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COMMITTEE ON AGRICULTURE

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The International Year of Pulses: Nutritious Seeds for a Sustainable Future

Executive Summary

In recognition of the contribution that pulses can make to human well-being and to the environment, 2016 was declared the International Year of Pulses (IYP). Pulses are inextricably linked to:

- a) Food security as they are a critical and inexpensive source of plant-based protein, vitamins and minerals for people around the world, especially for smallholder farmers;
- b) Human health as their consumption can prevent and help managing for example obesity, diabetes, and coronary conditions;
- c) Sustainable agriculture as they are able to biologically fix nitrogen and free soil-bound phosphorus which is very important for efficient resource management and ecosystem health; and
- d) Climate change adaptation as they have a broad genetic diversity from which climate-resilient varieties can be selected and/or bred.

Despite these benefits, the per capita consumption of pulses has declined in both developed and developing countries. This trend reflects the change of dietary patterns, consumer preferences and the failure of domestic production to keep pace with demand in many countries. It calls for appropriate policies to promote and support pulses consumption and production.

The IYP was declared to raise awareness of the contribution of pulses to food security and nutrition. The role of the Food and Agriculture Organization of the United Nations (FAO) and the IYP Steering Committee is to encourage relevant stakeholders to work towards increasing production, and consumption improving productivity of pulses while enhancing the resilience of agro-ecosystems. This will be carried out through the development of advocacy documents, public goods such as the Global Compositional Database on Pulses, with national and international events promoting best practices and success stories on pulses as well as several communication, advocacy and outreach activities. IYP's awareness raising activities, advocacy strategies and consultative policy dialogue process will be instrumental for improving the knowledge, information and public perception of pulses and their role in sustainable agriculture and food security.

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Suggested action by the Committee

The Committee is invited to:

- 1) Acknowledge the contribution of pulses to sustainability, food security, nutritional health, environmental protection and climate change mitigation and adaptation.
- 2) Encourage governments to use the opportunity of the International Year of Pulses (2016) to engage in raising public awareness on the multiple benefits of pulses and to develop and implement policies for promoting the improved production and consumption of pulses.

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I. Introduction

1. The United Nations (UN) General Assembly, at its 68th session, declared 2016 as the International Year of Pulses (IYP) to further promote the use and value of pulses inviting FAO to facilitate the activities of the IYP¹. Pulses² can play a crucial role due to their important nutritional, environmental and economic value generating economic benefits that can help to significantly reduce poverty³, contributing to nutrition and healthy diets and to the sustainability of food systems.

2. Therefore, pulses can make an important contribution to achieving several of the UN's Sustainable Development Goals, including: a) End poverty in all its forms everywhere (1), b) End hunger, achieve food security and improved nutrition and promote sustainable agriculture (2), c) Ensure healthy lives and promote well-being for all at all ages (3), d) Ensure sustainable consumption and production patterns (12) and Take urgent action to combat climate change and its impacts (13).

3. FAO together with the IYP Steering Committee have drafted an Action Plan for the International Year which includes the production of outreach materials and several activities to raise awareness of the contribution of pulses to food and nutrition security and the environment. Important activities of the IYP are the regional dialogues which were designed to identify region-specific obstacles hampering the improvement of production and consumption of pulses. The present document aims to provide background information about the importance of pulses for food security and nutrition, sustainable agricultural production, adaptation and mitigation of climate change and trade. Additionally, needs for the future improvement of production and consumption of pulses are presented.

4. Pulses are a critical source of protein and other nutrients for a large part of the world population. In order to value the importance of pulses, some key issues need to be addressed:

- a) The lack of policies to promote sustainable production of pulses, research and extension;
- b) The lack of knowledge and information on the nutritional value of different pulses species;
- c) The need to better understand the value of pulses for soil health, climate change and biodiversity;
- d) The lack of access to local and global markets including seeds; and
- e) The need to gather evidence on farming practices to improve pulses-based production systems; especially addressing family farmers and rural poor households to improve their livelihood and food security.

II. The International Year of Pulses

A. Key objectives

5. An UN International Year is an opportunity to draw global attention to a priority concern for all or the majority of countries. According to the "Guidelines for the proclamation of international years", the Year should contribute to the development of international cooperation in solving global problems, in particular those affecting developing countries. The International Year should involve

¹ UN (United Nations) 2013. Resolution 68/231: International Year of Pulses, 2016. (<http://www.un.org/en/ga/>). Accessed 9 May 2016.

² According to FAO, pulses, a subgroup of legumes, are crop plant members of the *Leguminosae* family (commonly known as the pea family) that produce edible seeds, which are used for human and animal consumption. Only legumes harvested for dry grain are classified as pulses.

³ Macharia I, Orr A, Simtowe F & Asfaw S. 2012. Potential economic and poverty impact of improved chickpea technologies in Ethiopia. Triennial Conference of the International Association of Agricultural Economists, Foz do Iguaçu, Brazil.

action at the international, regional and national levels and should be expected to generate significant follow-up at all levels in the form of new activities or the strengthening of existing ones⁴.

6. The main objective of the IYP is to raise awareness of the contribution of pulses to food security and nutrition, more specifically: (i) increase the knowledge and the evidence on pulses, their attributes and their ability to provide solutions to health, trade and environmental sustainability issues; and (ii) strengthen national, regional and local capacities to formulate and implement policies and programmes to improve nutritional status.

B. Key activities

7. An IYP Action Plan was prepared by FAO in collaboration with the members of the Steering Committee. It comprises the following: 1) **outreach activities**, including information and dissemination through publications, web, and media; 2) **Regional and global awareness raising campaigns** aimed at enabling discussions and knowledge exchange among diverse stakeholders; 3) **regional dialogues and a face-to-face global dialogue on pulses** for validating future investments in the pulse value chain addressing: (a) the role of pulses and their contribution to sustainable rural development, market access and food security and nutrition; (b) pulses actors (such as family farmers, producers and processors); and (c) pulses good practices and innovations; 4) **a food composition database on pulses**; 5) **research/scientific papers and studies**, such as a report on the impacts of climate change on global pulse production over the next 20 years, a report on the world pulses economy and a research paper on pulses; 6) **two global online forums on the FAO Food Security and Nutrition platform**; (7) **FAO IYP Book**: recipes and FAO's five IYP key messages; (8) designation of **IYP special ambassadors**⁵ to support FAO in raising public awareness on pulses for food security and nutrition.

III. The importance of pulses

A. Human health and nutrition

8. Pulses are an important part of a healthy diet because of their high content of protein, fibre, vitamins, minerals and bioactive compounds while being low in fat. Pulses contain about 20-25 percent of protein, i.e., double of wheat and triple of rice. When consumed with cereals, the protein quality is significantly improved⁶. This benefit is used to replace meat protein and thus contributes to healthy diets and sustainable consumption. The high dietary fibre content improves stool volume and bowel transit, and binds toxins and cholesterol in the stool. The combination of high fibre and slowly digested starch increases satiety and lowers the Glycaemic Index (an indicator of the effect on blood sugar), both important in weight control and for diabetic patients. Pulses are rich in iron, magnesium, potassium, phosphorus, zinc and B-vitamins (thiamine, riboflavin, niacin, B6, and folate). Additionally, because pulses are dried seeds they can be stored for long time, increasing the year-round food availability and usability in emergencies and food aid. Because of the beneficial combination of components, pulses can reduce risks of developing anaemia (through iron and zinc), foetal neural tube defects (through folate), and cancer, diabetes, heart disease by improving gut health and lowering blood cholesterol. Eating pulses regularly can help improve nutrition and human health.

⁴ UN (United Nations) 1980. Decision 35/424: Guidelines for the proclamation of international years. (<http://www.un.org/en/ga/>). Accessed 10 May 2016.

⁵ **Elizabeth Mpofu**, Special Ambassador for Africa; **Kadambot Siddique**, Special Ambassador for Asia and the Pacific; **Jenny Chandler**, Special Ambassador for Europe; **Patricia Mercedes Juárez Arango**, Special Ambassador for Latin America and the Caribbean; **Magy Gamal Habib AbdElmessih** (Special Ambassador for the Near East), **Joyce Boye** (Special Ambassador for North America)

⁶ **Singh U & Singh B.** 1992. Tropical grain legumes as important human foods. *Economic Botany* 46(3): 310-321.

B. Sustainable agricultural production

9. An important attribute of pulses is their ability to biologically fix nitrogen. In symbiosis with certain types of bacteria (i.e., *Rhizobium* and *Bradyrhizobium*), these plants are able to convert atmospheric nitrogen into nitrogen compounds that can be used by plants, while also improving soil fertility⁷. Some varieties of pulses are also able to free soil-bound phosphorous, which plays an important role in the nutrition of plants⁸. The presence of pulses in agro-ecosystems helps to maintain and/or increase vital microbial biomass and activity in the soil, thereby nourishing those organisms that are responsible for promoting soil structure and nutrient availability⁹. A high level of soil biodiversity not only provides ecosystems with greater resistance and resilience against disturbance and stress, but also improves the ability of ecosystems to suppress diseases¹⁰. These features are particularly important for low-input agricultural production systems.

10. Pulses are a critical component of multiple cropping systems, e.g., intercropping, crop rotation, agroforestry, and these cropping systems have greater species diversity than monocrop systems¹¹. Increasing species diversity of cropping systems not only results in a more efficient use of resources, namely light, water and nutrients¹², but also can increase the combined yields of intercropped species in a given area and lowers the risk of overall crop failure¹³. Furthermore, intercropping systems not only permit greater underground utilisation efficiency due to their root structures¹⁴, but also deep rooting pulses like pigeon peas can provide groundwater to intercropped companion species¹⁵. Pulses have an important social value because through the promotion of local indigenous, under-utilised pulses such as Bambara beans, they can contribute not only to improve economies, thus increasing well-being of communities, but also can help to preserve culturally appropriate foods while contributing to balanced diets.

C. Climate change

11. The inclusion of pulses in different agricultural production systems can make an important contribution to reduce the impacts of agriculture on climate change. The inclusion of legumes in crop rotations improves the nitrogen cycling through biological nitrogen fixation; in its turn, this nitrogen is harvested in the crop and partly transferred to subsequent crops thus increasing their yields. In forage legume/grass mixtures, nitrogen is also transferred from legume to grass, increasing pasture production. The high protein content gives legumes a particular importance from a nutritional point of view. When legumes are included in livestock's feed, food conversion ratio is increased and thus methane emissions from ruminants are reduced, leading to an increased efficiency and reducing greenhouse gas (GHG) emissions.

⁷ **Nulik J, Dalgiesh N, Cox K & Gabb S.** 2013. *Integrating herbaceous legumes into crop and livestock systems in eastern Indonesia*. Canberra, Australia: Australian Centre for International Agricultural Research.

⁸ **Rose TJ, Hardiputra B & Rengel Z.** 2010. Wheat, canola and grain legume access to soil phosphorus fractions differs in soils with contrasting phosphorus dynamics. *Plant and Soil* 326 (1):159-170.

⁹ **Blanchart E, Villenave C, Viallatoux A, Barthès B., Girardin C, Azontonde A & Feller C.** 2005. Long-term effect of a legume crop cover (*Mucuna pruriens* var *utilis*) on the communities of soil macrofauna and nematofauna under maize cultivation in southern Benin. *European Journal of Soil Biology* 42(S1): 136-144.

¹⁰ **Brussaard L, Ruiten PC de & Brown GG.** 2007. Soil biodiversity for agriculture sustainability. *Agriculture, Ecosystems and Environment* 121(3):233-244.

¹¹ **FAO.** 2013. *Save and Grow: A policy maker's guide to sustainable intensification of smallholder crop production*. Rome, Italy.

¹² **Giller KE & Wilson KJ.** 1991. *Nitrogen fixation in tropical cropping systems*. Wallingford, United Kingdom: CAB International.

¹³ **Altieri MA.** 1995. *Agroecology: The science of sustainable agriculture*. Boulder, United States of America: Westview Press.

¹⁴ **Li L, Sun J, Zhang F, Guo T, Bao X, Smith FA & Smith SE.** 2006. Root distribution and interactions between intercropped species. *Ecosystem Ecology* 147(2):280-290

¹⁵ **Sekiya N & Yano K.** 2004. Do pigeon pea and sesbania supply groundwater to intercropped maize through hydraulic lift? - Hydrogen stable isotope investigation of xylem waters. *Field Crop Research* 86(2-3):167-173.

12. Pulses can play a key role to address simultaneously food security and climate change challenges in an integrated way: (1) by providing proteins and lysine, in which cereals are deficient, legumes complement cereals in human alimentation and can compensate the lack of animal proteins; (2) they contribute to diversified crop rotations, which is important to reduce the impact of climate related risks (as well as other risks); and (3) because of their nitrogen fixing abilities, they enable the reduction of the use of fertilizers (organic and synthetic) and thus to reduce GHG emissions. Therefore, pulses can be considered an element in making agriculture more climate-smart, i.e., they can improve food security while helping to adapt to and mitigate effects of climate change.

D. Economy and trade

13. World production of pulses has increased by over 20 percent since 1990, to surpass 77 million tons in 2014. Pulse production is highly concentrated. The top five producing countries, i.e., India, Canada, Myanmar, China and Nigeria, accounted for half of world production. India is the world largest producer, accounting for a quarter of world production. The main markets for pulses (i.e. greatest total consumption) are India, Brazil, Nigeria, China and Mexico, whereas the countries with highest per capita consumption of pulses are Rwanda, Niger, Haiti, Ethiopia and Tanzania.

14. International trade in pulses has grown rapidly, much faster than output. Since 1990, total exports of pulses have more than doubled, expanding from 6.6 to almost 14 million tons in 2013. As a result, the proportion of pulse production that is traded has increased from 11 percent to 18 percent during this period. The value of pulse exports has grown even more rapidly, rising from US\$ 2.5 billion in 1990 to US\$ 9.6 billion in 2013.

15. By contrast, the consumption of pulses, in per capita terms, has decreased in both developed and developing countries, from 9.4 kg/person/year in 1961 to 6.9 kg/person/year in 2011. Nonetheless, the long-term trend of declining consumption witnessed in earlier decades appears to be in reversal, with per capita consumption picking up slowly since the early 1990s.

16. These global trends reflect not just changing dietary patterns and consumer preferences but also the failure of domestic production to keep pace with demand in many countries. Since 1961, the average annual growth of world cereal yields has been almost three times larger than that of pulses. The annual yield of pulses in developing countries (mainly on small-scale farms) is about five times less than that in developed countries (mainly on industrial farms).

IV. Improvements for production and consumption of pulses

17. Promotion activities framed within the IYP Action Plan should lead to an increase of pulses consumption and, consequently, it is expected that production should also increase. In order to assure a sustainable increase of pulses-based food systems, particularly to benefit small-scale farmers and the poor, some integrated and local specific actions are needed:

- a) The genetic improvement of pulses, including under-utilised species, to ensure availability of cultivars adapted to different ecological conditions (including marginal areas such as drylands), future climate risks and different large and small scale farming systems.
- b) Improvement of the value chains of pulses at all stages (i.e., seed systems, production, post-harvest –including improving the use of residues, trade, and consumption).
- c) Enhancement of the social acceptance of indigenous, under-utilised pulse species, which can help to improve production of pulses since some of them are well adapted to marginal areas.
- d) Advancement of the knowledge about the nutrition quality of different pulse species, including the different cultivars within the species and about the understanding of the role of pulses to maintain ecosystem functions and soil health.

V. Suggested action by the Committee

18. The Committee is invited to:
 - 1) Acknowledge the contribution of pulses to sustainability, food security, nutritional health, environmental protection and climate change mitigation and adaptation;
 - 2) Encourage governments to use the opportunity of the International Year of Pulses (2016) to engage in raising public awareness on the multiple benefits of pulses and to develop and implement policies for promoting the improved production and consumption of pulses.