3.1.Determination of total aerobic bacteria counts (TABCs) (CFU/g) .	45
4.3.2 .Determination of total psychrotrophic bacteria counts (TPBCs) (CFU/g) .	45
4.3.3.Determination of total lipolytic bacteria counts (TLBCs) (CFU/g)	45
4.3.4. Determination of Total Proteolytic Bacteria Counts (TPBCs) (CFU/g)	45
4.3.5.Determination of total mold & yeast counts (TM&YCs) (CFU/g) .	46
4.3.6 .Detection and determination of Bacillus cereus counts (CFU/g)	46
4.3.7. Detection and determination of Staphylococcus aureus counts . ( CFU/g)	46
4.3.8. Detection and determination of Esherichia coli counts . (MPN/g)	46
4.3.9. Detection of salmonella spp.per 25g sample	47
4.4. Experiments with liquid media .	47
4.4.1. Experiments with Aspergillus flavus and aflatoxins .	48



	Page
4.5. Preparation of media .	48
4.6. Preparation of Fungal Spore Suspension .	49
4.7. Inoculation and Incubation.	49
4.8. Determination the effect of SEo on the aflatoxins production by A.flavus .	50
4.9. Total aflatoxins Analyses .	51
4.10. Extraction of total Aflatoxins .	51
4.11. Aflatoxins Content.	51
4.12. Evaluation Method.	52
4.13. Sensory Evaluation.	52
4.14. Statistical Analyses .	53
<b>5. Results And Discussion .</b>	<b>55</b>
5.1. Chemical Composition Of The Essential Oil.	55
5.2. Microbiological profile of fresh beef meat burger.	57
5.3. Microbiological profile and shelf-life of beef meat burger stored at refrigeration temperature	59
5.4. Beef meat burger storage trails	60
5.5. Microbiological profile of fresh chicken meat burger	63
5.6. Microbiological profile and shelf-life of chicken meat burger stored at refrigeration temperature	65
5.7. Chicken meat burger storage trails	67
5.8. Microbiological profile of fresh chicken fillets meat	71
5.9. Microbiological profile and shelf-life of chicken fillets meat stored at refrigeration temperature	72

	Page
5.10. Chicken fillets meat storage trails	74
5.11. Determination of bacteriostatic and bactericidal concentrations	78
5.12. Effects of sage oil on the growth of <i>Aspergillus flavus</i> and aflatoxins production	81
5.13. Sensory Evaluation	85
<b>6. RECOMMENDATIONS</b>	90
<b>7. SUMMARY AND CONCLUSION</b>	92
<b>8. REFERENCES</b>	97
الملخص العربي	117
المستخلص العربي	121

## LIST OF TABLES

N	Title	Page
(1)	Chemical Composition of the essential oil of <i>Salvia Officinalis</i> .	55
(2)	Microbiological profile of beef meat burger after 5 h of slaughtering as control samples .	57
(3)	Microbiological profile and shelf-life of beef meat burger after stored at 4 °C $\pm$ 1 up to 4 days	59
(4)	Microbiological profile and shelf-life of beef meat burger treated with SEo 0.75 % (v/w) after stored at 4 °C $\pm$ 1 up to 8 days .	61
(5)	Microbiological profile of chicken meat burger through 3 h of slaughtering as control samples .	64
(6)	Microbiological profile and shelf-life of chicken meat burger after stored at 4 °C $\pm$ 1 up to 4 days .	66
(7)	Microbiological profile and shelf-life of chicken meat burger treated with SEo 0.75 % (v/w) after stored at 4 °C $\pm$ 1 up to 8 days .	68
(8)	Microbiological profile of chicken fillets meat after 3 h of slaughtering as control samples .	71
(9)	Microbiological profile and shelf-life of chicken fillets meat after stored at 4 °C $\pm$ 1 up to 5 days .	73
(10)	Microbiological profile and shelf-life of chicken fillets meat treated with SEo 0.75% (v/w) after stored at 4 °C $\pm$ 1 up to 8 days .	75

<b>N</b>	<b>Title</b>	<b>Page</b>
(11)	Bacteriostatic & bactericidal and (MIC) & (MFC) concentrations (%) of SEO against <i>Escherichia coli</i> , <i>Staphylococcus aureus</i> and <i>Aspergillus flavus</i> .	78
(12)	SEO effects on <i>A. flavus</i> growth and aflatoxins production in broth medium .	81
(13)	Mean score of sensory evaluation of cooked beef meat burger treated with different concentrations .	85
(14)	Mean score of sensory evaluation of cooked chicken meat burger treated with different concentrations .	85
(15)	Mean score of sensory evaluation of cooked chicken fillet meat treated with different concentrations .	85

## LIST OF FIGURES

N	Title	Page
(1)	Chemical composition of the essential oil of <i>Saliva Officinalis</i>	56
(2)	Microbiological profile and shelf-life of beef meat burger after stored at 4°C ±1 up to 4 days without SEO and 8 days with SEO 0.75% (v/w)	62
(3)	Microbiological profile and shelf-life of chicken meat burger after stored at 4°C±1 up to 4 days without SEO and 8 days with SEO 0.75% (v/w).	69
(4)	Microbiological profile and shelf-life of chicken fillets meat after stored at 4°C ±1 up to 4 days without SEO & 8 days with SEO 0.75% (v/w) and control samples	76
(5)	Effect of sage oil on the inhibition of <i>A. flavus</i> colony growth on 8th day. A (♦) 1.0 %, B (■) 0.75%, C (◄) 0.50%, D (×) Control 0.0%.	79
(6)	Effect of sage oil on <i>A. flavus</i> colony growth during 8 days of incubation at 25 °C on a PDA medium. A (♦) 1.0 %, B (■) 0.75%, C (◄) 0.50%, D (×) Control 0.0%.	81

## LIST OF ABBREVIATIONS

<b>SEO</b>	Sage Essential Oil
<b>+Ve</b>	Positive detected
<b>BGLB</b>	Brilliant Green Lactose Bile
<b>C</b>	Celsius
<b>CFU</b>	Count Flora Unit
<b>E.Coli</b>	Escherichia Coli
<b>EOs</b>	Essential Oils
<b>EOSQ</b>	Egyptian Organization for Standardization and Quality
<b>g</b>	Grame
<b>GC/MS</b>	Gas Chromatography-Mass Spectrometry
<b>GR</b>	Glutathione Reductase
<b>GST</b>	Glutathione S-transferase
<b>h</b>	Hour
<b>ICMSF</b>	International Commission on Microbiological Specification for Foods
<b>ICMSF</b>	International Commission on Microbiological Specification for Food
<b>l</b>	Liter
<b>LP</b>	Lipid Peroxidation
<b>LST</b>	Lauryl Sulfate Tryptose
<b>LST</b>	Lauryl Sulfate Tryptose
<b>MBC</b>	Minimum Bactericidal Concentration
<b>MFC</b>	Minimal Fungicidal Concentration
<b>mg</b>	Milligram
<b>MIC</b>	Minimum Inhibitory Concentration

<b>ml</b>	Milli Liter
<b>MPN</b>	Most Probable Number
<b>MRSA</b>	Methicillin-Resistant Staphylococcus aureus
<b>MTC</b>	Maximal Tolerated Concentrations
<b>OD</b>	Optical Density
<b>PBS</b>	phosphate-Buffer Saline
<b>PDA</b>	Potato Dextrose Agar
<b>RSC</b>	Radical Scavenging Capacity
<b>RSD</b>	Relative Standard Deviation
<b>S.aureus</b>	Staphylococcus aureus
<b>S.D</b>	Standard deviation
<b>S.E.</b>	Standard error of the mean
<b>TABCs</b>	Total Aerobic Bacteria Counts
<b>TAFs</b>	Total Aflatoxins
<b>TLBCs</b>	Total Lipolytic Bacteria Counts
<b>TM&amp;YCs</b>	Total Mold & Yeast Counts
<b>TPBCs</b>	Total Psychrotrophic Bacteria Counts
<b>TPBCs</b>	Total Proteolytic Bacteria Counts
<b>USA</b>	United State Of America
<b>V/V</b>	Volume/ Volume
<b>V/W</b>	Volume/ Weight
<b>-Ve</b>	Negative detected
<b>VRE</b>	Vancomycin-Resistant Enterococci
<b>WHO</b>	World Health Organization
<b>"YES"</b>	Yeast Extract Sucrose