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KIDNEY BEANS: KING OF NUTRITION

Kidney beans have become a popular food all over the world due to their savory texture and ability to absorb flavours. But many don't know that these are a source of health benefits too.



Beans are intricately woven into the fabric of human history. The first 'permanent cultures' evolved when hunter-gatherers and nomadic people began tilling the earth and developing

systems of agriculture. Beans were among the first cultivated crops. This progression served as a gateway from what could be considered a 'primitive' existence into a more stabilised one, which allowed for long-term living situations to be established. With

the knowledge of agriculture came the domestication of animals and the art of creating tools and implements. These three things combined, altered the course of human history in an unparalleled way, and beans played an integral part.

Kidney beans, also known as haricot bean, common bean, snap bean or navy bean, are valued for their protein-rich (23 per cent) seeds. Seeds are also rich in calcium, phosphorus and iron. The fresh pods and green leaves are used as vegetable. Kidney beans are also known as the chilli beans. These are dark red in colour and visually resemble the shape of a kidney.

History

Kidney beans are referred to as 'common beans' probably owing to the fact that they all are derived from a common bean ancestor that originated in Peru, throughout South and Central America as a result of migrating Indian traders who brought kidney beans with them from Peru. Beans were introduced into Europe in the 15th century by Spanish explorers returning from their voyages to the New World. Subsequently, Spanish and Portuguese traders introduced kidney beans into Africa and Asia.

Table I
Kidney Bean Farming

Particulars	Description
Climate	Major kidney beans producing areas are located in tropical and temperate regions with a temperature of around 21°C. The optimal temperature for better growth is 16-24°C. The crop is generally raised in areas receiving 50-150 cm annual rainfall.
Soil and its preparation	Kidney beans grow on a variety of soils ranging from light sand to heavy clay, but well drained loams are the best. The crop is sensitive to salinity. Soil pH of around 5.2-5.8 is optimal. An electrical conductivity of 1 dS/m is the threshold limit for kidney beans. Soil having a high amount of organic matter promote more vegetative growth. Crop requires fine seedbed and adequate soil moisture for good germination. A deep ploughing followed by 2-3 harrowing and planking is adequate to obtain required tilth.
Time of sowing	Kidney beans are grown in kharif and rabi seasons in different parts of the country. The optimal time of sowing in rabi season varies from state to state. It is first and second fortnight of November for central Uttar Pradesh and north Bihar. However, mid October is optimal for Vidarbha region (Maharashtra). For early varieties, October end is optimal, while late varieties can be sown up to mid November. In kharif, mid May-mid June is ideal. The spring crop can be sown from February-early March.
Seed rate and spacing	Seed rate varies with seed size. Bold seeded varieties with a test weight of 350-450 gm need 120-140 kg seed/ha, while in small seeded varieties, it varies from 80-100 kg/ha. The seed rate in intercropping may vary with row proportions. Kidney beans are generally sown in rows 30 cm apart. In northern plain, rabbi kidney beans are sown in rows of 45 cm. The plant-to-plant spacing is 10-12 cm. For good yield, its plant population should be 250,000-300,000 plants/ha. 8-10 cm is the optimal depth of sowing.
Manures and fertilisers	Kidney beans lack biological N fixation because of poor or no nodulation. Hence, it needs liberal N fertilisation (100-120 kg/ha). The crop requires 60 kg P2O5/ha and response to potassium and other micronutrients is rarely observed.
Irrigation	Kidney beans have shallow root system and hence moisture stress at any stage is detrimental to their performance. As a rainy season crop, these don't require irrigation when rainfall distribution is even throughout crop cycle. However, rabi crop requires irrigation. Irrigation at 25 days after sowing (DAS) is critical. In north-east plains zone, 3 irrigations at 25, 75 and 100 DAS and in central zone 4 irrigations at 25, 50, 75 and 100 DAS are necessary for optimal crop performance.
Weed control	Kidney beans suffer severe competition from weeds in initial stages. First 30-40 days after planting is the critical period for crop weed competition. One-hand weeding at 30-35 days after sowing is found beneficial. Pre-emergence application of pendimethalin @ 1.0 kg/ha or pre-plant incorporation of 1.0 kg/ha of fluchloralin have been found effective in controlling weeds.
Cropping systems	In north India it is grown in spring season after potato or mustard. In the hills, it is intercropped between maize and soybean. In Rabi, intercropping of potato + kidney beans (3:2 ratios) is being practised in central and eastern Uttar Pradesh and northern Bihar. Kidney beans + linseed (2:1) is also found to be an efficient cropping system.
Pests and diseases	Bihar hairy caterpillar, blister beetle, bean bug and aphids are main insect pests of the crop. Rot (collar, stem and pod) and bean golden mosaic virus are the main diseases limiting kidney beans productivity.
Harvesting and threshing	At maturity, leaves and pods turn yellowish brown and majority of leaves drop. Delay in harvesting may cause shattering. Selection of shattering-resistant varieties like HUR 137 is necessary to overcome this problem. The harvested crop is kept for sun drying for 5-7 days, and thereafter threshed.
Yield	Under optimal conditions, 2.0-2.5 t/ha of grain and 3.0-3.5 t/ha straw yield can be obtained.

As beans are a very inexpensive form of good protein, they have become popular in many cultures throughout the world. Today, the largest commercial producers of dried common beans are India, China, Indonesia, Brazil and the United States.

Kidney beans have evolved in the highlands of Middle America and Andes from a wild vine over a period of 7000-8000 years. The red kidney bean is actually not of Indian origin but native to the New World—Cen-

tral Mexico and Guatemala. Kidney bean had a special place in the diet of native Americans. The amino acid profile of the pod complemented the amino profile of corn—the staple of most tribes. Some predominantly vegetarian tribes of Central America avoided malnutrition by incorporating the red seed into their daily corn recipes.

The term 'kidney bean' refers to the shape of the bean, but it is also true that native Americans used the bean to treat a variety of kidney and

bladder complaints. The bean paste was a vital ingredient in ointments for rheumatism, sciatica, eczema and common skin infections.

Kidney beans producing countries and states in India

Brazil is the leading producer of kidney beans. Columbia, USA, Canada, Ethiopia, China and Turkey are other leading countries producing kidney beans. In India, it is grown in

Table II
Health Benefits of Kidney Beans

Diseases	Benefits from kidney beans
Cancer prevention	Manganese, in which kidney beans are abundant, is one aspect of the antioxidant defense they provide. The crucial oxidative enzyme superoxide dismutase, which is responsible for disarming free radicals in mitochondria (the powerhouses of the cells), needs manganese. On top of that, the vitamin K in kidney beans has been shown to protect cells from oxidative stress, reducing chances of cancer.
Brain function	The vitamin K in kidney beans offers outstanding benefits for the brain and nervous system. Vitamin K is known to be essential for the synthesis of the sphingolipids, and therefore proper brain and nervous function. Kidney beans are also a good source of thiamin, which is critical for brain cell and cognitive function. This vitamin is needed for the creation of acetylcholine—a neurotransmitter used for memory and the lack of which is a significant factor in senility and Alzheimer's disease.
Blood sugar	The soluble fibre in kidney beans decreases the metabolism rate of the bean's carbohydrates, which prevents blood sugar levels from rapidly spiking after a meal. The kidney bean's high protein content also contributes to this effect.
Digestive tract health	The insoluble fibre in kidney beans helps to maintain bowel regularity by increasing stool bulk.
Cardiovascular benefits	The high fibre content of kidney beans is responsible for their cholesterol-lowering power. The folate they contain helps in lowering levels of homocysteine, which is associated with an increased risk of stroke, heart attack, and peripheral vascular disease. The high content of magnesium found in kidney beans contributes to a healthy cardiovascular system.
Energy booster	Kidney beans are high in iron, which helps increase your energy levels. Iron is required for the body's metabolism and energy production and helps move oxygen throughout the body. The manganese in kidney beans is also an important contributor to the body's energy production.
Bone strength	The manganese and calcium in kidney beans work hand in hand to maintain strong bones and along with other trace minerals may help prevent osteoporosis. Kidney beans are also a great source of folate. Research has shown that low amounts of folic acid in the diet lead to an increase in homocysteine levels and significantly increase risk of osteoporosis-related bone fractures, particularly hip fracture in both men and women. Vitamin K has also turned out to be a critical nutrient for bone health.
Extraordinary antioxidant and anti-aging prowess	The health benefits of eating red kidney beans are not only linked to their fibre and folate content; red kidney beans are also supercharged with antioxidants. Antioxidants are believed to have strong anti-aging properties and to promote longevity by limiting damage caused by free radicals. This helps protect the skin and the rest of the body from long-term health problems caused by environmental factors and unhealthy foods.



Kidney beans plants

the states of Maharashtra, Jammu and Kashmir, Himachal Pradesh and Uttar Pradesh Hills, Nilgiri (Tamil Nadu) and Kerala hills, Chickmagalur (Karnataka) and Darjeeling hills (West Bengal).

An integral part of Indian cuisine

Red kidney beans, called as *Rajma* in Hindi and Punjabi, are an integral part of the cuisine in northern region of India. In India, especially in Punjab and other northern states, kidney beans are the quintessential north Indian dish. Prepared as a thick curry with red kidney beans being the chief ingredient and lots of Indian whole spices, the dish is served with hot rice.

MARKET SURVEY

This dish developed after the red kidney bean was brought to the Indian subcontinent from Central Mexico and Guatemala. It is prepared by soaking beans in water overnight before they are boiled in a pressure cooker. Curry spices are generally cooked beforehand and then added at a later time.

Nutritional value

Kidney beans are a very good source of cholesterol-lowering fibre. In addition to lowering cholesterol, kidney beans' high fibre content prevents blood sugar levels from rising too rapidly after a meal, making these beans an especially good choice for individuals with diabetes, insulin resistance or hypoglycemia. When combined

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with whole grains such as rice, kidney beans provide virtually fat-free high-quality protein. Kidney beans are an excellent source of the trace mineral molybdenum—an integral component of the enzyme sulphite oxidase, which is responsible for detoxifying.

Kidney beans are an excellent source of molybdenum. They are a very good source of folate, dietary fibre and manganese. Kidney beans are a good source of protein,

thiamin (vitamin B1), phosphorus, iron, copper, magnesium, potassium and vitamin K. The best thing about kidney beans is that these are economical, easy to store for long periods and suit a number of cooking styles.

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