

*Editorial*

## **Challenges and Opportunities of Agro-Bio Sciences in the Nano Era**

**Vijay K. Arora**

*UTM Distinguished Visiting Professor and IEEE-EDS Distinguished Lecturer, Wilkes University, U. S. A.*

The scope of *Pertanika Journal of Tropical Agricultural Science (JTAS)* embraces a wide area of the agricultural and biological sciences. While the fundamental sciences in plant and human biology have not changed much, there is a shift in probing the living organism both in plants as well as in humans and animals through the power of microscopes, or nanoscopes, using current technology. The nanometer is one-billionth of a metre and it allows us to image organisms with greater resolution. As surface-to-volume ratio increases on the nanoscale, the dangling bonds at the surface become more reactive, creating a number of opportunities for sensors as well as actuators. Nanotechnology has been heralded as a new industrial revolution combining all basic sciences (physics, chemistry, biology, mathematics, computer and material) in engineering new systems and devices. The development of new nanotech-based tools and equipment may help to increase efficiency and overcome challenges faced by the agricultural industry and by health agencies in controlling diseases in search

for a healthy habitat for humanity through vigilant resource management.

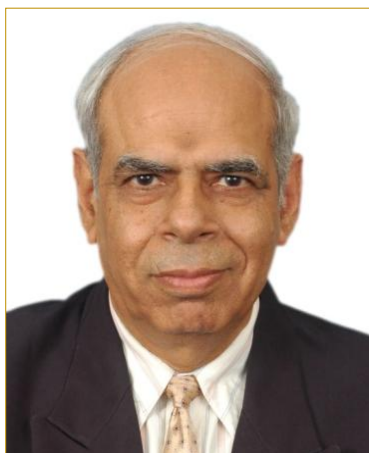
At the time of independence from the British Raj, the Indian subcontinent was largely an agrarian society, experimenting with a mixed economy of capitalism and socialism. Although independence from the British Raj returned power to the people for a large part of Asia, it was a time of turmoil and social unrest. Formation of the Islamic State of Pakistan created mass migration of the people of same race; China was gripped by the Cultural Revolution launched by Mao Zedong; North Vietnam, led by the revolutionary Ho Chi Minh, fought for control of South Vietnam in a civil war; and Indonesia under Sukarno was in a state of confrontation against Malaysia and Singapore. The far-reaching impact of the Cold War had crept into Asia. The energy that should have gone into nation building went into claiming a fair share of hard-won freedom. In the new millennium of the 21<sup>st</sup> century, a new renaissance has engulfed Asia. Asia is regaining the stature it once enjoyed as the birthplace of the world's

major civilisations and religions. Part of the reason is the mobility of the work force that is global in the sense that products designed in one country are produced in another country for consumption in other countries of the globe to reap the benefits of political stability and knowledge no matter where they are found. Governments of the world are being asked about the value they add to the national economy. In their turn, governments question academia for the outcomes of their investment in higher education. How much smarter are students on graduation after spending three to six years in a university? There are also challenges facing the present generation: global terror, nuclear proliferation, hacking of the Internet, religious and cultural conflicts and climate change, just to name a few. These challenges are ecological with underlying age-old similarities: dealing with how we will share the planet's resources, of how we as humans relate to one another, of how we choose to live our lives.

Modern agriculture makes extensive use of chemicals. The process can be transformed through nanotechnology in making production more effective and less harmful to the environment. Precision-farming methodologies through the implementation of nanotechnology in the form of small sensors and monitoring devices will enable us to make accurate decisions related to plant growth and soil suitability. Consumer-friendly and eco-friendly nano delivery systems for nutrients and pesticides have started to find their place in the market. On the other hand, we are

also finding healthy mind-body connections that are not fully documented because of religious dogma attached to them. Spirituality is universal or ever present, which makes us question the meaning of our existence. Religions are man-made. The only way to overcome that conflict is to examine ourselves, ask ourselves whether we are drawing nearer to the ideals we profess or departing from them. Aristotle's words still resonate in enlightened minds: "We are what we repeatedly do. Excellence, therefore, is not an act, but a habit." A research mind will habituate open communications by freely expressing the ideas for advancement of humanity through science-spirituality connection. In fact, there is no conflict between the two as both science and spirituality are in search of truth. As Newton's first law of inertia tells us, we are by our nature peace-loving minds. Newton's second law pushes us towards change in the light of our necessities that is driven by forces external to our inner self. The third law of action and reaction disturbs our peace as we spend considerable energy in reacting. That is where famine and hunger arises as valuable resources are diverted to fund wars. The outcome of our actions is now embedded in defining the educational outcomes of the Washington Accord ([washingtonaccord.org](http://washingtonaccord.org)), which has 17 participating countries, as we embrace 2015. The concept of 1Malaysia is being floated in the true spirit of the Arabic word *wahdat al-wujud*: unity of all beings to unite minds or thinking forces that are centred on outcome-based education (OBE).

*Pertanika* JTAS with its scope of uniting agro-bio sciences in the welfare of humankind and managing resources through capturing the power of thinking minds is a valuable resource to put your intellectualism on paper so others can benefit. As we usher in the new year of 2015, I envision *Pertanika* becoming a powerhouse of transformative science and technology for a better world habitat. *Pertanika* will be a place for creative interplay of curiosity, reason and necessity. With the engagement of its readers, *Pertanika* will be a wellspring of ideas and innovation, overflowing with benefits for planet Earth's habitat. Our wants are insatiable but our resources are limited. It is through scientific discourse that we may be able to manage well our resources by deriving synergy, instituting a process of quality deployment and ongoing improvements for limited agro, bio and intellectual resources through careful strategic planning and understanding the diversity of Nature. *Pertanika* is the ideal forum to unite these disparate thinking processes of the mind for the betterment of humanity. See the world around you, feel its pulse, reach out and touch lives -- make a difference. Catch the wave of opportunity. Catch it with your mind. And catch it with your heart and soul in creating mind-body-soul integration for a healthy world habitat.



**Vijay K. Arora:**  
*Distinguished Professor & noted international educator and IEEE-EDS Distinguished Lecturer*

Professor Arora, noted international educator and IEEE-EDS Distinguished Lecturer, resurrects nanoengineering integration in his most recent book entitled *Nanoelectronics: Quantum Engineering of Low-Dimensional Nanoensembles*, soon to be released by CRC Press: Taylor and Francis Group. Professor Arora obtained his Ph.D from the University of Colorado. He has held distinguished appointments at the University of Tokyo, National University of Singapore, Nanyang Technological University, University of Western Australia, and Universiti Teknologi Malaysia (UTM), in addition to several short-term visiting assignments around the world. Presently, he is Distinguished Visiting Professor at UTM on leave from Wilkes University, U. S. A., where he holds tenure as Professor teaching electrical engineering, physics and engineering management. Professor Arora was accorded Leading Educators of the World 2005, Leading Scientists of the World 2005 and Man of Achievement 2005 by International Biographical Centre of

Cambridge, England. He is listed in a number of Who's Who biographies. He has been invited to give keynote lectures and presentations internationally. His publications include more than 100 papers in reputed journals and many uncounted publications in conference proceedings and numerous invited/keynote lectures. Professor Arora serves on the editorial board of a number of journals. He was chair of NanoSingapore2006, NanotechMalaysia2010 and EscienceNano2012 conferences. He can be reached at [vijay.arora@wilkes.edu](mailto:vijay.arora@wilkes.edu).

