PULSES

GPC GLOBAL PULSE CONFEDERATION

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# Orphan Crops: a solution to global food system risks and an investment opportunity for future agricultural research

"Orphan crops" are crops that are largely grown and used locally by communities. They are not part of the main crops that are traded internationally and which have often been considered staple crops, such as rice or maize. Several pulses are considered orphan crops, along with certain types of cereals, fruits, nuts, vegetables, roots, tubers and oil seeds. For example, in Africa, several types of beans such as cowpeas are considered "orphan crops".

Yet, these "orphan" crops are an important component of diets in many countries and can help provide balanced nutrition and support resilience and sustainable agricultural practices. They can also be grown as feed for animals, fibre for clothing, a fuel source, or even for medicinal use. But a lack of commercial use has until recently led to lower levels of investment in research around those crops.

The lack of investment in research is not only into varieties, but also into cropping systems and other issues, which results in orphan crops not being as well prepared to face new and changing pests and diseases, increased heat, drought or salinity, and can result in a lower productivity. Given that these crops play an important role in providing diverse and nutritious diets and are a key element of many household food strategies, ensuring they are adapted to new challenges is very important.

## Why Has Agricultural Research Neglected Orphan Crops?

From the 1930s through to the 1960s, the so-called "Green Revolution" in agriculture constituted a major push to boost agricultural productivity through intensive research and development programmes. This was coupled with technology transfer and extension work in the developing world, especially in parts of central America (e.g. Mexico) and Asia (e.g. India and the Philippines). It was based on plant breeding programmes which focused on creating high-yielding varieties of a few key staple crops, namely wheat, maize and rice, as well as irrigation and the use of synthetic fertilizers and pesticides.

While the Green Revolution can be credited with feeding billions of extra people around the world, it was not followed by equivalent efforts to develop similarly improved varieties and cultivation methods of many other crops that also have great potential. For example, today rice, maize and wheat alone provide over 60 percent of global food energy intake, according to the UN Foood and Agriculture Organisation. But there are over 50,000 kinds of edible plants available in the world. The potential to increase productivity, diversity and nutritional outcomes through investments in orphan crops is tremendous.

As orphan crops, pulses provide an **especially diverse and underexploited set of potential benefits.** For instance, many pulses are:

- **Nitrogen-fixing,** which means that their roots contain symbiotic bacteria called Rhizobia which can 'fix' nitrogen from the atmosphere into the root system, making them more nitrogen efficient and leaving any unused nitrogen in the soil after the plant dies
- **Highly nutritious**, with substantial amounts of dietary fibre, complex carbohydrates and proteins as well as micronutrients (e.g. iron, potassium, magnesium, zinc and B vitamins including folate, thiamin and niacin)
- **Affordable and sustainable**, providing a good source of protein and being often very water efficient. For example, only 43 gallons of water is used to produce 1 lb. of pulses
- **Resilient**, being both drought- and frost-tolerant as well as able to grow in harsher environments than many staple crops

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## A Call-to-Action for Investments in Orphan Crops

Orphan crops require more attention and funding if they are to fully contribute to **food security, nutrition and sustainability**. More than 800 million people globally still suffer from acute or chronic undernourishment. More than 3 million children die from under-nutrition each year, accounting for almost half (45%) of all deaths of children under age five. Meanwhile, unsustainable water use means that two-fifths of the world's grain production is at risk.

Investments in orphan crops can also make **sound business sense**. Take, for instance, the case of Canada, whose production of pulses has grown over 500 percent since the early 1990s due to investments in world-class breeding programmes to bolster "orphan crops". After creating new varieties that have been adapted to the country's agroecology, Canada has become the second largest pulse producer globally, with excess production contributing $2.2 billion in export sales (as of 2009).[1]

These types of efforts can be scaled up around the world with the aim being to:

- Understand the agro-ecological conditions and production techniques under which orphan crops are grown
- Conduct conventional breeding and genomics research to boost the agricultural productivity and resilience of orphan crops under changing climatic conditions and marginal lands
- Strengthen input markets for seed distribution and rural value chains, from processing to marketing orphan crops for output markets
- Improve access to extension services, especially for women smallholder farmers, for cultivating orphan crops and preparing them as food

The International Year of Pulses in 2016 is aimed at drawing attention to these crops as key examples of orphan crops to be prioritised in future agricultural research and production.

[1] http://www.idrc.ca/EN/Programs/Agriculture_and_the_Environment/Agriculture_and_Food_Security/Pages/ArticleDetails.aspx?PublicationID=1

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## Further Resources:

**African Orphan Crops Consortium**
(www.africanorphancrops.org)
The consortium's goal is to sequence, assemble and annotate the genomes of 100 traditional African food crops, which will enable higher nutritional content for society over the decades to come. The resulting information will be put in the public domain with the endorsement of the African Union. (Pulses on the list include: lab lab beans, lentils, geocarpa groundnuts, yambeans, fava beans, mung beans and Bambara groundnuts.)

**CGIAR Consortium of International Agricultural Research Centers**
(www.cgiar.org)
CGIAR is the only worldwide partnership addressing agricultural research for development, whose work contributes to the global effort to tackle poverty, hunger and major nutrition imbalances, and environmental degradation. It is carried out by 15 Centers that are members of the CGIAR Consortium, in close collaboration with hundreds of partners, including national and regional research institutes, civil society organizations, academia, development organizations and the private sector.

**Crop Trust**
(www.croptrust.org)
The Crop Trust is an established independent organization under international law working to safeguard crop diversity, forever. The Crop Trust is funding the world's most important genebanks, but its work does not end there. They maintain the ultimate failsafe for these and other collections in the Svalbard Global Seed Vault, backing up seeds from almost every country beneath the arctic permafrost against an uncertain future. They pursue conservation and use of the wild cousins of our food crops. And they help develop a new generation of information technologies to make the world's crop diversity searchable and accessible wherever it is needed.

**Crops for the Future**
(www.cropsforthefuture.org)
Crops for the Future develops solutions for diversifying future agriculture using underutilised crops to improve food and nutritional security and livelihoods of the poor. It aims to be a world leader in producing excellent, innovative research on underutilised crops that is demand-led and development focused.