



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.

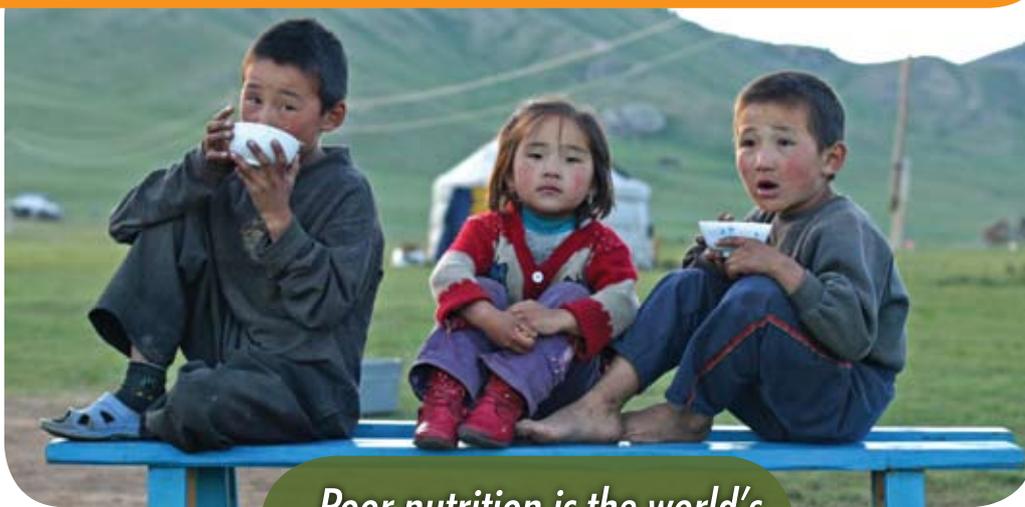
Once introduced, the access to better nutrition provided by nutritious, productive, reliable varieties is sustainable, through effective seed delivery systems.

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.

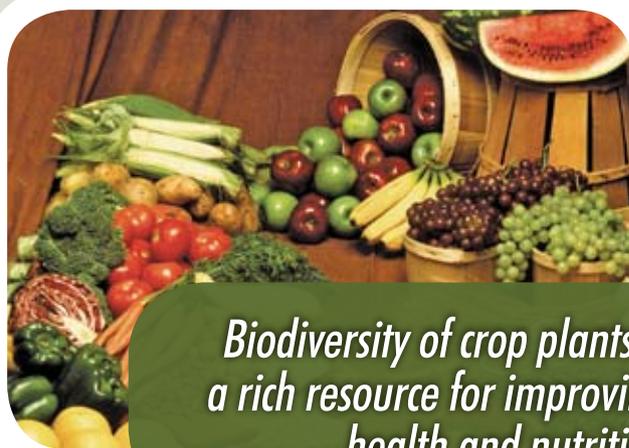
Improvements in nutrition benefit public health, individual opportunity, and national economies.

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.

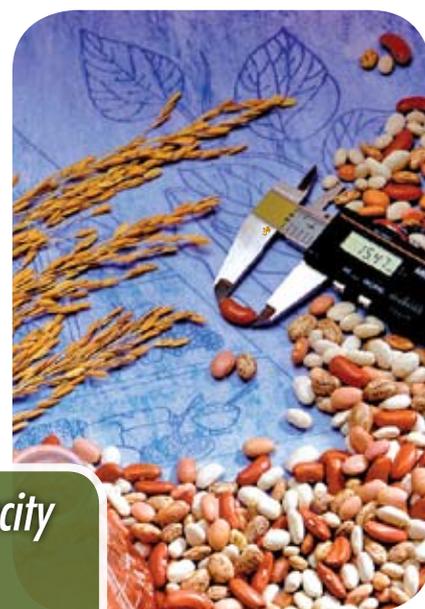
Methods range from selecting desirable plants in farmers' fields, through intercrossing and formal breeding experiments, to molecular techniques. Supporting sciences are advancing rapidly, including new biotechnology and computational tools.

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.