BREVE BIOGRAPHIE

Pr. Cherkaoui EL MODAFAR

Ranked in list of world's top 2% scientists 2023

https://elsevier.digitalcommonsdata.com/datasets/btchxktzyw/6

Premier Grand Prix Hassan II pour l'Invention et la Recherche dans le Domaine Agricole (2022)
Catégorie Sciences et Technologies Avancées

h-index Scopus : 26

Scopus Author ID: 57218330906

https://www.scopus.com/authid/detail.uri?authorId=57218330906

ORCIDE : https://orcid.org/0000-0002-0839-5823

Monsieur Cherkaoui El Modafar, né en 1964, est titulaire d'un Doctorat de l'Université Montpellier II et d'un Doctorat d'Etat de l'Université Cadi Ayyad en Biotechnologie et Amélioration Génétique des Plantes. Actuellement, il est Professeur de l'Enseignement Supérieur et Directeur du Centre d'Agrobiotechnologie et Bio-ingénierie à l'Université Cadi Ayyad (Unité de Recherche Labellisée CNRST). Monsieur El Modafar a été Vice-Président de l'Université Cadi Ayyad et Vice-doyen de la Faculté des Sciences et Techniques de Marrakech. Il a été également Directeur du Centre des Etudes Doctorales « Sciences de l'ingénieur », Directeur de l'Unité de Formation Doctorale « Biotechnologie et Bioingénierie de la Production Végétale » et fondateur et responsable de plusieurs filières dans le domaine de Biotechnologie des plantes (Licence, Maîtrise, Master).

Monsieur El Modafar est expert en matière d'agrobiotechnologie auprès de diverses instances nationales et internationales, membre de plusieurs associations savantes et réseaux scientifiques nationaux et internationaux, fait partie de plusieurs comités scientifiques de congrès nationaux et internationaux et « reviewer » de plusieurs revues scientifiques. Il a assisté à plus de 110 soutenances de thèses et d'habilitations universitaires dont 62 en tant que rapporteur et 38 en tant que président du jury.

En matière d'activités de recherche, Monsieur Cherkaoui El Modafar porte plusieurs programmes et contrats de recherche nationaux et internationaux dans le domaine d'agrobiotechnologie. Il a encadré de 23 thèses de doctorat soutenues dont 8 en cotutelle avec des universités étrangères. Il a publié plus de 150 articles indexés dont plus 130 articles dans des revues à impact factor et plus de 220 communications scientifiques dans des congrès nationaux et internationaux.

Principale production scientifique (5 dernières années)

Thèses de Doctorat dirigés et soutenues (5 dernières années)

1. Soufiani Merieme (2023). Promotion de la croissance de l'arganier et amélioration de sa résilience au déficit hydrique par un consortium composite autochtone de champignons mycorhiziens arbusculaires. Thèse de Doctorat, Université Cadi Ayyad, Marrakech.

2. Mohoub Anouar (2023). Bioformultion ed concepts d'emballage alimentaire antiadhésif et antimicrobien à base de chotosane enrichi en huiles essentielles. Thèse de Doctorat, Université Cadi Ayyad, Marrakech.

3. Aitouguinane Meriem (2022, Thèse en cotutelle). Stimulation des défenses naturelles de la tomate et de l'olivier et induction de la résistance vis-à-vis de la verticilliose par les poly/oligosaccharides d'algues marines des côtes marocaines. Thèse de Doctorat, Université Cadi Ayyad, Marrakech.

4. Bouissil Soukaina (2021, Thèse en cotutelle). Induction de la PAMP-Triggered Immunity, de l'expression des gènes de défenses et de la résistance du palmier dattier au Fusarium oxysporum f. sp. albedinis par des motifs saccharidiques extraits de macroalgues brunes. Thèse de Doctorat, Université Cadi Ayyad, Marrakech.

5. El Maaloum Sanae (2021). Valorisation des boues de lavage des phosphates en biofertilisant du sol et biostimulant de la croissance des plantes : Effets synergiques d'un phosphocompost enrichi d'un consortium de bactéries PGPR et de champignons mycorhiziens arbusculaires isolées d'un miocrobiome approprié. Thèse de doctorat, Université Cadi Ayyad, Marrakech.

6. Boutaj Hanane (2020). Rôle des champignons mycorhiziens arbusculaires dans l'amélioration de la résistance del'olivier à la verticilliose causée par *Verticilliumdahliae*. Centre d'Etudes Doctorales « Sciences et Techniques ». Université Cadi Ayyad, Marrakech.

7. Bensalah Imane (2018). La verticilliose de l'olivier causée par *Verticilliumdahliae* : Evaluation de la résistance variétale, caractérisation des mécanismes de défense et leur stimulation par des bioéliciteurs naturels. Centre d'Etudes Doctorales « Sciences et Techniques ». Université Cadi Ayyad, Marrakech.

Principales publications indexées (5 dernières années)

1. Oulad Ziane S., El Alaoui Talibi Z.., Douira A., Amir S., Meddich A., & **El Modafar C. (2023).** Synergistic effects of arbuscular mycorrhizal fungi associated to plant growth-promoting rhizobacteria in suppression of soil-borne Fusarium wilt of date palm. *Biocatalysis and Agricultural Biotechnology*51, 102753. https://doi.org/10.1016/j.bcab.2023.102753

2. Soufiani, M., Chakhchar, A., Aissam, S., Ferradous, A., Douira, A., Meddich, A., & **El Modafar, C. (2023)**. Can an indigenous consortium of arbuscular mycorrhizae effectively mitigate drought stress in argan trees (Argania spinosa L. Skeels) by modulating mineral nutrition and phosphatase activities? South African Journal of Botany 159, 439-446. https://doi.org/10.1016/j.sajb.2023.06.033

3. Mouhoub, A., Guendouz, A., Alaoui-Talibi, E., Ibnsouda Koraichi, S., Delattre, C., & **El Modafar, C. (2023)**. Development of Food Packaging with Desirable Properties and Activities Using Chitosan and Mentha piperita, Salvia officinalis, Melaleuca quinquenervia, and Eucalyptus globulus EOs. *Food and Bioprocess Technology*. https://doi.org/10.1007/s11947-023-03106-0

4. Soufiani, M., Chakhchar, A., Aissam, S., Ferradous, A., Douira, A., Meddich, A., & **El Modafar, C. (2023).** Beneficial effects of an indigenous arbuscular mycorrhizal consortium on phosphate nutrition and growth of argan tree seedlings. Archives of Agronomy and Soil Science 69, 2386-2400. https://doi.org/10.1080/03650340.2022.2155951

5. Abou-Saaid O., Yaacoubi A. E., Moukhli A., El Bakkali A., Oulbi S., Delalande M., Farrera I., Kelner J.J., Lochon Menseau S., **El Modafar C.**, Zaher H. & Khadari, B. **(2022).** Statistical Approach to Assess Chill and Heat Requirements of Olive Tree Based on Flowering Date and Temperatures Data: Towards Selection of Adapted Cultivars to Global Warming. Agronomy, 12 (12), 2975. https://doi.org/10.3390/agronomy12122975

6. Anli, M., Alahyane, A., Babram, M. A., Boutasknit, A., **El Modafar, C.**, & Meddich, A. (2023). Agro-physiological traits as biological factors to optimize organic and inorganic amendments for date

palm cultivation. International Journal of Applied and Experimental Biology 2(1), 1-13. https://doi.org/10.56612/ijaeb.v1i1.17

7. Mouhoub, A., Guendouz, A., Alaoui-Talibi, E., Ibnsouda Koraichi, S., Delattre, C., & **El Modafar, C. (2023).** Elaboration and general evaluation of chitosan-based films containing terpene alcohols-rich essential oils. *World J. Microbiol Biotechnol* **39**, 146.. https://doi.org/10.1007/s11274-023-03597-1

8. Ait-Ouakrim, E. H., Chakhchar, A., **El Modafar, C.**, Douira, A., Amir, S., Ibnsouda-Koraichi, S., Belkadi, B. & Filali-Maltouf, A. **(2023)**. Assessment of Potent Phosphate-Solubilizing Bacteria Isolated from the Olive Tree Rhizosphere Grown on Phosphate Sludge and Their Effect on Common Bean Growth. Geomicrobiology Journal 40, 605–617. doi.org/10.1080/01490451.2023.2218839

9. Rharbi S., Talbi C., Sijilmassi B., Triqui Z.E., Smouni A., Lamaoui M., Filali-Maltouf A., **El Modafar C.**, Chakhchar A. **(2023)**. Foliar application with salicylic acid alleviates cadmium toxicity in chia (*Salvia hispanica* L.). *Scientific African,* e01773, https://doi.org/10.1016/j.sciaf.2023.e01773

10. Aitouguinane M., El Alaoui-Talibi Z., Rchid, H., Fendri, I., Abdelkafi, S., El-Hadj, M.D.O., Boual, Z., Le Cerf, D., Rihouey, C., Gardarin, C., Dubessay P., Michaud P., Pierre G., Delattre C., **El Modafar C. (2023**). Elicitor Activity of Low-Molecular-Weight Alginates Obtained by Oxidative Degradation of Alginates Extracted from Sargassum muticum and Cystoseira myriophylloides. Mar. Drugs 2023, 21, 301. https://doi.org/10.3390/ md21050301

11. Mouhoub, A., Raouan, S. E., Guendouz, A., El Alaoui-Talibi, Z., Koraichi, S. I., El Abed, S., Delattre, C. & **El Modafar, C. (2023).** Inhibition of multi-species biofilm formation using chitosan-based film supplemented with essential oils. *European Polymer Journal*, *188*, 111943. https://doi.org/10.1016/j.eurpolymj.2023.111943

12. Hadjkacem, F., Elleuch, J., Aitouguinane, M., Chakou, F. Z., Ursu, A. V., Dubessay, P., Bourgougnon, N., Traikia, M., Le Cerf, D., El Alaoui-Talibi, Z., **El Modafar, C.,** Boual, Z., Didi Ould El Hadj, M., Delattre, C., Gwendoline, C., Michaud, P., Fendri, I., Abdelkafi, S. & Pierre, G. **(2023).** Primary structural features, physicochemical and biological properties of two water-soluble polysaccharides extracted from the brown Tunisian seaweed Halopteris scoparia. *International* Journal of Biological Macromolecules, 253, 126757. https://doi.org/10.1016/j.ijbiomac.2023.126757

13. Mouhoub, A., Boutachfaiti, R. E., Petit, E., Molinié, R., Guendouz, A., El Alaoui-Talibi, Z., Ibnsouda Koraichi, S., Delattre, C., & **El Modafar, C. (2023).** Chemical extraction, characterization, and inspection of the antimicrobial and antibiofilm activities of shrimp chitosan against foodborne fungi and bacteria. World Journal of Microbiology and Biotechnology, 39(12), 338. https://doi.org/10.1007/s11274-023-03798-8

14. Chenine, A. S., Boual, Z., Elhadj, M. D. O., Addoun, N., Mahfoudi, R., Khemili, A., Belkhalfa, H., Bachari, K., Fendri, I., **El Modafar, C.,** El Alaoui-Talibi, Z., Dubessay, P., Delattre, C., Pierre, G., Michaud, P., Elleuch J., & Abdelkafi, S. **(2023).** Inhibitory effect of arabinoxylan oligosaccharides from Plantago ciliata Desf. seeds on α-amylase and α-d-glucosidase and the inhibition kinetics. Euro-Mediterranean Journal for Environmental Integration, 8(4), 795-805. https://doi.org/10.1007/s41207-023-00402-1

15. Mouhoub, A., Guendouz, A., El Alaoui-Talibi, Z., Koraichi, S. I., Delattre, C., & **El Modafar, C. (2023).** Evaluation of different characteristics and bioactivities of chitosan-based films incorporating Eugenia caryophyllus and Cinnamomum zeylanicum essential oils. Materials Chemistry and Physics, 307, 128201. https://doi.org/10.1016/j.matchemphys.2023.128201

16. Anli, M., Alahyane, A., Mohamed, A. B., Boutasknit, A., Ben-Laouane, R., Rahou, Y. A., **El Modafar C.,** & Meddich, A. **(2023).** Effectiveness of green compost mixed with phosphate sludge on the defense performance of date palm in soil with fusarium oxysporum f. sp. albedinis infestation. European Journal of Plant Pathology, 165(2), 287-303. https://doi.org/10.1007/s10658-022-02606-7

17. Sallami, A., Rabeh, K., Idrissi Lahsini, A., El Khedri, H., Douira, A., **El Modafar, C.,** Medraoui, L., & Filali-Maltouf, A**. (2023).** The ability of two indigenous bacteria isolated from Moroccan olive tree to promote the growth of olive seedlings in the presence of the pathogen Verticillium dahliae. Biocontrol Science and Technology, 33 (10), 963-984. https://doi.org/10.1080/09583157.2023.2263185

18. El Aymani, I., Ourras, S., Mouden, N., Chliyeh, M., Selmaoui, K., Msairi, S., Benkirane, R., **El Modafar, C.,** Touhami Ouazzani, A., & Douira, A. **(2023).** Effect of endomycorrhizal fungi inoculum on agro morphological behavior and productivity of saffron (crocus sativus l.) under water and salinity stress. Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis, 71(4). 10.11118/actaun.2023.013

19. Zeghlouli, J., Schiavone, N., Askanian, H., Guendouz, A., **El Modafar, C**., Michaud, P., & Delattre, C. **(2023).** Thermal, Morphological and Mechanical Properties of a BioPE Matrix Composite : Case of Shell, Pulp, and Argan Cake as Biofille**rs.** Materials 16(6), 2241 ; https://doi.org/10.3390/ma16062241

20. Mouhoub, A., Er Raouan, S., Guendouz, A., El Alaoui-Talibi, Z., Ibnsouda Koraichi, S., El Abed, S., Delattre, C. & **El Modafar, C. (2023).** The effect of essential oils mixture on chitosan-based film surface energy and antiadhesion activity against foodborne bacteria. *World Journal of Microbiology and Biotechnology*, *39*(3), 77. https://doi.org/10.1007/s11274-023-03520-8

21. Oueslati, S., Serairi Beji, R., Zar Kalai, F., Soufiani, M., Zorrig, W., Aissam, S., Msaada, K. & **El Modafar, C. (2023).** Antioxidant potentialities and gastroprotective effect of Reichardia picroides extracts on Ethanol/HCl induced gastric ulcer rats. *International Journal of Environmental Health Research*, 1-12. https://doi.org/10.1080/09603123.2023.2198760

22. Ait-Ouakrim, E. H., Chakhchar, A., **El Modafar, C.**, Douira, A., Amir, S., Ibnsouda-Koraichi, S., Belkadi, B. & Filali-Maltouf, A. **(2023)**. Valorization of Moroccan Phosphate Sludge Through Isolation and Characterization of Phosphate Solubilizing Bacteria and Assessment of Their Growth Promotion Effect on Phaseolus vulgaris. Waste and Biomass Valorization, https://doi.org/10.1007/s12649-023-02054-2

23. Ait-El-Mokhtar M., El Amerany F., Fakhech A., Akensous F.Z., Ait-Rahou Y., Ben-Laouane R., Anli M., Boutasknit A., Wahbi S., **El Modafar C.**, Meddich A. & Baslam M. **(2022).** Cereals and Phytohormones Under Drought Stress. In: Abdel Latef, A.A.H. (eds) Sustainable Remedies for Abiotic Stress in Cereals. (pp. 313-350). Springer, Singapore. https://doi.org/10.1007/978-981-19-5121-3_13

24. Anli M., Boutasknit A., Ben-Laoaune R., Ait-El-Mokhtar M., Fakhech A., **El Modafar** C., Baslam M. & Meddich A. **(2022).** Use of Biostimulants to Improve Drought Tolerance in Cereals. In: Abdel Latef, A.A.H. (eds) Sustainable Remedies for Abiotic Stress in Cereals (pp. 519-555). Springer, Singapore. https://doi.org/10.1007/978-981-19-5121-3_20

25. Sellal Z., Ouazzani Touhami A., Dahmani J., Maazouzi S., Mouden N., Chliyeh M., Selmaoui K., Benkirane R., **El Modafar C.** & Douira Allal **(2022).** Diversity of Arbuscular Mycorrhizal Fungi in the Rhizosphere of Argania spinosa in Morocco. In Mycorrhiza-New Insights. IntechOpen. https://www.intechopen.com/chapters/83295 ISBN 978-1-83768-090-0

26. Soufiani M., Aissam S., Boutaj H., Ferradous A., Douira A., Meddich A., **El Modafar C. (2022)**. Effectiveness of indigenous arbuscular mycorrhizal consortium on the growth and mineral nutrition of *Argania spinosa* (L.) Skeels. Plant Biosystems 156, 1365-1372. https://doi.org/10.1080/11263504.2022.2048280

27. Zeghlouli, J., Christophe, G., Ogura, K., Sawamura, N., Guendouz, A., **El Modafar**, C., Michaud P., & Delattre, C. **(2022**). High-Pressure Water Jet System Treatment of Argan Nut Shell and Enzymatic Hydrolysis for Bioethanol Production. Fermentation 8 (11), 627. https://doi.org/10.3390/fermentation811062

28. Ben-Laoaune R., Lahbouki S., Toubali S., Benaffari W., Raho W., Wahbi S., **El Modafar** C., Baslam M. & Meddich A. **(2022).** Use of biostimulants to improve salinity tolerance in cereals. In: Abdel Latef, A.A.H. (eds) Sustainable Remedies for Abiotic Stress in Cereals. (pp. 471-517). Springer, Singapore. https://doi.org/10.1007/978-981-19-5121-3_19

29. Hadjkacem, F., Pierre, G., Christophe, G., Elleuch, J., Fendri, I., Boual, Z., Didi Ould El Haj, M., El Alaoui Talibi, Z., **El Modafar, C**., Dubessay, P., Delattre, C., Michaud, P. & Abdelkafi, S. **(2022)**. Bioconversion of the Brown Tunisian Seaweed Halopteris scoparia: Application to Energy. *Energies*, *15*(12), 4342. Energies **15** (12), 4342 ; **https://doi.org/10.3390/en15124342**

30. Mouhoub, A., Guendouz, A., Belkamel, A., El Alaoui Talibi, Z., Ibnsouda Koraichi, S., **El Modafar, C.**, & Delattre, C. **(2022).** Assessment of the antioxidant, antimicrobial and antibiofilm activities of essential oils for potential application of active chitosan films in food preservation. World Journal of Microbiology and Biotechnology, 38, 179. https://doi.org/10.1007/s11274-022-03363-9

31. Aitouguinane M., El Alaoui-Talibi Z.E., Rchid H., Fendri I., Abdelkafi S., El-Hadj M.D.O., Boual Z., Dubessay P., Michaud P., Traikia M., Guillaume P. **El Modafar C.** & Delattre C. **(2022).** Polysaccharides from Moroccan Green and Brown Seaweed and Their Derivatives Stimulate Natural Defenses in Olive Tree Leaves. Applied Sciences, 12(17), 8842. https://doi.org/10.3390/app12178842

32. Ait Rahou Y., Douira A., Tahiri A.I., **El Modafar C.,** Benkirane R., & Meddich A. (2022). Application of plant growth-promoting rhizobacteria combined with compost as a management strategy against Verticillium dahliae in tomato. Canadian Journal of Plant Pathology 44, 806-827. https://doi.org/10.1080/07060661.2022.2089235

33. Mouhoub A., Raouan S.E., Guendouz A., El Alaoui-Talibi Z., Ibnsouda Koraichi S., El Abed S., Delattre C. & **El Modafar, C. (2022).** Antiadhesion effect of the chitosan-based film incorporated with essential oils against foodborne bacteria. Industrial Crops and Products, 189, 115742. https://doi.org/10.1016/j.indcrop.2022.115742

34. Anli M., Alahyane A., Mohamed A. B., Boutasknit A., Ben-Laouane R., Ait Rahou Y.A., **El Modafar C.** & Meddich, A. **(2022).** Effectiveness of green compost mixed with phosphate sludge on the defense performance of date palm in soil with Fusarium oxysporum f. sp. albedinis infestation. European Journal of Plant Pathology, 1-17. https://doi.org/10.1007/s10658-022-02606-7

35. Lahsini A. I., Sallami A., Ait Ouakrim A., El Khedri H., Obtel M., Douira A., **El Modafar C.,** Benkerroum N., talbi A., Chakhchar A. & Filali-Maltouf, A. **(2022).** Isolation and molecular identification of an indigenous abiotic stress-tolerant plant growth-promoting rhizobacteria from the rhizosphere of the olive tree in southern Morocco. Rhizosphere 23, 100554, https://doi.org/10.1016/j.rhisph.2022.100554

36. Drira M., Elleuch J., Hadjkacem F., Hentati F., Drira R., Pierre G., Gardin D., Delattre C., El Alaoui Talibi Z., **El Modafar C.**, Michaud P., Abdelkafi S. & Fendri I. **(2022)**. Influence of the sulfate content of the exopolysaccharides from *Porphyridium sordidum* on their elicitor activities on date palm vitroplants. Plant Physiology and Biochemistry 186, 99-106. https://doi.org/10.1016/j.plaphy.2022.06.012

37. Ait Rahou Y., Boutaj H., Ait-El Mokhtar M., Anli M., Boutasknit A., Tahiri A., El Amerany F., **El Modafar C.**, Douira A. Benkirane R., Meddich A. **(2022)**. Effect of benefcial indigenous microorganisms on tomato growth performance, productivity, and protection against *Verticillium dahliae*. Journal of Plant Diseases and Protection, 129, 1163–1180. https://doi.org/10.1007/s41348-022-00616-5

38. Raho O., Boutasknit A., Anli M., Ben-Laouane R., Rahou T.A., Ouhaddou R., Duponnois R., Douira A., **El Modafar C.** and A. Meddich A. **(2022)**. Impact of native biostimulants/biofertilizers and their synergistic interactions on the agro-physiological and biochemical responses of date palm seedlings. Gesunde Pflanzen 74(4), pp. 1053–1069. https://doi.org/10.1007/s10343-022-00668-5

39. Aitouguinane M., El Alaoui-Talibi Z., Rchid H., Fendri I., Abdelkafi S., Ould El-Hadj M.D., Boual Z., Dubessay P., Michaud P., Le Cerf D., Rihouey C., Pierre G., Delattre C., **El Modafar C. (2022)**. A Novel Sulfated Glycoprotein Elicitor Extracted from the Moroccan Green Seaweed *Codium decorticatum* Induces Natural Defenses in Tomato. Applied Sciences 12 (7), 3643. https://doi.org/10.3390/app12073643

40. Boutaj H., Meddich A., Roche J., Mouzeyar S., **El Modafar C. (2022)**. The effects of mycorrhizal fungi on vascular wilt disease. Crop Protection 155, 105938. https://doi.org/10.1016/j.cropro.2022.105938

41. Boutasknit A., Baslam M., Anli M., Ait-El-Mokhtar M., Ben-Laouane R., Ait-Rahou Y., El Modafar C., Douira A., Wahbi S., & Meddich A. **(2022)**. Impact of arbuscular mycorrhizal fungi and compost on the growth water status and photosynthesis of carob (Ceratonia siliqua) under drought stress and recovery. Plant Biosystems 156, 994-1010. https://doi.org/10.1080/11263504.2021.1985006

42. Soufiani M., Aissam S., Boutaj H., Ferradous A., Douira A., Meddich A., Cherkaoui El Modafar C. (2022). Effectiveness of indigenous arbuscular mycorrhizal consortium on the growth and mineral nutrition of Argania spinosa (L.) Skeels. Plant Biosystems, https://doi.org/10.1080/11263504.2022.2048280

43. Ourras S., Ouazzani Touhami A., **El Modafar C.**, Benkirane R., Msairi S., Selmaoui K., Chliyeh M., Mouden N., El Aymani I., EL Gabardi S., Douira A. (2022). Diversity of arbuscular mycorrhizal fungi in the rhizosphere of saffron (*Crocus sativus*) plants along with age of plantation in Taliouine region in Morocco. Acta Biologica Szegediensis 2(65), 199–209. http://abs.bibl.u-szeged.hu/index.php/abs/article/view/3245

44. Bouissil S., Guérin C., Roche J., Dubessay P., El Alaoui-Talibi Z., Pierre G., Michaud P., Mouzeyar S., Delattre C., **El Modafar C. (2022)**. Induction of defense gene expression and the resistance of date palm to *Fusarium oxysporum f. sp. albedinis* in response to alginate extracted from *Bifurcaria bifurcata*. Marine Drugs 20, 88. https:// doi.org/10.3390/md20020088

45. Chakhchar A. Ben Salah I. El Kharrassi Y. Filali-Maltouf A., **El Modafar C.** and Lamaoui M. **(2022)**. Agro-Fruit-Forest Systems Based on Argan Tree in Morocco: A Review of Recent Results. Frontiers in Plant Science 12 783615. https://doi.org/10.3389/fpls.2021.783615

46. Chakou F.Z. Boual Z. Hadj M.D.O.E. Belkhalfa H. Bachari K. El Alaoui-Talibi Z. **El Modafar C.** Hadjkacem F. Fendri I. Abdelkafi S. Traïkia C. Le Cerf D. Dubessay P. Delattre C. Pierre G. Michaud P. **(2021)**. Pharmacological investigations in traditional utilization of alhagi maurorum medik. in saharan Algeria: in vitro study of anti-inflammatory and antihyperglycemic activities of water-soluble polysaccharides extracted from the seeds. Plants 10 2658. https://doi.org/10.3390/ plants10122658

47. Boutasknit A. Baslam M. Ait-El-Mokhtar M. Anli M. Ben-Laouane R. Ait-Rahou Y. Mitsui T. Douira A. **El Modafar C.** Wahbi S. Meddich A. **(2021)**. Assemblage of Indigenous Arbuscular Mycorrhizal Fungi and Green Waste Compost Enhance Drought Stress Tolerance in Carob (*Ceratonia siliqua* L.) trees. Scientific Reports 2021 11(1) 22835 https://doi.org/10.1038/s41598-021-02018-3

48. Dihazi A. Naamani K. Nabgui A. El Meziane A. El Modafar C. Dihazi H. **(2021)**. Proteome analysis of an aggressive and a hypoaggressive isolates of Fusarium oxysporum f. sp albedinis showing several differently expressed-proteins related to the aggressiveness. Physiological and Molecular Plant Pathology116 101738 https://doi.org/10.1016/j.pmpp.2021.101738

49. Chakou F.Z. Boual Z. Ould El Hadj M.D. Atallah B. El Alaoui-Talibi Z. El Modafar C. Fendri I. Abdelkafi S. Dubessay P Gardarin C. Delattre C. Pierre G. Michaud P. **(2021)**. Ethnobotanical utilization of Alhagi maurorum Medik. in traditional recipes of Algerian Sahara Illizi Wilaya. Euro-Mediterranean Journal for Environmental Integration 6 71. https://doi.org/10.1007/s41207-021-00277-0

50. Ait Rahou Y. Boutaj H. Boutasknit A. Douira A. Benkirane R. **El Modafar C.** Meddich A. **(2021).** Colonization of tomato roots with arbuscular mycorrhizal fungi changes of antioxidative activity and improves tolerance to *Verticillium dahliae*. Plant Cell Biotechnology and Molecular Biology 22 65-81.

51. Boutaj H Meddich A Chakhchar A Wahbi S El Alaoui-Talibi Z Douira A Filali-Maltouf A and **El Modafar C. (2021)**. Induction of early oxidative events in mycorrhizal olive tree in response to Verticillium wilt. Archives of Phytopathology and Plant Protection. 54 1323-1345 https://doi.org/10.1080/03235408.2021.1907506

52. Boutaj H, Chakhchar A, Meddich A, Wahbi S, El Alaoui-Talibi Z, Douira A, Filali-Maltouf A and El **Modafar C. (2021)**. Mycorrhizal autochthonous consortium induced defense-related mechanisms of olive trees against *Verticillium dahliae*. Journal of Plant Disease and Protection 128, 225–237 https://doi.org/10.1007/s41348-020-00365-3

53. Zeghlouli J., Guendouz A., Duchez D., **El Modafar C.,** Michaud P., Cédric Delattre C. **(2021)**. Valorization of co-products generated by argan oil extraction process: application to biodiesel production, Biofuels 13(6), pp. 771–777 https://doi.org/10.1080/17597269.2021.1941573

54. Haouas A., **El Modafar C.**, Douira A., Ibnsouda-Koraichi S., Filali-Maltouf A., Moukhli A. & Amir S. **(2021).** Evaluation of the nutrients cycle, humification process, and agronomicefficiency of organicwastescompostingenrichedwith phosphate sludge. Journal of Cleaner Production 302, 127051 https://doi.org/10.1016/j.jclepro.2021.127051

55. Haouas A. **El Modafar C.** Douira A. Ibnsouda-Koraichi S. Filali-Maltouf A. Moukhli A. Soumia Amir S. (2021). Phosphate sludge : Opportunities for use as a fertilizer in deficient soils. Detritus 16 82-93 https://doi.org/10.31025/2611-4135/2021.15112

56. El Gabardi S., Mouden N., Chliyeh. M., Selmaoui K., Ouazzani-Touhami A., FilaliMaltouf A., IbnsoudaKoraichi S., Amir S., Benkirane R., **El Modafar C.** & Douira A. (2021).Effect of phospho-compost and phosphate laundered sludge combined or not with endomycorrhizal inoculum on the growth and yield of tomato plants under greenhouse conditions. Acta Biologica Szegediensis 64(2):221-232https://doi.org/10.14232/abs.2020.2.221-232

57. Sarraf A., Verton E., Addoun N., Boual Z., Didi Ould El Hadj M., El Alaoui-Talibi Z., **El Modafar C**., Abdelkafi S., Fendri I., Delattre C., Dubessay P., Michaud P., Pierre G. **(2021)**. Polysaccharides and Derivatives from Africa to Address and Advance Sustainable Development and Economic Growth in the Next Decade. Applied Sciences 2021, 11(11), 5243; https://doi.org/10.3390/app11115243

58. Zeghlouli J., Christophe G., Guendouz A., **El Modafar C.**, Belkamel A., Michaud P. & Delattre C. **(2021)**. Optimization of Bioethanol Production from Enzymatic Treatment of Argan Pulp Feedstock. Molecules *26* (9), 2516; https://doi.org/10.3390/molecules26092516

59. Bourhim T., Chakhchar A., Lamaoui M., El Kharrassi Y., Alaoui A., **El Modafar C.** , Ibnou Ali El Alaoui M., Hsissou D. **(2021)**. Morphologicalcharacterization and assessment of geneticdiversity of naturalMoroccan populations of *Capparisspinosa*. Acta PhysiologiaePlantarum 43: 37 https://doi.org/10.1007/s11738-021-03209-1

60. Sellal Z., Ouazzani-Touhami A., Dahmani J., Maazouzi S., Chliyeh M., Selmaoui K., Benkirane R., **El Modafar C.** and Douira A**. (2021)**. Distribution and abundance of arbuscular mycorrhizal fungi of *Argania spinosa* tree and mycorrhizal infectious potential of rhizospheric soil of 15 argania groves in southwestern morocco. Plant Cell Biotechnology and Molecular Biology 22, 1-29

61. Haouas A., **El Modafar C.**, Douira A., Ibnsouda-Koraichi S., Filali-Maltouf A., Moukhli A. & Amir S. **(2021).** Alcaligenes aquatilis GTE53: phosphate solubilising and bioremediationbacteriumisolatedfrom new biotope "phosphate sludgeenriched-compost. Saudi Journal of Biological Sciences 28, 371-379. https://doi.org/10.1016/j.sjbs.2020.10.015

62. Benbrik B. , El Abed A. , ., Iraqui M., El Gachtouli N., Douira A., Amir S., FilaliMaltouf A., El Abed S., **El Modafar C**., &IbnsoudaKoraichi S. **(2021)**. A phosphocompost amendment enriched with PGPR

consortium enhancing plants growth in deficient soil. Communications in Soil Science and Plant Analysis 52, 11, 1236-1247, DOI: 10.1080/00103624.2021.1879121

63. AitRahou Y., Ait-El-Mokhtar M., Anli M., Boutasknit A., Ben-Laouane R., Douira A., Benkirane R., **El Modafar C.,**Meddich A. **(2020).** Use of mycorrhizal fungi and compost for improving the growth and yield of tomato and its resistance to *Verticiliumdahliae*. Archives of Phytopathology And Plant Protection, https://doi.org/10.1080/03235408.2020.1854938

64. Bouissil S., El AAlaoui-Talibi Z., Pierre G., Rchid H., Michaud P., Delattre C. **El Modafar C. (2020).** Fucoidans of Moroccan Brown Seaweed as Elicitors of Natural Defenses in Date Palm Roots. Marine Drugs, 18 (12), 596. https://doi.org/10.3390/md18120596

65. Aitouguinane M., Bouissil S., Mouhoub A., Rchid H., Fendri I., Abdelkafi S., Didi Ould El-Hadj M., Boual Z., Dubessay P., Gardarin C., Michaud P., El Alaoui-Talibi Z., **El Modafar C.**, Pierre G., & Delattre C. **(2020).** Induction of natural defenses in tomato seedlings by using alginate and oligoalginates derivatives extracted from Moroccan brown algae. Marine Drugs 18 (10), 521. https://doi.org/10.3390/md18100521

66. Benbrik B. , El Abed A. , **El Modafar C**., Douira A., Amir S., FilaliMaltouf A., El Abed S., El Gachtouli N., Iraqui M., &IbnsoudaKoraichi S. **(2020)**. Reusing phosphate sludge enriched by phosphate solubilizing bacteria as biofertilizer: Growth promotion of *Zea Mays*. Biocatalysis and Agricultural Biotechnology 30, 101825. https://doi.org/10.1016/j.bcab.2020.101825

67. Bouissil S., El Alaoui-Talibi Z., Pierre G., Rchid H., Michaud P., **El Modafar C.,** Delattre C. **(2020).** Radical Depolymerization of Alginate Extracted from Moroccan Brown Seaweed *Bifurcaria bifurcata*. Applied Sciences 10, 4166; https://doi.org/10.3390/app10124166

68. Bouissil S., El Alaoui-Talibi Z., Pierre G., Michaud P., **El Modafar C.,** Delattre C**. (2020)**. Use of alginate extracted from Moroccan brown algae to stimulate natural defense in date palm roots. Molecules 2020, 25(3), 720; https://doi.org/10.3390/molecules25030720

69. Khirani S., Boutaj H., **El Modafar C.**&OueldElhadjKhelil A. **(2020).** Arbuscular mycorrhizal fungi associated with date palm in ouargla region (Southeastern Algeria). Plant Cell Biotechnology and Molecular Biology 21, 15-28.

70. Boutaj H, Chakhchar A, Meddich A, Wahbi S, El Alaoui-Talibi Z, Douira A, Filali-Maltouf A and **El Modafar C. (2020)**. Bioprotection of olive tree from Verticillium wilt by autochthonous endomycorrhizal fungi. Journal of Plant Disease and Protection 127:349–357 DOI: 10.1007/s41348-020-00323-z

71. Boutasknit A., Baslam M., Ait-El-Mokhtar M., Anli M., Ben-Laouane R., Douira A., **El Modafar C.**, Mitsui T., Wahbi, S., Meddich A. **(2020)**. Arbuscular Mycorrhizal Fungi Mediate Drought Tolerance and Recovery in Two Contrasting Carob (*Ceratonia siliqua* L.) Ecotypes by Regulating Stomatal, Water Relations, and (In) Organic Adjustments. Plants 9(1), 80. https://doi.org/10.3390/plants9010080

72. Boutasknit A., Anli M., Tahiri A., Raklami A., Ait-El-Mokhtar M., Ben-Laouane R., AitRahou Y., Boutaj H., Oufdou K., Wahbi, **El Modafar C.**, Meddich A**. (2020).** Potential Effect of Horse Manure-green Waste and Olive Pomace-green Waste Composts on Physiology and Yield Of Garlic (Allium sativum L.) and Soil Fertility. Gesunde Pflanzen 72, 285–295. https://doi.org/10.1007/s10343-020-00511-9

73. Haouas A., **El Modafar C.**, Douira A., Ibnsouda-Koraichi S., Filali-Maltouf A., Moukhli A. And Soumia Amir S. **(2020)**. The effect of phosphate and organic additives on the stability of food waste in the full-scale composting. Plant Cell Biotechnology and Molecular Biology 21, 17-28.

74. Benbrik B. , El Abed A. , El Abed S., El Gachtouli N., Douira A., Amir S., FilaliMaltouf A., Iraqui M., **El Modafar C**., &IbnsoudaKoraichi S. **(2020)**. Characterization of phosphate solubilizing bacteria isolated from Moroccan phosphate sludge and their promoting effect of bean growth and development. Interciencia Journal 45, 97-119.

75. El Gabardi S., Chliyeh. M., Ouazzani-Touhami A., Mouden N., , Selmaoui K., FilaliMaltouf A., Elabed S., IbnsoudaKoraichi S., Amir S., Benkirane R., **El Modafar C.**&Douira A. **(2020)**. Effects of phospho-compost and mud from phosphate sludges combined or not with an endomycorrhizal inoculum on the improvement of the agronomic parameters of maize (Zea mays) plants. Plant Cell Biotechnology and Molecular Biology 21, 65-80.

76. El Maaloum S., El Abed A., El Alaoui-Talibi Z., Meddich A., Filali-Maltouf A., Douira A., Ibnsouda-Koraich S., Amir S., Meddich A. &**El Modafar C. (2020)**. Effect of Arbuscular Mycorrhizal Fungi and Phosphate-Solubilizing Bacteria Consortia Associated with Phospho-Compost on Phosphorus Solubilization and Growth of Tomato Seedlings (Solanum lycopersicum L.). Communications in Soil Science and Plant Analysis, 51, 622-634, DOI: 10.1080/00103624.2020.1729376

77. Boutaj H., Boutasknit A., Elhaissoufi W. , Anlib M, Ait-El-Mokhtar M., Ben-Laouane R., Ait-Rahou Y., Wahbi S., **El Modafar C.,**Meddich A. (**2020)**. Olive mill wastewater spreading improves growth, physiological, and biochemical traits of Phaseolus vulgaris. Desalination and Water Treatment 185, 87–98.

78. Sellal Z., Ouazzani-Touhami A., Chliyeh M., Mouden N., Selmaoui K., Dahmani J., Benkirane R., **El Modafar C.** and Douira A**. (2020)**. Effect of seeds treatment with *Trichoderma harzianum* on argan plants growth. Plant Cell Biotechnology and Molecular Biology 2, 69-77.

79. Boutaj H, Chakhchar A, Meddich A, Wahbi S, El Alaoui-Talibi Z, Douira A, Filali-Maltouf A and El **Modafar C. (2020)**. Arbuscular mycorrhizal fungi improve mineral nutrition and tolerance of olive tree to Verticillium wilt. Archives of phytopathogoly and plant protection 53: 673-689. DOI: 10.1080/03235408.2020.1792603

80. Msairi S., M. Chliyeh, A. OuazzaniTouhami, A. El Alaoui, K. Selmaoui, R. Benkirane, A. Filali-Maltouf, **C. El Modafar** and A. Douira**(2020**). First report of *Colletotrichum lupini* causing anthracnose disease in olive fruits in Morocco. Plant Cell Biotechnology and Molecular Biology 21, 1-11.

81. Boutaj H., Meddich A., Wahbi S., Moukhli A., El Alaoui-Talibi Z., Douira A., Filali-Maltouf A. &**El Modafar C. (2020).** Improvement of growth and development of olive tree by mycorrhizal autochthonous inoculum.Research Journal of Biotechnology 15, 76-84.

82. El Gabardi S., Chliyeh. M., Ouazzani-Touhami A., **El Modafar C.**, FilaliMaltouf A., Elabed S., IbnsoudaKoraichi S., Amir S., Moukhli A., Benkirane R. &Douira A. **(2019).** Diversity of mycorrhizal fungi arbuscular at phosphates sludge, Khouribga region (Morocco). Plant Archives, Vol. 19 No.2, 2233-2241.

83. Chakhchar A., Lamaoui M., El Kharrassi Y., Bourhim T., Filali-Maltouf A. &**El Modafar C. (2019).** A Review on the Root System of Argania spinosa. Current Agriculture Research Journal 8 (1), 7-17. http://dx.doi.org/10.12944/CARJ.8.1.03

84. Bouissil S., Pierre G., El Alaoui-Talibi Z., Michaud P., **El Modafar C.**, Delattre C. **(2019)**. Applications of algal polysaccharides and derivatives in pharmaceutical and agricultural fields. Current Pharmaceutical Design, 25, 1187-1199.

85. El Gabardi S, Chliyeh M, Mouden N, Selmaoui K, Ouazzani-Touhami A**., El Modafar C**., FilaliMaltouf A, Elabed S, IbnsoudaKoraichi S, Amir S, Moukhli A, Benkirane R and Douira A. **(2019).** Study of the effect of different phospho- compost doses on the growth and development of bean plants. Plant Cell Biotechnology and Molecular Biology 20,710–725.

86. Boutaj H., Meddich A., Wahbi S., Moukhli A., El Alaoui-Talibi Z., Douira A., Filali-Maltouf A. &**El Modafar C. (2019).**Effect of Arbuscular Mycorrhizal Fungi on *Verticillium* wilt development of olive trees caused by *Verticillium dahliae*. Research Journal of Biotechnology 14, 79-88.

87. Sellal Z., OuazzaniTouhami A., Mouden N., Chliyeh M., Selmaoui K., Dahmani J., Benkirane R., **El Modafar C.**&Douira A. **(2019).** The effectiveness of seed coating with composite endomycorrhizal

inoculum for establishing mycorrhization and growing Argan seedlings. Interciencia journal 44 24-37

88. El Gabardi S., Chliyeh. M., Mouden N., Ouazzani-Touhami A., **El Modafar C.**, FilaliMaltouf A., Elabed S., IbnsoudaKoraichi S., Amir S., Moukhli A., Benkirane R. &Douira A. **(2019).** Determination of the endimycorhizogenic potential of phosphate laundered sludge by using the mycorhizal infectious method (PIM). Plant Cell Biotechnology and Molecular Biology 20, 501-510.

89. Chakhchar A., Lamaoui M., Aissam S., Ferradous A., Wahbi S., El Mousadik A., Ibnsouda-Koraichi S., Filali-Maltouf A. &**El Modafar C. (2019).** Physiological and carbohydrate metabolism traits for discrimination of drought-tolerant elite ecotypes of Argania spinosa. . Plant Physiology Reports 24, 388–398 (2019). https://doi.org/10.1007/s40502-019-00463-x

90. El Gabardi S., Chliyeh. M., Ouazzani-Touhami A., **El Modafar C.**, FilaliMaltouf A., Elabed S., IbnsoudaKoraichi S., Amir S., Moukhli A., Benkirane R. &Douira A. **(2019).** Study of the endomycorrhizogenic potential of phosphate laundered sludge. WulfeniaJoural 26, 38-57.

91. El Gabardi S., Chliyeh. M., Ouazzani-Touhami A., **El Modafar C.**, FilaliMaltouf A., Elabed S., IbnsoudaKoraichi S., Amir S., Moukhli A., Benkirane R. &Douira A. **(2019).** Diversity of endomycorrhizal fungi isolated from soil sites adjacent to Khouribga phosphate mines (Morocco). Interciencia Journal 44, 60-83.

92. Lamaoui M., Chakhchar A., El Kharrassi Y., Wahbi S., Ferradous A., El Mousadik A., Ibnsouda-Koraichi S., Filali-Maltouf A. &**El Modafar C. (2019).** Selection and Multiplication of Argan (Argania spinosa L.) Superior Clones for Conservation Purposes. Acta Scientific Agriculture 3, 116-123.

93. Lamaoui M., Chakhchar A., Benlaouane R., El Kharrassi Y., Farissi M., Wahbi S., &**El Modafar C. (2019).** Uprising the antioxidant power of Argania spinosa L. callus through abiotic elicitation. ComptesRendusBiologies 342, 7-17.