



Buried treasure: the potato

This hardy Andean tuber grows fast, is adaptable, high yielding and responsive to low inputs. And it's a staple food of millions of people around the world...

"A United Nations designation of an international year once actually meant something. But what to make of the UN's designation of 2008 as International Year of the *Potato*?" So began a recent scathing editorial in a Canadian online daily, which joked that IYP 2008 might result in a "Declaration of the rights of potatoes and other starchy edible tubulars".

The editorialist revealed a lack of familiarity not only with botany - the potato is a "tuber", not a "tubular" - but, above all, with the potato's place in agriculture, the economy and global food security. In terms of sheer quantity harvested, the humble potato tuber is, in fact, the world's No. 4 food crop - after maize, wheat and rice - with production in 2005 of more than 323 million tonnes. For the top 10 producing countries, which account for two-thirds of global potato output, the total value of the crop was estimated at some \$40 billion.

Potatoes are also crucial to the food security of hundreds of millions of people in the developing world, where annual consumption has risen from 9 kg/capita in 1961-63 to around 15kg. While potato output has declined in Europe, growth is so strong in developing countries - notably China and India - that global production has nearly doubled over the last 20 years. Since the early 1960s, FAO says, the increase in the production area dedicated to potatoes in the developing world has outstripped that of all other food commodities, and by 2020 demand for potato is expected to be double that of 1993.

High potential. "For low-income people in both urban and rural areas, the potato really is a buried treasure," says Eric Kueneman, chief of FAO's Crop and Grassland Service, which will serve as FAO's lead unit for implementing IYP 2008. "It grows fast, it's adaptable, high yielding and responsive to low inputs. Potatoes are ideally suited to places where land is limited and labour is abundant, conditions that characterize much of the developing world. It also has considerable, untapped potential for further increases in yield



and productivity, especially in some marginal farming areas unsuitable for other crops."

Potato (*Solanum tuberosum*) originated some 8,000 years ago in high-altitude tropical areas of Peru, where a staggering 5,500 cultivated varieties have been developed by generations of farmers. Taken by the Spanish to Europe in the 16th century, the tuber quickly adapted to northern growing conditions and soon became a staple food at a time of rapid population growth. From Europe it spread further across the globe: today potatoes are grown on an estimated 180,000 sq km of farmland, ranging from China's Yunnan plateau and the subtropical lowlands of India, to Java's equatorial highlands and the steppes of the Ukraine.

While potatoes are considered relatively poor in nutrients, they are rich in carbohydrates, making them a good source of energy. They have the highest protein content (around 2.1 percent on a fresh weight basis) in the family of root and tuber crops, and protein of a fairly high quality, with an amino-acid pattern that is well matched to human requirements. They are also very rich in vitamin C - a single medium-sized potato contains about half the recommended daily intake.

Under temperate and subtropical conditions, an irrigated crop of about 120 days can yield from 25 to 35 tonnes/ha of fresh tubers, while

farmers in the tropics can harvest between 15 and 25 tonnes within 90 days of planting. In the lowlands of Bangladesh and eastern India, potato has become a valuable winter cash crop, while in the Philippines and Indonesia, potato production helps to satisfy rapidly increasing demand from snack food industries. In sub-Saharan Africa, potatoes have become a preferred food in urban areas, and an important staple and cash crop in highland production zones of Cameroon, Kenya, Malawi, Nigeria, Rwanda and South Africa.

FAO says that "gender has particular relevance for potato". Edible tubers are usually women's crops due to their prominent role in household garden systems and to the feminization of agriculture. In many developing countries, potato production and marketing is the domain of women in farm families. The potato's nutritive value and relative ease of production have also made it an important component in the rapidly expanding urban agriculture sector, which provides food security and employment for as many as 800 million people in developing countries.

Biotic stresses. With potato intake in the developing world averaging less than a quarter of that in Europe and North America, there is ample room for continued increases in production and consumption. But, FAO warns, higher production will require improvements in the quality of planting material, farming systems that make better use of natural resources and reduce negative impacts on the environment and, above all, tubers with greater resistance to biotic stresses caused by pests and diseases.

Potato late blight (LB) - caused by an airborne mould - is the most serious potato disease worldwide. In developing countries alone, the disease affects 3 million hectares of potato-producing land, and crop losses are estimated at \$2.75 billion a year. Efforts to fight LB are also costly - in northern Ecuador, farmers spend an average of \$120 per hectare on fungicides, about 10 percent of their overall production costs.

The threat posed to food security is starkly illustrated by the Irish "potato famines" of the mid-19th century: potato blight destroyed most of the country's potato crop, leading to the deaths of as many as one million people and the mass emigration of millions more. Researchers at the International Potato Center (CIP) are now developing integrated management systems for

potato late blight that use varieties with "stable and durable" resistance to the disease, coupled with farmer field schools that test and adapt disease management approaches. CIP says that better control of LB would generate annual benefits of \$530 per hectare.

Meanwhile, FAO is helping several developing countries to boost potato output by eliminating diseases and viruses from "seed potato", the tuber pieces used to grow each season's crop. In Tajikistan, for example, potato production declined by more than 50% during the 1990s owing to a lack of good local planting material and to viruses introduced with imported tubers. FAO provided an international expert in tissue culture to help the country establish disease-free seed potato production, and trained groups of technicians and farmers in potato propagation.

Another recent project in Syria drew up procedures for the production of virus-free seed potato, trained growers to carry out tuber multiplication and marketing, and built a national facility for the production of antisera for use against local virus strains.

Drought resistance. Research is addressing other key issues in potato production, such as the tuber's thirst for increasingly scarce, and costly, water resources: modern potato varieties need frequent, shallow irrigation. To reduce water requirements, breeders are developing varieties that are drought-resistant properties and have longer root systems. Cutting post-harvest losses will also increase potato supply. In Belize, an ongoing FAO project is helping farmers' cooperatives reduce losses of both stored seed potatoes and harvested potatoes, which run up to 20 percent a year. The project aims at cutting those losses to 3 percent by building at strategic locations bamboo-floored cooling stores for demonstration to farmers.

Finally, potato cultivation in some developing countries entails the use of hazardous agro-chemicals. In the Andes, in particular, death and disease among farm workers and their families from the misuse of pesticide is a serious problem. Dense highland soils can absorb great quantities of insecticide, which penetrate subsequent crops and run off to contaminate water supplies. Developing clean, reliable seed potato, pest- and virus-resistant potato varieties, and integrated pest management will have valuable benefits for the environment by drastically reducing the need for chemicals.