AinShams University
Faculty of Specific Education
Home Economic Department

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

By
Asmaa Mohammed Ahmed Khalef
Bachelor of Specific Education, El Minia University,2006, Home Economic department

Under the Supervision of:

Prof. Dr. Mohamed Ahmed Arafa
Prof. Dr. of Food Microbiology
Faculty of Home Economics
Helwan University

Dr.Samah Mohamed Esmeal
Asst. Prof. of Nutrition and Food Science
Home Economics Department ,
Faculty of Specific Education ,
Ain Shams University

Dr. Yasser Mahmoud Ibraheem
Asst. Prof. of Nutrition and Food Science
Home Economics Department ,
Faculty of Specific Education ,
Ain Shams University

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Name of student: Asmaa Mohammed Ahmed Khalaf

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This Thesis for M.Sc.degree has been approved by:

Prof.Dr: .....

Prof.Dr: .....

Prof.Dr: Sameh Mohamed

Prof.Dr: Zenab M. Mostafa Nasr

Prof.Dr: Yasser Mohamed Hegazi

Committee in Charge

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ABSTRACT

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

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Asmaa Mohammed Ahmed Khalaf
B.Sc.Home Economic (Home Economic Dep.), Fac.of Specific Education, Minia Univ., 2006

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), α-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 ≤ 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 ≤ 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 4ºC ±1 according to the microbiological examination and sensory evaluation .The microbial load values were not reached to unsatisfactory or unacceptable limits at 4ºC ±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.

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LIST OF ABBREVIATIONS

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

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