Profile

Huong Thi Mai To

What inspired your interest in plant science?

I grew up in Son Tay, a quiet town nestled *c.* 50 km west of Hanoi, where we did not have many toys or books like children in the cities. Instead, we made our own toys and found joy in the natural world around us, especially in plants. I spent hours wandering alone through nearby forests, every time trying to find a new path and fascinated by the diversity of the plants I encountered: the strange shapes of leaves, the beauty of flowers, and the odd forms of fruit. Every discovery was a wonder. Even within a single species, some individuals still do not look exactly the same. I loved finding the 'different' ones, perhaps because I saw a part of myself in them.

I could play for hours with the sensitive mimosa, amazed at how its leaves folded shyly at a touch, or with the ripe seed pods of wood sorrel that exploded when squeezed. I was captivated by how new shoots always grew back after harvesting, how plants pushed through cracks in stone, clung to cliffs, or formed intricate root networks to survive. Unlike animals, plants offer an endless world of biodiversity. That diversity continues to fuel my curiosity and love for plant science.

Why did you decide to pursue a career in research?

In my generation, the most dynamic and outgoing students often chose business, finance, or banking. As someone more introverted, perhaps a bit 'nerdy', I was drawn to quieter paths, where deep focus and solitude were strengths rather than obstacles. Academic research offered exactly that freedom to think deeply, to observe quietly, and to follow curiosity wherever it leads.

I have always felt more comfortable 'communicating' with plants and my students than in crowds. I enjoy observing gradual changes: how plants respond under stress, and how my students mature and develop under pressure. Research allows me to spend time uncovering the hidden genetic logic behind these transformations.

I am fascinated by genetic diversity and the connections between phenotype and genotype. There must be a genetic code that explains why one rice variety withstands stress better than another; what molecular mechanisms give rise to resilience or adaptability? I used nearly 200 Vietnamese rice landraces to decode new mysteries related to the development of rice roots under stress conditions or the response to phosphate nutrient deficiency in rice plants.

Over time, I have come to value not only the science but also conversations with fellow researchers through papers, reviews, and collaboration. The intellectual challenge of answering nature's questions continues to inspire me far more than solving human or societal puzzles ever could.

Box 1

Dr Huong is an Associate Professor and currently the Deputy Director of the Direction of Research, Innovation, and Technology Transfer at the University of Science and Technology of Hanoi (USTH), Vietnam. She received her Engineer's degree in Food Technology from Hanoi University of Science and Technology, Vietnam, in 2006, obtained her Master's degree (2007) and PhD degree (2010) from the University of Bourgogne, France, and subsequently completed her postdoctoral research at the French National Centre for Scientific Research (CNRS) in 2012. Her research focuses on the genetic diversity and functional genomics of rice, with an emphasis on improving crop resilience and sustainability. She has led genome-wide association studies (GWAS) on Vietnamese rice and is actively exploring the use of gene-editing technologies for functional genomic study and crop improvement. Her recent studies investigate the regulatory mechanisms of the rice root system under abiotic stress conditions and explore the molecular adaptation of rice to low phosphate availability.

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Huong Thi Mai To presented her talk 'Exploring the hidden half – A surprising role of a plasmodesmal protein controlling the root development in rice under abiotic stress' (https://cassyni.com/events/DoG4SxnX6FWXEe3FDtndE5) at the 2023 New Phytologist next generation scientists symposium at the National University of Singapore.

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Fig. 1 Terraced fields in Mu Cang Chai, Vietnam. Photograph by Nguyen Ngoc Tuan (©), used with permission.

What motivates you on a day-to-day basis?

Connection. What I find most fulfilling in research is the opportunity to connect with ideas, with collaborators, and with people who share a similar passion and 'frequency'. Reading a compelling paper feels like a silent conversation with its author; even the toughest rounds of peer review offer new perspectives and help sharpen our thinking.

Pursuing high-quality plant science research in Vietnam, especially with a young research team like ours, is far from easy. We often aim for ambitious targets with limited resources, and it is only possible thanks to the 'stubborn' persistence of our team and collaboration. I feel incredibly lucky to work with dedicated colleagues (Phat, Tam, Hoa, Duong, Kieu, Tien and especially my friend and mentor Daniel Le), as well as with valued international partners from South Korea, France, the UK, India, and the International Rice Research Institute, all of whom believe in and support our work. With persistence and teamwork, each publication becomes more than just a paper; it reflects a collective effort. Every new discovery feels like planting a small tree in the vast forest of knowledge. That, to me, is the most meaningful motivation.

Is there anyone that you consider to be a role model?

As a woman pursuing science in Vietnam, where gender biases and stereotypes still persist, I have always found strength and inspiration in the stories of pioneering women scientists. Figures like Jane Goodall, Katalin Karikó, Pamela Ronald for *Sub1A* discovery, and Susan McCouch for the first-ever molecular map of rice have been powerful role models, not only for me but also for many young women navigating similar paths.

What these women biologists share is an unwavering passion and determination to pursue their work, despite social pressure, gender-based prejudice, and professional obstacles. Their ability to remain committed to their ideals, even in the face of loneliness, financial hardship, and doubt from others, is deeply admirable.

One of my favorite words is 'độ lì', which can be translated as 'grit' or 'mental toughness'. In my view, passion alone is not enough to thrive in research, especially for women. We need a certain level of 'độ lì' to stay grounded, move forward, and remain resilient through the many challenges of academic life.

What are your favorite *New Phytologist* papers of recent years, and why?

Two of my favorite *New Phytologist* papers in recent years are the Tansley reviews focused on plasmodesmata (PD): 'Plasmodesmata and intercellular molecular traffic control' by Tee & Faulkner (2024) and 'Auxin fluxes through plasmodesmata' by Band (2021). These papers highlight an emerging perspective in plant biology: that auxin movement is not limited to carrier-mediated transport but can also occur through symplastic

transport via PD. While membrane transporters have long been considered the dominant mechanism for auxin distribution, especially in root development, these reviews bring attention to PD as an alternative and biologically significant pathway.

PD serve as cytoplasmic bridges that connect plant cells, enabling the selective exchange of signaling molecules, ions, RNAs, and proteins. These papers convincingly argue that PD-mediated auxin transport is not merely a passive process; it is subject to regulation and plays a critical role in development and stress responses. This broader view of hormone movement adds complexity to our understanding of intercellular communication in plants.

The theme of connectivity presented in these reviews resonates with me both scientifically and philosophically. In my own research, I have explored two proteins that unexpectedly localize to PD: OsGER4 – a germin-like protein potentially involved in auxin transport via PD under stress (To *et al.*, 2022), and OsGDPD13 – a phospholipid-remodeling enzyme linked to membrane lipid turnover under phosphate starvation (Dang *et al.*, 2025). These findings highlight that PD are not just structural features but dynamic, responsive hubs in signaling networks that mediate stress adaptation and nutrient responses.

To me, PD embody a broader truth: there is never just one pathway to accomplish a goal – there is always an alternative route. As Robert Frost wrote, 'Two roads diverged in a yellow wood, and I took the one less travelled by, and that has made all the difference'. In biology as in life, connections and choices shape outcomes, and every divergence offers the potential for new possibilities.

What is your favorite plant, and why?

My favorite plant is rice. Vietnam is home to over 8000 traditional rice varieties, each distinguished by its unique aroma, flavor, color, productivity, and adaptability. Much of this rice is grown in magnificent terraced fields (Fig. 1), true masterpieces crafted by the highland people. Often referred to as the 'Stairway to Heaven', these breathtaking landscapes rank among the most beautiful terraced fields in the world and stand as a powerful symbol of Vietnam's agricultural heritage. In Vietnam, we eat rice every day, so much so that the word 'eating rice' is often used to mean simply 'eating', regardless of what the actual meal contains. It is deeply woven into our culture, our cuisine, and our way of life.

There is a Vietnamese proverb I grew up hearing: 'Lúa chín cúi đầu' or 'a ripe rice plant bows its head'. When I was younger, I disliked this saying. I thought it promoted excessive humility, even weakness. But as I have matured, I have come to appreciate its quiet wisdom. Just like rice plants bow when their grains are full, people grow humbler as they gain more experience in life. True maturity comes with the understanding that we owe much of our success to those who supported and nourished us along the way. That is why rice will always be more than just a crop to me: it is a symbol of growth, gratitude, and grace.

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