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FAO REGIONAL CONFERENCE FOR EUROPE

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Pulses for improving balanced nutrition and healthy food systems in Europe and Central Asia - International Year of Pulses 2016

Executive summary

With a food insecurity level below five percent in most countries of Europe and Central Asia (EuCA), major nutrition concerns across the region relate to micronutrient deficiencies, overnutrition, non-communicable diseases (NCDs) and unhealthy diets. Coherent policies, technical capacities, investments and intersectoral programmes are required to address them.

Pulses are grown around the world for human consumption and animal feed and are recognized as being inexpensive, readily available sources of protein, complex carbohydrates, fibres, vitamins and minerals. Pulses have an exceptional capacity and potential to contribute significantly to sustainability, food security, nutrient-rich and diverse diets, human health, soil fertility, improved yields of companion or subsequent crops, biodiversity, environmental protection and climate-change mitigation and adaptation. Recent research has revealed new advantages of pulses and many innovative ways to use them for food purposes, which are generally not well known or under-appreciated. In EuCA region the share of pulses in the total daily caloric intake ranges only between 0.2 and 2.82 percent.

The versatile benefits of pulses for nutrition, health and the environment and their potential to eliminate multiple forms of malnutrition need to be highlighted and brought to the attention of governments and a broad range of stakeholders aiming at their engagement with policy and enhanced support to growers and with advocacy for increasing the demand from consumers. Pulses are extraordinary crops for developing nutrition-sensitive value chains and making food systems more sustainable.

This paper highlights various benefits and uses of pulses, provides data on global and regional production, consumption and trade, and underlines some of the constraints faced by the pulses sector in EuCA region. The proposed policy recommendations aim to support positive transformations in various areas of the pulses sector.

Guidance sought

Acknowledging the contribution of pulses to sustainability, food security, nutritional health, environmental protection and climate-change mitigation and adaptation, the Conference may wish to encourage governments to use the opportunity of the International Year of Pulses (IYP) 2016 to engage in raising public awareness on the multiple benefits of pulses and to apply policies that fit best in developing pulses' value chains and promoting their contribution to nutrition-sensitive changes in the agri-food systems in mid- and long-term perspectives beyond the IYP 2016.

I. Introduction

1. Ensuring food security and reducing all forms of malnutrition through nutrient-rich, diverse, safe and healthy diets, sourced from sustainable agriculture and food systems that are energy-, water- , resource-efficient and with minimal environmental impact, are high on the agenda of governments worldwide.

2. With a food insecurity level below five percent in most EuCA countries,[i] the major nutrition concerns across the region relate to micronutrient deficiencies, overnutrition and unhealthy diets.[ii,iii]

3. In many EuCA developing economies, despite the rise in income, monotonous diets still pose a challenge. High shares of food expenditures in households' budgets, the focus of agricultural and food security policies on a few major staple crops and lack of knowledge on nutrition and healthy dietsiv limit their capacity for diversified nutrient-rich diets.

4. The FAO/WHO Second International Conference on Nutrition (ICN2) Framework for Action (FfA)[v] recommends major shifts in the way malnutrition is addressed by raising the nutrition sensitivity of agri-food systems, promoting crop diversification and food-based approaches for achieving sustainable and healthy diets.

5. Better promotion and broader use of pulses could be an important solution towards making food systems more sustainable and nutrition-sensitive. In order to support the spread of knowledge on pulses and trigger positive transformations in the pulses sector, the 68th United Nations General Assembly (UNGA) endorsed recommendation 6/2013 of the 38th FAO Conference and declared 2016 the International Year of Pulses (IYP) (A/RES/68/231). FAO has been tasked by UNGA to facilitate the implementation of the IYP that was officially launched in November 2015 under the slogan "International Year of Pulses: Nutritious Seeds for a Sustainable Future".

6. Pulses are dry seeds of leguminous plants which are distinguished from leguminous oilseeds by their low fat content.[vi] Pulses comprise a broad range of species, varieties and cultivars of dry beans, dry peas, chickpeas, and lentils. Pulses do not comprise legume crops harvested green for food, which are classified as vegetable crops, or oil-rich soybeans and peanuts used for oil extraction. They also exclude technical leguminous crops such as clover and alfalfa that are used exclusively for sowing purposes.[vii]

7. Pulses have been an essential part of the human diet for centuries. Agricultural production of pulse crops dates back to 10 000 B.C.[viii] Available in a wide diversity of species, varieties and cultivars, pulses are produced in a broad range of ecological conditions throughout the world, becoming part of many traditional diets.

8. Pulses have many advantages as exceptional crops for environmental sustainability, food security, nutrition and health. However, with some exceptions, pulses have not received significant government support in breeding new varieties, yield improvement, and expansion of production areas similar to those for cereal crops. Thus, from the early 1960s up to the present, production gains of

maize, wheat and rice reached 306, 188 and 212 percent, respectively, while those of pulses reached only 54 percent over the same period.[ix]

9. Moreover, the multiple benefits of pulses remain generally unknown or are under-appreciated. Significant in this regard is the fact that in EuCA region the share of pulses in the total daily caloric intake ranges between 0.2 and 2.82 percent.

10. The IYP aims[x] to raise awareness on varieties of pulses and their benefits at all levels: global, regional, national and local, and highlight the challenges for the pulses sector to promote the value addition and utilization of pulses throughout the food system, facilitate connections for global production and trade of pulses, foster research and innovations and advocate for better utilization of pulses in crop rotation and intercropping. The IYP is marked by countries with thematic conferences, consultations, round tables, exhibitions, public promotional events and tasting of dishes prepared with pulses.[xi]

11. The IYP presents a great opportunity to promote the benefits of pulses in the context of the Sustainable Development Goals (SDGs). Sustainable development includes identifying, processing and consuming foods with special benefits for health, particularly with properties for preventing and treating a variety of worldwide expanding NCDs. Consuming pulses may help in preventing many diseases, in promoting health and raising the overall quality of life. Production and greater utilization of pulses for healthy diets are relevant for SDGs 2, 12, 13 and 15.[xii]

12. The IYP may promote the better use of whole pulses and pulse-derived ingredients, such as protein isolates, fibres and other components through innovations in processing, packaging, labelling and new food formulations that would contribute to more food diversity and to raising consumers' demand.

II. Multiple benefits of pulses

A. Nutritional value and health benefits of pulses

13. Studies in recent years have identified both demonstrated and potential health benefits of pulses as nutrient-rich food, with an associated risk-reduction for some chronic diseases,[xiii] beyond meeting dietary recommendations; demonstrated benefits refer to the effect of their components on maintaining metabolic, cardiovascular and gastrointestinal health.[xiv,xv]

14. The nutrient composition varies among different pulses (Table 1, Annex 1) and may be influenced by environmental conditions. The commonality of pulses is their significantly higher protein content than that of the most important cereal crops. Pulses contain on average 19-25 percent of protein, and over 30 percent in newly-developed varieties.[xvi]

15. The nutritional and phytochemical components of pulses, combined with those of whole grain cereals have significant synergistic effects and health benefits.[xvii,xviii] Proteins from pulses and cereals are mutually complementary with their respective limiting essential amino acids; therefore, when pulses and cereals are used in composite recipes or diets the result is a nutritionally complete protein that is a quality alternative to proteins of animal origin and an excellent substitute for meat in a vegetarian diet.

16. Pulses do not contain gluten and are therefore suitable for people affected by coeliac disease.

17. Pulses are rich in fibres (soluble and insoluble), which have proven health benefits, including the improvement of serum lipid profiles and reduction of other risk factors of cardiovascular diseases.[xix,xx]

18. The high content of fibre and protein in pulses leads to a positive association between their consumption and increased satiety,[xxi] reduced appetite and decreased caloric intake, which make pulses a key food in body weight management and overweight reduction.

19. Pulses are a significant source of minerals such as potassium, phosphorus, magnesium and calcium, with key functions for the body, such as maintaining bones' structure and strength, lowering blood pressure, etc. Pulses also contain various essential trace elements, such as iron, selenium, zinc, molybdenum, manganese, copper and boron – many of them with antioxidant and anti-inflammatory properties, which are protective against chronic diseases.

20. Pulses contain several vitamins with antioxidant properties (C, E and beta-carotene) and other vitamins with important roles in metabolic processes, such as B6, folic acid and K.

21. A range of components with biological activity in pulses, such as saponins and phytates may have beneficial effects on human health through cholesterol-reducing and anti-carcinogenic activities. A range of phytochemicals and enzymes, once considered as only anti-nutritive factors[xxii] may have beneficial health effects as well.[xxiii]

22. The starch in pulses contains higher levels of indigestible enzyme-resistant and slowly digestible fractions compared to cereal starches. This particularity and the significant content of dietary fibre make pulses a low-glycaemic index food,[xxiv] beneficial in the prevention and dietary management of type 2 diabetes.[xxv]

23. Limiting factors to wider dietary use of pulses are their lengthy cooking time and flatulence caused by the non-digestible oligosaccharides. However, reducing cooking time is addressed by research with the release of new varieties, while the level of oligosaccharides may be reduced by simple cooking procedures.[xxvi]

24. Governments are developing national food-based dietary guidelines[xxvii] with recommendations to all categories of the population - low-income and wealthy groups - to consume pulses as part of healthy balanced diets to prevent NCDs and optimize health.

25. However, despite the multiple benefits for nutrition and health, the share of calories from pulses in the total daily dietary intake in the EuCA region is very low (Figure 1), amounting on average to 32 kcal/capita/day, or about one percent of total daily calories consumed.

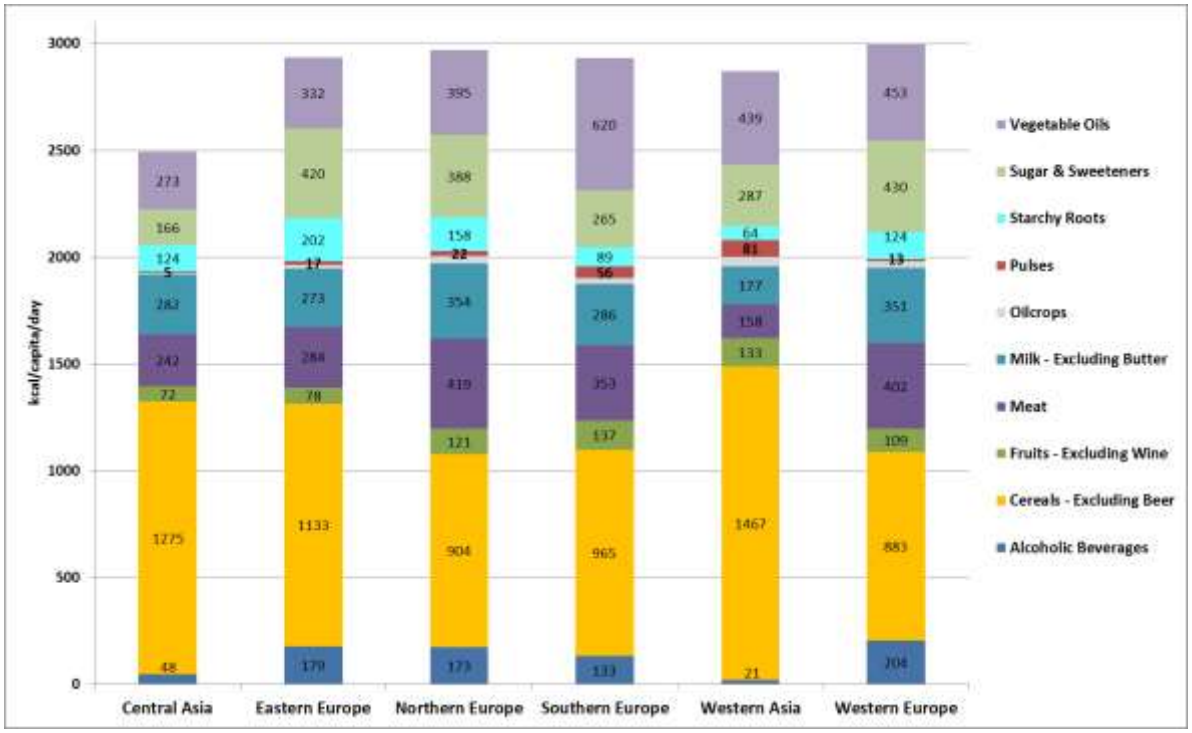

Figure 1. Sources of daily calories in the EuCA sub-regions[xxviii] 2011 year); Source: FAOSTAT (Accessed: Jan/2016)

26. The IYP may support an important change in enhancing the use of pulses in the diets across EuCA region and in showcasing the functional link between agriculture, nutrition and health.

B. Environmental benefits of pulses

27. Compared to other protein sources, pulses are an excellent choice for climate-smart agriculture, having beneficial implications on all three of its pillars,[xxix] among which reducing the carbon footprint of crops is one of the targets that needs to be achieved for limiting the overall environmental impact of agriculture.

28. The carbon footprint of pulses (125 kg CE[xxx]/ha/year) is significantly lower than that for other highly consumed crops, such as potatoes (540 kg CE/ha/year), winter cereals (388 kg CE/ha/year), winter oilseed rape (436 kg CE/ha/year) and spring-sown cereals (310 CE/ha/year).xiv By producing a smaller carbon footprint, pulses indirectly reduce greenhouse gas (GHG) emissions, an important factor in climate-change mitigation.

29. Estimates show that 75 percent of total GHG emissions result from the energy-intensive production and application of nitrogen fertilizers (both organic and inorganic);xiv their overuse might be detrimental to the environment. All pulses fix nitrogen and some of them help to increase the availability of phosphorus in the soils for companion or subsequent crops, thus providing naturally two fertilizers. Growing pulses may bring double benefits: reducing farmers' dependence on synthetic fertilizers and lowering the carbon footprint of their agricultural production.

30. Pulses are important for sustainable intensification of crop production by alternating them with other crops in the same field (crop rotation) or growing them with one or more crops in the same field and at the same time (inter-cropping). It is estimated that pulses can cover between 20 and 40 percent of wheat's nitrogen needs, with some varieties fixing as much as 300 kg of nitrogen per hectare. As a result of their use in crop rotation and intercropping, pulses can increase the productivity of wheat for example by about 77 percent[xxxi] as compared to mono-cropping, yielding at the same time

grains with a higher protein content. Similarly, growing maize subsequently to pulses increases the productivity by 25-33 percent. xxxi

31. A high level of water efficiency is yet another property of pulses, also saving water for subsequent crops grown in rotation.[xxxii] The water used to produce one kilogram of animal-sourced protein-rich food is hundreds of times higher than the water necessary to produce one kilogram of pulses.[xxxiii, xxxiv] High levels of water efficiency make feasible the production of pulses also in dry and drought-vulnerable areas. xxxiii, [xxxv]

32. Pulses have a favourable impact on soil organisms, increasing their number, diversity and activity as well as a capacity to disrupt the cycle of weeds, pests and disease agents. This property is further enhanced by applying minimal conservation tillage or no-till on land under pulses cultivation.

33. Having a long shelf life with no refrigeration allows pulses to be stored in dry places for months without spoiling or losing their high nutritional value. Pulses are also easily transported, making them an excellent staple for food-aid baskets.

34. Crop residues from pulses can also be used as animal fodder to increase nitrogen concentration in their diets, thus improving animal health and growth.

III. Pulses production, consumption and trade: global and regional trends

A. Pulses production and trade

35. World production of pulses has steadily increased since the 1960s at a rate of about one percent per year.[xxxvi] The world's largest producer of pulses in 2014 by volume is India, followed by Canada, Myanmar, China, Brazil and Australia (Figures 2 and 3, Annex 2). The three foremost producers in EuCA region are Russian Federation (in 10th place among global producers), followed by Turkey and France (Figure 4, Annex 2).

36. In 2014, France was the largest producer of dry pulses in the EU (26.6 percent of the EU-28 total), with French production of field peas accounting for nearly half (41 percent) of EU-28 total, followed by Germany (12.1 percent) and the United Kingdom (9.8 percent). Spain alone accounted for almost one-third of the total EU area of dry pulses in 2014, with over 0.4 million hectares. This was almost double the area registered in France.[xxxvii] The United Kingdom was the leading producer of broad and field beans in 2014, accounting for 35.1 percent of the EU-28 total, followed by France (21.9 percent) and Italy (10.8 percent).

37. Planting areas of pulses vary by year depending on the availability of seeds, prices and subsidies/premium policies, weather conditions, fertilizer prices, plant diseases, competition from other crops in pulses-growing areas, etc.[xxxviii] (Figure 5, Annex 2).

38. The international pulses market is relatively small, with about 15 percent of global production traded in 2003[xxxix] and 18 percent in 2013.[xl] A barrier and challenge to wider international trade in pulses is the absence of grading standards and classifications of individual pulse-crop species.[xli]

39. The five major exporters in EuCA region are Russian Federation, France, United Kingdom, Turkey and Ukraine (Figure 6, Annex 2) and the five major importers are Turkey, Italy, United Kingdom, Spain and Belgium (Figure 7, Annex 2).

40. The annual yield of pulses in developing countries (mainly on small-scale farms) is about five time less than that in developed countries (mainly on industrial farms).[xlii]

41. Since 2006, prices for most pulses are growing gradually yet steadily (Figure 11, Annex 3), opening up the possibility of higher incomes to growers.

B. Pulses utilization

42. Pulses are used for food, feed, income generation from sales and seeds for replanting. Up to 25 percent of pulses are used globally as feed, particularly for pigs and poultry and 65 percent for human consumption. There are large differences between developing countries, where pulses are used mainly for food, and developed countries, where they are mainly used for feed. Losses of pulses from harvesting, storage, transportation and distribution to households are highest in Eastern and Southern Europe and in Western Asia (Figure 8, Annex 3).

43. During the period 2002-2011 the cumulative volume of utilized pulses in EuCA region ranged from less than half a million tonnes in Central Asia to over nine million tonnes in Eastern Europe (Figure 8, Annex 3). The use of pulses for food purposes is lowest in Western Europe and highest in Western Asia; however an upward trend in the consumption of pulses in developed countries is emerging with increasing interest in healthy diets. [xli, xliii, xliv] The projection on demand for pulses shows rising trends, both due to the growth in population and to the rise in consumption. While the level of pulses used as animal feed in EuCA region ranges between 35 and 55 percent, which is higher than the worldwide average of 15-20 percent, in Western Asia it is 14.3 percent (Table 2, Annex 3).

44. In EuCA region the highest consumer of pulses is Turkey, followed by Serbia, Spain, Israel and the former Yugoslav Republic of Macedonia with an annual consumption ranging between 4 and 13 kg/capita (Figure 10, Annex 3), which is still about three times lower than global levels (Figure 9, Annex 3). Very low production and consumption of pulses is registered in the Central Asian subregion.

45. Different varieties of pulses, diverse means of processing, as well as culinary preparation options, make pulses exceptional crops for dietary diversity. As food manufacturers are increasingly interested in improving the nutrient profile of their products, pulses are becoming an ingredient in high demand. An emerging trend in their processing is milling and utilization of pulses in flour form in processed foods, including in composite cereal-based foods.

IV. Challenges and constraints in EuCA region

46. Many global challenges[xlv] related to the efficiency of the pulses sector in developing countries are also applicable to developing economies from EuCA region, such as:

i) production is largely of a subsistence nature, rather than commercial;
ii) lack of investment in small-scale farming;
iii) cultivation of pulses is moved to marginal zones, with better land used for cereals;
iv) agricultural policies focus on cereals, and
v) limited research, lack of technology and scarce availability of improved cultivars to small-scale farmers.

47. In addition, other particular challenges in EuCA region to the production of pulses include high costs of inputs (oil, fertilizers, pesticides), small sizes of farmers' fields, lack of mechanization, high share of manual work (especially women's work for sowing and harvesting), low yields, deficiencies in marketing and low market prices, lack of subsidies, losses at harvesting, threshing and storage and low demand for and consumption of pulses. Weak capacity to control plant diseases, pests and weeds in pulses production is an area which needs to be strengthened in developing economies as well as the knowledge of WTO SPS requirements, including compliance capacity of small-scale farmers.

V. FAO's role in the promotion of pulses

48. FAO facilitates the implementation of the IYP in collaboration with governments, farmer's organizations, non-governmental organizations, the private sector, agricultural research and academia and all other relevant organizations, partners and stakeholders. FAO has been assigned the leading role in IYP implementation due to its expertise in the food and agricultural sectors and especially because in many countries pulses are produced mostly by small-scale and family farmers, which are a priority for FAO support.

49. In line with its mandate, technical comparative advantage and in close collaboration, synergy and complementarity with other development partners, FAO is committed to support governments in achieving the IYP objectives in medium- and long-term perspectives through:

- support in promoting pulses for sustainable crop production intensification, biodiversity, ecosystem-based agriculture and more sustainable nutrition-sensitive food systems;
- contributing to knowledge-sharing and awareness-raising on pulses' benefits, advertising results of research and innovation on pulses and offering a neutral platform for exchange of information and technical consultation; a multi-stakeholder approach to knowledge-sharing and mutual learning will receive support as appropriate;
- compiling a comprehensive, harmonized and evaluated database on food composition of pulses as a resource for policy- and decision-makers on addressing micronutrient deficiencies and incorporating pulses into nutrition and agricultural policies and food-based guidelines;
- communicating best practices for eliminating food losses in the pulses sector;
- supporting gender inclusiveness in the pulses value chain and pulses-related income-generating activities;
- supporting mutual learning of good practices on natural selection, production, processing and utilization of pulses by mobilizing and facilitating South-South and Triangular cooperation and partnerships with civil society and the private sector.

VI. Policy recommendations

50. Due to the importance of pulses for agriculture, the environment, nutrition and health, and taking into consideration their multiple benefits, the Regional Conference is encouraged to recommend that members consider applying the following policies:

- strengthen the enabling environment to promote pulses in production, consumption and trade and to raise awareness on pulses in terms of nutritional, health and environmental benefits;
- promote the use of pulses by all groups of the population, with targeting to achieve a greater share of pulses in their diets;
- include the consumption of pulses as an indicator of dietary diversity within the Minimum Dietary Diversity Score for Women;
- channel investments in line with the CFS principles for responsible investment in agriculture and food systems for developing the pulses sector through research and innovation, in particular enhancing crop-selective breeding/genetic improvement with desired features[xlvi,xlvii] and cultivation technologies for small-scale and family farms;
- support resilience building in small-scale and family farms and local food systems by transferring knowledge and empirical practices aiming at obtaining predominant qualities adapted to climate-change challenges and extreme temperatures through natural selection;
- collect and revive ancient traditional recipes and support preservation of local biodiversity in pulses produced on small-scale farmlands;
- support in generating high-quality analytical data on nutrient composition of different varieties and species of pulses for informed decision- and policy-making concerning production, processing and use of pulses for special dietary requirements;

- develop extension programmes and training for farmers on varieties, agronomic properties and production technologies of pulses and compliance with WTO SPS and IPPC rules, considering the information and capacity-development needs of both industrialized and smallholder sectors;
- support in developing marketing channels and inclusive market access;
- promote inter-sectoral and multi-stakeholder collaboration in support of developing new processing techniques, milling, mechanization means for smallholders and new food formulations with ingredients from pulses;
- promote the use of the FAO database of food composition of pulses[xlviii] when developing food security and nutrition-related policies and programmes

Annex 1. Nutritional value of pulses

Table 1. Nutrient profile of pulses and major cereal crops (per 100 g)

Crops	Energy (kcal)	Protein (g)	Fat (g)	Carbo-hydrates (g)	Total Dietary Fibre (g)*	Fe (mg)	Zn (mg)	B9 (mcg)	Ca (mg)	P (mg)	Mg (mg)
Adzuki beans, whole, dried, raw (*Vigna angularis*)	272	19.9	0.5	50.1	16.8	4.2	5.0	121*	84.0	380.0	130.0
Blackeye beans, whole, dried, raw (*Vigna unguiculata*)	311	23.5	1.6	54.1	10.6	7.6	3.2	630	81.0	410.0	140.0
Broad/fava beans, dried, raw (*Vicia faba*)	245	26.1	2.1	32.5	25	5.5	3.1	423*	100.0	590.0	190.0
Butter/lima beans, dried, raw (*Phaseolus lunatus*)	290	19.1	1.7	52.9	19	5.9	2.8	395	85.0	320.0	190.0
Chickpeas, Kabuli, whole, dried, raw (*Cicer arietinum*)	320	21.3	5.4	49.6	12.2	5.5	3.0	557*	160.0	310.0	130.0
Navy/haricot beans, whole, dried, raw (*Phaseolus vulgaris*)	286	21.4	1.6	49.7	15.3	6.7	2.8	364*	180.0	310.0	180.0
Mung beans, whole, dried, raw (*Vigna radiata*)	279	23.9	1.1	46.3	16.3	6.0	2.7	625*	89.0	360.0	150.0
Pigeon peas, whole, dried, raw (*Cajanus cajan*)	317	20.0	1.9	58.6	15	3.4	2.5	456*	140.0	290.0	100.0
Red kidney beans, dried, raw (*seolus vulgaris*)	266	22.1	1.4	44.1	15.2	6.4	3.0	394*	100.0	410.0	150.0
Dried peas, raw (*Pisum sativum*)	303	21.6	2.4	52.0	5.1	4.7	3.7	65*	61.0	300.0	120.0
Lentils, green and brown, whole, dried, raw (*Lens culinaris*)	297	24.3	1.9	48.8	10.7	11.1	3.9	479*	71.0	350.0	110.0
Lentils, red, split, dried, raw (*Lens culinaris*)	318	23.8	1.3	56.3	10.8	7.6	3.1	204*	51.0	320.0	83.0
Wheat, bulgur, raw	352	10.6	2.0	77.8	12.5	1.98	2.1	27*	29.0	282	85
Sweet corn, kernels, raw	60	3.4	1.8	8.1	2.7	0.70	0.4	46*	3.0	91.0	37.0
Rice, white, long grain, raw	355	6.7	1.0	85.1	1.3	0.26	1.4	8*	16	117	25

Sources: McCance and Widdowson's The Composition of Foods Integrated Dataset 2015 (on the nutrient content of the UK food supply. Published: 25 March 2015)
https://www.gov.uk/government/publications/composition-of-foods-integrated-dataset-cofid
**USDA (United States Department of Agriculture) Agricultural Research Service National Nutrient Database for Standard Reference Release 28*

Annex 2. Global and regional pulses production and trade

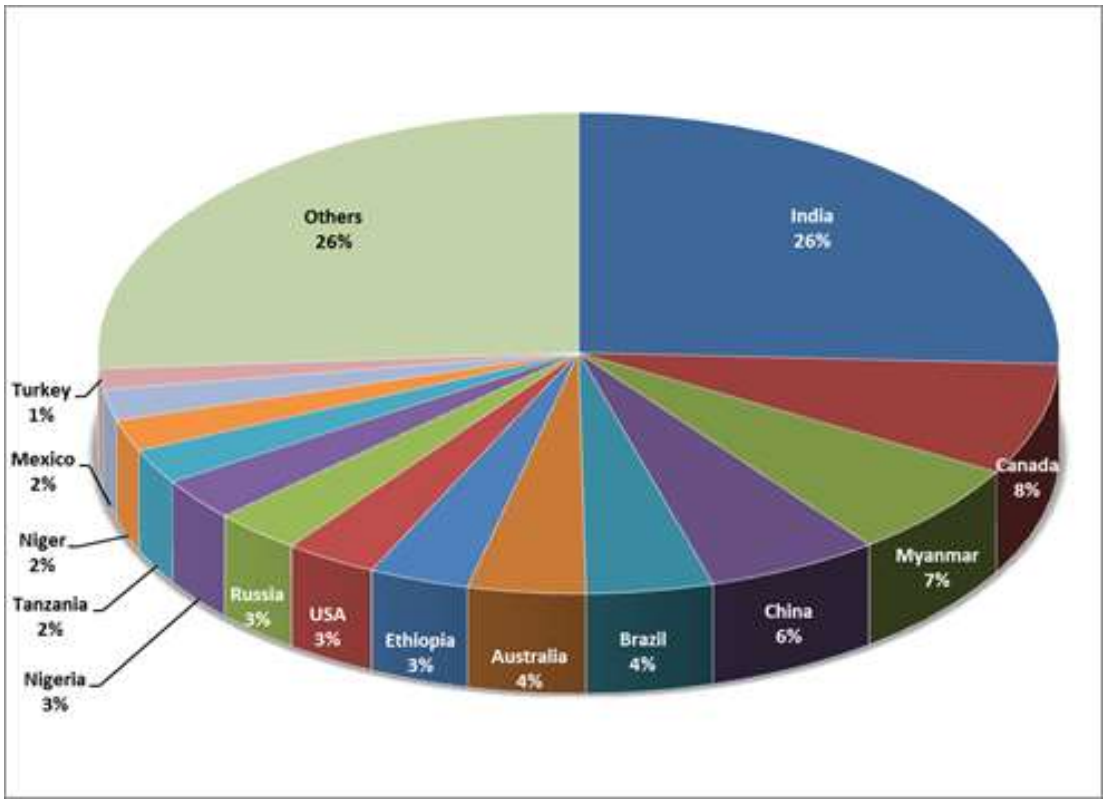

Figure 2. Producing countries' share in the global production of pulses (2014)
Source: FAOSTAT, 2016 (Accessed: Jan.2016)

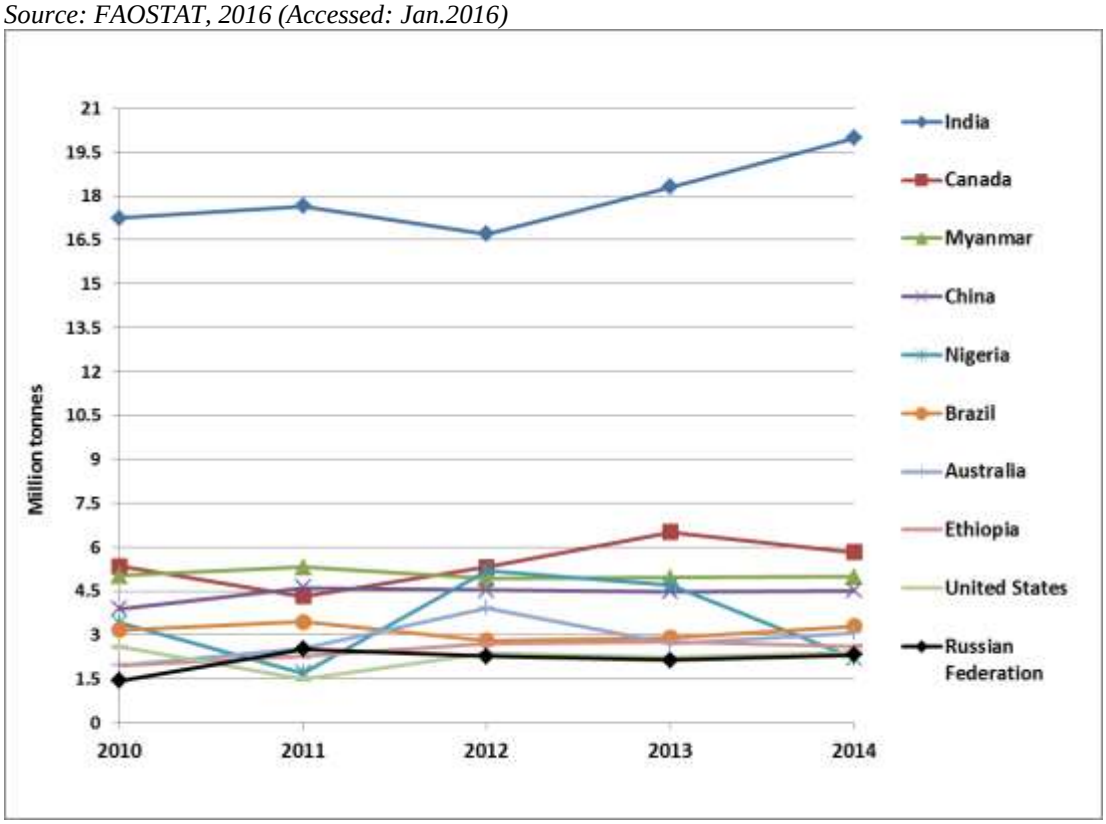

Figure 3. Volumes of production of ten top producers of pulses in the world
Source: FAOSTAT, 2016

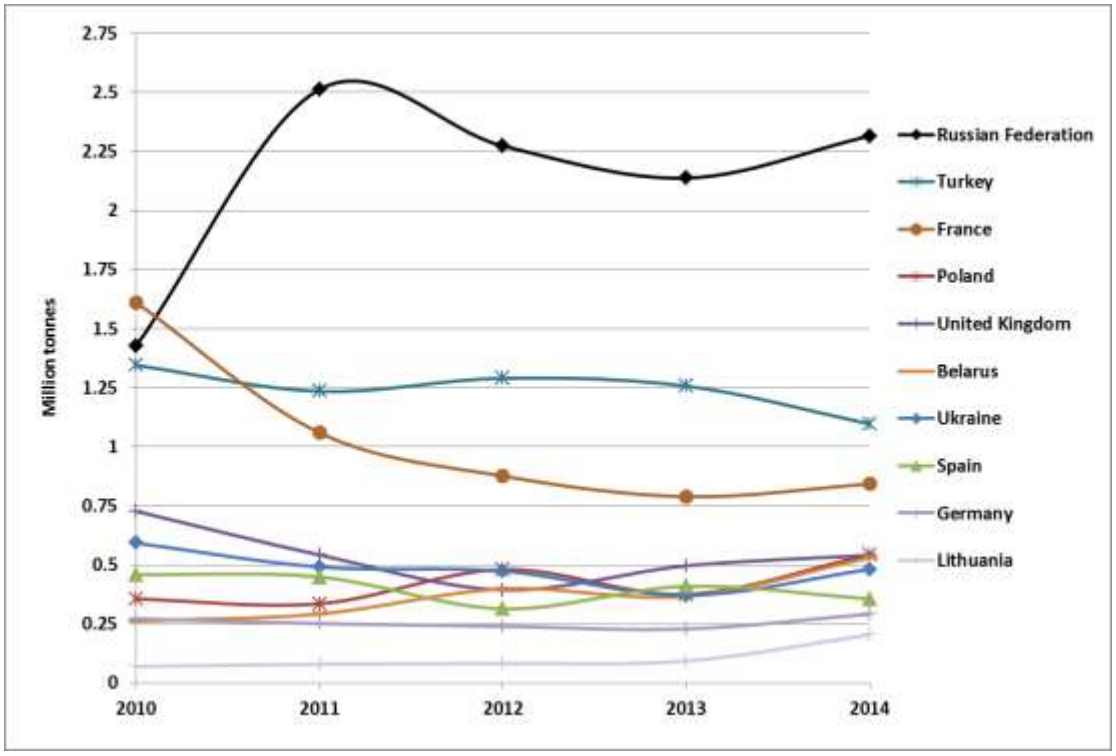

Figure 4. The ten top producers of pulses in the region of Europe and Central Asia
Source: FAOSTAT (Accessed: Jan.2016)

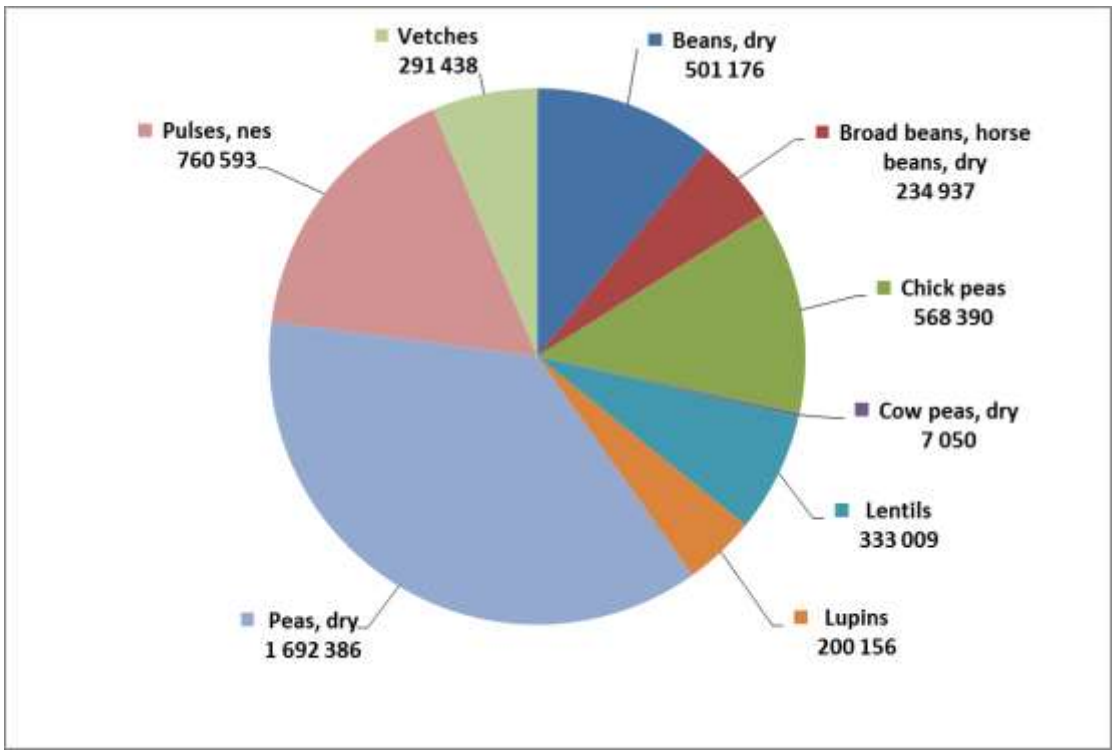

Figure 5. Area harvested under various pulses in EuCA region (ha, 2014)
Source: FAOSTAT (Accessed: Jan.2016)
** Pulses, nes = not elsewhere specified [including inter alia: lablab or hyacinth bean (Dolichos spp.); jack or sword bean(Canavalia spp.); winged bean (Psophocarpus tetragonolobus); guar bean (Cyamopsis tetragonoloba); velvet bean (Stizolobium spp.); yam bean (Pachyrrhizus erosus)]*

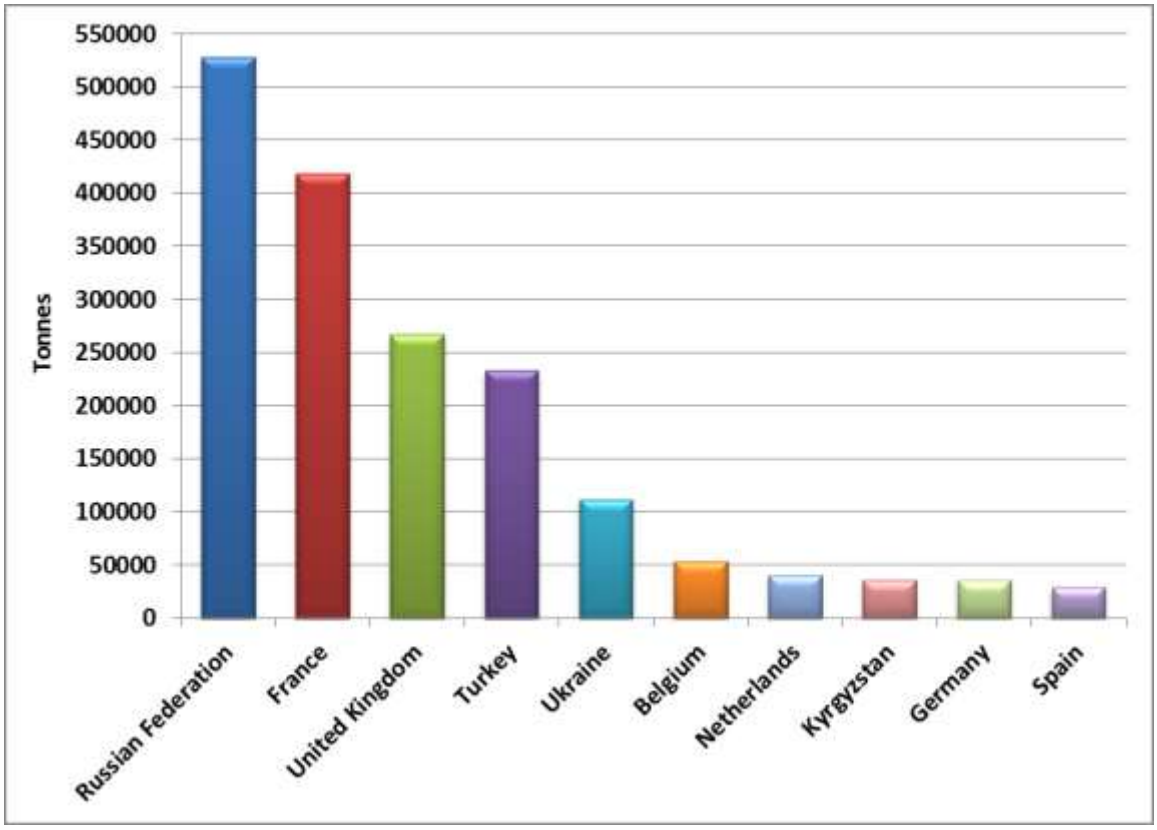

Figure 6. Highest exporters of pulses in the region of Europe and Central Asia (tonnes, 2014)
Source: FAOSTAT (Accessed: Jan.2016)

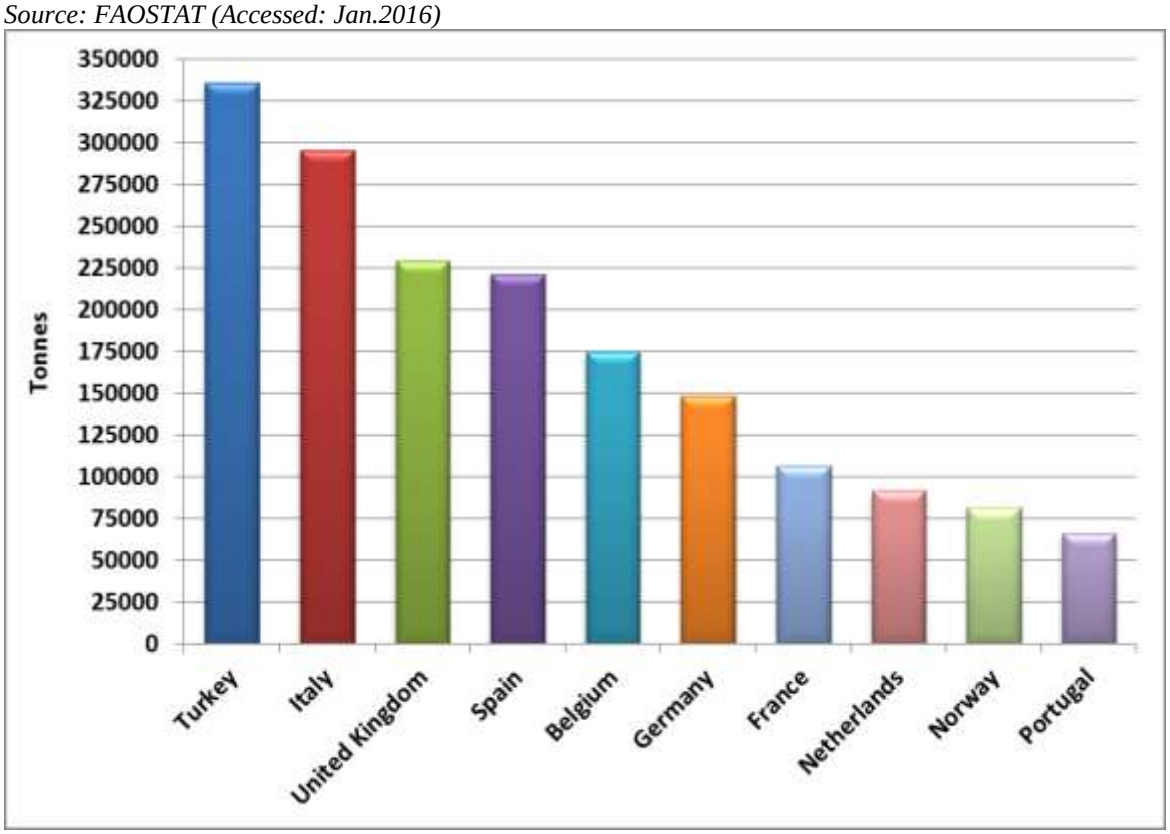

Figure 7. Highest importers of pulses in the region of Europe and Central Asia (tonnes, 2014)
Source: FAOSTAT (Accessed: Jan.2016)

Annex 3. Utilization of pulses

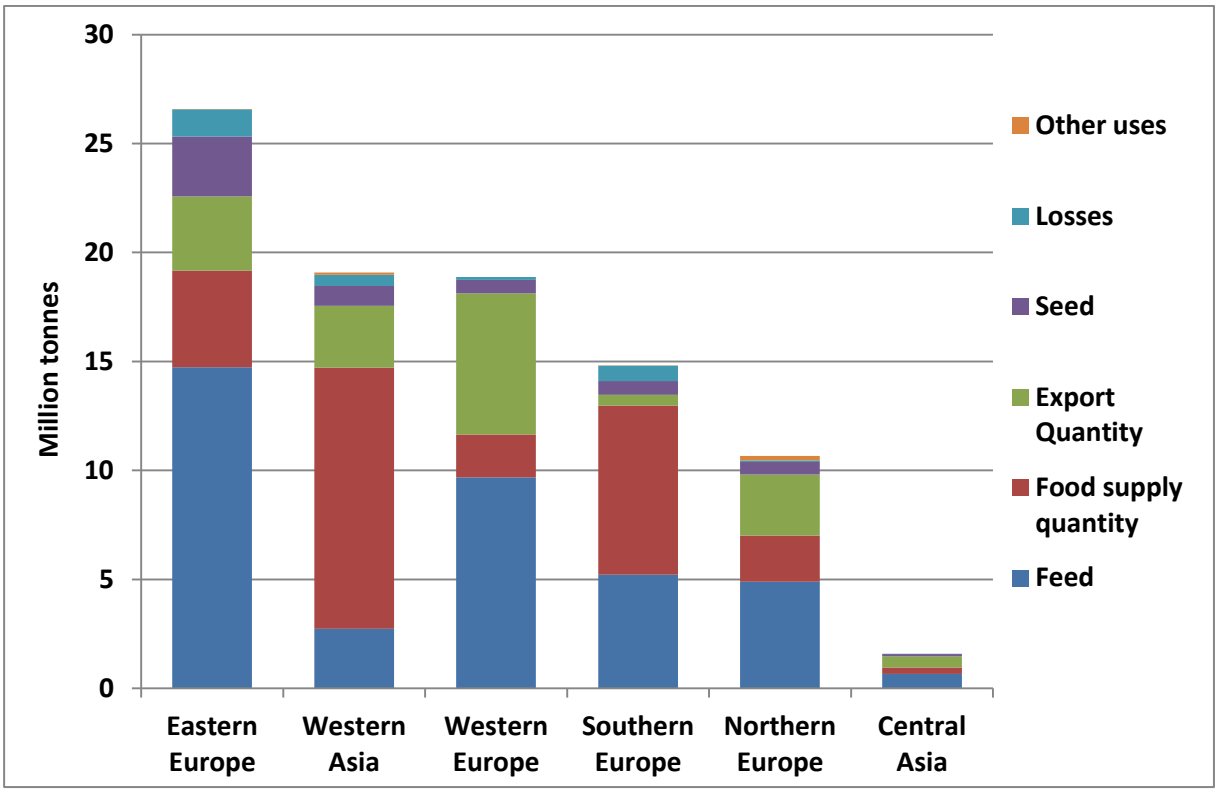

Figure 8. Utilization of pulses in EuCA region in 2002-2011 (million tonnes [cumulative], percentage by type of use)
Source: FAOSTAT (Accessed: Jan.2016)

Table 2. Utilization of pulses in EuCA region in 2002-2011 (percentage by type of use)

Sub-region	Export Quantity	Feed	Food supply quantity	Other uses	Seed	Losses
Eastern Europe	12.8	55.5	16.7	-	10.3	4.7
Western Asia	14.9	14.3	62.8	0.5	4.7	2.7
Western Europe	34.3	51.3	10.5	-	3.3	0.7
Southern Europe	3.3	35.2	52.3	0.1	4.2	4.7
Northern Europe	26.4	45.9	19.8	1.8	5.4	0.7
Central Asia	32.2	41.5	18.6	-	6.5	1.2

Source: FAOSTAT (Accessed: Jan.2016)

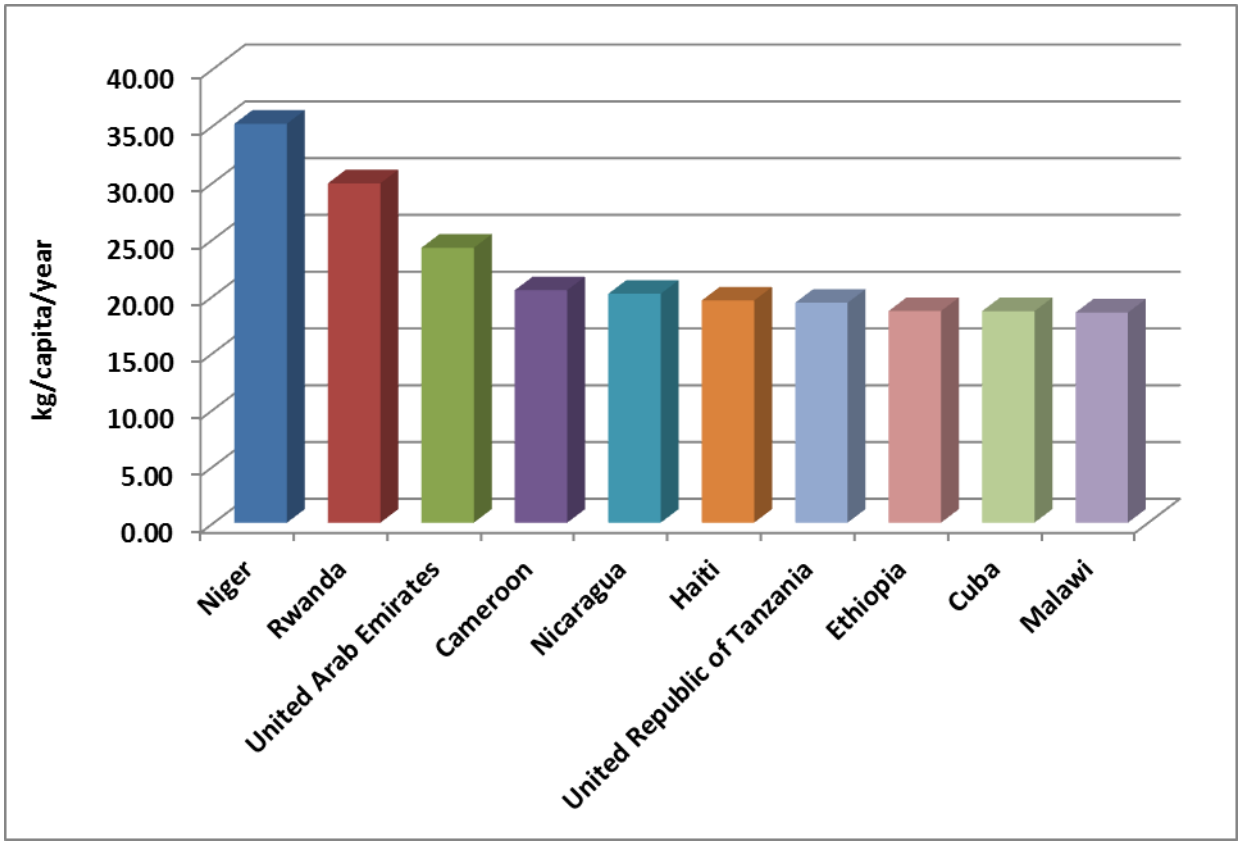

Figure 9. Highest consumers of pulses in the world, kg/capita/year
Source: FAOSTAT (Accessed: Jan/2016)

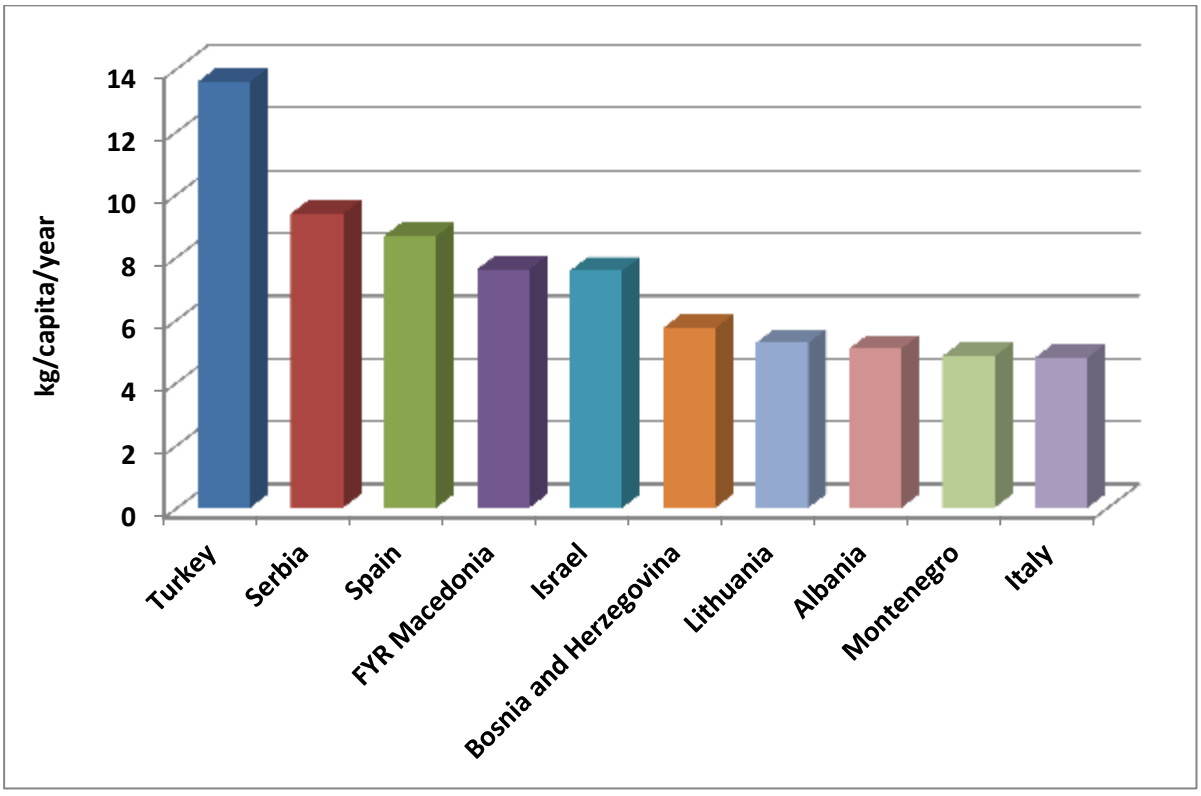

Figure10. Highest consumers of pulses in the region of Europe and Central Asia, kg/capita/year

Source: FAOSTAT (Accessed: Jan.2016)

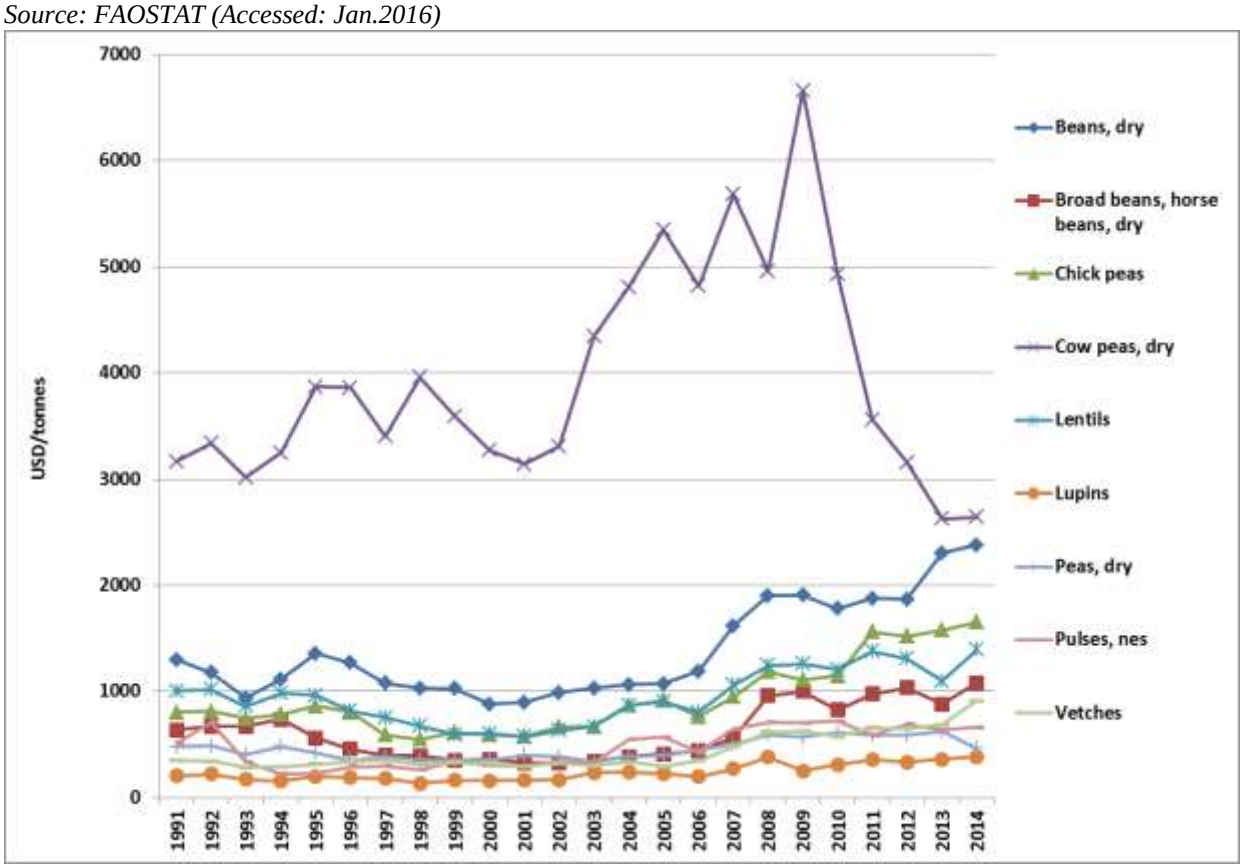

Figure 11. Evolution of Producer Prices for Pulses

Source: FAOSTAT (Accessed: Jan.2016)

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[xxii] Antinutritive factors are substances which are not toxic, but reduce the bioavailability and utilization of essential nutrients by the body. Some antinutritive factors lose their activity through heat treatment and technological processes, such as germination, fermentation.
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[xxvi] Soaking and changing cooking water after several minutes of boiling are among the most widely used procedures to reduce the flatulence effect of pulses.
[xxvii] Examples of recommendations on the consumption of pulses in national food-based dietary guidelines across the world: Eat well Plate/Food Standards Agency UK; Health Canada's Eating Well/Canada's Food Guide; MyPlate/USDA; Healthy Living Pyramid/Nutrition Australia.
[xxviii] Composition of subregions is based on the UN country classifications (M49). The subregion of **Western Asia** includes countries from FAO EuCA and Near East regions: Armenia, Azerbaijan, Bahrain, Cyprus, Georgia, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, State of Palestine, Syrian Arab Republic, Turkey, United Arab Emirates, Yemen.
[xxix] FAO is engaged in the promotion of climate-smart agriculture, which builds on three pillars: (i) sustainably increasing agricultural productivity and incomes; (ii) adapting and building resilience to climate change; (iii) reducing and/or removing greenhouse gases emissions, where possible.
[xxx] CE is carbon equivalent.
[xxxi] FAO. 2016. *Save and Grow in Practice: Maize, Rice, Wheat. A guide to sustainable cereal production.* (www.fao.org/3/a-i4009e.pdf).
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[xxxiv] For comparison, water used to produce one kilogram of beef, mutton and chicken amounts to 13 000, 5 520 and 4 325 liters, respectively. Meanwhile, only 50 liters of water are necessary to produce one kilogram of *daal* (split peas or lentils).
[xxxv] In particular, pigeon peas and Bambara beans can be cultivated in very poor soils and semi-arid conditions.
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[xlvii] Pulses grow in hundreds of varieties out of which only a small number are widely cultivated or moving into international trade. Their genetic diversity is a source of traits, such as drought tolerance, ability to grow with little water, on poor soils, etc. Science and technology innovations can help access and bring these traits into the widely-grown and traded varieties and close the yield gap in pulses production.

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