

Curriculum Vitae

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ACADEMIC EDUCATION

- 1997 : Ph.D in Organic Chemistry. Mohammed V University in Rabat, Morocco. Thesis entitled “**Phenolic compounds of red vine (*Vitis vinifera* L.) cultivated in Morocco: Structure, reactivity and pharmacological properties**”.
- 1990 : Master of Science in Organic Chemistry. Ecole Normale Supérieure, Rabat, Morocco. Thesis entitled “**Contribution to the study of essential oils and tanins of Eucalyptus trees cultivated in Morocco**”
- 1986 : Certificate for teaching chemistry in frames training centers. Ecole Normale Supérieure Rabat, Morocco.
- 1984 : Graduate of the Ecole Normale Supérieure, Option Physique – Chimie, Rabat, Morocco.

EMPLOYMENT

- Jan 2001-Present: Professor at Mohammed V University in Rabat. Ecole Normale Supérieure, Rabat – Morocco (Chemistry department).
- July 2014 - 2021: Deputy Director of the Ecole Normale Supérieure. Mohammed V University in Rabat – Morocco.
- Jan 1997- 2001: Associate Professor at the same department.
- 1986-1997 : Assistant Professor at the same department.
- 1984-1986 : Assistant at the same department.

PROFESSIONAL EXPERIENCE

Research Competence:

- Dexterous in isolation and characterization of natural bioactive molecules.
- Endured in minor natural products purification.
- Familiar with HPLC and related chromatographic techniques.
- Adept in analyzing spectral data like ^1H , ^{13}C , 2D NMR (COSY, NOESY, HMBC and HMQC), IR and MS (ESI-MS, Tandem MS-MS, Maldi-Tof MS).
- Development of synthetic methodologies for natural/modified compounds synthesis.
- Development of regio- and stereoselective methodologies for modified polyphenols synthesis.
- Capable of both collaborative and independent research.
- Possession of good communication and management skills.

Research Conducted or Supervised

- *Natural Products:*
 - Essential oils, polyphenols, flavonoids, anthocyanins, iridoids, ...
 - Phytochemical investigations and biological activities of various Moroccan medicinal plants used in traditional pharmacopeae.
- *Analytical methods:*
 - Chromatography: HPLC/DAD, HPLC/ESI-MS. Application to the study of the condensation of flavanols and anthocyanins in model solution systems.
 - Spectroscopy: ESI/MS, MS/MS, ICD MS, 1D (^1H , ^{13}C) and 2D (COSY, HSQC, HMBC, NOESY, ROESY) NMR techniques. Application to the structural elucidation of natural and synthesized compounds.
- *Composition of foods:*
 - Food polyphenols and their role in human health
 - Polyphenols and their role in food technology
- *Flavor and aroma:*
 - Essential oils: extraction, analysis by GC/MS techniques, antibacterial and antifungal properties.
- *Chemical changes during food processing:*
 - Chemical transformations which contribute to the organoleptic properties alterations (de-astringency, browning, darkening, etc ...) of foods during processing, maturation, storage and aging.
 - Role of the new formed compounds in food organoleptic properties and human health.
- *Pharmacological activity:*
 - Biological activities (antibacterial, antifungal, molluscicidal, antioxidant, free radical scavenging, ...) of natural and synthesized compounds.
 - Structure-activity relationships.

Teaching Experience

- Organic Chemistry: Stereochemistry, reactions, mechanisms and structures.
- Natural Products chemistry
- Spectroscopic analysis techniques.
- Chromatographic separation and isolation techniques
- Valorization of natural substances in the pharmaceutical, cosmetic and agri-food fields
- Scientific communication

LANGUAGES

- English, French and Arabic (Native Language): Writing, Speaking and Reading.

OTHERS

- **Deputy Director** of Ecole Normale Supérieure, Rabat, Morocco. July 2014-2021.
- **Head of the Chemistry department** at Ecole Normale Supérieure, Rabat, Morocco. 2011-2014.
- **Professor** at Ecole Normale Supérieure, Mohammed V University of Rabat. Since 2001.
- **Responsible of the research team** "Organic Chemistry and Physical and Chemical Studies" (2012-2017).
- **Responsible of the Master** program "Valorization of the natural plant and mineral resources".
- **Responsible of the professional bachelor's degree** "university course teaching in physics and chemistry".
- **Expert Evaluator** for PRIMA (Partnership for Research and Innovation in the Mediterranean Area)
- **Expert Evaluator** for Mohammed VI Polytechnic University (Multi-thematic Applied Research Projects [APRA 2020])
- **Expert** for the Moroccan CNRST center (Centre National pour la Recherche Scientifique et Technique)
- **Project Expert Reviewer** of the Chilean National Science and Technology Commission (CONICYT-Chile)
- AOAC International (American Organization of Analytical Communities) **Expert Review Panel Member** for several ingredients (flavanols, St John's Wort, Ashwagandha, Folin C, Kratom, Proanthocyanidins, Lactose in Low-Lactose or Lactose- Free Milk, Milk Products, and Products Containing Dairy Ingredients, veterinary drug residues, Cannabinoids in Cannabis Concentrates, Cannabinoids in Plant Materials of Hemp, *trans* Resveratrol, Nonvolatile Ginger Constituents, *Aloe Vera*, ...)
- AOAC International **Stakeholder Panel Member** on Strategic Food Analytical Methods
- AOAC International **Stakeholder Panel Member** on Dietary Supplements
- **Member** of various scientific associations.
- **Post-doc** and Several Scientific stays in foreign laboratories.
- **Supervisor** of PhD students.

- **Editor in Chief** of *Green and Sustainable Chemistry* journal
- **Associate Editor** of *Heliyon – Food Science and Nutrition* journal
- **Past Editorial Board Member** of the *Journal of Food Composition and Analysis*
- **Editorial Board Member** of the *Current Bioactive Compounds*
- **Guest Editor** for the *Molecules* journal special issue “Natural Polyphenols in Human Health”
- **Guest Editor** for the *Molecules* journal special issue “Natural Polyphenols in Human Health (Volume II)”
- **Guest Editor** for the *Molecules* journal special issue “Essential oils in Human Health”
- **Guest Editor** of the topic “Bioactive Phytochemicals from Plant Essential oils” for the journals: *Antioxidants, Molecules, Pharmaceuticals, Pharmaceutics, Plants*.
- **Guest Editor** for the *Frontiers in Bioscience-Landmark* journal special issue “New insights into natural products analysis”
- **Associate Editor** of *Asian Journal of Scientific Research* journal
- **Regional Editor** of the *American Journal of Food Technology*.
- **Guest Editor** of *Current Bioactive Compounds* journal special issue on “Current Hyphenated Methods in Polyphenol Analysis”.
- **Editorial Board Member** of various scientific journals
- **Reviewer** for many scientific journals
- **Academic Editor of the reprint *Molecules* book “Natural Polyphenols in Human Health” (Volume I), November 2023, 534 pages. ISBN 978-3-0365-9075-2.** <https://doi.org/10.3390/books978-3-0365-9075-2>
- **Academic Editor of the reprint *Molecules* book “Natural Polyphenols in Human Health” (Volume II), November 2023, 532 pages. ISBN 978-3-0365-9077-6.** <https://doi.org/10.3390/books978-3-0365-9077-6>

PUBLICATIONS

1. En-nahli, Y. ; Abbes, Z. ; Trabelsi, I. ; Makaza, W. ; Kharrat, M. ; **Es-Safi, N.** ; Amri, M. (2024). Multi-environment Validation of the Resistance to Broomrape (*Orobanche crenata* Forsk.) in Lentil (*Lens Culinaris* Medik.): exploring the role of strigolactones in the resistance. *Food Security* (To be submitted).
2. Moutik, S.; Benali, A.; Lakram, N.; Maadoudi, E.H.; Kabbour, M.R.; El Housni, A.; **Es-Safi, N.** (2024). Fatty acid profile, composition and milk production of milk from ewes fed diet supplementation with argane by-products (*Argania spinosa*). (To be submitted)
3. Moutik, S.; En-Nahli, Y.; Mouhaddach, A.; Maadoudi, E. H.; Kabbour, R. M.; El Housni, A.; **Es-Safi, N.** (2024). The Effects of *Argania spinosa* by Products Supplementation on Phenolic Compounds, Antioxidant Capacity of ewe's Milk. (To be submitted)
4. Rajeev K. S. ; De, R. ; ... ; **Es-Safi, N.** et al. (2024). Twitter-based Survey to Gain Insights about the use of Nutritional Supplements to Counteract Respiratory Infections. *Phytomedicine* (Submitted).
5. Fadil, M.; Lebrazi, S.; Aboulghazi, A.; El Baakili, A.; **Es-Safi, N.**; Rais, C.; Slimani, C.; Farah, F. (2024). Enhancement of ultrasonic-assisted extraction and antioxidant potential of phenolic compounds from Moroccan *Cannabis sativa*: A green intelligent approach integrating optimal mixture process design and artificial neural networks. *Sustainable Chemistry and Pharmacy*, 37, 101359.
6. Guaouguaou, FE., **Es-Safi, N.** (2023). *Cotula cinerea* as a Source of Natural Products with Potential Biological Activities. In: Cruz, J.N. (eds) Drug Discovery and Design Using Natural Products. Springer, Cham.

7. El Baakili, A.; Fadil, M.; **Es-Safi, N. (2023)**. Ultrasonic-assisted extraction for phenolic compounds and antioxidant activity of Moroccan *Retama sphaerocarpa* L. leaves: simultaneous optimization by Response Surface Methodology and characterization by HPLC/ESI-MS analysis. *Heliyon*, 9, e17168.
8. El Baakili, A.; Fadil, M.; **Es-Safi, N. (2023)**. Multi-objective optimization for ultrasound-assisted extraction of phytochemicals from Moroccan *Retama raetam* using a solvent system: Comparison of mixture design methodology and artificial neural network modeling. *Separation Science and Technology*, 58, 1433-1449.
9. Mahou Y., Chda A., **Es-Safi N.**, Tesse A., Fettoukh N., Aziz EB., Stambouli H., El Abida K. and Bencheikh R. (2023). Vasorelaxant effect of non-psychoactive compounds of Cannabis sativa on rat mesenteric arterial bed is endothelium and muscarinic receptor dependent. *Evidence-Based Complementary and Alternative Medicine*, 1265103.
10. Y. En-nahli, K. Hejjaoui, R. Mentag, **N. Es-Safi**, M. Amri (2023). Large Field Evaluation and Screening for Resistance to *O. crenata* in Lentil (*Lens Culinaris* Medik.) Germplasm Collection. *Plants*, 12, 2064
11. Guaouguaou, F.; Sudhakar, Y.; **Es-Safi, N. (2023)**. Ultra-high-performance liquid chromatography with photodiode array and high-resolution time-of-flight mass spectrometry detectors (UHPLC-PDA-ESI-ToF/HRMS) for the tentative structural characterization of bioactive compounds of *Salvia verbenaca* extracts in relation to their biological activities. *Frontiers in Bioscience-Landmark*, 28, 86.
12. Rajeev K. S. ; De, R. ; ... ; **Es-Safi, N.** et al. (2023). The International Natural Product Sciences Taskforce (INPST) and the power of Twitter networking exemplified through# INPST hashtag analysis. *Phytomedicine*, 108, 154520.
13. Fadil M.; Lebrazi, S.; Aboulghazi, A.; Guaouguaou F.; Rais, C.; Slimani, C.; **Es-Safi, N. (2022)**. Multi-response optimization of extraction yield, total phenols-flavonoids contents, and antioxidant activity of extracts from moroccan *Lavandula stoechas* leaves: Predictive modeling using simplex-centroid design. *Biocatalysis and Agricultural Biotechnology* 43, 102430.
14. Y. En-nahli, Z. Abbes, I.Trabelsi, W. Makaza, M. Kharrat, **N. Es-Safi**, M. Amri (2022). Host – Parasitic Plant Interaction: The Key Role of Strigolactones. Chapter in Edited book titled “Strigolactones, Karrikins and Alkamides in Plants: Recent Updates and Future Prospects. *CRC press Taylor and Francis Group* (accepted).
15. Y. En-nahli, H. El Arroussi, S. Kumar, O. Bouhlal, R. Mentag, K. Hejjaoui, A. Douaïk, Z. Abbes, **N. Es-Safi & M. Amri (2021)** Resistance to *Orobancha crenata* Forsk. in lentil (*Lens culinaris* Medik.): exploring some potential altered physiological and biochemical defense mechanisms. *Journal of Plant Interactions*, 16:1, 321-331, DOI: 10.1080/17429145.2021.1949498.
16. Moutik, S.; Benali, A.; Bendaou, M.; Maadoudi, E.H.; Kabbour, M.R.; El Housni, A.; **Es-Safi, N. (2021)**. The effect of using diet supplementation based on argane (*Argania spinosa*) and other agricultural by-products on fattening performance, carcass characteristics and fatty acid composition of lambs. *Heliyon*, 7(2): e05942. (DOI: 10.1016/j.heliyon.2021.e05942).
17. El Haddad, N.; Rajendran, K.; Smouni, A.; **Es-Safi, N.**; Benbrahim, N.; Mentag, R.; Nayyar, H.; Maalouf, F.; Kumar, S. (2020). Screening the FIGS Set of Lentil (*Lens Culinaris* Medikus) Germplasm for Tolerance to Terminal Heat and Combined Drought-Heat Stress. *Agronomy*, 10, 1036; doi:10.3390/agronomy10071036.
18. Guaouguaou, F.; Ahl Bebaha ; M.A. ; Sudhakar, Y.; Taghzouti, K.; **Es-Safi, N. (2020)**. Structural characterization of bioactive compounds in *Cotula cinerea* extracts by ultra-high-performance liquid chromatography with photodiode array and high-resolution time-of-flight mass spectrometry detectors. *Rapid Communications in Mass Spectrometry*, 34, e8695.
19. Guaouguaou, F.; Ahl Bebaha, M. A.; Taghzouti, K.; **Es-Safi, N. (2020)** Phytochemical Investigation, Acute Toxicity, Central Analgesic and Antioxidant Activities of Extracts and Essential Oil of *Cotula cinerea* Del (Asteraceae). *Current Bioactive Compounds*, 16, 164-173. (DOI: 10.2174/1573407214666180821115826)
20. Moutik, S.; Lakram, N.; Bendaou, M.; Maadoudi, E.H.; Kabbour, M.R.; Douaïk, A.; Zouahri, A.; El Housni, A.; **Es-Safi, N. (2019)**. The effect of including argane by-products (meal and pulp) in dairy ewe diet on milk quality and production, and lamb growth performance. *Tropical Animal Health and Production*, 51, 2437-2445. (DOI: 10.1007/s11250-019-01943-w).
21. Benbrahim, N.; Mentag, R.; Elghzaoui, Y.; Triqui, Z.; Gmouh, S.; **Es-Safi, N.**; Halim, J.; Gaboun, F.; Taghouti, M. (2019). Fruits Morphological Qualitative Traits, Biochemical Components and Pungency Strength of Spicy Pepper from Maleh Valley in Morocco. *Universal Journal of Plant Science*, 7, 29-43.

22. Guaouguaou, F.; Taghzouti, K.; Oukabli, M.; Masrar, A.; Chabraoui, L.; Bouabdellah, M.; **Es-Safi N. (2018)** Acute and Subchronic Oral and Dermal Toxicological Studies of *Salvia Verbenaca* Extracts in Mice and Rats. *Journal of Herbs, Spices & Medicinal Plant*, 24, 1-10. (DOI: 10.1080/10496475.2018.1556372)
23. Guaouguaou, F.; Ahl Bebaha, M. A.; Taghzouti, K.; Bouyahya, A.; Bakri, Y.; Dakka, N.; **Es-Safi, N. (2018)** Cytotoxicological Investigation of the Essential Oil and the Extracts of *Cotula cinerea* and *Salvia verbenaca* from Morocco. *BioMed Research International*, 2018, Article ID 7163961, 5 pages <https://doi.org/10.1155/2018/7163961>.
24. Guaouguaou, F.; Taghzouti, K.; Oukabli, M.; **Es-Safi, N. (2018)** The effect of *Salvia verbenaca* extracts for healing of second-degree burn wounds in rats. *Current Bioactive Compounds*, 14, 419-427.
25. Benayad, Z.; Gomez-Cordoves, C.; **Es-Safi, N. (2018)** Phenolic Composition, Antioxidant, Cytotoxicity and Anti-Inflammatory Activities of Extracts Obtained From Germinated and Crude Fenugreek (*Trigonella foenum-graecum*) Seeds. In: Govil, J.N. and Singh, S. (eds) Recent Progress in Medicinal Plants. Vol. 46 Metabolic Disorder Diabetes, Part II. Studium Press, LLC, USA, pp. 401-422.
26. Van Breemen, R.; Bzhelyansky, A.; **Es-Safi, N.**; Jennens, M.; Johnson, H.E.; ... **(2018)**. Standard Method Performance Requirements (SMPRs®) 2018.004: Determination of trans Resveratrol in Dietary Supplements and Dietary Ingredients. *Journal of AOAC International*, 101, 1254-1255
27. Ben Ajmia, W.; Makni, M.; Ammar, S.; Khannous, L.; Ben Hassana, A.; Bouaziz, M.; **Es-Safi, N.**; Gdoura, R. **(2017)**. Antimicrobial effect of the Tunisian Nana variety *Punicagranatum* L. extracts against *Salmonella enterica* (serovars Kentucky and Enteritidis) isolated from chicken meat and phenolic composition of its peel extract. *International Journal of Food Microbiology*, 241, 123-131.
28. **Es-Safi, N. (2017)**. Plant Polyphenols: Extraction, Structural Characterization, Hemisynthesis and Antioxidant Properties. In: Belt, V. (ed) Encyclopedia of -Phytochemicals Volume IV (Nutraceuticals and Impact on Health). Academic Pages, N.Y. pp. 181-206.
29. Caleb, A.A.; Ramli, Y.; Benabdelkamel, H.; Bouhfid, R.; **Es-Safi, N.**; Essassi, E.M.; Banoub, J. **(2017)**. Synthesis and ESI-MS/MS Fragmentation Study of Two New Isomeric Oxazolidin-2- One Derivatives. In: Banoub J., Caprioli R. (eds) Molecular Technologies for Detection of Chemical and Biological Agents. NATO Science for Peace and Security Series A: Chemistry and Biology. Springer, Dordrecht, pp. 253-268.
30. Ingle, P.; Barrett, B.; Betz, J.M.; Don, C.; **Es-Safi, N.**; Griffiths, J.; Joseph, G.; ... **(2017)**. AOAC SMPR® 2017.009: Standard Method Performance Requirements (SMPRs) for Quantitation of Aloe Vera Characteristic Water-Soluble Main Constituents in Dietary Supplements. *Journal of AOAC International*, 100, 1185-1186.
31. Ingle, P.; Barrett, B.; Betz, J.M.; Don, C.; **Es-Safi, N.**; Griffiths, J.; Joseph, G.; ... **(2017)**. AOAC SMPR® 2017.010: Standard Method Performance Requirements (SMPRs) for Identification of Aloe Vera in Dietary Supplements and Dietary Ingredients. *Journal of AOAC International* 100 (4), 1187-1188.
32. Bzhelyansky, A.; Atkinson, G.; Brown, L.V.; Burns, P.; **Es-Safi, N.**; Farthing, C.; ... **(2017)**. AOAC SMPR® 2017.012: Standard Method Performance Requirements (SMPRs) for Quantitation of Select Nonvolatile Ginger Constituents. *Journal of AOAC International*, 100, 1192-1196
33. Caleb, A.A.; Ramli, Y.; Benabdelkamel, H.; Bouhfid, R.; **Es-Safi, N.**; Kandri Rodi, Y.; Essassi, E.M.; Banoub, J. **(2016)**. Synthesis and ESI-MS/MS fragmentation study of two new isomeric-oxo-oxazolidinylquinoxaline derivatives. *Journal Marocain de Chimie Hétérocyclique*, 15, 109-123.
34. Elbir, M.; **Es-Safi, N.**; Amhoud, A.; Mbarki, M. **(2015)**. Characterization of phenolic compounds in olive stones of three Moroccan varieties. *Maderas, Ciencia y tecnología*, 17(4).
35. Benayad, Z. ; Gomez-Cordoves, C. ; **Es-Safi, N. (2014)**. Characterization of flavonoid glycosides from fenugreek (*Trigonella foenum-graecum*) crude seeds by HPLC-DAD-ESI/MS analysis. *International Journal of Molecular Sciences*, 15, 20668-20685.
36. Benayad, Z. ; Gomez-Cordoves, C. ; Martinez-Villaluenga, C.; Frias, J. ; **Es-Safi, N. (2014)**. Phenolic composition, antioxidant and anti-inflammatory activities of extracts from Moroccan *Opuntia ficus-indica* flowers obtained by different extraction methods. *Industrial Crops and Products*, 62, 412-420
37. Benayad, Z. ; Gomez-Cordoves, C. ; **Es-Safi, N. (2014)**. Identification and quantification of flavonoid glycosides from fenugreek (*Trigonella foenum-graecum*) germinated seeds by LC-DAD-ESI/MS analysis. *Journal of Food Composition and Analysis*, 35, 21-29.
38. **Es-Safi, N. (2012)**. Plant Polyphenols: Extraction, Structural Characterization, Hemisynthesis and Antioxidant Properties. *Phytochemicals as Nutraceuticals - Global Approaches to Their Role in Nutrition and Health*, Dr Venketeshwer Rao (Ed.), Intech Open Access Publisher, ISBN 979-953-307-611-8, 181-206.

Available from: <http://www.intechopen.com/books/phytochemicals-as-nutraceuticals-global-approaches-to-their-role-in-nutrition-and-health/polyphenols-as-potent-antioxidants-with-a-major-role-in-food-organoleptic-properties-and-human-health>

39. **Es-Safi, N.** Mass Spectroscopic Methods for the Characterization of Flavonoid Compounds. *Current Bioactive Compounds* **2012**, 8, 240-265.
40. **Es-Safi, N. (2014).** Review of the Book "Green Materials for Sustainable Water Remediation and Treatment" Edited by Anuradha Mishra and James H Clark. *Green and Sustainable Chemistry*.
41. **Es-Safi, N. (2012).** Mass Spectroscopic Methods for the Characterization of Flavonoid Compounds. *Current Bioactive Compounds*, 8, 240-265.
42. **Es-Safi, N. (2012).** Editorial Hot Topic: **Current Hyphenated Methods in Polyphenol Analysis**. *Current Bioactive Compounds*, 8, 189.
43. **Es-Safi, N.;** Essassi, E. M.; Massoui, M.; Banoub, J. Mass Spectrometry as a Powerful Analytical Technique for the Structural Characterization of Synthesized and Natural Products. In: *Detection of Biological Agents for the Prevention of Bioterrorism*, NATO Science for Peace and Security Series A: Chemistry and Biology, ISBN 978-90-481-9814-6. Springer Science+Business Media B.V., **2011**, p. 319
44. Tene Ghomsi, J.; Hamou Ahabchane, N.; **Es-Safi, N.**; Essassi, E.M. 4-Phenyl-1,5-benzodiazepin-2-one Compound as a Precursor of Various New heterocyclic Systems with Potent pharmacological Properties. *Frontiers in Science and Engineering an International Journal Edited by Hassan II Academy of Science and Technology*, 1-2, 17 pages, **2011**.
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