
Legumes: Solutions to Human Health and Agricultural Sustainability

Background

As part of the Worldwide Universities Network (WUN), a workshop on “Legumes 2020: The hub of diversification and adaptation to climate change in agriculture” was held at Zhejiang University in November 2015. Selected participants from Australia, China, UK, USA and South Africa attended.

Purpose

The purpose of this policy is to highlight the importance of grain legumes (those that produce edible seeds) and to facilitate a coordinated approach towards their use in achieving an environmentally, socially and economically sustainable food and feed sector. This will support the international commitment towards, food security, health, economic development and poverty alleviation. The strength is based on the creation of a prosperous agricultural sector while protecting the biological resource base, enhancing cooperative activities and improving human health and well-being. Grain legumes provide significant biodiversity to sustain productivity in the face of the environmental stresses resulting from climate change. A strong research and development effort is required for legumes to provide a significant contribution to a healthy diet.

Problem statement

Legumes are currently underutilized in comparison to cereals in spite of the known benefits to agricultural productivity, sustainability and human health. Grain legume production is static or declining in developing countries, in the face of an increasing global demand. These crops are grown across a range of farming systems, from subsistence agriculture to sophisticated commercial production systems, so research and development needs to target particular species to these various agroecological systems.

Farming systems need to be profitable and sustainable to meet the growing needs of the world’s population and respond to the changing climate. Farmers need to optimize the use of inputs such as water and fertilizers. Legumes have a significant role in cropping systems because of their sustainable and environmental benefits such as reducing the carbon footprint and the need for nitrogen fertilizers. They provide nutritious human food and animal feed in both commercial and low-input subsistence agriculture.

The health advantages of a legume-rich diet are many faceted. Their role in global health including the reduction of non-communicable diseases, such as obesity, diabetes, heart disease and neurodegenerative diseases is underappreciated. A diverse diet including a range of legumes is required for health benefits.

The insufficient knowledge of legume science and technology limits current and future global production and consumption. This includes access to germplasm, both of nodulating legume species and rhizobia. New technologies for crop improvement need to be applied to legume research in order to achieve these goals especially in response to climate change.

Strategies for policy development

As scientists we would welcome a dialogue with national funding agencies and industry to advise them on where global investment should be made in order to achieve increased consumption and sustainable expansion of legume production. This requires innovation, strategic funding and relevant training of researchers, agronomists, growers and the food and health sectors.

The full potential of legumes will only be realized by the formation of a global network to pool resources and information, drive application of innovative technologies, and promote the human health benefits of legumes and their value to the environment.

To achieve increased and sustainable use of legumes both fundamental research and on-farm approaches are necessary. This requires innovation, strategic funding and relevant training of researchers, agronomists, growers and the food and health sectors to maximize outputs (market value) and adoption by consumers.

The essential recommendations are:

- (i) To develop a global, publically funded network of shared access to germplasm and data.
- (ii) To develop a better understanding on the health effects with regard to the global obesity epidemic and increased prevalence in diabetes
- (iii) To undertake further research to understand cultural attitudes towards the use of legumes, to promote the health benefits and how these can be effectively marketed
- (iv) To include more participatory approaches to transfer of long established and recently developed technologies related to grain legume production to resource-poor rural communities.
- (v) To develop a comprehensive understanding of the value addition chain for the particular sub-sector, to better understand the bottlenecks.
- (vi) To undertake fundamental research into biological nitrogen fixation and nitrogen use efficiency, as well as phosphorus in relation to climate change
- (vii) To develop the underpinnings of transformative technologies necessary for producing new elite varieties

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