

# Legumes and Pulses

The Fabaceae or Leguminosae (commonly known as the legume, pea, or bean) family is the 3rd largest family of flowering plants, consisting of over 20,000 species. Legumes are a nutritious staple of diets around the world. All the “Blue Zone ” populations, the ones who live the longest and are the healthiest, eat them in one form or another with most meals. They are an inexpensive source of protein, vitamins, complex carbohydrates, and fiber.

Although used interchangeably, the terms “legumes,” “pulses,” and “beans” have distinct meanings. A legume refers to any plant from the Fabaceae family that would include its leaves, stems, and pods. A pulse is the edible seed from a legume plant. Pulses include beans, lentils, and peas. For example, a pea pod is a legume, but the pea inside the pod is the pulse. The entire legume plant is often used in agricultural applications (as cover crops or in livestock feed or fertilizers), while the seeds or pulses are what typically end up on our dinner plates. Beans in their various forms (kidney, black, pinto, navy, chickpeas, etc.) are just one type of pulse.

All of the most important dietary advising organizations, including the U.S. Dietary Guidelines, the DASH Eating Plan of the National Heart, Lung, and Blood Institute and the Food and Agriculture Organization (FAO) of the United Nations strongly recommend eating them daily. They are touted as one of the most significant contributors to food production and nutritional diversity to help eradicate hunger and malnutrition worldwide.

They are a significant source of many nutrients including:

- Protein
- Folate
- Fiber (both insoluble and soluble)
- Iron
- Phosphorus
- Polyunsaturated and monounsaturated fatty acids, including linoleic and oleic acids

Legumes contain several components that, when eaten as part of a balanced plant-rich diet, may help prevent the development of various chronic diseases:

- **Cardiovascular disease.** There are several components of legumes that may benefit heart health including fiber, folate, and phytochemicals. Legumes in their whole unprocessed form are low in saturated fat and sodium. The fibers in legumes lower blood cholesterol even without weight changes and prevent sharp rises in blood sugar, both of which are risk factors for cardiovascular disease.
  - A meta-analysis of mostly observational studies found that eating legumes about 4 times weekly was associated with a 14% reduced risk of coronary artery disease.
  - A cohort study looking at legumes and heart health followed 9,632 men and women free of cardiovascular disease at baseline from the National Health and Nutrition Examination Survey. It found that after 19 years, people who ate legumes 4 times or more a week had a 22% lower risk of heart disease and 11% lower risk of cardiovascular diseases (stroke, heart attack...) than those who ate legumes less than once weekly.
- **Cancer.** The fiber, phytochemical, and mineral content of legumes may have anti-cancer effects according to animal and cell studies. For example, nutrients in legumes such as zinc have been associated with improved immune function and decreased oxidative stress to cells, and selenium and phytic acid have been found to inhibit the growth of tumors in mice. However, there is less conclusive evidence from human studies on legumes and cancer protection. Colorectal cancer protection has the most study support.
- **Digestive health.** Legumes contain fiber, resistant starches, and non-digestible carbohydrates like oligosaccharides. Resistant starch, sometimes called slowly digestible starch, is not digested and enters the colon where it works similarly to fiber by promoting bulky stool and acting as a prebiotic food for beneficial bacteria like Bifidobacteria. As these bacteria break down and ferment resistant starches and oligosaccharides, they create gas, which causes bloating and abdominal cramping in some people.

Soaking dried beans for at least 3 hours and cooking them may help decrease this side effect. In the long run, however, these beneficial bacteria support normal bowel function and may reduce levels of cancer-causing compounds. The more often you eat beans, the more of these beneficial bacteria develop and the gas diminishes. During fermentation, the bacteria also create a short-chain fatty acid called butyrate that may be associated with the prevention of colorectal cancer.

- **Diabetes.** Legumes have a low glycemic index, are high in fiber, and contain slow-digesting resistant starch, all of which benefit in the prevention and reversal of diabetes. A cohort study of 64,277 middle-aged women in China without diabetes at baseline found that after 4.5 years, those who ate the most legumes (about 1/3 cup daily) compared with the least, had a 38% reduced risk of type 2 diabetes.
- **Obesity.** Legumes contain dietary components that help promote weight loss. Their protein and soluble/insoluble fiber content increase feelings of fullness and modestly increase calorie expenditure through thermogenesis, a process whereby rising the body's core temperature a bit, more calories are burned. Only about 40% of fiber in a food is broken down during digestion, which reduces total calorie intake. Fiber takes longer to chew, slowing down one's eating pace, and slows digestion in the stomach, both of which may lead to feelings of fullness. A study using data on 8,229 adults from the National Health and Nutrition Examination Survey found that people who ate beans had a lower body weight and smaller waist size than people who did not eat beans. The bean eaters had a 23% and 22% lower risk of an increased waist size and obesity, respectively.

What about products made from legumes?

Because of their texture, flavor, and nutritional profile, legumes are found in numerous products throughout the supermarket. While these can include classic options such as tofu, peanut butter, and hummus, legumes and their components are also a key ingredient in a wide range of plant-based meat alternatives. Just be mindful of the fact that processed foods have added sodium, sugar, saturated fat from tropical oils, or other additives.

Legumes and the Environment.

Food production places an enormous demand upon our natural resources, as agriculture is a major contributor to climate change, deforestation, species extinction, and freshwater depletion and contamination. However, along with varying impacts on human health, different foods also have differing impacts on the environment. Generally, the production of plant-based foods tends to have lower greenhouse gas emissions, and use less land and water than producing animal-based foods. In transitioning towards healthy diets from sustainable food systems—especially with our global population slated to reach 10 billion by 2050—legumes are slated to play a key role. The 2019 EAT-Lancet report that outlines a “planetary health diet” recommends 50 grams of legumes (about ¼ cup) in the daily diet.

Legumes have a range of characteristics that make them a relatively sustainable crop. For example, legumes release up to 7x less greenhouse gas emissions per area compared to even other crops and can sequester carbon in soils. They can also make their own nitrogen from the atmosphere, thus reducing the application of nitrogen fertilizers. This leaves nitrogen-rich residues in the soil after harvesting; a benefit for the next crop planted in its place. According to the FAO, drought-resistant species of legumes can be of particular benefit to dry environments where food security is often a challenge. They can also help minimize food waste, since pulses can be dried and stored for relatively long periods of time without losing their nutritional value.