Food and Agriculture Organization of the United Nations

2016 INTERNATIONAL YEAR OF PULSES

Can pulses efficiently feed the world in a sustainable agriculture?

The FAO international year of pulses in action

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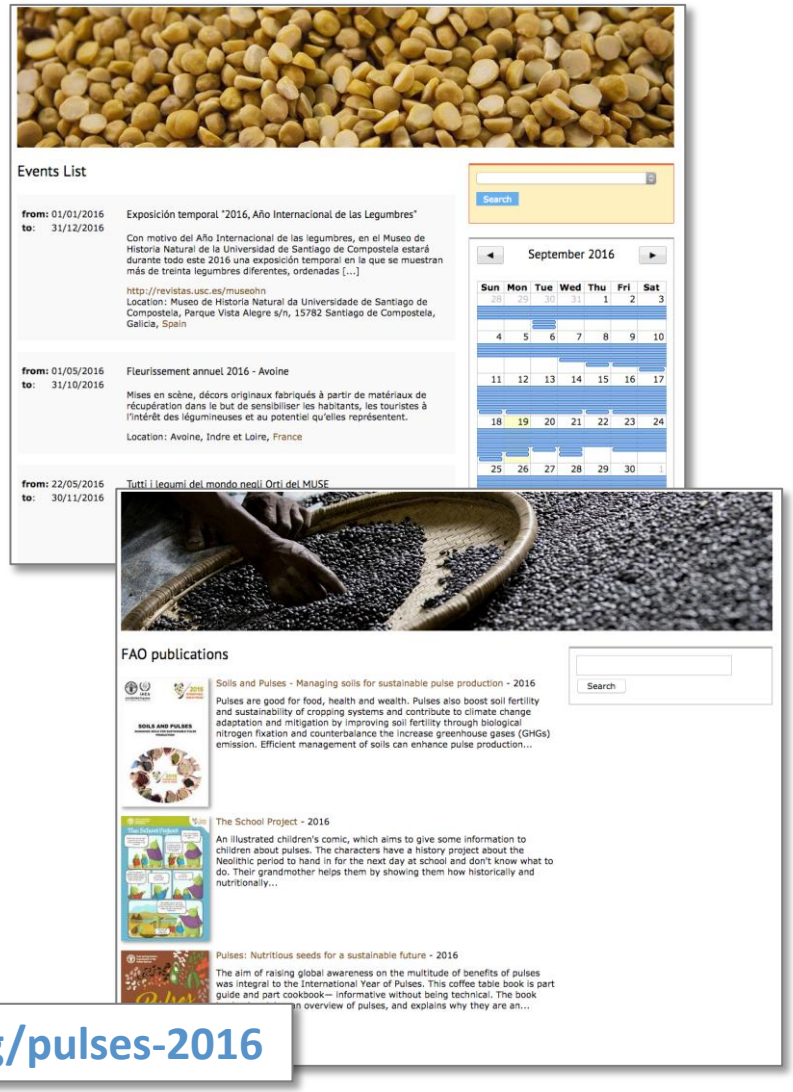
The International Year of Pulses



http://www.fao.org/pulses-2016

What are pulses?

- Pulses are a subgroup of legumes
- They belong to the *Leguminosae* family
- Dry grains which are used for human and animal consumption
  - Common bean (*Phaseolus vulgaris*)
  - Chickpea (*Cicer arietinum*)
  - Lentil (*Lens culinaris*)
  - Cowpea (*Vigna unguiculata*)
  - Pigeon pea (*Cajanus cajan*)

Pulses and sustainable agriculture

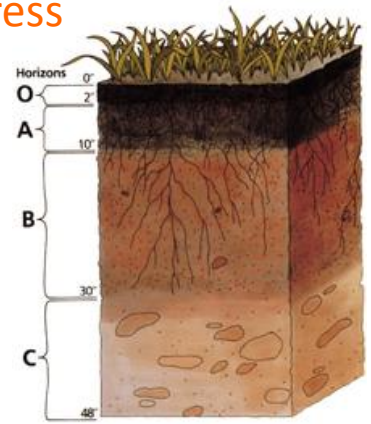
- An important attribute of pulses is their **ability to biologically fix nitrogen**
- Some pulses are able to **free soil-bound phosphorous**

➔ Soil health

- Present of pulses in agro-ecosystems **helps to maintain or increase the vital microbial biomass and activity**

➔ Greater resistance and resilience against disturbance and stress

➔ It improves ability of ecosystems to suppress diseases



Pulses and sustainable agriculture

- Pulses are a critical component of multiple cropping systems

  (e.g., intercropping, crop rotations, agroforestry)
- Multiple cropping systems obviously have greater species diversity

  ➔ More efficient use of resources

  ➔ Increases yields

  ➔ Reduces the risk of overall crop failure

  ➔ Greater underground utilization efficiency

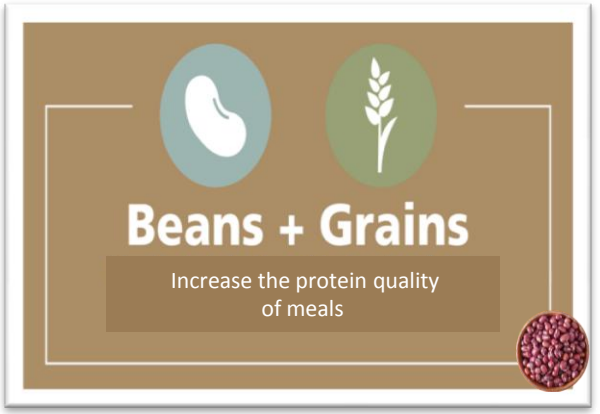
  ➔ Improves recycling of nutrients

Pulses and nutrition

✓ Source of protein

- Pulses contain about 20-25% protein, i.e. double the content of wheat and triple that of rice. However, protein quality is not as high as that from animal source foods.

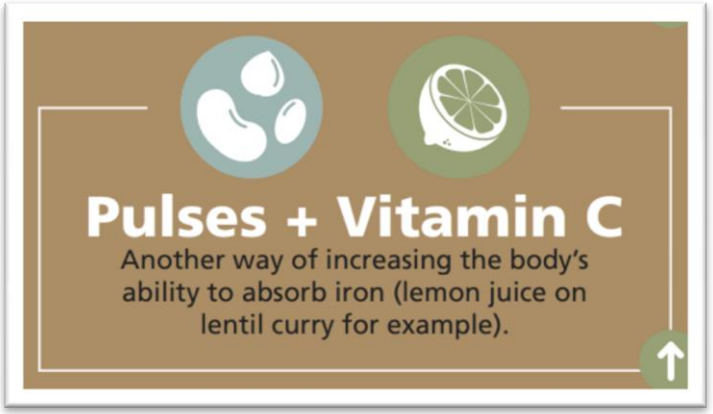
- Amino acid composition of pulses is complementary to that of cereals: when consumed in combination, these two foods increase the protein quality of meals (e.g. rice and beans)

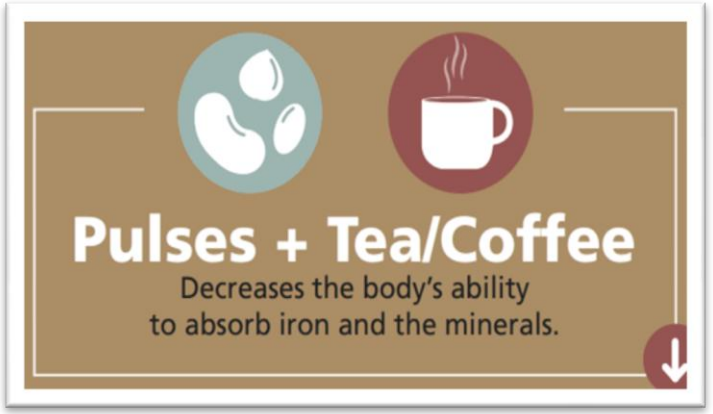


Pulses and nutrition

- The absorption of "non-haeme" iron in pulses can be increased if the pulse is consumed with certain other foods and nutrients, especially meat or vitamin C.

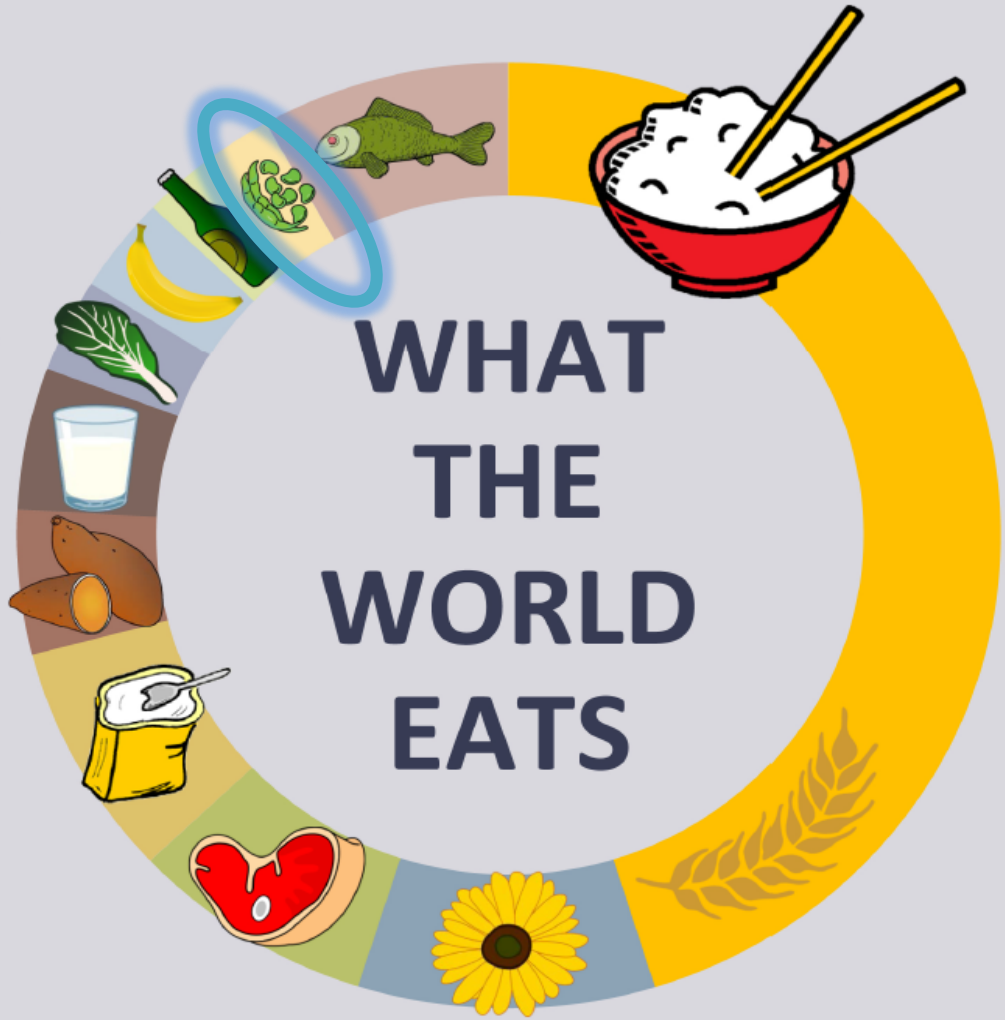
- Drinking tea or coffee with meals decreases the absorption of the minerals.





Pulses and nutritional benefits

- High in many B-vitamins including folate, which is essential to nervous system function and especially important during pregnancy to prevent foetal neural tube defects.
- High dietary fibre content – improves stool volume and bowel transit; slows the absorption of lipids and lowers blood cholesterol.
- Low Glycemic Index – helps to increase satiety and weight loss and has positive implications particularly for people with type 2 diabetes.



- Cereals - Excluding Beer
- Vegetable Oils
- Meat
- Sugar & Sweeteners
- Starchy Roots
- Milk - Excluding Butter
- Vegetables
- Fruits - Excluding Wine
- Alcoholic Beverages
- Pulses
- Other

FAOSTAT.FAO.ORG (2015)

How to eat pulses?

Breakfast / Snacks

Homemade Baked Beans

Roasted chickpeas

Hummus

Meals

Salad (beans, chickpeas and lentils)

Quinoa and rice with lentil stew

Soup (beans)

Fava bean puree

Source: http://www.fao.org/pulses-2016/recipes/en

Nutrient profile (per 100g EP)

Pulse	Energy (kcal)	Protein (g)	Fat (g)	CHO (g)	Fiber (g)	Fe (mg)	Zn (mg)	Folate (mcg)
Beans, white, dried[1]	335	22.1	1.50	47.1	16.7	5.70	3.80	395
Cowpea, dried, raw[1]	316	21.2	1.30	47.2	15.3	7.30	4.60	417
Chickpeas, mature seeds, raw[2]	378	20.5	6.00	62.9	12.2	4.30	2.80	557
Beans, pinto, mature seeds, raw[2]	347	21.4	1.20	62.5	15.5	5.10	2.30	525
Lentil, Green, whole, large, raw[3]	360	25.6	1.50	61.6	17.7	6.20	2.41	105
Faba beans, raw[3]	312	24.3	2.10	58.3	18.6	3.70	2.40	-
Mung beans, Crystal, raw[3]	316	24.5	2.00	56.9	13.7	4.00	2.80	-
Pigeon pea, seeds, raw[3]	344	19.0	2.13	64.0	21.3	1.94	2.02	-

Source: [1]West African Food Composition Table, 2012; [2]USDA, 2014; [3]FAO/INFOODS Food Composition Databases (data not published)

Pulses and food security

- Low food wastage
- Pulses have a long shelf life = lower proportion of food waste at the consumption stage
- Pulses can be stored for long periods without losing their nutritional value increasing the year-round food availability and usability in emergencies and food aid

Pulses and climate change

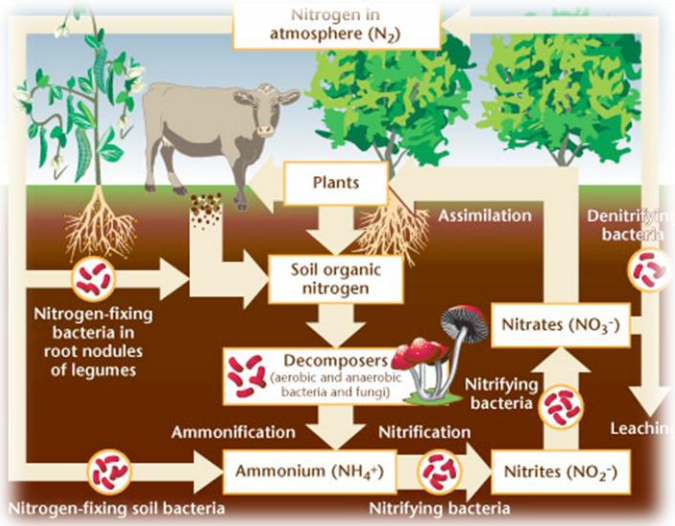
- Pulse species have a broad genetic diversity
  - ➔ Improve varieties
- International Center for Tropical Agriculture (CIAT)
  - ➔ Heat stress will be the biggest threat to bean production
  - ➔ Improve varieties that can grow above the crop's "comfort zone"

Turning down the heat: breeding beans for a changing climate

- International Center for Agricultural Research in the Dry Areas (ICARDA) and Turkish national scientists
  - ➔ Drought-tolerance chickpea variety (e.g. Gokce)
  - ➔ Withstood severe drought in Turkey
  - ➔ Accounts for more than 80% of chickpea production in Turkey

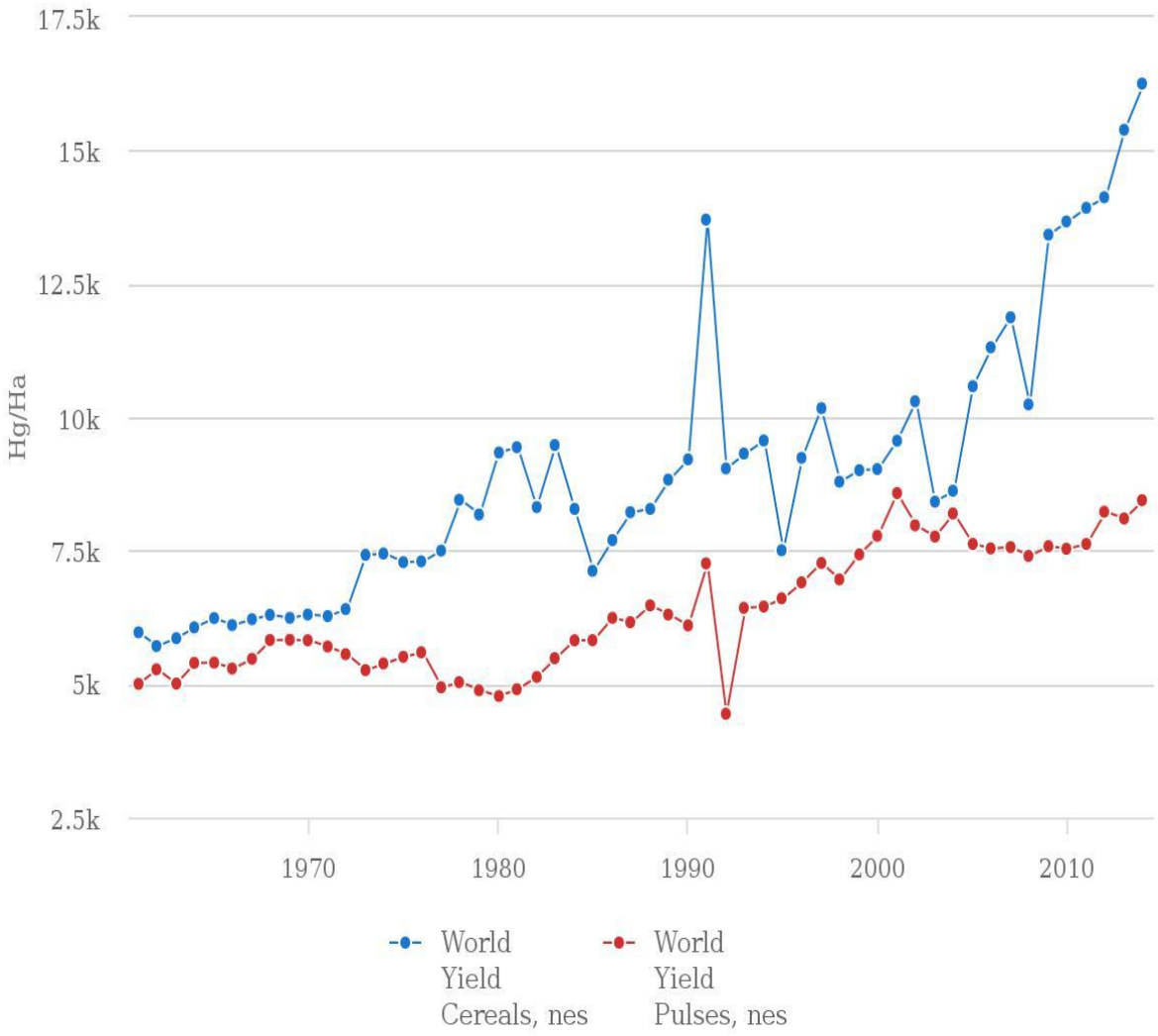
Pulses and climate change

- Manufacture of fertilizers
  - ➔ Energy intensive
  - ➔ Emits green house gasses
  - ➔ Overuse might be detrimental
  - ➔ Pulses can reduce the use of fertilizer



- Pulses often promote higher rates of accumulation of soil carbon than cereals and grasses

Major constraint for adoption: low yield = low income



Source: FAOSTAT (Sep 07, 2016)

But funding for pulse research is low:

- **Global**: 175 M USD/year (China not included) or 0.55% of the global spending on agricultural R&D (2008);
- **CGIAR**: 59.7 M USD/year or 11% of total expenditure (2002-06);
- **USA**: 16.8 M USD/year or 0.1% of total expenditure on crop research.

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