

PhD Thesis proposal¹

| General Information | | |
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| PhD Thesis Title | Comparative analysis of chemical profile and antimicrobial activity of essential oils of selected wild and commercial herbs and spices of Lebanon | |
| USEK Doctoral Degree | PhD in Agriculture and Food Sciences | |
| Research Unit | | |
| Laboratory | Agriculture laboratories | |
| Axis | Agriculture, Food sciences, Environment | |
| PhD Supervisor 90% | Name & Title : Nelly Arnold Apostolides, Prof. Dr. Emerita of Pharmacy and Pharmacognosy; Drug Control Email : nellyarnold6@gmail.com | University Address : Holy Spirit University of Kaslik- USEK |
| Co-supervisor (if applicable) 10% | Name & Title : Nabil Nemer, Associate Professor Email : nabilnemer@usek.edu.lb | University Address : Holy Spirit University of Kaslik- USEK |
| Location (s) | Location 1: USEK | Work shift calendar /per year (%): 100% |
| | Location 2: (if applicable) | Work shift calendar /per year (%): |
| Potential funding and scholarship | | |

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| Applicant Profile and/or Special Requirements | <ul style="list-style-type: none"> - Holder of a Master degree or its equivalent in medical biology. - Extensive experience in Microbiology |
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| Subject's national or worldwide Context, Objectives & Research lines |
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| <p>Herbs and spices (H&Ss) have in recent years been witnessing largely expanding national and international demands. This has led to high demands for pure and not adulterated products. Being attributed primarily to increased demand and greater profit margins, adulteration has been largely practiced. Besides its negative economic impact, such adulteration can lead to serious implications for public health. Thus, adulteration detection and authenticity testing are highly important for value assessment.</p> <p>Lebanon is recognized to have a wealth of floristic species of which many are utilized as herbs and spices in traditional culinary and medicinal (nutraceuticals) since time immemorial. This has created a rich and unique relevant ethnobotanical traditional knowledge (TK) that is highly important. The country has a significant opportunity to benefit from the increasing demand of H&Ss at both national and international scales. However, reliance on import with no quality</p> |

¹ Thesis proposal should not exceed two pages

control policy and regulations is largely evident. Thus, there is a need to provide scientific evidence of H&Ss adulteration in the Lebanese market. This will contribute to enhancing the quality of locally produced and commercial H&Ss.

Objectives

- 1- Document ethnobotanical knowledge of traditional use of H&Ss;
- 2- Verify authenticity of selected important herbs and spices by assessing the chemical composition and antimicrobial activity of essential oils and extracts;
- 3- Evaluate the antimicrobial activity of the selected herbs and spices against several strains of food-borne pathogens and spoilage microorganisms.

Research lines

- I. Field ethnobotanical survey by personal interviews of local informants using semi-structured survey questionnaire and determination of priority H&Ss by quantitative data analysis;
- II. Dry specimens collection and herbarium development
- III. Taxonomic identification;
- IV. Phytochemical analysis of essential oils and extracts of selected important H&Ss by standard chromatography techniques;
- V. Assessing the antimicrobial activity of essential oils and extracts of selected H&Ss according to Clinical and laboratory Standards Institute (CLSI);
- VI. Assessing authenticity profiles and possible adulteration through comparison with pharmacopeia and ISO standards

| Outcomes (OCs) : What do we wish to achieve? | |
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| OC1: | A comprehensive ethnobotanical TK of locally produced and imported H&Ss documented; |
| OC2: | A chemical and antimicrobial profiling of locally produced and imported H&Ss achieved; |
| OC3 : | Locally produced H&Ss potential of use in medicinal natural products and food preservation tested; |
| OC4 : | Scientific evidence useful for combating adulteration and for future scientific research generated. |

| References (R) (5 most recent peer-reviewed publications) | |
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| R1: | International Trade Centre, UNCTAD/WTO (ITC) (2006). Technical paper. Marketing manual and web directory for organic spices, culinary herbs and essential oils. (Hot Spice Newsletter http://www.hotspice.de "Spice museum"). |
| R2: | Food and Drink Federation (FDF)/ the Seasoning and Spice Association (SSA), British Retail Consortium (BRC) (2015). <i>Guidance on authenticity of herbs and spices</i> . Industry Best Practice on Assessing and Protecting Culinary Dried Herbs and Spices. (Good Agricultural Practices http://www.esa-spices.org/download/iosta-gap-final). |
| R3: | Joint FAO/WHO Expert committee on food additives, 2002. http://www.fao.org |
| R4: | UNDP (2016), www.undp.org/content/undp/en/home/librarypage/hdr/2016-africa-human-development-report.html . |
| R5: | Mouterde, P. (1966 ; 1970 ; 1983). Nouvelle flore du Liban et de la Syrie [Newflora of Lebanon and Syria], Vol. 1 ; 2 ; 3. Beyrouth: Dar El-Machreq (Imprimerie Caholique). |

