

**EFFECT OF PARSLEY, ROCKET AND THYME
ESSENTIAL OILS ON FUNGAL GROWTH AND
AFLATOXIN PRODUCTION IN WHEAT GRAINS
AND FRENCH BREAD**

By

GHADA SALEM RAGGEB AL-SAQQA

B.Sc. Sci. (Pure Chemistry), Fac. Sci., Al-Azhar Univ., Palestine, 1997

**M.Sc. Agric. Sci. (Food Science), Fac. Agric., Al-Azhar Univ., (Palestine)
and Fac. Agric., Cairo Univ., 2008**

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M.Sc. Agric. Sci. (Food Science), Fac. Agric., Al-Azhar Univ. and Cairo
Univ., Palestine and Egypt, 2008**

APPROVAL COMMITTEE

Dr. HASSAN AHMED EL-SAYED AMRAH
Professor of Food Toxicology and Contaminants, National Research Centre

Dr. MAHMOUD ALI BEKHIT
Professor of Food Science, Fac. Agric., Cairo University

Dr. FERIAL ABD EL-AZIZ ISMAIL
Emeritus Professor of Food Science, Fac. Agric., Cairo University

Dr. AHMED MAHMOUD ALIAN
Emeritus Professor of Food Science, Fac. Agric., Cairo University

Date: / /

SUPERVISION SHEET

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and Fac. Agric., Cairo Univ., 2008**

SUPERVISION COMMITTEE

Dr. AHMED MAHMOUD ALIAN

Professor of Food Science, Fac. Agric., Cairo University

Dr. FERIAL ABD EL-AZIZ ISMAIL

Professor of Food Science, Fac. Agric., Cairo University

Dr. SHERIF RAMZI MOHAMED

Associate Professor of Food Science, National Research Centre

Name of Candidate: Ghada Salem AL-Saqqa	Degree: Ph.D.
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Supervisors: Dr. Ahmed Mahmoud Alian Dr. Ferial Abd El-Aziz Ismail Dr. Sherif Ramzi Mohamed	
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ABSTRACT

Fifty wheat grain samples were collected from local auction market throughout the five Gaza governorates for isolation and identification of fungi as well as evaluation of aflatoxin levels contaminated wheat grain samples using HPLC technique, the obtained results indicated that the most common molds isolated from different wheat grain samples were; *Aspergillus flavus* 84%, *Aspergillus parasiticus* 72%, *Fusarium oxysporum* 64%, *Aspergillus niger* 48%, *Alternaria alternata* 36%, *Penicillium* 22%, *Aspergillus ochraceus* 20% and *Aspergillus versicolor* 4%. Twenty-two percent wheat grain samples showed AFs contamination higher than the EU permissible limits (>4ng/g) and ten percent of samples showed AFB₁ contamination above the permissible limits (>2ng/g). The aflatoxin levels were arranged as follow: North Gaza > Rafah > Khan Younis > Mid Zone > Gaza City were 8.62 > 6.361 > 4.187 > 3.134 > 2.33 (ng/g). Considering the high incidence of contamination by AFB₁ 80% in Gaza City and 70% in both Khan Younis and Mid Zone governorates. The highest amount of aflatoxin B₁ was found in Mid Zone and North Gaza and AFs level were 2.51 and 2.31ng/g, respectively.

To inhibit the fungi contaminated wheat grains, the essential oils of parsley (*Petroselinum crispum*), rocket (*Eruca sativa*) seeds and thyme (*Thymus vulgaris*) leaves were tested against some dominant isolated fungi spp. from wheat grains at concentration of 5µl , 7.5µl and 10µl/10ml against *Aspergillus flavus*, *Alternaria alternata* and *Fusarium oxysporum*. The three EOs significantly inhibited the three fungal growth and aflatoxin production by *Aspergillus flavus*. The extent inhibition of fungal growth and aflatoxin production was dependent on the type, concentration and main components in terms of oils content of active compounds that have an impact inhibitor against fungi. The results indicate that rocket (*Eruca sativa*) and thyme (*Thymus vulgaris*) oils were more effective than parsley (*Petroselinum crispum*) oil.

The three tested essential oils have been added at concentrations of 50µl , 75µl and 100µl/100g to dough French bread in order to control spoilage molds and extent the shelf life, and the results indicated that the tested essential oils have the ability as antifungal activity and maintaining the shelf life of French bread. Rocket and thyme oils had abundant effect followed by parsley, and could be delayed the growth of fungi in French bread and subsequently extent the shelf life for six days. The produced French bread was tested for sensory evaluation and the results showed that there were no significantly differences comparing with control sample. It is worthy to mention that the addition of tested essential oils delayed the staling property of French bread so will decrease the significant economic losses, also the chemical, physical and rheological properties of produced French bread were improved.

Key words: Wheat, fungi, antifungal activity, aflatoxins, essential oils, French bread.

DEDICATION

I dedicate this work to my beloved father Salem Al- Saqqa who has meant and continue to mean so much to me. Although he is no longer of this world, his memories continue to regulate my life. This work is also dedicated to my mother, Insherah Al- Saqqa, she has always love me unconditionally and whose good example have taught me to work hard for the things that I aspire to achieve.

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