Hunger in a world of plenty and what can we do about it.

By Ronald F. Eustice

Global population will exceed 9 billion by 2050, up from some 7 billion people on earth today. Thanks to modern technology, improved genetics, sustainable management and environmental stewardship, farmers, growers and ranchers are producing more food than at any time in history.

A growing wave of food insecurity threatens more than 1 billion people around the world. Global food costs are growing to dangerous levels, reaching record highs in January 2011. And these prices are expected to persist, according to the United Nations Food and Agriculture Organization (FAO).

We are at a crossroads:
In the past three years, the global economic recession has decreased consumer buying power and increased food insecurity. In the near future, tight supplies and rising food prices may stretch an already extended system to the breaking point.

During the 1960’s and seventies the “Green Revolution” used science and technology to increase yields and helped make many countries in the developing world techni-

cally self sufficient in food production. Importing countries such as India, Mexico and many others became net exporters. Hybrid seeds combined with responsible use of chemical fertilizer, pesticides, and irri-
gation produced yields previously considered impossible. While the Green Revolution remaina “work in progress” in certain regions of the world (mainly sub-Saharan Africa) significant progress has been made.

Despite record food production, more than 100 million join the ranks of the world’s hungry each year. The rise in global population coincides with an increase in world hunger. No longer is the number of hungry people steadily decreasing. In fact, the number of malnourished could grow staggeringly as the population reaches 9 billion by mid-century.

Why are so many hungry in a world of plenty?
There are many reasons—ranging from poverty and politics to food waste, spoilage and infrastructure issues. But morally, it’s unacceptable. A recent United Nations report estimates that more than one billion people consume less than 1800 calories per day and go to bed hungry every night.

Hunger and Obesity:
The face of hunger has changed, so has the address. The suburbs are the home of the American dream, but they are also the place of rising poverty. With expensive housing and rising food costs, the working poor have been pushed out. Today hunger in the suburbs is growing faster than in cities, having more than doubled since 2007. Obesity is endemic in America and many other countries.

How can hungry people be obese? So-called “fast food” is cheap and convenient. Hungry people go to what’s convenient when they have money to eat. Too often the choices are high on saturated fats, carbohydrates and salt and low on fruits, vegetables and low-fat proteins. Childhood obesity has more than doubled in children and quadrupled in adolescents in the past 30 years.

The percentage of children aged 6–11 years in the United States who were obese increased from 7% in 1980 to nearly 18% in 2012. Similarly, the percentage of adolescents aged 12–19 years who were obese increased from 5% to nearly 21% over the same period. According to the CDC, in 2012, more than one third of children and adolescents in America were overweight or obese. Overweight and obesity are the result of “caloric imbalance”—too few calories expended for the amount of calories consumed—and are affected by various genetic, behavioral, and environmental factors.

We must not over simplify a complex situation. Certainly the global economic situation has made certain foods less affordable for a sizeable portion of the world’s population. Political instability, civil strife, drought, and unreliable distribution systems have all exacerbated the situation. While the weather, politics and inadequate distribution systems are mostly beyond our control, we do have resources available to help us improve the situation.

By 2050, we’ll need 100 percent more food and according to the U.N. FAO, 70 percent of it must come from efficiency-enhancing technologies.

Technology defined:
1. Practices — Doing it better
2. Products—Using new, innovative tools and technologies
3. Genetics—To enhance desired traits in plants and animals

We must call a truce to the debate about the role of technology in the sustainable production of safe, affordable and abundant food if we are to protect the Three Rights:
1. Ensuring the human right of all people around the world to have access to affordable food.
2. Protecting all consumers’ rights to spend their food budget on the widest variety of food choices.
3. Creating a sustainable global food production system, which is environmentally right.
Just as the Green Revolution used science to feed a hungry world, it is imperative that we once again look to technology to prevent a global food crisis. We must continue to rely on innovations available while seeking to identify new and under-utilized practices to feed more people.

Post harvest food loss in Africa represents a multi-faceted challenge that reduces the income of approximately 470 million farmers and other value chain participants by as much as 15% (The Rockefeller Foundation 2013).

A recent study released by the United Nations Environment Program shows that over half of the food produced globally is lost, wasted or discarded as a result of inefficiency in the human-managed food chain.

Losses and food waste in the United States could be as high as 50 percent, according to some recent estimates. Up to one-quarter of all fresh fruits and vegetables in the United States is lost between the field and table.

While relatively simple approaches exist to reduce post harvest loss, such as improved handling of perishable crops, currently no proven intervention is routinely used to mitigate this issue at a scale sufficient to dramatically improve the lives of poor and vulnerable people affected by it.

Current treatments designed to prevent spoilage include the use of fumigants, chemical washes and pesticides. These are surface treatments that can leave chemical residues on the skins. Some of these are potentially harmful and importing countries, including the USA, Japan and many in Europe, have banned the use of several common fumigants such as ethylene dibromide, ethylene dichloride and ethylene oxide. The fumigant most widely used today is methyl bromide (MeBr) which is highly ozone depleting.

The time has come to take a serious look at food irradiation as a routine practice that is one of the most effective tools to alleviate world hunger. Irradiation which uses energy supplied by gamma rays, electron beams or x-rays, is a cost effective and environmentally-friendly technology that has the potential to do more to prevent food spoilage and alleviate hunger than any other technology we have available.

In addition to controlling pests and eliminating harmful bacteria, irradiation extends the storage life of many foods. This effect makes irradiation particularly useful for fruits which are commonly infested and also require extended shelf-life in order to be shipped long distances to reach consumer markets in good quality.

Although irradiation is often clearly a superior technology, there are certain factors that currently limits its use. Primarily among these are: 1) lack of regulatory approvals, 2) labeling issues, 3) lack of consumer information and understanding, 4) the wide dissemination of false and incorrect information regarding irradiation, and 5) accessibility to logistically viable facilities.

Every minute we delay is another minute during which 12 children will die from hunger. This is morally wrong, given that solutions exist. Facts support a more hopeful future where the consumer’s right to choose and the farmer’s right to use safe efficient and effective technologies are protected and the moral imperative of feeding the world is finally achieved.

Countries such as India, Malaysia, Nigeria and dozens of others have officially identified food irradiation as a focal point to alleviate rising food prices and hunger.
Tescos, the UK’s largest supermarket chain completed a study in 2013 revealing that up to two thirds of supermarket food ends up in the trash bin. Tesco found that 68 per cent of its bagged salads, 48 per cent of its bakery goods and 24 per cent of its grapes go to waste.

Much of the food is thrown away by customers – but large amounts are lost because of lack of freshness. Yet more produce had to be ditched before it even reaches shelves. A study by the Institution of Mechanical Engineers found up to half the food bought from supermarkets goes in the waste bin.

**Consumer acceptance of irradiated food is not the issue:**
Consumers readily choose irradiated foods when they are available and when they are informed about the technology. The amount of irradiated produce marketed in the US and worldwide is growing daily. Estimates are that in 2012 an estimated 18,000 metric tons (40 million pounds) of irradiated fresh produce were consumed in the US. This volume includes papaya, longans, lychees and Okinawa sweet potatoes from Hawaii, mangoes, guavas and boniato sweet potatoes from Florida, mangoes from India and Mexico, guavas from Mexico, dragon fruit from Vietnam and other items. In Australia, the volume of irradiated produce has grown significantly. More than 1,000 metric tons of mangoes were irradiated in 2011/12 compared to 300 metric ton the previous season. These products are being exported to New Zealand. Thailand irradiated 2,100 metric tons of produce (mangosteen, rambutan, lychee) in 2009 compared to 1,400 in 2008. China leads the world in food irradiation with over 200,000 metric tons of food irradiated annually.

While irradiation is being used to protect public health by eliminating harmful bacteria and to access new markets by destroying unwanted pests, there is a growing need to use irradiation as a tool to prevent food spoilage by extending shelf life of produce and other foods.

**The Real Cost of Wasted Food:**
When spoiled food is thrown in the garbage, the cost is much more than the price of the food. We must also calculate the cost to produce the food and transport it to market. The cost also includes the price of land to grow the crop; seed, fertilizer, labor and petroleum to plant the crop; water to irradiate the land, harvesting costs and the cost of transportation to market. With 30 to 50 percent of the food we produce worldwide being wasted, the time has come to find real solutions to a very real problem.

**Efforts to reduce world hunger and prevent a global food crisis must take a multi-pronged approach.** We must expand the Green Revolution to regions of the world most affected by famine such as sub-Saharan Africa; we must improve the distribution infrastructure in developing countries; and we must use food irradiation on a routine basis to prevent food spoilage and extend the shelf life of foods. Irradiation serves many purposes.

1). **Prevention of Foodborne Illness** – irradiation is used to effectively eliminate organisms that cause foodborne illness, such as Salmonella and Escherichia coli (E. coli).

2). **Preservation** – irradiation is used to destroy or inactivate organisms that cause spoilage and decomposition and extend the shelf life of foods.

3). **Control of Insects** – irradiation is increasingly being used to destroy insects in or on tropical fruits imported into the United States. Irradiation also decreases the need for other pest-control practices that may harm the fruit.

4). **Delay of Sprouting and Ripening** – irradiation is used in Japan and other countries to inhibit sprouting (e.g., potatoes) and delay ripening of fruit to increase the longevity of that food.

5). **Sterilization** – irradiation is used to sterilize foods, which enables storage for years without refrigeration. Sterilized foods are particularly useful in hospitals for patients with severely impaired immune systems, such as patients with AIDS or undergoing chemotherapy. Irradiated food has been used by the US National Aeronautic and Space Agency (NASA) for many years as food for the astronauts. Foods that are sterilized by irradiation are exposed to substantially higher levels of treatment than those approved for general use.
Use of irradiation to extend freshness and shelf-life

Blackberries: Control vs. Irradiated samples
(41 days after storage at 0 degrees Celsius (32 degrees F))

Blueberries: Control vs. Irradiated samples
41 days after storage at 0 degrees Celsius (32 degrees F)

Asparagus (Non-irradiated)
(Control 36 days at 34F)

Asparagus (Irradiated at 400 Gy)
(36 days at 34F)

Irradiated at 1.0 kGy; stored at 40 F.

Irradiated Strawberries
(Stored at 40 degrees F for 17 days)

Strawberries:
Control not edible
(after 7 days storage)

Learn more at www.foodirradiation.org

Food Irradiation is endorsed or supported by virtually every health and scientific agency in the World including the American Medical Association, the World Health Organization, Centers for Disease Control, American Dietetic Association, American Council on Science & Health, Food & Drug Association, Institute of Food Technologists and hundreds more.