

Agronomy – Rabi Crops

French Bean

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FRENCH BEAN

Botanical Name: *Phaseolus vulgaris* L.

Chromosome Number: $2n=22$

French bean also known as *rajmash* or *rajma* (Hindi) or haricot bean or kidney bean or common bean or snap bean, navy bean. It is valued for its protein rich (23%) seeds. Seeds are also rich in calcium, phosphorus and iron. The fresh pods and green leaves are used as vegetable. The antimetabolites of dry beans needs removal by cooking and soaking in water.



Origin

French beans have evolved in the highlands of middle America and Andes from a wild vine over a period of 7000-8000 years. Vavilov (1951) reported Mexico and Central America as

the primary and Peruvian-Ecuadorian-Bolivian region of South America as the secondary center of French bean.



Various kinds of *Ph. vulgaris*

Geographic Distribution

Globally French bean is cultivated on about 28 m ha with a production of 19 million tonnes. Brazil is the leading producer of French beans. Columbia, USA, Canada, Ethiopia, China and Turkey are other leading countries producing French bean.

In India, it is grown on an area of about 1 lakh ha mainly in the states of Maharashtra (60,000 ha), Jammu and Kashmir (10,000 ha), Himachal Pradesh and Uttar Pradesh Hills, Nilgiri (Tamil Nadu) and Palni (Kerala) hills, Chickmagalur (Karnataka) and Darjeeling hills (West Bengal).

Classification

The genus *Phaseolus* has over 50 species and Rajmash (*Phaseolus vulgaris* L) is one of them accounting for 90% of cultivated species worldwide. In India, both bushy and trailing types rajmash are found.

Climate

Major *rajmash* producing areas are located in tropical and temperate regions with a temperature around 21°C. The optimum temperature for better growth is 16-24°C. Growth of plant ceases if temperature falls below 10°C. Temperatures above 35°C cause dropping of buds and flowers resulting in poor yield. It is highly susceptible to frost. The crop is generally raised in areas receiving 50-150 cm annual rainfall. Waterlogging at any stage adversely affects its yield. Rains cause flower drop and spread of leaf spot diseases.

Soil and its Preparation

Rajmash grows 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 around 5.2-5.8 is optimum. An electrical conductivity of 1 dS/m is threshold limit for frenchbean. Soil having 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 harrowings and planking is adequate to obtain required tilth.

Time of Sowing

Rajmash is grown in *kharif* and *rabi* seasons in different parts of the country. The optimum 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 optimum for Vidarbha region (Maharashtra). For early varieties, October end is the optimum, 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 g 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.

Rajmash is generally sown in rows 30 cm apart. In northern plain, *rabi rajmash* is sown in rows of 45 cm. The plant-to-plant spacing is 10-12 cm. For obtaining good yield, its plant population should be 2.5-3.0 lakh plants/ha. 8-10 cm is the optimum depth of sowing.

Manures and Fertilizers

French bean lacks biological N fixation because of poor or no nodulation. Hence, it needs liberal N fertilization (100-120 kg/ha). The crop requires 60 kg P₂O₅/ha and response to potassium and other micronutrients are rarely observed.

Irrigation

Rajmash has shallow root system and hence moisture stress at any stage is detrimental to its performance. As a rainy season crop, it does not 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 optimum crop performance.

Weed Control

Rajmash suffers 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 + *rajmash* (3:2 ratio) is being practiced in central and eastern Uttar Pradesh and northern Bihar. *Rajmash* + 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 important insect pests of the crop. Rot (collar, stem and pod) and bean golden mosaic virus are important diseases limiting *rajmash* 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 optimum conditions, 2.0-2.5 t/ha of grain and 3.0-3.5 t/ha straw yield can be obtained.