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- **Organization:** Faculty of sciences Semlalia
- **Department/Institute:** Biology department
- **Research group:** Plant Biotechnology and physiology Team
- **Country:** Morocco
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- **Fields of scientific & technical expertise and interests (descriptive):**

Plant Eco-physiology; Agronomy; Water saving irrigation techniques and water harvesting technologies; Plant growth and water use efficiency along the gradient of aridity; Plant water status under deficit irrigation, water use efficiency in drylands.

- **Educational background:**

**Doctorat d'Etat in Plant physiology. Faculty of Sciences, Marrakech, Morocco, 2005.** Réponses agronomiques et physiologiques de l'olivier et de la tomate sous deux régimes d'irrigation : PRD (Partial Root Drying) & RDI (Regulated Deficit Irrigation).

**Doctorat de 3 ème cycle in plant pathology. Faculty of sciences, Marrakech, Morocco, 1989.** Les pourritures racinaires des céréales dans les régions du Haouz et des Rhamnas (Maroc).

- **Most relevant work experience:**

Full professor, Biology Department, Faculty of Sciences Semlalia, Marrakech 2005 - present

Associate professor, Biology department, Faculty of Sciences Semlalia, Marrakech (1986-2005).

- **Most relevant project experiences:**

- PRIMA SALAM-MED « Sustainable Approaches to LAnd and water Management in MEditerranean Drylands ». PI Wahbi Said, Université Cadi Ayyad, Marrakech, Morocco (2022 - 2025), involved countries: Morocco, Italy, Spain, Greece, Tunisia and Egypt.

- European Commission - FP7, Contract number: 212337. Sustainable water use securing food production in dry areas of the Mediterranean Region. International collaborator: Prof. Sven-Erik Jacobsen University of Copenhagen, Denmark; Prof. Manuela Chaves, Universidade Nova de Lisboa, Portugal; Dr. Ragab Ragab, Centre for Ecology and Hydrology, Wallingford, UK.

- **Most relevant Publications:**

1. Yaakoubi, A., Aganchich, B., Meddich, A. and Wahbi, S., 2024. Land spreading of olive mill wastewater (OMW): Biodegradation of organic matter and polyphenols in soil and effect on the activity of the total soil microflora. *Water Practice & Technology*, 19(2), pp.297-310.
2. El Moussaoui, T., Belloulid, M.O., El Ass, K., Mandi, L., Wahbi, S., Masi, S. and Ouazzani, N., 2024. Study of an eco-efficient method for wastewater treatment and safe agricultural reuse: Effect of influent splitting rates on effluent quality parameters. *Irrigation and Drainage*, 73(1), pp.304-321.
3. El Amerany, F., Meddich, A., Wahbi, S., Taourirte, M. and Rhazi, M., 2023. Application of Compost, as a Peat Substitute, and Foliar Spray of Chitosan and/or Roots Inoculation With Beneficial Fungus Increases Tomato Plants Productivity and Fruit Size. *Gesunde Pflanzen*, pp.1-11.
4. Boutasknit, A., Anli, M., Ben-Laouane, R., Fakech, A., Rahou, Y.A., Wahbi, S. and Ait-El-Mokhtar, M., 2023. Arbuscular Mycorrhizal Fungi for Enhanced Production and Crop Yield Under Changing Climate. In *Intelligent Solutions for Optimizing Agriculture and Tackling Climate Change: Current and Future Dimensions* (pp. 115-147). IGI Global.
5. Anaya, F., Fghire, R., Lamnai, K., Loutfi, K., Wahbi, S. and Carvalho, I.S., 2022. Effect of Exogenous Salicylic Acid on Growth Parameters, Gas Exchange, and Photosynthetic Yields in Salt-Stressed *Vicia faba* L. Plants. *Russian Journal of Plant Physiology*, 69(7), p.149.
6. El Amerany, F., Rhazi, M., Balcke, G., Wahbi, S., Meddich, A., Taourirte, M. and Hause, B., 2022. The effect of chitosan on plant physiology, wound response, and fruit quality of tomato. *Polymers*, 14(22), p.5006.
7. Ait-El-Mokhtar, M., El Amerany, F., Fakhech, A., Akenous, F.Z., Ait-Rahou, Y., Ben-Laouane, R., Anli, M., Boutasknit, A., Wahbi, S., El Modafar, C. and Meddich, A., 2022. Cereals and Phytohormones Under Drought Stress. In *Sustainable Remedies for Abiotic Stress in Cereals* (pp. 313-350). Singapore: Springer Nature Singapore.
8. Raja, B.L., Soufian, L., Salma, T., Wissal, B., Ouissame, R., Said, W., Cherkaoui, E.M., Marouane, B. and Abdelilah, M., 2022. Use of biostimulants to improve salinity tolerance in cereals. In *Sustainable Remedies for Abiotic Stress in Cereals* (pp. 471-517). Singapore: Springer Nature Singapore.
9. Lamnai, K., Anaya, F., Fghire, R., Janah, I., Wahbi, S. and Loutfi, K., 2022. Salicylic Acid and Iron Reduce Salt-Induced Oxidative Stress and Photosynthesis Inhibition in Strawberry Plants. *Russian Journal of Plant Physiology*, 69(5), p.103.
10. Aganchich, B., Wahbi, S., Yaakoubi, A., El-Aououad, H. and Bota, J., 2022. Effect of arbuscular mycorrhizal fungi inoculation on growth and physiology performance of olive trees under regulated deficit irrigation and partial rootzone drying. *South African Journal of Botany*, 148, pp.1-10.
11. Ait-El-Mokhtar M., Ben-Laouane R., Boutasknit A., Anli M., El-Amerany F., Toubali S., Lahbouki S., Mitsui T., Wahbi S., Baslam M. and Meddich A. 2022. The beneficial effects of arbuscular mycorrhizal fungi and compost on plant tolerance to drought and salinity stresses : A study on date palm and alfalfa. In: *Microbial BioTechnology for Sustainable Agriculture Volume 1*. Springer Nature Singapore Pte Ltd Ed Naveen Kumar Arora, Brahim Bouizgarne. Microorganisms

for Sustainability, vol 33. Springer, Singapore. [https://doi.org/10.1007/978-981-16-4843-4\\_12](https://doi.org/10.1007/978-981-16-4843-4_12).

12. Ait-El-Mokhtar M., Fakhech A., Ben-Laouane R., Anli M., Boutasknit A., Ait-Rahou Y., Wahbi S. and Meddich A. 2022. Compost as an eco-friendly alternative to mitigate salt-induced effects on growth, nutritional, physiological and biochemical responses of date palm. *International journal of recycling organic waste in agriculture*, 11(1): 85-100.
13. Lahbouki S., Ben-Laouane R., Anli M., Boutasknit A., Ait-Rahou Y., Ait-El-Mokhtar M., El Gabardi S., Douira A., Wahbi S., Outzourhit A. and Meddich A. 2021. Arbuscular mycorrhizal fungi and/or organic amendment enhance the tolerance of prickly pear (*Opuntia ficus-indica*) under drought stress. *Journal of Arid Environments*, 199: 104703
14. 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. and 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*, 11(1): 1-23.
15. Boutasknit A., Baslam M., Anli M., Ait-El-Mokhtar M., Ben-Laouane R., Ait-Rahou Y., El Modafar C., Douira A., Wahbi S. and Meddich A. 2021. 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-An International Journal Dealing with all Aspects of Plant Biology*, 1- 17.
16. Lahbouki S., Anli M., El Gabardi S., Ait-El-Mokhtar M., Ben-Laouane R., Boutasknit A., Ait-Rahou Y., Outzourhit A., Wahbi S., Douira A. and Meddich A. 2021. Evaluation of arbuscular mycorrhizal fungi and vermicompost supplementation on growth, phenolic content and antioxidant activity of prickly pear cactus (*Opuntia ficus-indica*). *Plant Biosystems-An International Journal Dealing with all Aspects of Plant Biology*, 1-11.
17. Lamnai, K., Anaya, F., Fghire, R., Zine, H., Wahbi, S., Loutfi, K (2021). Impact of Exogenous Application of Salicylic Acid on Growth, Water Status And Antioxidant Enzyme Activity of Strawberry Plants (*Fragaria vesca* L.) Under Salt Stress Conditions. *Gesunde Pflanzen*, in press.
18. Ben-Laouane, R., Ait-El-Mokhtar, M., Anli, M., Boutasknit, A., Ait Rahou, Y., Raklami, A., Oufdou, K., Wahbi, S., Meddich, A (2021). Green Compost Combined with Mycorrhizae and Rhizobia: A Strategy for Improving Alfalfa Growth and Yield Under Field Conditions. *Gesunde Pflanzen*, 73 (2), pp. 193-207.
19. Boutaj, H., Chakhchar, A., Meddich, A., Wahbi, S., El Alaoui-Talibi, Z., Douira, A., Filali-Maltouf, A., El Modafar, C (2021) .Mycorrhizal autochthonous consortium induced defense-related mechanisms of olive trees against *Verticillium dahliae* *Journal of Plant Diseases and Protection*, 128 (1), pp. 225-237.
20. Meddich, A., Ait Rahou, Y., Boutasknit, A., Ait-El-Mokhtar, M., Fakhech, A., Lahbouki, S., Benaffari, W., Ben-Laouane, R., Wahbi, S (2021). Role of mycorrhizal fungi in improving the tolerance of melon (*Cucumis melo*) under two water deficit partial root drying and regulated deficit irrigation. *Plant Biosystems*, in press.

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23. Ait-El-Mokhtar, M., Baslam, M., Ben-Laouane, R., Anli, M., Boutasknit, A., Mitsui, T., Wahbi, S., Meddich, A (2020). Alleviation of Detrimental Effects of Salt Stress on Date Palm (*Phoenix dactylifera* L.) by the Application of Arbuscular Mycorrhizal Fungi and/or Compost. *Frontiers in Sustainable Food Systems*, 4, art. no. 131, .
24. Boutasknit, A., Anli, M., Tahiri, A., Raklami, A., Ait-El-Mokhtar, M., Ben-Laouane, R., Ait Rahou, Y., Boutaj, H., Oufdou, K., Wahbi, S., 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 (3), pp. 285-295.
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26. Boutaj, H., Meddich, A., Chakhchar, A., Wahbi, S., El Alaoui-Talibi, Z., Douira, A., Filali-Maltouf, A., El Modafar, C (2020). Arbuscular mycorrhizal fungi improve mineral nutrition and tolerance of olive tree to *Verticillium* wilt. *Archives of Phytopathology and Plant Protection*, pp. 673-689.
27. Ait-El-Mokhtar, M., Fakhech, A., Anli, M., Ben-Laouane, R., Boutasknit, A., Wahbi, S., Meddich, A (2020). Infectivity of the palm groves arbuscular mycorrhizal fungi under arid and semi-arid climate and its edaphic determinants towards efficient ecological restoration. *Rhizosphere*, 15, art. no. 100220.
28. El Amerany, F., Meddich, A., Wahbi, S., Porzel, A., Taourirte, M., Rhazi, M., Hause, B (2020). Foliar application of chitosan increases tomato growth and influences mycorrhization and expression of endochitinase-encoding genes. *International Journal of Molecular Sciences*, 21 (2), art. no. 535.
29. Boutasknit, A., Baslam, M., Ait-El-mokhtar, M., Anli, M., Ben-Laouane, R., Douira, A., Modafar, C.E., 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), art. no. 80.
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individually or in combination on growth, nutrient uptake, and stem anatomy of tomato. *Scientia Horticulturae*, 261, art. no. 109015.

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33. Ait-El-Mokhtar M, Ben Laouane R, Anli M, Boutasknit A, Wahbi S and Meddich A. (2019). Use of mycorrhizal fungi in improving tolerance of the date palm (*Phoenix dactylifera* L.) seedlings to salt stress. *Scientia Horticulturae* 253: 429-438.
34. Ben Laouane R, Meddich A, Bechtaoui N, Oufdou K, and Wahbi S. (2019). "Effects of Arbuscular Mycorrhizal Fungi and Rhizobia Symbiosis on the Tolerance of *Medicago sativa* to Salt Stress." *Gesunde Pflanzen* 71, no. 2: 135-146.
35. Oudou Issa A, Fghire R, Anaya F, Benlhabib O. and Wahbi S. (2019). "Physiological and Morphological Responses of two Quinoa Cultivars (*Chenopodium quinoa* Willd.) to Drought Stress." *Gesunde Pflanzen* 71, no. 2: 123-133.
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39. Lamaoui M., Chakhchar A., El Kharrassi Y., Wahbi S. & El Modafar C. (2018). Morphological, physiological, and biochemical responses to water stress in Melon (*Cucumis melo*) subjected to Regulated Deficit Irrigation (RDI) and Partial Rootzone Drying (PRD). *Journal of Crop Science and Biotechnology*, 21(4): 407-416.
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41. Chakhchar A., Lamaoui M., Aissam S., Ferradous A., Wahbi S., El Mousadik A., Ibensouda Koraichi S., Filali-Maltouf A. & El Modafar C (2018). Using chlorophyll fluorescence, photosynthetic enzymes and pigment composition to discriminate drought tolerant ecotypes of *Argania spinosa*. *Plant Biosystems*, 152(3):356-367.
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