Sustaining Food Security

by Werner Burkart

Sound science and technology can help the world meet its needs of food production.

There is no quick fix to the food security crisis that continues to afflict the world's poorest nations. However, in the medium term, action can be taken to lay the necessary foundations for a lasting solution to the crisis, enhancing the sustainability of food production and agriculture while simultaneously improving the quality and safety of the food available for consumption, particularly in the least developed countries. At the IAEA, our role is to encourage Member States to apply, in an integrated manner, the results of decades of scientific research. As importantly, we work to promote dialogue between policy makers and to encourage interdisciplinary and sustainable solutions to the food crisis.

Good seeds and fertilizer, albeit extremely important, will not alone solve the issue of sustainable agriculture and food production if the most precious resources — our soil and water — are squandered. Through integrated management of these resources, and with the application of a range of technologies, including nuclear technologies, current farming practices can be transformed to obtain higher and sustainable yields. At the same time, greenhouse gas (GHG) emissions can be reduced, thus contributing to climate change mitigation.

Moreover, diseases such as cancers, heart disease and diabetes are on the rise, much of which is attributed to changes in lifestyle and diet. It is important to address not only the quantity but also the quality of food available to the world population. In particular for children and young people, who are growing and developing quickly, we must ensure that the right foods, rich in essential micronutrients and vitamins, are available at affordable prices.

A study in Bangladesh is evaluating the impact of replacing white sweet potatoes with orange flesh potatoes having high pro-vitamin A carotenoid content (biofortified sweet potatoes) to combat vitamin A deficiency in women.

(Photo: K. Jamil, ICDDR, B. Dhaka, Bangladesh)

Integrated Solutions to Complex Questions

Some would argue that the present food crisis closely follows the theory of Reverend Thomas Malthus, espoused back in the 18th century, that food production, growing arithmetically, could never match exponential population increase. A closer look shows this analysis to be inexact.

IAEA scientists assess the impact of exposure of commercial seafood, such as the cuttlefish, to seawater at the decreased pH levels predicted by climate change models.
(Photo: Courtesy of Todd Stailey, Tennesee Aquarium)

In the next 30 years, by 2040, the world population will reach nine billion people, compared with today's nearly seven billion. This fact, combined with a host of problems such as poor water and soil management, climate change and variability, lack of investment in research and development, inefficient or non-existent infrastructure for food distribution infrastructure and plummeting world economic growth prospects in the near future paints a dire and increasingly complex picture.

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At the IAEA, we are working closely with the Food and Agriculture Organization of the United Nations (FAO) through our Joint FAO/IAEA Division to change this picture. We believe that on the basis of sound science and technology and through efficient technology transfer mechanisms, food production can keep up not only with the pace of population growth but also with the needs of the growing population, provided that considerable educational efforts are made in the name of nutrition and food security.

The Recent Fall in Food Prices Provide a False Sense of Security

Since the financial crisis began at the end of last year, food prices have fallen steeply; the international price of corn, wheat and rice has tumbled by 40–60%, but remains above the long-term average. However, as FAO warned, this temporary relief to ordinary people must not provide a false sense of security.

As the credit crunch hits the agricultural market, with prices falling and limited financing available for fertilizers and other inputs, farmers will reduce their planting. This could result in smaller harvests. And with less food on the shelves, prices might surge to all-time highs, unleashing worse riots than those witnessed in Latin America and the Middle East in 2007. Even more countries may require food aid, leaving us even further from achieving the Millennium Development Goal of halving the number of those going hungry by 2015.

This is of particular concern: rather than declines in the number of hungry people on the planet, the world has witnessed increases of 75 million in 2007 and 40 million in 2008, bringing the world total to 963 million hungry people.

To rid the world of extreme poverty and hunger, continued investment and the application of research and development in agriculture and food production is essential. For the past 60 years, the international community has called for integrated approaches to food security. One such call was made at the beginning of the year at the Madrid High-Level Meeting on Food Security for All, hosted by the Government of Spain on behalf of the United Nations High Level Task Force on the Global Food Security Crisis that was set up in April 2008 by United Nations Secretary-General Ban Ki-moon.

Collective Action

The challenges facing us in food and agriculture are enormous and require both a collective effort and long-term solutions. Scientific and technological innovation will play a crucial role in promoting global food safety and security, and international coop-

eration will be vital. As a related organization to the United Nations system with a technical mandate, in continued partnership with the FAO and the World Health Organization (WHO), the IAEA is well positioned to further the use and application of technology in both agriculture and food production systems including water and soil management as well as fisheries. Down the line, nuclear technology can greatly assist in improving the nutritional quality of food.

While more can be done to encourage their use, applications of nuclear science and technology already are essential components of the work to improve crop and livestock production, and the quality and variety of foods. For example, isotopic techniques and neutron moisture probes are part of almost all national research efforts to optimize plant fertilizer uptake, minimize soil erosion and water pollution, improve soil fertility and the efficient use of water for food production.

Likewise, research supported through partnerships encourages plant breeding and genetics programmes to produce better varieties of food and industrial crops. Radiation induced mutations such as drought-resistant cotton plants and saline-resistant rice, to mention just two, have provided new hopes and economic opportunities for rural communities around the world.

In animal production, the FAO/IAEA implements feed supplementation strategies for animals kept on low-quality diets by smallholder farmers. The nuclear and nuclear related serological platforms that FAO/IAEA experts helped to develop are now widely used by artificial insemination services for dairy farmers and by veterinary authorities to diagnose diseases and to monitor the success of eradication or control efforts. Advances in molecular technologies will follow suit. Nuclear techniques are also used to identify the causes of ocean acidification, partly responsible for the depletion of fish stocks in our oceans.

Working directly with ministries of science and technology, ministries of health, and ministries of agriculture through technical cooperation, the IAEA promotes the use of scientific and technological innovation in global food security. Performed under controlled conditions, applications of nuclear science and technology have much to contribute to improving the quality and variety of foods, to avoiding the loss of genetic diversity and its consequent impact on long-term human health, to boosting the nutrient content of crops, and to increasing crop and livestock production.

Nuclear techniques are used extensively in agriculture to make food crops more resistant to disease, boost crop yields and combat pests and animal diseases, manage soils and water management, and identify causes of ocean acidification, largely responsible for the depletion of fish stocks in our oceans.

Using integrated management approaches, nuclear techniques are used extensively in agriculture to make food crops more resistant to disease, boost crop yields and combat pests and animal diseases, manage soils and water management, and identify causes of ocean acidification. The immediate solution to the crisis is to increase and finance mechanisms of agricultural self-sufficiency, particularly for food import-reliant countries. In the medium to long term, the world must look beyond the acute needs and invest in comprehensive agricultural and environmental management that not only mitigates, but actually contributes to enrich the world's food and water sources for future generations.

Werner Burkart is Deputy Director General and Head of the IAEA's Department of Nuclear Sciences and Applications. E-mail: w.burkart@iaea.org

Using nuclear techniques in conservation agriculture, can increase crop yield, improve soil quality and enhance land carbon sequestration. These techniques are being applied in extensive soybean cultivation in Brazil.
(Photo: IAEA)