

Science and She:

Empowering Women in Science



ISAAA
INTERNATIONAL SERVICE
FOR THE ACQUISITION
OF AGRI-BIOTECH
APPLICATIONS

Why are there few women in science?



UNESCO Institute for Statistics data states that in 2015, only 30% of the world's researchers were women. Based on headcount data, the highest percentage of women doing research was in Central Asia where 48.1% were women, followed by Latin America and the Caribbean (45.4%). The lowest percentage was reported in South and West Asia where only 18.5% of the researchers were women. There was no region reported with more than 50% saturation of women scientists. This brings us back to the question, why are there few women involved in science?

A meta-analysis by the American Association of University Women shows that the environment shapes women's achievements and interests in science, technology, engineering, and mathematics (STEM). When women believe in their potential for intellectual growth, they become achievers. Based on that finding, it is implied that there is a loophole in the growth mindset of women all over the world which can be attributed to their environment.

History tells us that the central role of women in society has led to stability, progress, and long-term development of nations. In the agricultural sector, women comprise 43% of the labor force globally, and in some areas reaching over 70%. In a study conducted by the International Service for the Acquisition of Agri-biotech Applications (ISAAA) in China, India, and the Philippines, women play a significant role in biotech crop farming. In India, the male farmers take charge of the farm activities that require physical labor, but women take an active part in farm operations such as weeding, picking, and cleaning. In China, there has been a growing feminization in cotton farming. Fieldwork is mainly conducted by women, which enable the men to engage in off-farm tasks. Based on focus group discussions, the reduction in pesticide use and less labor requirement of planting GM crops benefitted

women. In the Philippines, women take charge of managerial tasks such as budgeting farm expenses, deciding on inputs, and hiring laborers to work on the farm.

Women play key roles in family health by breastfeeding their babies, providing meals, making up the majority of the food processing and manufacturing industry. They play the largest role in family health by being the decision-maker about family meals and diet.














When it comes to education, women who are more emotional and more emphatic, tend to relate and engage with communities easier.

It has been proven that they have abilities that make them achieve equality with men. Thus, they can be encouraged to have a growth mindset that will lead them to maximize their potential.

Building a culture that empowers women motivates them to do great things in science that will benefit their personal lives and the society. Their knowledge and experiences will lead the public to appreciate science and make informed decisions about technology applications such as biotechnology.

Considering that the stories and aspirations of women could help bridge the gap between science and the public, ISAAA and its network of Biotechnology Information Centers launched *Science and She* in 2018. It is an online campaign aimed at empowering women in science by showcasing the experiences and viewpoints of female scientists and science communicators. This publication summarizes their stories.

Table of Contents

| | |
|--|--|
|  Dr. Mahaletchumy Arujanan 2 |  Dr. Pamela Ronald 11 |
|  Dr. Rhodora Aldemita 2 |  Dr. Jennifer Thomson 12 |
|  Dr. Margaret Karembu 3 |  Doris Wangari 12 |
|  Dr. Maria Monina Cecilia Villena 3 |  Hermelina 'Melly' Tenorio 13 |
|  Shamira Shamsuddin 4 |  Dewi Suryani 13 |
|  Dr. Bahagiawati Amir Husin 4 |  Kristine Grace Tome 14 |
|  Dr. Nina Fedoroff 5 |  Farah Nadzri 14 |
|  Hellen Beatrice Apio 5 |  Melody Aguiba 15 |
|  Dr. Barbara Mugwanya Zawedde 6 |  Dr. Sammer Yousuf 15 |
|  Dr. Naglaa Abdallah 6 |  Gracetine Magpantay 16 |
|  Clement Dionglay 7 |  Patricia Nanteza 16 |
|  Dr. Umaiyal Munusamy 7 |  Dr. Magaret Sivapragasam 17 |
|  Dr. Rose Suniso Maxwell Gidado 8 |  Sophia Mercado 17 |
|  Dr. Rashmi Nair 8 |  Dr. Jazmina Urriola 18 |
|  Ayesha Aslam 9 |  Benice Angelique Battreal 18 |
|  Zahra Hajat Poor 9 |  Geronima Eusebio 19 |
|  Dr. Usha Barwale Zehr 10 |  Dr. Ruth Mbabazi 19 |
|  Arlina "Lyn" Resurreccion 10 |  Ma. Lorelie U. Agbagala 20 |
|  Dr. Ju Lin Tan 11 | |



Dr. Mahaletchumy Arujanan

- Global Coordinator, International Service for the Acquisition of Agri-biotech Applications (ISAAA)
- Executive Director, Malaysian Biotechnology Information Center
- 2010 The World Academy of Sciences Regional Prize for Public Understanding of Science for East, SEA and the Pacific Region
- 100 Most Influential Persons in Biotech in the World, *Scientific American's* Worldview

Inspiring young minds

“There is a tremendous increase in the number of women in science. This is really an achievement of progressive policies, government measures, and also the society that allowed women to pursue their dreams around the world. But the truth is we have not achieved equality yet with our male counterparts. There is still a leaky pipe somewhere along the career path. We still do not see enough women at the pinnacle of organizations, at the decision-making positions and in the boardrooms.

As a trained science communicator, I feel we have to take the onus to inspire young girls to pursue STEM education and careers. We need to be their mentors and role models. We need to share our stories, journey, accomplishments, and challenges with them. More importantly, we need to stand up for our rights so we pave a road that is with fewer obstacles for the next generation. So that their journey becomes sweeter than ours and they could contribute much more than us.”



Dr. Rhodora Romero-Aldemita

- Director, ISAAA SEAsiaCenter and Global Knowledge Center on Crop Biotechnology
- Outstanding Young Scientists in the Philippines
- Science Prize in Biology, National Academy of Science and Technology, Philippines and The World Academy of Sciences
- Outstanding Women in the Nation’s Service Foundation
- Awardee, Filipino Faces of Biotechnology 2018

Transforming biotechnology and science communication

“As a scientist, I was able to develop a rice transformation technology that is still being used by researchers today. As a science communicator, I am honored to help others gain knowledge and understanding about a technology that is highly beneficial to many. I have worked for years in the lab, and I am confident that biotechnology is used by scientists like me to help improve lives. Scientists work hard for their own families, as well as to help other families have bountiful harvest and food on their plates. By communicating about the benefits of biotechnology, I am hopeful that time will come when more people will appreciate the technology and acknowledge its importance. This will lead to more countries planting biotech crops, and more mouths being fed. When that time comes, all my hard work, together with the efforts of other scientists, will be worth it.”



Dr. Margaret Karembu

- Director, ISAAA AfriCenter
- Chair, Open Forum on Agricultural Biotechnology (OFAB) Programming Committee, Kenya Chapter
- Founding Chair, African Women for Biosciences

Dreaming for Africa's greater access to biosciences

“My passion for science started very early in life. Having grown and lived in rural Africa most of my childhood, direct interaction with nature would start early in the morning until dusk. The roadside grass dew provided easy wipes to our weary feet after trekking several kilometers to school barefoot. Evening routine entailed fetching firewood from nearby bushes and drawing water from a local stream on the Slopes of Mt Kenya. I would smell every flower and berry I came across though some were not that pleasant! I had no idea that this was preparing me for a quantum leap from the village to the world.

Now, I dream of a world where those privileged with technology abundance would stop obstructing its access to those who need it most especially in Africa. A time when the naysayers would stop demonizing biotechnology and tagging those who struggle to explain. Rather, a world where people accommodate each other's opinions and choice. I picked these victuals from Kenyatta University in Kenya where I attained all my degrees from - from undergraduate, masters to PhD. My father always encouraged us to respect the lesser and the mightier and this has helped me a lot in achieving my life's dream.



Dr. Maria Monina Cecilia Villena

- Former Head, Knowledge Management Department, Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA)

Telling stories to influence communities

“Destiny is not by chance. It is a choice. I chose to study communication because I want to tell stories and influence people. Communicating science enables me to change the existing narrative and touch people's lives.

I've always dreamed of doing development work. Communication allows you to construct reality using different lenses. Science communication is difficult when done in an environment where there is a low appreciation for science. But when people begin to listen that's when all efforts are made worthwhile.



Shamira Shamsuddin

- Former Project Manager, Malaysian Biotechnology Information Center

Expanding capacities and enriching lives



When I was little, I just loved to find out what new and exciting things scientists were discovering and, when I found out, I loved to tell the stories to my friends and family (I still do). I never thought of this as a career. Seven years ago, when I first joined MABIC and The Petri Dish, I didn't even know there was such job as a science communicator. Now, I am able to tell science stories to all walks of life.

The job of a science communicator is very interesting, and the workspace is not limited to a cubicle with a desktop. Being a science communicator allows me to travel the world for meetings and conferences. Not just I get to sharpen my skills and expand my network, I also get the chance to see stunning places, be part of various other cultures and traditions, and discover foods I've never tried before. It's very life-enriching.



Dr. Bahagiawati Amir Husin

- Senior Researcher, Indonesian Center for Agricultural Biotechnology and Genetic Resources Research and Development (ICABIOGRAD), Ministry of Agriculture, Indonesia
- Editorial Board Member, Agrobiogen Journal and Indonesia Entomology Journal
- Awardee, Food and Agriculture Innovation Award for National Achievement Researchers

Contributing to research and regulations for development



It is fun to pursue a hobby and get paid from it. Being a researcher has been my dream while I was working on my undergraduate research in Bogor. In 2007, my biggest dream came into reality when I became a Senior Researcher and then a Research Professor in 2011. Aside from doing research, I also got involved in designing regulations related to the use of GMOs. These contributions give me fulfillment in my longtime dream to be a woman in science.





Dr. Nina Fedoroff

- Willaman Professor of Life Sciences and Evan Pugh Professor, Pennsylvania State University
- Former Science and Technology Adviser to the U.S. Secretary of State
- Former President, American Association for the Advancement of Science
- Outstanding Contemporary Women Scientist Award, New York Academy of Sciences

Enabling growth of knowledge for food sustainability

“There’s plenty of evidence that using molecular methods to add, silence, and modify genes is less disruptive of both the genetics and epigenetics of plants than the methods used in the 20th century and before, be it controlled cross-breeding, tissue culture, or chemical and radiation mutagenesis. These are better and less disruptive methods than the ones we used before. That, combined with the astonishing growth of knowledge about plant physiology, biochemistry, and genetics, gives me confidence that molecular modification is the safest and most powerful technology we’ve ever developed for the daunting task of continuing to increase the amount of food for a growing population and doing it more sustainably.

If we throw away these important (molecular) tools, we’ll find it very difficult to improve sustainability while continuing to increase production. Genetic modification of plants and animals using molecular methods can decrease the use of toxic chemicals, decrease soil erosion, decrease food waste and spoilage, and decrease agriculture’s carbon footprint, while increasing the nutritive value of major calorie crops. There’s just no other way.”



Hellen Beatrice Apio

- Researcher, Virus-resistant and Nutritionally-enhanced Cassava for Africa (VIRCA Plus), National Crops Resources Research Institute

Uplifting women, advancing the nation

“There is a saying that goes ‘Train a woman and you will have trained a nation.’ The support systems in all economies around the world are women, not to mention, the largest number of farmers in the world are women. Many women use agriculture as a means to support their families, therefore the more reason why having more women in science will trickle down to the households easily because they are involved right from the grassroots. Women do act as role models and champions for the younger generation, giving them confidence that all is possible.”



Dr. Barbara Mugwanya Zawedde

- Coordinator, Uganda Bioscience Information Center
- Vice Chairperson, Uganda Biotechnology and Biosafety Consortium

Living the legacy of women in science for national development

“My interest in science started when I was 10 years. My auntie was a medical doctor working with Red Cross and lived in many parts of the world. I dreamt to be like her. At University I enrolled in the Agriculture Program and selected another role model—Dr. Theresa Sengooba. In 2003, Theresa was the lead of the East African Component for the Program for Biosafety Systems and she hired me as her Programme Assistant. That work exposed me to biotechnology, which I found to offer enormous opportunities for national development.

I look forward to the day when all scientists will appreciate and allocate resources for communicating about their findings. A lot has been generated through science but majority has remained on the shelf or has been misused—resulting in rejection—because of inadequate information or misinformation. Biotechnology especially genetic engineering is a victim of such sad reality.



Dr. Naglaa Abdallah

- Head, Genetics Department in the Faculty of Agriculture, Cairo University
- Editor-in-Chief, GM Crops
- Genetic Engineering Award, Cairo University

Creating biotech solutions to improve life

“Biotechnology is one of the latest advances in the biological sciences; it can revolutionize our understanding and utilization of facts of life, all forms of life. Biotechnology can help tackle agricultural problems, clean our environment, contribute to solving our health problems, increase our income, and make our life easier. In the past few decades, biotechnology has accelerated its pace in improving all aspects of human life.





Clement Dionglay

- Community Manager, *Science and She*
- Project Associate, Global Knowledge Center on Crop Biotechnology
- Grand Prize Winner, Jose G. Burgos Jr. Awards for Biotech Journalism Features Category

Showcasing the success of biotech farmers

“How do we tell the world that agricultural biotechnology is good for us? By showing the technology’s benefits, its uses, and how it has improved the lives of so many people. As a science communicator, I take it as my job to help spread the benefits of biotechnology so more people will understand and eventually embrace the technology.

In 2015, I received the grand prize in the features category of the Jose G. Burgos Jr. Awards for Biotech Journalism for the story I wrote about a Filipino biotech corn farmer. The farmer, a self-made man, used to be an errand boy for big corn farms in his province. He was one of the early adopters of Bt corn, and this changed not only his life but that of his family, too. He said, “Biotech corn changed my life completely, I am now an important man.

The award was given to me, but I shared it with my fellow science communicators who tirelessly write about biotechnology and its benefits; I share it with all the scientists who work hard on developing new crops with improved traits; and I share it with farmers whose lives -- through biotechnology -- are made better each day.”



Dr. Umaiya Munusamy

- Science communicator
- Awardee, FameLab Malaysia Audience Choice Award 2016

Leading the youth towards breakthroughs

“In 2018, I coached refugee students who had zero experience in pitching research invention to external judges. I taught them proper communication techniques to pitch portable garden invention in the World Young Inventors Exhibition (WYIE 2018), and they won! It is a dream come true for them to get the prestigious award and I feel proud to have helped them achieve such accomplishment at their young age. For me, helping the youth like them is my most significant contribution to science communication.”



Dr. Rose Suniso Maxwell Gidado

- Assistant Director, Nigeria's National Biotechnology Development Agency
- Country Coordinator, Open Forum on Agricultural Biotechnology-Nigeria Chapter
- Awardee, African Women in Agricultural Research and Development (AWARD)

Shaping conversations about biotech and biosafety

“My involvement in science began during my secondary school days. I was consistently good in both Science and Arts (History, Literature, French, English). I was always on top in French. My French teacher thought I was going to do choose Arts subjects and focus on French. Suddenly she traveled just when we were about choosing subjects. I was confused initially but later on decided to go for the Science subjects. That natural pull was there. When my French Teacher returned, she was surprised that I had dropped French for Science.

Women scientists have a critical role to play in Africa's development, and yet they are woefully underrepresented in positions of leadership. UNESCO estimates that just 30% of professionals in the sciences in Sub-Saharan Africa are women. In our 21st century economy, we must actively welcome the immense talents and contributions of women and girls to advance peace and prosperity. Ultimately, we need science and evidence-based information to inform and shape conversations about biotechnology and biosafety, and to ensure that farmers everywhere – including women, have the opportunity to benefit from innovation to transform their communities.



Dr. Rashmi Nair

- Expert Toxicologist
- President, Nair Continuum
- Asia Coordinator and Senior Regulatory Advisor, Program for Biosafety Systems
- Regulatory Policy Lead, Monsanto (35 years)

Promoting biotechnology through sound regulation

“I have chosen to promote biotechnology through the regulatory field. I'm very proud to say that some of the countries I've worked with—the Philippines and Vietnam—were successful. I've worked with India too, but only the first product was successful. The inner drive to prove something or the commitment to what's in it for everybody, rather than what's in it for you has really helped me connect with people, it's all about that rather than knowledge. Knowledge is important, but at the same time, it's all about people. The connectivity from caring for each other, you know I'd do the same thing for anybody. That's what makes it special.





Ayesha Aslam

- Manager, Pakistan Biotechnology Information Center-Lahore Chapter

Facilitating science fascination for public engagement

“ Since my childhood, one thing was clear to me—I want to do something related to science. Over the years, I realized how fascinating biotechnology is. This fascination made me precede my academics with biotech as my major. After completing my MPhil, I realized that working in labs is not my cup of tea. I wanted to translate the spectacular work happening in the labs for the general public to appreciate and understand. PABIC Lahore Chapter has provided me the platform to excel on doing this. Being a science communicator is challenging because people always want simple answers and simple answers are not always right. So I strive to communicate science in simple yet accurate way. By this way, the public would be able to find interest in it, and later on seek to understand its importance in improving our daily lives.

I value my job as a science communicator because I am able to bring scientific knowledge to people that becomes the basis for important decisions in their lives. Communicating complex science to the world and connecting the dots for others is what makes me love my job.

”

Zahra Hajat Poor

- Deputy Executive Manager, Iran Biotechnology Information Center

Honoring country by showcasing science

“ My strongest motivation to pursue science communication is the opportunity to showcase the abilities of the fellow countrywomen and their brilliant accomplishments in science to the world. I do believe that this is an advantageous technique to lead talented women to get the highest rank they deserve and play the right role in social affairs, thus giving more honor to my country. Our Supreme Leader in Iran has always emphasized the importance of educating women and their active participation in society. Women should be confident enough to be excellent at work, same as the role they play at home as a wife or mother.

”



Dr. Usha Barwale Zehr

- Chief Technology Officer, Maharashtra Hybrid Seeds Company Private Limited
- Director, Barwale Foundation
- Board Member, Donald Danforth Plant Science Center, and Alliance for Green Revolution in Africa
- Chair, Breeder’s Committee of the International Seed Federation

Developing the best technologies for farmers



Tissue culture is how I started my journey in the field of biotechnology. As a Ph.D. student, I worked on developing a protocol for soybean regeneration and at that time, this was hi-tech. The one thing this has taught me is that science is innovating at a fast pace and the simple tissue culture process still remains relevant for many of the applications we are using today.

Science is changing at such a fast pace that it is difficult to keep up with it. On top of that are the regulatory challenges and I really wonder when our farmers will use the new innovations that are available around the world. My biggest desire is to make the best technologies available to our farmers to improve their livelihoods.



Arlina “Lyn” Resurreccion

- Science Editor, *Business Mirror*
- Awardee, Jose G. Burgos Awards for Biotechnology Journalism
- Best Journalist Award for Print, Department of Science and Technology’s (DOST)
- Awardee, Filipino Faces of Biotechnology 2016

Reporting science, abiding by the truth



In writing about any topic, especially on biotechnology, my guiding principle is to abide by truth, which means by science. I make it a point that my articles on biotechnology are supported by scientific evidence gathered from my news sources—from the sources I interview and the documents I use. This way, I help provide our readers the scientific explanation or basis of the technology. In a way, I am also trying to help them develop a scientific mindset, an informed decision-making, not only on biotechnology, but also on other issues they confront in their daily lives. Thus, this would help them against relying or believing on false news that proliferate in news and social media, or rumors that lack scientific basis.





Dr. Ju Lin Tan

- Research Scientist, GeneSEQ Sdn Bhd
- Founder, *Jom Science, Malaysia!*

Simplifying science for public understanding

“

My passion in science communication was ignited when I participated in a 3-Minute Thesis competition, where I presented my work to an audience with limited knowledge in science. I learned to associate science to everyday analogies so that the audience did not feel intimidated by the scientific jargons. Other than simplifying science to the general public, I feel that it is important to help society understand the framework of “science”. When you search the word “scientist” in Google Images, almost all the pictures depict a person in a white coat holding a tube containing an unknown substance. But did you know that farmers and plant breeders are also considered as scientists? They understand how plants grow in a certain climate and the optimal conditions that are required for seed germination. This is why we should help society to better understand what “science” means.

”



Dr. Pamela Ronald

- Distinguished Professor, University of California, Davis
- Awardee, Louis Malassis International Scientific Prize for Agriculture and Food
- Co-founder, Biology Fortified, Inc.
- Author, *Tomorrow's Table: Organic Farming, Genetics, and the Future of Food*

Helping rice farmers rise up from flooding woes

“

Every year, millions of small rice farmers lose their entire crops to flooding. Even though rice plants grow in water, most varieties will die after 3 days of being submerged...Together with my colleagues, David Mackill and Kenong Xu, we isolated the flood tolerance gene (*SUB1*) in an ancient variety. Then, using that genetic information and marker-assisted breeding, breeders at the International Rice Research Institute (IRRI) were able to introduce the SUB1 gene precisely into varieties preferred by farmers without destroying the other important plant characteristics...Since then, IRRI has developed several flood tolerant rice varieties that have been rapidly adopted by farmers. Their yields increased by 300% more than what they used to get in planting conventional rice varieties following a flood.

”



Dr. Jennifer Thomson

- President, Organization for Women in Science for the Developing World
- Emeritus Professor, University of Cape Town
- Former Chair, African Agricultural Technology Foundation
- Best-selling Author, *Genes for Africa, Seeds for the Future, and Food for Africa*

Serving women in science passionately



Growing up, my inspiration was my Aunt Margaret, who was the youngest woman headmistress of a high school in South Africa. As a family, we never made any major academic decisions without first consulting her. She also knew the names and family details of all her pupils, past and present. Her influence helped shape who I am today. When I was elected as President of the Organization for Women in Science for the Developing World (OWSD) in 2016, it was a fulfillment of my lifelong passion to promote women in science.

My hope is that Africa's agricultural productivity will boost through use of every modern tool that can improve both yield and nutrient value. If that involves genetically modified crops, indigenous knowledge, artificial intelligence, better use of greywater – no matter – go for what works best. But make sure that technology serves the people, not the other way round.



Doris Wangari

- Country Coordinator, Program for Biosafety Systems-Kenya
- Member, African Women for Biosciences

Enriching families through enabling families



As a wife and mother, I have a God-given task to decide on the family nutrition, health, and environmental matters. Having a background and understanding of biotechnology's benefits ensures I support the development of micronutrient enriched genetically modified foods and point of care diagnostics for my loved ones. It is widely recognized that women face a number of gender-related barriers to succeed in science and technology. Biotechnology is no different, albeit the great promises on the health and social well-being of women. We have the supreme responsibility of caring for our families and ensuring we meet income-generating obligations. Through my interactions with various decision makers, my greatest achievement will be the realization and recognition of the importance of gender-responsive biotechnology policies.





Hermelina 'Melly' Tenorio

- Broadcast Program Producer Announcer III/ Supervisor, Philippine Broadcasting Service, DZRB-Radyo ng Bayan 738 Khz
- Outstanding Media Award for Radio, Department of Science and Technology, Philippines
- Agricultural Broadcaster of the Year, Binhi Awards, Philippine Agricultural Journalists, Inc.

Broadcasting science to equip the public

“

The numerous accolades I received in my career at the forefront of science journalism are enough to validate my work and contributions to science communication. As such, my programs are geared not just simply towards educating and improving public awareness and understanding of science, but to inspire interest and empower public decision making as well; to inform people about the benefits, risks, options science present to us, and ultimately how it impacts our lives for the better.

Just as there is science to be communicated, there is a science of communication. Effective communication requires clear, mutually understood terms. This is why as a science journalist, I have only three rules in my line of work: (1) skip the jargon; (2) get to the point; and (3) don't overstate or make topics more impactful than they might actually be.

”



Dewi Suryani

- Program Manager, Indonesian Biotechnology Information Center

Sharing scientific knowledge to provide food security solutions

“

Biotechnology is one of the possible solutions to help alleviate hunger and malnutrition and ensure food security. For almost 12 years, I dedicated myself to be part of communicating science-based information on biotechnology to the public so they will understand the benefits of the technology, which can affect their lives today and in the future.

Communicating science effectively is one of the many challenges faced by scientists today. In my experience, sharing scientific knowledge to the public involves a lot of effort, especially when you are trying to explain things to different kinds of audiences. Thus, knowing your audience is very important. It is vital to be concise in delivering the facts than describing a ton of details.

”



Kristine Grace Tome

- Community Manager, *Science and She*
- Program Associate, Global Knowledge Center on Crop Biotechnology, ISAAA
- 3rd Place, IR8 Essay Writing Contest, International Rice Research Institute

Making science sexy through creative science communication



After graduating from college, I was confused whether I would use my B.S. degree by working in the lab or just pursue a path outside science. I initially thought that science is a rigid world where my creativity has no space. A few years later, I found my fit in creative science communication. I developed publications, games, and social media campaigns with science as the backbone and creativity as its jumpsuit. One of my favorite products is *Biotech sQuizbox*, an interactive cartoon booklet which have been requested for reprint several times because of its catchy design and easy-to-understand content. The cartoons were illustrated by Steph Bravo-Semilla of the *Philippine Daily Inquirer*.

Getting public engagement for hard core science like biotechnology may be difficult, but with the right strategy and dressing up of information, science can be sexy too.



Farah Nadzri

- Project Officer, Malaysian Biotechnology Information Center

Mentoring the youth and building networks for empowerment



Years ago, I joined MABIC as an intern. Now, I have mentored more than twenty interns at MABIC. We believe in mentoring young people to be well-prepared for employment. Through our various activities, our interns get the opportunity to network with biotech expertise and know about the different aspects of the industry. This will increase their confidence level, knowledge, and social skills.





Melody Aguiba

- Journalist, *Manila Bulletin*
- Hall of Fame Awardee, Jose Burgos Gawad Galing Biotechnology Award 2008
- Founder, Illumina Science Journalistic Workshop

Writing as a witness of biotech success



The first biotechnology press conference I attended was given by biotech critics. After listening to the talks, I was confused. In 2001, I was invited to attend another conference by biotech advocates. Then, it became clear to me that biotechnology is among the better paths to solving hunger, malnutrition, and poverty. Eventually, I became among the first reporters to have seen Bt eggplant field trials in India and in the Philippines.

Writing about biotechnology was fulfilling because it requires a combination of interesting tasks tapping one's journalism skills: interviewing farmers and scientists; understanding and explaining science, environment, and court proceedings; and witnessing to successful biotech crop planting.

Biotechnology appealed to me like the Journalist's Creed by Walter Williams which states: "I believe that clear thinking and clear statement, accuracy... are fundamental to good journalism...I believe that a journalist should write only what he holds in his heart to be true.



Dr. Sammer Yousuf

- Associate Professor, International Center for Chemical and Biological Sciences (ICCBS), University of Karachi
- Coordinator, Pakistan Biotechnology Information Center

Facilitating feminization of agri-sciences



Nowadays, the number of young women scientists are rapidly growing in various fields especially in biological sciences, but a reverse trend is observed in the field of agricultural sciences in Pakistan. This may be attributed to the extensive fieldwork that comes with the job. However, women have a vital role to play in this field and it's time to facilitate our young and bright-minded women to opt for a career in agri-sciences.





Gracetine Magpantay

- Former Web Content Developer, Global Knowledge Center on Crop Biotechnology, ISAAA

Realizing the strength of women in science

“

Molecular biology and biotechnology seem intimidating when looked at from afar, but when I was spending time understanding it, I fell in love and enjoyed exploring complex processes from the DNA to an observable trait. My dream for biotechnology is for it to be seen for what it is, a tool for peace. Peace because its goals root from the aim of its promoters to ease the burden of farmers and consumers so that we can progress to a more food secure future.

In 2017, I dared to fuse agriculture and musical theater by co-writing a musical play called Agra: A New Musical, which features women in power to introduce change for the betterment of many. The power of women in science is the freedom to be weak and to cry for the masses. These tears will soon be tools to realize her strength and to do more things for science, especially biotechnology.

”



Patricia Nanteza

- Communication Specialist, Uganda's National Banana Research Program
- Trainer, Cornell Alliance for Science

Making a mark to set a model for the next generation

“

Women make up 50% of the entire population, this is what gives us relevance in science. If women are not speaking up that means science is incomplete; it is missing out on half of the scientific story and this story is everything that women represent – attention to detail, intelligence, beauty, empathy, practical application, etc. We need women in science to complete the story but to also provide role models for the next generation of women so that young girls realize that they can pursue careers in science or its communication if they want to.

”



Dr. Magaret Sivapragasam

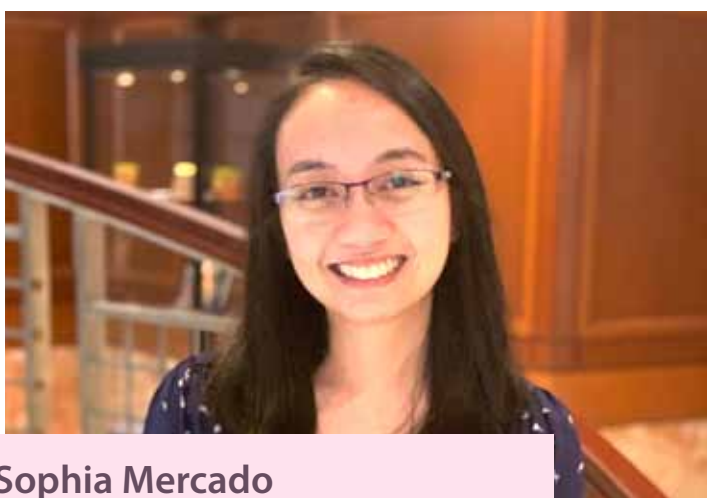
- Research Scientist, Research in Ionic Liquids, PETRONAS University of Technology
- Science Finder, CAS Future Leader, American Chemical Society
- Honorable Mention, Yale University Green Chemistry Challenge

Inspiring young scientists to speak for science

“On December 2017, I was invited by a local public university to share my views on science communication and social media. During that time, I challenged the postgraduate students to be bold in communicating their science through social media. The challenge was to setup a Twitter handle! I was elated to learn that many of them picked it up and started a Twitter account. Sometimes, the ability to inspire is a win itself!

We as scientists are so caught up with the number of publications and the impact factor of journals. These impact factors are calculated by companies and are designed to indicate the quality of journals. However, we often see researchers using that metric to assess the quality of individual papers; and even, in some cases, the authors! The key tenet of a manuscript should be giving it the widest exposure you can. How many of us actually put our purpose to play?

My aim is to inspire young scientists to speak their science effectively. What better way than the use of social media platforms? Be proud of your achievements! Sometimes you must put yourself out there to be heard.”



Sophia Mercado

- University Extension Specialist, National Institute of Molecular Biology and Biotechnology (BIOTECH), University of the Philippines Los Baños

Shaping science communication with versatility

“When it comes to science communication, I prefer working behind the scenes. I would rather be an author of the story, the brain behind an idea than be the actor or presenter on the stage. But through the course of my work and from what I learned from esteemed science communication experts, whom I was very fortunate enough to work with, and I learned this from graduate school too, you need to be both in order to achieve your goals in the field — you need to be versatile. Being flexible is one of the most important traits of people in science communication. One should know how to adapt to different situations.”



Dr. Jazmina Urriola

- Former Advisor, National Commission for Biosafety of Genetically Modified Organisms, Panama
- Member, American Association for the Advancement of Science and Panamanian Association for the Advancement of Science
- Volunteer, ISAAA

Building resilience for science to thrive



Back in graduate school, the first experiment I ran for one of my thesis projects was isolating a gene from sorghum. Naively, I had expectations of completing this in less than a week; however, it actually took me 3 months of disappointment, self-doubt, and tiredness. One day, as I was routinely checking my results, I unexpectedly saw I had finally isolated the gene I had been chasing for months. My surprise was such that I inadvertently jerked my knee and turned off the computer! This long encounter with trial and error made me appreciate that frequent failure is an intrinsic part of science that enables scientists to develop the resilience and tenacity much needed to thrive.



Benice Angelique Battreal

- Former Intern, ISAAA
- Administration Associate, Axis Software Development, Inc.

Fostering science acceptance and accessibility by all communities



For me, the most interesting scientific discoveries are those that concern healthcare, livelihood, and the environment. It always amazes me how science develops possible solutions for the problems we face. I think it's very timely as well, because we are really starting to feel the consequences of climate change and pollution. This really affects our well-being, our livelihood and especially our environment, and this is no time to be ignorant. My dream for science is that it gets the support and funding it needs to be able to explore more and offer new solutions. My dream is for science and research to be more accessible and thus acceptable to all communities. I hope for collaboration and higher engagement because the problems that we have to face are not problems of the selected. This concerns us all, and we have the power to act. We have unique and sustainable ideas, we have great minds, we have the advanced technologies, we have science. I hope that we use it not primarily for profit, but to focus on the things that matter.





Geronima Eusebio

- Supervising Agriculturist, Bureau of Plant Industry - Biotech Office, Philippines
- Member, BPI-Biotechnology Core Team

Cultivating resourcefulness to move forward with science



Science is for everyone. It doesn't matter whether you are male or female, as long as you have something to contribute to the advancement of the field and you can communicate about it, you matter. However, when a significant number of women contribute to science, the feminization of the field empowers other women to maximize their potential. Women are able to multitask well. In our society, men are expected to provide for their families. The tasks of the women include budgeting the income (and adding more funds if needed), while running the household. These cultivate women's resourcefulness as well as the way we handle pressure, leading us to excel in all areas of our lives.



Dr. Ruth Mbabazi

- Research Assistant Professor, Michigan State University
- 2018 John K. Hudzik Emerging Leader in Advancing International Studies and Programs Award, Michigan State University
- Fellow, 2006 Norman E. Borlaug International Science and Technology Fellow scholarship award for strengthening of the food and agricultural systems in Africa

Impressing science and technology to combat poverty



My dream is for my country to impress science and technology. Uganda is a third world country. I think this speaks for every developing country, to impress science and technology and move away from poverty. My dream is to have policies which provide platforms for different players to do what is supposed to be done. Let the scientists do their work, while policymakers must be there to guide the community.

For them to fully understand the technology, they must be involved in every step of the process. Yes, they are too busy, but you can get identified champions and involve them in what you are doing. When you win a research grant, share the excitement with and let them celebrate with you. Let them journey with you for them to appreciate the outcome. When you involve them only at the commercialization stage of a product, they will not understand or appreciate it. It would be too late.





Ma. Lorelie U. Agbagala

- Assistant Scientist, National Committee on Biosafety of the Philippines, Department of Science and Technology

Fostering science-based regulation for biotech crops

“

I know the technology is good, and a lot of people will benefit from it. Why can't other people understand? Why can't they think the way we do? Why do we have different opinions about biotechnology? We may have different interpretations of the technology and how it should be regulated, but we shouldn't decide based on emotions. We must make our decisions based on science.

I was part of the team who made Bt corn happen in the Philippines. I was part of the team who made this technology available to Filipino farmers who are now enjoying the benefits. I feel proud to see progress in areas where Bt corn is planted. Whenever I see farmers whose lives were improved by the technology, I am very happy to know that I was part of the team who made that possible.

”

References:

AAUW. 2013. Why So Few? Women in Science, Technology, Engineering, and Mathematics. <https://www.aauw.org/files/2013/02/Why-So-Few-Women-in-Science-Technology-Engineering-and-Mathematics-executive-summary.pdf>.

Food and Agriculture Organization of the United Nations. 2011. The Role of Women in Agriculture. <http://www.fao.org/3/am307e/am307e00.pdf>.

Global Volunteers. Nd. The Global Role of Women. <https://globalvolunteers.org/global-role-of-women/>.

Navarro, M.J. and R.A. Hautea. 2014. Adoption and Uptake Pathways of GM/Biotech Crops by Small-Scale, Resource-Poor Farmers in China, India, and the Philippines. ISAAA Brief No. 48. ISAAA: Ithaca, NY. <http://www.isaaa.org/resources/publications/briefs/48/download/isaaa-brief-48-2014.pdf>.

Unesco Institute for Statistics. 2015. Women in Science. <http://uis.unesco.org/sites/default/files/documents/fs51-women-in-science-2018-en.pdf>.

Follow the campaign on social media!



/ScienceAndShe/



/ScienceAndShe/



/ScienceAndShe/

Interested to join the *Science and She* campaign? Go to bit.ly/joinSciandShe.





Science and She: Empowering Women in Science

Production Team:

Writer & Editor: Kristine Grace Tome
Layout Artist: Eric John Azucena

ISAAA SEAsiaCenter
c/o IRRI, Los Baños, Laguna
DAPO Box 7777
Metro Manila, Philippines
isaaa-seasia@isaaa.org