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Viewpoint

Unheard voices speak up: the Arabidopsis community and the representation of researchers from the Global South

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In June 2023, the Arabidopsis community met in Makuhari, Chiba, Japan, for the 33rd International Conference in Arabidopsis Research (ICAR). The meeting, at which more than 1200 researchers gathered, spanned the course of 5 days showcasing three keynote lectures, six plenary sessions, 11 workshops, and 33 concurrent sessions, in addition to two poster sessions.

One of the concurrent sessions, titled 'Arabidopsis and its translational research in the Global South', chaired by José M. Estévez (Fundación Instituto Leloir - CONICET, Argentina, and Centro de Biotecnologia Vegetal, Universidad Andrés Bello, Chile) and Gabriela Auge (IABIMO, INTA-CONICET, Argentina), sought to highlight the work of researchers from the Global South, which is often underrepresented in international conferences. Arabidopsis research globally has provided invaluable tools to understand the plant world at different biological scales, from ecology and evolutionary biology, to molecular biology. For many researchers, Arabidopsis is also a means to translate their work to other plant species of regional relevance, increasing the impact of this study model. A sizable proportion of that research is carried out by researchers in the Global South (i.e. countries located around the tropics and the Southern Hemisphere), even though these countries face many political and budgetary limitations for scientific pursuits. The invited and selected speakers represented a diverse group of scientists at different stages of their careers. They presented their work on plant adaptation to environmental cues using Arabidopsis as a tool, as well as diverse approaches to understanding physiological responses, and their underlying molecular mechanisms, to changing climates: drought, temperature, salinity, and plant nutrition.

Here we provide a brief summary of each researcher's presentation, in the same order as the presentations in the session. Ravi Maruthachalam [Indian Institute of Science Education and Research (IISER), Thiruvananthapuram, India] showed us work using haploid genetics to unravel mechanisms and genes associated with developmental processes in *Arabidopsis thaliana* and relatives. Sridevi Sureshkumar (Monash University, Clayton, Australia) showed how she uses Arabidopsis to shed light on molecular mechanisms underlying human genetic diseases. Robert Ingle (University of Cape Town, South Africa) presented results on the link between components of the circadian core clock and plant

immunity gating in Arabidopsis. Pamela Carlson (graduate student at the University of Campinas, Brazil) delved into the signalling factors regulating energy management during growth in Arabidopsis. José Alvarez [Centro de Biotecnologia Vegetal, Universidad Andres Bello, and ANID–Millennium Science Initiative–Millennium Institute for Integrative Biology (iBIO), Chile] explained how he used meta-analysis, followed by experimental approaches, to uncover how plant nutrition regulators balance the response and interaction with other abiotic stresses. Rahul Puthan Valappil (graduate student at IISER, Bhopal, Madhya Pradesh, India) showed his work on a newly identified element within the photoperiod pathway regulating flowering time. Ruth Cookson (research associate at the Plant Biotechnology group, Grasslands Research Centre, AgResearch Ltd, Palmerston North, New Zealand) discussed her ongoing efforts to characterize and decipher the evolutionary biology of a conserved group of transcriptional regulators that control organ size and shape and which were lost in the evolution of some grasses, most likely conferring adaptability to environmental change.

Why did we organize this session?

As scholars from the Global South, we have found ourselves underrepresented across multiple discussion spaces, including international conferences, which frequently lack a diversity perspective (in the context of this article, this would include diversity of geographical representation). This is reflected in many areas of the scientific endeavour, such as the publishing system. Knowledge from specific regions of the world, particularly the Southern Hemisphere and near the tropics, is discriminated against, despite being of comparable overall quality and value to knowledge from other regions (Marks *et al.*, 2023). Fewer articles from the Global South are accepted and published; additionally, researchers from this region are underrepresented in international collaborations (Marks *et al.*, 2023). As a consequence, we could see a significant loss for scientific progress due to limited knowledge exchange. This suggests that neglecting voices from the Global South may lead to research topics of high importance being overlooked, which emphasizes the relevance of promoting equality and diversity within the scientific community. Furthermore, when compared with researchers from high Human Development Index (HDI) countries, those from lower HDI countries (which constitute the majority of the Global South) face a negative bias throughout the publication process (Fox *et al.*, 2023). Double-blind peer review has demonstrated that this bias can be eliminated and the peer-review process can be made more equitable (Fox *et al.*, 2023). The scientific community is requesting a change, yet this will be fruitful only with strong support from people with power and influence, such as conference organizers and journal editors.

What barriers prevent researchers from the Global South from attending international conferences?

Participation in on-site international conferences results in better prospects for participants and the scientific endeavour overall. Researchers use these gatherings to discuss their work, establish collaborations, and network; participation and visibility may also lead to opportunities such as new jobs, positions on editorial boards, learning experience for early career researchers, the development of new skills, and so on. However, unequal access of attendance at international conferences hinders opportunities for many researchers, especially those from peripheral countries such as those in the Global South. We can list several barriers to participation, including high travel costs, a lack of financial support, visa-related and political issues, a lack of a diversity perspective from conference organizers, and language barriers.

Costs for attending international conferences for researchers from lower/middle-income countries represent a higher ratio of (or even can exceed) the country's GDP per capita than for those from high-income countries (Doğan *et al.*, 2023). Financial constraints include, among other potential factors, a lower overall income, higher transport costs, a lack of travel funding or scholarships, and high registration fees (Tulloch, 2020; Velin *et al.*, 2021). Travel-related expenses are usually processed as reimbursements, meaning that there is a high upfront cost for most researchers. In addition, many governments tax credit card and bank international transactions at a higher rate, making the trip even more expensive.

Visa requirements vary from country to country but generally they are a hurdle for the international mobility of scientists. Visa processing times and fees reduce the possibility of sharing science with the international community in person for many researchers; even when their abstracts or papers are accepted by scientific committees, visas may not be granted for conference attendance (Orazbayev, 2017; Tulloch, 2020; Velin *et al.*, 2021; Wondimagegn *et al.*, 2022; Doğan *et al.*, 2023).

The lack of a diversity perspective in conference organization and scientific committees is another significant limitation for the attendance of scientists from the Global South. Accepted abstracts and selected speakers will almost certainly result in a pool with a lack of diversity if guidelines and review criteria are not explicitly set ahead of time, and if committees themselves are not diverse (Gerull *et al.*, 2020; Tulloch, 2020; Fox *et al.*, 2023).

When conducting scientific activities, researchers from non-English-speaking nations go above and beyond what researchers from English-speaking nations do. They spend more time reading and editing publications, preparing presentations, and replying to reviewers. (Amano *et al.*, 2023; Fox *et al.*, 2023). Early career researchers are more severely affected by language barriers, which also hinders possibilities for scientists from lower-HDI and non-English-speaking nations to participate in international conferences and creates disparities in productivity and professional growth (Amano *et al.*, 2023).

How can we diversify international conferences?

To achieve a good representation of the scientific community at an event, active efforts and the implementation of inclusion policies are required. Organizers and scientific committees that are aware of and committed to the diversity in the scientific community have different means to support members from underrepresented regions. For example, when choosing keynote and plenary speakers, organizers should: consider a wider pool of possible speakers, to give opportunities to those conducting equally important science but from typically underrepresented regions, and to address important topics and research questions that may not be on the radar of researchers in high-HDI countries; offer financial support or fellowships to offset the higher travel costs for those from lower- and middle-income countries; prepare the necessary paperwork in advance for visa applications to account for waiting times; consider holding conferences in more convenient and affordable locations; provide tools for attendees to attend virtually (e.g. by organizing hybrid conferences); and offer translation services. Concurrent sessions are just one modest step in the right direction toward making international conferences such as ICAR more inclusive, diverse, and equitable for all members of the community. It is also essential that the commitment to promote diversity and the efforts undertaken in this regard are prominently displayed, in order to raise awareness and to encourage more people to reflect on their own unconscious bias. Scientific progress—and the scientific community—as a whole will benefit from a strong coalition among scientists and active attempts to diversify the voices that are heard.

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Author contributions

GA and JE together conceived the idea for this article, wrote the draft, and edited the final manuscript.

Conflict of interest

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