

Keynote Symposium

KS-1

Global Agriculture at the Crossroads: Pathway to an Era of Biohappiness. M. S. SWAMINATHAN. UNESCO Chair in Ecotechnology, Chairman, M S Swaminathan Research Foundation, Third Cross Street, Taramani Institutional Area, Chennai-600 113, INDIA. Email: swami@mssrf.res.in

The 21st Century has begun with both new challenges as well as opportunities in the field of sustainable food security. Among the challenges, some of the serious ones are: climate change, rising cost of petroleum based energy leading to the diversion of farm land for fuel production, damage to the ecological foundations essential for agricultural progress, and transboundary pests. Fortunately, new innovations in science and technology particularly in the fields of biotechnology, information and communication technology, and space technology have opened up new opportunities for launching an era of evergreen revolution, leading to an enhancement in farm productivity in perpetuity, without associated ecological harm. In the area of climate change, the areas of concern are: higher temperatures, reduced precipitation resulting in more frequent drought, increased incidence of floods, and rise in sea levels as a result of the melting of the Antarctic and Arctic snow. Higher CO₂ concentration in the atmosphere may also afford some opportunities particularly in the field of horticulture. Specific anticipatory research programs will have to be initiated to meet these challenges and opportunities. New genes for drought, flood, and sea water tolerance will have to be introduced from suitable donors, such as the hardy shrub *Prosopis juliflora* (for drought tolerance) and the mangrove species *Avicennia marina* for salinity tolerance. Rice (*Oryza*

sativa) may become the major cereal of the world in an era of climate change because the amplitude of variability in terms of ability to grow under different conditions is very high in rice. Deep water or floating rice can be grown in the areas prone to floods. We should launch an international collaborative program on “Searching and Saving Genes for Posterity”. Surveillance and early warning systems need to be strengthened in the case of transboundary pests like the H5N1 strain of the Avian influenza. At present, the answer to such pandemics is the culling of the animals, leading to the elimination of all poultry birds in an affected area. Screening facilities are needed in isolated islands, where the search for resistance genes can be conducted under strict quarantine conditions. Finally, the two major pathways to an evergreen revolution, namely organic farming and green agriculture, need standardization. Currently, organic farming precludes the use of mineral fertilizers, chemical pesticides and genetically modified crop varieties. Green agriculture, on the other hand, involves the adoption of integrated pest management, integrated nutrient supply, and the use of appropriate crop varieties, irrespective of the method of breeding—whether Mendelian or Molecular. The way ahead lies in harmonizing the methods of organic farming, including crop–livestock integration, with the new genetics. This will call for a universally agreed Biotechnology Regulatory System, whose bottom line should be the safety of the environment, the health of the consumer, and the biosecurity of the nation. It will be difficult to face the emerging challenges without the help of the tools associated with biotechnology like cell and tissue culture and recombinant DNA technology. We can enter an era of biohappiness through a mutually reinforcing integration of biodiversity, biotechnology, and business.