



# Health and Nutrition through Plant Breeding and Plant Genetic Resources

*Globally, inadequate nutrition is the primary factor in child mortality. Vitamin and mineral deficiencies are common, even where general under-nutrition is absent. At the same time, obesity is increasing, with its associated health problems. Health systems are burdened with high costs of treating obesity-related diseases, while also fighting malnutrition.*

*Plant breeding is one of the shortest and most effective routes to improving global health through better nutrition.*

## *Examples of available heritable variations in quality traits of basic foodstuffs:*

- Breeding materials of common beans can be used to develop varieties with enhanced contents of up to 80% more iron and 40% more zinc. Wheat, maize and rice germplasm collections also contain heritable variations for enhancing the contents of these two mineral elements and healthful fiber.
- Genetic diversity for increasing the levels of antioxidants exists for maize, cassava, potato, and sweet potato.
- Among oilseeds, genetic variation exists for use in improving nutritional value of cooking oils.
- Genetic resources exist for increasing yield and yield stability of fruits, vegetables, and other highly nutritious crops, and for reducing post-harvest losses of perishable fruits and vegetables.

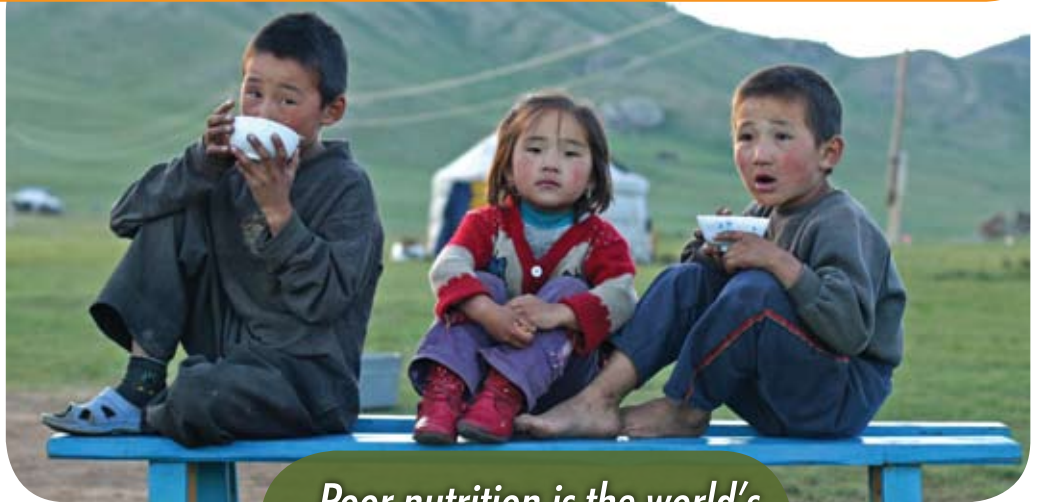
*Once introduced, the access to better nutrition provided by nutritious, productive, reliable varieties is sustainable, through effective seed delivery systems.*

Poor nutrition is more common in low-income groups, where it causes losses to individuals estimated at more than 10% of lifetime earnings and productivity.

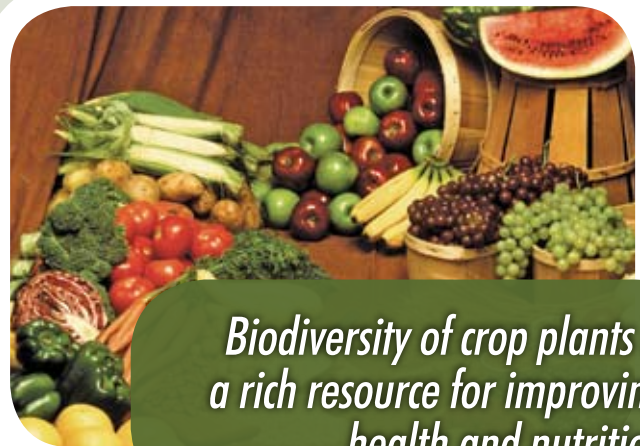
*Improvements in nutrition benefit public health, individual opportunity, and national economies.*

Plant breeding outcomes that affect nutrition include:

- *Improved intrinsic nutritional value of low-cost staple foods, to bring better nutrition even to very marginal or isolated populations.*



*Poor nutrition is the world's most serious health problem*



*Biodiversity of crop plants is a rich resource for improving health and nutrition*

- *Better availability and affordability of fruits, vegetables, whole grains, and healthful oils, to make it practical for all households to obtain recommended nutrition.*
- *Increased producer incomes through higher yields and added value, to increase household ability to afford balanced diets.*





***Plant breeding is the science that explores and uses genetic diversity for food and agriculture.***

Methods range from selecting desirable plants in farmers' fields, through intercrossing and formal breeding experiments, to molecular techniques. Supporting sciences are advancing rapidly, including new biotechnology and computational tools.

### ***What to expect from plant breeding for health and nutrition***

- *Varieties of common, low-cost staple food crops with higher concentrations of vitamins, minerals, antioxidants, fiber, and healthful oils.*
- *Fruits and vegetables that are more productive and reliable, readily available and affordably priced*

### ***Here are some examples of current plant breeding for nutrition and health:***

- A Uganda/International Potato Center team developed new sweet potato varieties for East Africa with increased pro-vitamin A.
- A Nicaragua/International Center for Tropical Agriculture team bred a variety of common beans with extreme drought tolerance, high yield and yield stability—plus good taste.
- The World Vegetable Center and its national partners bred nutritious varieties of tomatoes and onions that resist pre-and post-harvest pathogens in hot, humid regions.
- The US bred oats to contain 50% more beta-glucans for alleviating hypercholesterolemia, hyperglycemia and obesity.
- Several countries have improved peaches, almonds and citrus crops for increased antioxidants.



## ***Conclusions***

- *Genetic diversity and plant breeding are the key elements in enhancing the value of crops for improving nutrition.*
- *Integration of plant breeding in global nutrition strategies is a route to better health.*
- *Breeding can improve nutritional value of foods by increasing vitamins and minerals, antioxidants, fiber, and healthful oils.*
- *Genetic diversity of fruits and vegetables allow breeding for higher, more reliable yields, for greater availability and affordability.*

***Sustained support to plant breeding increases world capacity to move the potential in plant genetic diversity from promise to impact for nutrition and health.***