NABIL AHMAD

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Citizenship: Australian

EDUCATION

August 2005 PhD-Botany /Plant Breeding Institute, University of Sydney, Australia.
Dates Attended: Aug 01-March 05.
Project Title: "Biology of Sexual and Vegetative Reproduction in *Poa labillardieri* and *Lomandra longifolia*".

Jan 1995 M.Sc. – Plant Breeding, University of Jordan, Jordan.
Dates Attended: Sept 92-Jan 95.
Project Title: "Inheritance of Resistance to Powdery Mildew Disease in Cucumber Plant".

Jul 1992 B.Sc. – Plant Production, University of Jordan, Jordan.
Dates Attended: Sept 88-July 92.

EMPLOYMENT HISTORY

Jul 2011 – Jan 2020 **Plant Breeding Institute / University of Sydney / Australia.**
Research Fellow.

Chief Research Scientist/ development of new varieties of tomato, cucumber, capsicum and eggplant with the following breeding objectives:

- Resistance to cucumber gummy stem blight, tomato spotted wilt virus and tomato viruses (TYLCV, TSWV, ToMV).
- Tolerance to salinity and drought conditions (abiotic conditions).
- High productivity and fruit quality.

Feb 08 – Jun 2011 **Plantstra Pty Ltd. Head Researcher/ Project Manager, Honorary Research Associate at the University of Sydney/ Plant Breeding Institute.**

- Research on the large scale production of some vegetable crops and some native Australian grass-like plants through somatic embryogenesis and the use of bioreactors.
- Maximising seed germination of some Australian grasses and grass-like plants and optimising seed viability tests.
- Leading a breeding program to develop new hybrid varieties of vegetable crops.

- Frequent visits to farmers of the Sydney basin area to help in Applying Integrated Pest Management (IPM) practices.
- Marketing of commercially produced cucumber varieties.

March 06 – Jan 08 Plant Breeding Institute / University of Sydney / Australia.
Post Doctoral Fellow.

- Research on the large scale production of some native Australian grass-like plants through somatic embryogenesis and the use of bioreactors.
- Molecular biology studies to identify molecular markers to distinguish between male and female plants of *Lomandra longifolia* at the seedling stage.
- Consultancy work in Integrated Pest Management for greenhouse vegetable growers/ Sydney basin areas.

Nov 96 – Oct 00 National Center For Agricultural Research & Technology Transfer / Jordan.
Researcher and Coordinator.

- Research on various aspects of vegetable production and vegetable seed production:
  - Screening different cultivars of pepper, tomato, cucumber and squash for various climatic and soil conditions.
  - Hydroponic growing of tomato, cucumber, and lettuce crops.
  - Effect of growth regulators on physical and chemical characteristics of processing tomato cultivars.
  - Effect of different types and quantities of organic fertilizers (poultry, sheep, cow) on productivity and quality of tomatoes and potatoes.
  - Influence of different factors (storage T°, storage period, planting dates, bulb size) on onion seed production.
- Coordinator of the Vegetable Research Unit in the Irrigated Agriculture Research Program.
- Supervised farmers on technical issues related to vegetable production in both open field and greenhouses.
- Research coordinator of certain aspects of an international project (according to the Montreal protocol, Canada) in relation to protection of the ozone layer by finding alternatives to the use of methylbromide in agriculture.

Nov 96 – Oct 00 The Arab National Co. for Fertilizer Industry & Seed Production /Jordan (part time).
Technical Manager-Team Leader of plant breeders.

- Leading a team of four plant breeders and managing three experimental stations (one in Jerash and two in the Jordan Valley).
- Sole supervisor of all conventional breeding activities to develop new hybrid cucumber, tomato, and squash cultivars.
- Sole responsibility of the maintenance of homozygous inbred lines.
- Compatibility testing and planning of intensive experimentation and screening.
- Data analysis and responsibility for ranking and accepting superior hybrids according to their morphological characteristics and overall performance.

- Quality control of seed testing including germination, viability, purity, and seed health tests.

Feb 95 – Oct 96 **The Arab National Co. for Fertilizer Industry and Seed Production /Jordan.**
Technical Manager.

- Technical Manager at the company, leading a team of four plant breeders and managing three experimental stations (one in Jerash and two in the Jordan Valley).
- Head breeder of three breeding programs to develop new hybrid cultivars of tomato, cucumbers, and squash.

Jan 93 – June 94 **University of Jordan / Jordan.**
Teaching assistant.

- Teaching assistant in laboratories of undergraduate courses (Vegetable Production) for three semesters.
- Corrector of vegetable course examinations.

TRAINING

Additional Formal Training Courses Completed:

Feb-April 2010	Digital Photography, Northwest Community College Inc., NSW
October 05	Integrated Pest Management Course, NSW Agriculture.
2003	University of Sydney, Electron Microscopy Unit • Basic techniques in optical microscopy. • Introductory specimen preparation for light microscopy. • Specimen preparation for fluorescence microscopy. • Introduction to confocal microscopy. • Biological specimen preparation. • Operation of the Scanning Electron Microscope. • Operation of the Transmission Electron Microscope.
Apr 99-Jul 99	Seed Production of Upland Crops. At JICA Centre, Obihiro, Japan.
July 97	"Train the Trainers on Seed Processing and Storage". International Center for Agricultural Research in the Dry Areas (ICARDA), Aleppo, Syria.
July-Aug 96	Scientific tour to seed companies in Turkey, in cooperation between Jordanian Ministry of Agriculture and the German agriculture advisory service provider, GTZ .
May 96	"Breeding and Seed Technology of open Pollinated Vegetable Crops" Ministry of Agriculture in cooperation with GTZ, Jordan.
Jul-Aug 95	"Breeding of Cucumber and Tomato Crops" Ministry of Agriculture in cooperation with GTZ, Jordan.

Area of Research Interest:

I am a plant breeder, focusing on the incorporation of modern breeding tools for plant improvement in my research work. My research interests include tissue culture techniques for micropropagation, gene recombination and enhancing genetic variation (e.g. protoplast fusion, embryo rescue, mutation breeding and somaclonal variation); and anther culture, for dramatically reducing the time required to develop inbred parents for breeding of F1 hybrid varieties. I also have a passion for plant developmental biology research, including embryology and floral morphogenesis. Owing to my extensive expertise in cucumber breeding, I have a special research interest in sex expression in the cucurbit family.

Students supervision:

I have demonstrated a capacity to supervise students in world-leading plant research. Over the last 5 years, I have supervised or co-supervised nine post-graduate students and three undergraduate students at the University of Sydney. In addition, I have co-supervised three overseas students (two from France and one from Iran) on internships and exchange programs. Of these students, four have completed their studies and gone on to pursue their higher education or start their career. This supervision has resulted in the publication of some papers in high impact journals.

I am or have been a primary supervisor for the following postgraduate and undergraduate students at the University of Sydney:

- Ali Chamas (MAgr, coursework, 2014–15), Reproductive biology of *Solanum orbiculatum* ssp. *orbiculatum*, an Australian endemic bush tomato.

- Ahmed Al najm (PhD, 2014–19), *In vitro* propagation, reproductive biology and genetic diversity of date palm (*Phoenix dactylifera* L.).

- Shahnoosh (PhD), The effect of high temperature on physiological and metabolic parameters and reproductive tissues of okra (*Abelmoschus esculentus* (L.) Moench).

- Benjamin Gawthorne (4th year project, 2017), Effect of silicon on alleviating heat stress in tomato.

- Rongsheng Yue (4th year project, 2019), Study on Self-incompatibility, chromosome numbers and pairing of the Australian native *Scaevola*.

I am an associate supervisor for the following students at the University of Sydney:

- Muhammed Al Samir (PhD), Genetic and physiological analysis of tomato (*S. esculentum* L.) adaptation under heat and disease.

- Anber Hamdani (PhD), The effect of water deficit on physiology and water use in tomatoes.

- Misbah Sadar (PhD), Genetic basis of morphological and biochemical variation under heat stress in okra.

- Shahnoosh (Masters), Genetic basis of morphological and biochemical variation under heat stress in okra.

- Muktadir, MA (PhD), Chemical composition and reproductive functionality of contrasting faba bean genotypes in response to water deficit

- Mehwish Kanwal (PhD), Optimising in-vitro and in-vivo conditions for pollen mediated gene editing in wheat.

- Rohan Corrigan (4th year project, 2019), Assessing the Agronomic Properties of *Solanum centrale* on Two Substrates and Fertigation Levels

I have also co-supervised the following students on internship and exchange programs:

- Fatemeh Borna (2015), Molecular analysis and reproductive biology studies on the medicinal plant *Leonurus cardiaca*. Nabil Ahmad and Richard Trethowan. This seven-month project was part of an exchange program with the University of Tehran. The project produced two peer-reviewed articles.

- Gaëlle Van Frank, internship (AgroParisTech, France). Training period 30/9/2013–28/3/2014. Cucumber breeding. Nabil Ahmad and Peter Sharp.

- Laurene Angles, internship (E.I. Purpan traineeship program abroad, France). Training period 25/6/2014–19/9/2014. Reproductive biology studies in the Australian bush tomato *Solanum centrale*. Nabil Ahmad and Peter Sharp.

In conjunction with my work as Chief Research Scientist for the ASX-listed company Abundant Produce Limited, I lead an intensive vegetable research

program, with a strong focus on abiotic stress tolerance (including heat, salinity and drought) to address the challenges associated with feeding a growing world population amid a changing climate. This program includes breeding of tomato, cucumber, capsicum, eggplant and zucchini genotypes, and hybrid varieties with high tolerance to environmental stresses.

Tours

- USA Industry Leadership and Development Mission 7-20 February, 2016.
- Grower study tour to Germany and France 4-17 February 2014.

Notable research output

My notable research outputs include:

- Breeding of commercial F_1 hybrid cucumber and tomato varieties.
- Breeding of F_1 hybrid tomato and advanced lines with exceptional taste and quality attributes.
- Numerous peer-reviewed articles (see publications list).
- Successful partnership between the University of Sydney and Abundant Produce Limited.
- Increasing interest from the Australian Aboriginal community in the bush tomato breeding project, which may lead to post-graduate research studies in the future.
- Increasing interest from hydroponic vegetables growers and date palm farmers for research collaboration with the University of Sydney.

Governance, leadership and engagement

Over the past 8 years, I have led a team of employees, which currently includes two researchers with PhD degrees, two technical officers, and several casual workers. My responsibilities include managing a greenhouse facility with more than 5,000 square metres undercover.

During this time, I have substantially strengthened links between the University of Sydney and the private sector. The vegetable breeding program is funded by investors through the ASX-listed company and University partner, Abundant Produce Limited. This work involves commercialisation of vegetable varieties and visitor trials carried out by global seed companies. The extensive greenhouse facilities located at PBI and funded by Abundant

Produce provide a focal point that attracts students and visitors to the Institute. This facility is becoming a model for hydroponic production and breeding work.

More recently I have been engaged with the date palm industry as a leading researcher, with the aim of overcoming some of the problems faced by the industry, such as micropropagation by tissue culture, pollination and fruit setting issues.

Additional examples of my outreach and community engagement work include:

- Hosting delegates from other countries (e.g., China and Japan) and presenting activities at the PBI and Abundant Produce facilities, including presentations and scientific tours.
- Field days at PBI for local and overseas seed-producing and distributing companies.
- Collaborative work with Hendricks gin in relation to cucumber breeding (see www.abundantproduce.com/article/peculiarly-australian-cucumber-9112016).
- Participating in important vegetable events such as the annual vegetable convention organised by AUSVEG.
- Participating in a YouTube channel managed by Abundant Produce Limited, with a focus on plant breeding (www.youtube.com/channel/UCMnSBJkIedgECIUsiycDgeA).
- Participation with the Office of Global Engagement to attract funding from the Gulf countries (Middle East). I took part in the International Gulf Forum (Food and Water Security, 2012) with a presentation, and I also participated in two missions to the United Arab Emirates in 2013 and 2015 in collaboration with the business school and the Australian Centre for Field Robotics. During the mission, I visited the UAE University, Masdar Institute and the International Center for Biosaline Agriculture (ICBA).
- Inviting people from the UAE University to the University of Sydney to sign a memorandum of understanding (MoU) for a collaboration in the field of research and student exchange.
- Participated in many media interviews (TV, radio and newspaper) in addition to online international platforms such as HortiDaily:
    - www.hortidaily.com/article/9467/New-cucumbers-bred-for-Australian-greenhouses
    - www.hortidaily.com/article/21968/Australian-seed-breeder-Abundant-Produce-goes-public
    - www.hortidaily.com/article/30212/The-world-is-at-the-point-of-a-food-security-threshold
    - www.hortidaily.com/article/31026/The-plant-breeder-needs-to-be-an-artist
    - www.hortidaily.com/article/31943/The-importance-of-plant-structure

- Participated in tours organised by Horticulture Innovation Australia (HIA/AUSVEG) to some leading overseas organisations as part of the vegetable industry leadership program.
- Interaction with the cereal rust group at the PBI by programming a comprehensive FileMaker database for their internationally-recognised survey. The database solution includes sample collection entry platform, handling pathotype requests etc.
- Managing the tissue culture laboratory at the PBI with the associated training to new students.
- Collaborative work with a student in the amenity department at the University of Sydney. This collaborative work resulted in a publication of a review paper (www.publish.csiro.au/CP/justaccepted/CP15380).
- Expanding the research activities of the Plant Breeding Institute to include vegetables and fruit trees by introducing a major vegetable crops breeding program and date palm research, allowing the Institute's activities to expand well beyond cereal rust research.
- Chairing and panel member of PhD student annual review and progress assessments.
- Reviewing manuscripts for internationally recognised journals.
- Prize winner in the Bosch Institute Advanced Microscopy Facility Micrograph Competition 2016. Scanning electron microscopy images on plant developmental biology and embryology.

COMPUTER SKILLS

- Excellent skills in using Word, Excel, PowerPoint, Adobe Photoshop CC, Adobe Illustrator CC, Adobe pagemaker, Adobe InDesign, CoreDraw Graphics X6, Adobe Flash CC, Dreamweaver, Data analysis software (GenStat, SPSS, Minitab, and Mstat-c) and many others.
- Excellent skills in database programming using FileMaker Pro 15 Advanced. I have already developed two complete filemaker solutions to manage the data of the following institutions:
  - ✓ Plant Breeding Institute/University of Sydney: Developing and maintaining the Rust Database that has a complete solution to manage the biggest survey in Australia (Rust Collection Database and pathogenicity Survey, led by Prof. Robert Park and Dr. Colin Wellings) with functions like:
    - keeping records of all collected rust samples of wheat, Barley, Oats, Rye, Triticale and others
    - Keeping records of all found pathogens in Australia.
    - Handling requests from working and research collections.
    - Creating reports and mapping facilities.

- ✓ Leppington Speedy Seedlings and Supplies: Managing all nursery work including orders, sowing, shipping, invoicing, varieties and growers.

SPOKEN LANGUAGES

- Arabic as a native language.
- English with excellent proficiency in speaking, writing and reading.

ACCREDITATIONS

- Australian Farm Chemical User Accreditation (Accredited by ChemCert, Australia).
- Integrated Pest Management consultancy services, 2005 (Accredited by NSW Department of Primary Industries, Ministry of Agriculture, Australia).
- Foundations of Research Supervision, Accredited as Primary and associate supervisor for Masters and Doctorate students.

CONFERENCES and PUBLICATIONS

1. Ahmad, N.; Chamas, A.; Trethowan, R. (2023) Reproductive Biology of Solanum orbiculatum ssp. orbiculatum, an Australian Endemic Bush Tomato. Agronomy 2023, 13, 2701. https://doi.org/10.3390/agronomy13112701

2. Hayamanesh, S.; Trethowan, R.; Mahmood, T.; **Ahmad, N**.; Keitel, C. (2023) Physiological and Molecular Screening of High Temperature Tolerance in Okra [Abelmoschus esculentus (L.)Moench]. Horticulturae 2023, 9,722. https://doi.org/10.3390/horticulturae9060722

3. Kanwal, M.; Gogoi, N,; Jones, B.; Bariana, H.; Bansal, U.; **Ahmad, N.** (2002) Pollen: A Potential Explant for Genetic Transformation in Wheat (Triticum aestivum L.) Agronomy 2022, 12, 2009. https://doi.org/10.3390/agronomy12092009

4. Kanwal, M.; Bariana, H.; **Ahmad, N.;** Bansal, U. (2022) Wheat pollen uptake of CRISPR/Cas9 RNP-PDMAEMA nanoassemblies results in targeted loss of gene function in progeny. Submitted to Science Advances (Manuscript Number: add1441).

5. Al-Najm, A.; Brauer, S.; Trethowan, R.; Merchant, A.; **Ahmad, N.** (2021) Optimisation of in vitro pollen germination and viability testing of some Australian selections of date palm (*Phoenix dactylifera* L.) and their xenic and metaxenic effects on the tissue culture-derived female cultivar "Barhee". Accepted for publication in the journal "In Vitro Cellular and Developmental Biology – Plant".

6. Muktadir, A.; Adhikari N., K; **Ahmad, N.**; Merchant, A. (2020) Chemical composition and reproductive functionality of contrasting faba bean genotypes in response to water deficit. Physiologia Plantarum, 1-12.

7. Alsamir, M.; **Ahmad, N.**; Mahmood, T.; Trethowan, R. (2019) Phenotypic diversity and marker-trait association studies under stress in tomato

(*Solanum lycopersicum* L.). Australian Journal of Crop Science, 13(3).

8. Al-Najm, A.; Brauer, S.; Trethowan, R.; **Ahmad, N.** (2018) Optimisation of in vitro micropropagation of several date palm cultivars. Australian Journal of Crop Science, 12(12), 1937-1949.

9. Ahmad, N. & Martin, P. (2017) Pollen morphology and physiology of *Poa labillardieri* (Poaceae). The International Journal of Plant Reproductive Biology, 9(2), 139-147

10. Al-Najm, A.; Luo, S. **Ahmad, N.**; Pourkheirandish, M.; Trethowan, R. (2017) Molecular variability and population structure of a core collection of date palm (*Phoenix dactylifera* L.) cultivars from Australia and the Middle East. Australian Journal of Crop Science, 11(9), 1106-1115.

11. Alsamir, M.; **Ahmad, N.;** Mahmood, T.; Trethowan, R. (2017) Morpho-physological traits linked to high temperature stress tolerance in tomato (*S. lycopersicum* L.). American Journal of Plant Sciences, 8, 2681-2694.

12. Alsamir, M.; Mahmood, T.; **Ahmad, N.**; Trethowan, R. (2017) Distribution of organic metabolites after Fusarium wilt incidence in tomato (*Solanum esculentum* L.). Australian Journal of Crop Science, 11(9), 1123-1129.

13. Alsamir, M.; **Ahmad, N.**; Mahmood, T.; Trethowan, R. (2017) Impact of heat stress on Fusarium wilt (*F. solani*) incidence in cultivated tomato and related species. Australian Journal of Crop Science, 11(8), 997-1004.

14. Alsamir, M.; **Ahmad, N.**; Keitel, C.; Mahmood, T.; Trethowan, R. (2017) Identification of high-temperature tolerant and agronomically viable tomato (*S. lycopersicum*) genotypes from a diverse germplasm collection, Advances in Crop Science and Technology, 5(4) 299

15. S. Hayamanesh, C. Keitel, **N. Ahmad**, T. Mahmood and R. Trethowan (2017) Physiological, Biochemical and Morphological Response of Okra (*Abelmoschus Esculentus* L. (Moench) to High Temperature Stress at Different Stages of Development. Acta Horticulturae.

16. Fraser, D.; Sharp, P.; **Ahmad, N.**; Morris, B.; Trethowan, R. (2017) Abiotic stress tolerance of kikuyu (*Cenchrus clandestinus*) and some related grasses and potential of kikuyu for agricultural and urban environments. Crop and Pasture Science, 68, 285-296.

17. F. Borna, S. Luo, **N. Ahmad**, V. Nazeri, M. Shokrpour, R. Trethowan (2017) Genetic diversity in populations of the medicinal plant Leonurus cardiaca L. revealed by inter-primer binding site (iPBS) markers. Genetic Resources and Crop Evolution, 64(3), 479-492.

18. Borna, F.; **Ahmad, N.;** Luo, S.; Trethowan, R. (2016) Reproductive biology of a medicinally important plant *Leonurus cardiaca* (Lamiaceae). Australian Journal of Botany, 64, 342-358.Al-Najm, A., Luo, S., **Ahmad, N.**, Trethowan, R. (2016). Molecular variability and genetic relationships of date palm (Phoenix dactylifera L.) cultivars based on inter-primer binding site (iPBS) markers. Australian Journal of Crop Science, 10(5), 732-740.

19. Al-Nahm, A., Luo, S. **Ahmad, N.**, Trethowan, R. (2016 Molecular variability and genetic relationships of date palm (Pheonix dactylifera L.) cultivars based on inter-primer binding site (iPBS) markers. Australian Journal of Crop Science, 10(5), 732-740.

20. Mehmood, A., Luo, S., **Ahmad, N.**, Dong, C., Mahmood, T., Sajjad, Y., Jaskani, M., Sharp, P. (2016). Molecular variability and phylogenetic relationships of guava (Psidium guajava L.) cultivars using inter-primer binding site (iPBS) and microsatellite (SSR) markers.Genetic Resources and Crop Evolution: an international journal, 63(8), 1345-1361.

21. Luo, S., Goikoetxea Arango, A., Mehmood, A., **Ahmad, N.**, Brown, G. (2015). Developing New Cordylines via Interspecific Hybridisation of the Australian Native *Cordyline stricta* with the New Zealand Natives C. australis and the Cultivar 'Red Fountain' (C. hybrida).Acta Horticulturae, 1097, 205-212.

22. Mehmood, A., Jaskani, M., Khan, I., Ahmad, S., Ahmad, R., Luo, S., **Ahmad, N.** (2014). Genetic diversity of Pakistani guava *(Psidium guajava* L.) germplasm and its implications for conservation and breeding. Scientia Horticulturae, 172, 221-232.

23. Oral presentation at the The University of Sydney International Gulf Forum, Food and Water Security, (2012) Sydney. Intensive, resource efficient vegetable production for peri-urban areas.

24. Ahmad, N., Martin, P., Vella, J. (2014) Clonal propagation of Lomandra longifolia by somatic embryogenesis. Scientia Horticulturae, 180, 102-110.

25. Ahmad, N., Martin, P.M. (2013) Flowering, Seed setting and Self-incompatibility in Poa Labillardieri (Poaceae). International Journal of Plant Reproductive Biology, 5(1), 1-14.

26. Australian Hydroponics and Greenhouse Association (AHGA) Conference (2009) Sydney.

27. **Ahmad, N.**; Martin, P.M. and Vella, J. (2009) Floral morphogenesis and proliferation in *Poa labillardieri* (Poaceae). Australian Journal of Botany, 57, 602-618.

28. **Ahmad, N.**, Martin, P.M. and Vella, J. (2008) Embryology of thedioecious Australian endemic *Lomandra longifolia* (Lomandraceae). Australian Journal of Botany, 56, 651-665.

29. Ahmad, N., Martin, P.M. and Vella J. (2008) Floral structure and development in the dioecious Australian endemic *Lomandra longifolia* (Lomandraceae). Australian Journal of Botany, 56, 666-683.

30. Oral presentation at the Wetland Education and Training Program, (2005) Sydney Olympic Park "Biology of Sexual Reproduction in *Lomandra longifolia*".

31. **Ahmad N.** and Martin P.M. (2005) Floral development and embryology in *Lomandra longifolia*. Acta Biologica Cracoviensia *Series Botanica* 47 suppl. 1, 2005.

32. Ahmad, N., Martin, P.M. and Vella J. (2002) Maximising seed germination of selected Australian native geasses and grass-like plants. AuSHS Conference 29th September – 2nd October, Sydney "Opportunities through Diversity".

33. Oral presentation at the XII International Conference on Plant Embryology, (2005) Cracow, Poland. Floral development and embryology in *Lomandra longifolia*.

34. 6th Australian Wildflower Conference (2002) Sydney "The Wildflower Business: Keys to Progress and Profit".

35. AuSHS Conference (2001) Sydney. Presented a poster titled "Development of F_1 hybrid seed production systems in native grasses and grass-like plants"