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Challenges in the year of science

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The year 2012-13 represents the centenary year of the Indian Science Congress Association (ISCA). Prime minister Manmohan Singh will be chairing the centenary meeting of the ISCA in Kolkata on January 2013. The focal theme will be 'Science and Shaping India's Future'. The only other prime minister who has so far served as the general president of the Indian Science Congress is Jawaharlal Nehru. This historic session was held in 1947 and Nehru then made the oft-quoted statement, "The future belongs to science and to those who make friendship with science." It is a good augury that the year of science has started with global recognition given to tribal families of the Koraput district of Odisha for the sustainable and climate resilient farming systems they had developed over the centuries. These families were recognised through the selection of their traditional agricultural system for inclusion under the globally important agricultural heritage systems of the Food and Agricultural Organisation (FAO) of the United Nations.

Knowledge is a continuum and therefore we should respect both indigenous knowledge and frontier science. The future of food security will depend on a combination of the ecological prudence of the past and the technological advances of today and tomorrow. A second area, which deserves attention during the international year of science, is harnessing transformational genes and technologies. A good example of a transformational gene is the Norin 10 dwarfing gene in wheat, identified at the Norin Experiment Station, Japan, which enabled the breeding of semi-dwarf varieties like Kalyansona and Sonalika, capable of responding to good soil fertility and moisture content. These varieties helped to usher in the wheat revolution in the 1960s. Similar transformational genes have been identified and used in rice, maize and other crops. More recently, the genetic engineering technology has helped to identify and introduce transformational genes conferring tolerance to salinity, drought and floods.

A recent example of transformational technology is mobile telephony. Artisanal fishery is getting transformed through the application of mobile telephony. Small-scale fishermen going in catamarans can now leave the shore with information on wave heights at different distances and the location of fish shoals. Earlier they used to spend over ten hours in the sea but they now come back within two hours with good fish catch. Also, the fear of the sea, which they developed after the tsunami of December 26, 2004, has disappeared since they know what the wave heights will be at different distances from the shoreline.

Transformational technologies also carry risks and hence we should establish autonomous regulatory mechanisms to assess risks and benefits.

A third important area is pro-active action to checkmate the adverse impact of potential changes in temperature, precipitation and sea level, caused by global warming. The recently held conference (COP 17) at Durban in South Africa has reiterated that the expected rise in mean temperature can be limited to 2 degree centigrade. Also, it was agreed to set up a Durban Platform for Enhanced Action and to deliver a climate agreement covering all parties

by the year 2015. It was also decided to establish a green climate fund and a climate technology centre and network. However, as pointed out by the British Science Journal, Nature (Dec15, 2011), "The Durban meeting shows that climate policy and climate science inhabit parallel worlds". The political will to shift to a low carbon pathway of development is yet to emerge in industrialised nations. Unfortunately, poor nations and the poor in all nations will suffer most because of their limited coping capacity. Proactive action will be needed for implementing the legal food entitlements proposed under the National Food Security Act. In a crop like wheat, which occupies an important place in our public distribution system, we will have to develop new varieties capable of higher per day productivity. Vector borne diseases will become more important. For each 1 degree Celsius rise in mean temperature, wheat yield losses in India are likely to be around 6 million tonnes per year. Natural rubber (NR) will suffer in latex yield with a rise in temperature and we will have to increase the NR area in the Northeast. Climate refugees may become important in coastal areas as a result of a rise in sea level and we will have to put in place contingency plans for their resettlement. All along our coast we will have to develop methods of insulating both fishing and farming communities from the impact of sea level rise.

A fourth area is the development of strategies to combat the widely prevalent child malnutrition. The prime minister has rightly referred to the incidence of undernutrition among 42 per cent of India's children as "a national shame". Outpouring of grief and shame alone will not be enough. In a lecture delivered in 1966, I drew attention to the threat of intellectual dwarfism in our country as a result of maternal and foetal undernutrition and child malnutrition. This is where a community designed and implemented nutritional security system will help. The programme initiated by MSSRF in the Koraput district for developing a cadre of Community Hunger Fighters well versed in the science and art of eliminating malnutrition among children and adults may help to create synergy among national and local initiatives.

Thus, the year of science presents technical challenges in every area of human endeavour relating to safeguarding lives and livelihoods. It is to be hoped that all the Science Academies of our country will help to convert potential calamities into opportunities.

(The writer is an agricultural scientist who led India's green revolution)

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