



Food and Agriculture
Organization of the
United Nations



PULSES AND CLIMATE CHANGE

Revised edition

KEY FACTS

- According to FAOSTAT, **85 million hectares of pulses** were cultivated in 2014 worldwide and they **fixed approximately 3 to 6 million tonnes of nitrogen**. Consequently, pulses contribute to the more rational use of fertilizers, thus **reducing greenhouse gas emissions**.
- Including **pulses in crop rotations reduces** the risks of **soil erosion** and **depletion**.
- Multiple cropping systems, such as **intercropping** or crop rotations **with pulses**, have a **higher soil carbon sequestration potential** than monocrop systems.
- **Global production of pulses** increased from 40 million tonnes in 1961 to almost 78 million tonnes in 2014.

Food production, food security and climate change are intrinsically linked. Whether in the form of droughts, floods or hurricanes, climate change impacts every level of food production as well as ultimately, the price instability of food¹ and the food security of affected farming communities. While its impact varies across crops and regions, climate change puts global food security even more at risk and heightens the dangers of undernutrition in poor regions². Climate change also contributes to shifting the production areas of food and non-food crops around the world. Unless urgent and sustainable measures are established, climate change will continue to put pressure on agricultural ecosystems, particularly in regions and for populations that are particularly vulnerable.

INCREASING RESILIENCE

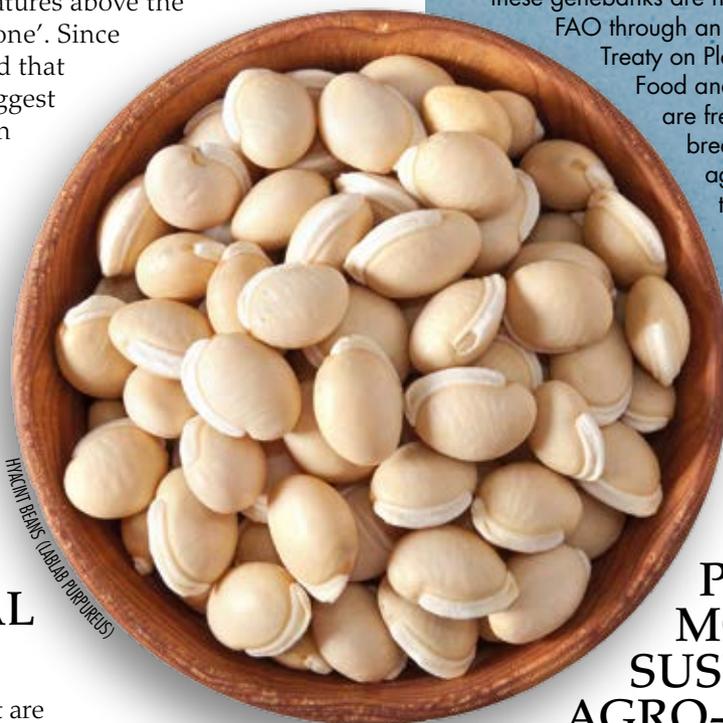
Introducing pulses into farming systems can be key to increasing resilience to climate change. Agroforestry systems, also including pulses like pigeon peas, support adaptation through diversification of the income source, increased resilience to climate extremes and increased productivity. In addition to adaptation, it is important to note that trees, and thus agroforestry systems, also sequester more carbon than field crops alone³.

Pulses are climate smart as they simultaneously adapt to climate change and contribute towards mitigating its effects.



BETTER VARIETIES

Pulses have a broad genetic diversity from which improved varieties can be selected or bred. This diversity is a particularly important attribute because more climate-resilient cultivars can be developed. For example, scientists at the International Center for Tropical Agriculture are currently working on developing pulses varieties that can grow at temperatures above the crop's normal 'comfort zone'. Since climate experts suggested that heat stress will be the biggest threat to bean production in the coming decades, these improved pulse varieties will be of critical importance, especially for low-input agricultural production systems⁴.



HVAINI BEANS (LADJAD PUPUREUS)

ECOLOGICAL FOOTPRINT

Agricultural practices that are more efficient can considerably reduce greenhouse gas emissions, which in turn will reduce the need for fertilizers, and pulses play an important role in this context.

Along with the better management of fertilizers, including integrated nutrient management, better timing of fertilization and precision farming, pulses have a very important role to play in climate change mitigation.

The inclusion of pulses in crop rotations utilizes symbiotic bacteria to fix nitrogen, which is partly transferred to subsequent crops, increasing their yields. In forage pulses/grass mixtures, nitrogen could be transferred from pulse to grass, increasing pasture production. When included in livestock feed, pulses' high protein content contributes to increase the food conversion ratio while decreasing methane emissions from ruminants, thus at the same time reducing greenhouse gas emissions.

THE IMPORTANCE OF GENE BANKS FOR CLIMATE CHANGE ADAPTATION

Genetic material of pulse crops and wild relatives conserved in the genebanks of the Consultative Group for International Agricultural Research centres and national and international genebanks, represents a good investment in adapting to climate change. The genetic resources stored in these genebanks are held in trust under the auspices of FAO through an agreement with the International Treaty on Plant Genetic Resources for Food and Agriculture. These resources are freely available for research, breeding and training in food and agriculture. In other words, the traits needed for adapting to future climate scenarios can be sourced from the gene reservoir that are preserved at the genebanks network.

POLICIES FOR MORE SUSTAINABLE AGRO-ECOSYSTEMS

The conundrum facing policymakers and agricultural experts today is how to produce sufficient food for a growing population without further degrading the natural resources and contributing to climate change. Agricultural policies cannot be developed in isolation but need to be developed together with social and economic policies. Farmers, pastoralists, fishermen and consumers should be at the centre of these policies, in order to eradicate hunger and improve livelihoods.

SOURCES:

- ¹ IPCC. 2015. Climate change 2014: Synthesis report. Geneva, Intergovernmental Panel on Climate Change.
- ² FAO. 2016. Climate change and food security: risks and responses. Rome, Food and Agriculture Organization of the United Nations.
- ³ Wollenberg, E., Nihart, A., Tapio-Bistroem M.L., & Grieg-Gran, M. 2012. Climate change mitigation and agriculture. Abingdon, Earthscan.
- ⁴ Russel, N. 2015. Beans that can beat the heat (available at www.ciat.cgiar.org).

