

RAJMASH

Botanical name	- <i>Phaseolus vulgaris L.</i>
Synonym	- Kidney bean, Common bean, Snap bean and French bean
Origin	- Central America and south Mexico



Importance

Rajmash, an important pulse crop, with high yielding ability as compared to gram and pea, require focussed attention both at the development and policy front. It is grown in Maharashtra, H.P., U.P., J&K., and NE states covering 80-85 thousand ha area. However, its cultivation during rabi and summer is also gaining popularity in northern Indian plains. Traditionally Rajmash is grown during kharif in Hills of Himalayas, however; high yield is attainable in Rabi in plains due to better management.

Nutritive value

Protein	- 22.9%	Calcium	- 260 mg/100g
Fat	- 1.3%	Phosphorus	- 410 mg/100g
Carbohydrate	- 60.6%	Iron	- 5.8 mg/100g

State-wise recommended varieties

S.No.	State	Recommended varieties
1.	U.P.	HUR-137, Malviya Rajmash-137
2.	M.H.	Varun (ACPR-94040), HPR-35
3.	Bihar	IPR 96-4 (Amber)
4.	Rajasthan	Ankur
5.	Karnataka	Arka Anup
6.	Gujrat	Gujrat Rajma-1
7.	Uttarakhand	VL Rajmash 125, VL Bean-2

Source: Seednet GOI, Min. of Agri. & FW & ICAR-IIPR, Kanpur

State-wise FLDs Result

State	Varieties		Yield kg/ha		% Increased over Local
	Improved	Local	Improved	Local	
Gujarat	Gujarat R 1	Local	1468.5	1217	20.66
Bihar	Utkarsh	PDR 14	1659	1417	17.07
M.H.	Varun	Vaghya	1692	853	98.36
U.P.	Varun	Local	1962	1430	37.20

Source: ICAR-IIPR, Kanpur, Average of 2007-08 to 2009-10

Climate

In the hilly region it is grown during kharif and in lower hills/tarai region, sown as spring crop. In north-east plains and hilly tracts of Maharashtra, it is cultivated during rabi. It is highly sensitive to frost and water logging. The ideal temperature range for proper growth of this crop is 10-27°C. Above 30°C, the flower drop is a serious problem. Similarly, below 5°C the flowers and developing pods and branches are damaged.

Soil Type & Field Preparation

The crop can be grown in light loamy sand to heavy clay soil under adequate moisture. Among various pulses. Soil must be free from excessive soluble salts and neutral in reaction. Rajmash having bold and hard seed coat needs a good seed bed accomplished by thorough primary tillage like ploughing, harrowing or discing and planking. A good seed bed have friable but compact soil adequate moisture and free from weeds and plant debris of earlier crop. Acidic soils of the hills must be treated with lime before sowing.

Sowing time

Kharif (Hills) last week June to first of July; Rabi (Plains) 2nd fortnight of October and for spring (Lower hills) 2nd fortnight of March..

Seed Rate & Spacing : 100-125 kg/ha

Kharif (Hills) - 45-50 cm x 8-10 cm;

Rabi & Spring - 40 cm x 10 cm (irrigated) ; 30 cm x 10 cm (Rain fed)

Cropping System

In hills, it is grown as intercrop with maize in 1:2 ratios. In-between two rows of maize sown at 90 cm apart, two rows of Rajmash are adjusted at 30 cm spacing with the plant population of 120000 of Rajmash and 40000 of maize.

In plains it is grown as spring season crop after harvesting of potato and mustard. It is also found quite compatible for intercropping with early potato due to its high nitrogen requirement and wet moisture regime in 2:2 or 2:3 row ratios.

Plant nutrient management

Unlike other Rabi pulses, Rajmash is very inefficient in biological nitrogen fixation owing to poor nodulation due to non availability of suitable and efficient Rhizobium strain for Indian plains. Hence, it requires relatively higher doses of fertilizer N. For enhanced productivity, application of 90-120 kg N ha⁻¹ has been found optimum. Half of the nitrogen should be applied as basal during sowing and rest half as top dressing after first irrigation. Rajmash responds well to phosphorus application like cereals. Its P requirement is distinctly higher than other pulse crops, significant response to P application has been obtained up to a level of 60-80 kg P₂O₅ per ha.

Water Management

Rajmash is the most irrigation responsive pulse crop due to its shallow root system and high nutrient requirements. It requires 2 to 3 irrigations in NEPZ and 3 to 4 irrigation in CZ for achieving highest productivity. Irrigation at 25 days after sowing is most critical followed by irrigation at 75 days after sowing.

Weed Management

One hand weeding/hoeing at 30-35 days after sowing or application of a pre-emergence herbicide like pendimethalin @ 0.75 to 1 kg a.i./ha in 500-600 liters of water immediately after sowing helps to keep the losses by weeds below ETL (Economic Threshold Level).

Plant Protection Measures

Diseases Anthracnose

Symptoms

Pale brown sunken spots may appear on the cotyledons of infected seedlings. Lesions on leaves are dark brown. They are restricted to the veins on lower leaf surface. On stems, lesions are elongated and sunken.

Control Measures

- i) Seed treated with Carbendazim & Thirum (1:1); ii) Spray Mancozeb 0.25 % or Carbendazim 0.1 % of 2-3 foliar spray at 45, 60, 75 DAS; iii) Remove from the field and destroy crop debris after harvest; iv) Practise a 2 to 3 year rotation; v) Avoid overhead irrigation; vi) Avoid movement of workers in the field when wet



Stem Blight

Symptoms

Small water-soaked spots are first symptoms observed on leaves & appear within 4 to 10 days of infection. Develop, centre spots becomes dry and brown. The lesion is surrounded by a narrow band of bright yellow tissue.

Control Measures

- i) Foliar spary of Carbandazim @ 0.2 % is recommended ; ii) Early or timely sowing; iii) Planting in well drained soil; iv) Avoid dense planting.



Angular leaf spot

Symptoms

Fungus produces a grey mould on the lower surface of the spots. Infected pods have brown blotches. The spots may increase in size, join together, and cause yellowing and necrosis of the affected leaves.

Control Measures

- i) Seed treated with Carbendazim @2-3 g/kg. of seeds; ii) 3 Foliar spray of Carbendazim @0.1% (1 gm/lit.) starting at the appearance (5-6 weeks after sowing) at 15 days interval; iii) Plough under bean debris after harvest; iv) Practice a 2-3 year crop rotation without legumes; v) Do not work in bean fields when the plants are wet.



Insect-Pest

Leaf Miner

Nature of damage

Severely mined leaves may turn yellow and drop. Severely attacked seedlings are stunted and may eventually die. It may be seen in vegetative stage.

Control Measures

- i) Spray of Oxydemeton methyl (Metasystox) 1 ml/liter of water and repeat at 15 day interval if required; ii) Roughing of infected plants; iii) Handpick & destroy mined leaves; iv) Whenever necessary spray the crop with neem products; v) Neem water extracts and neem oil give good control of leaf miners; vi) Remove and destroy crop residues and all plant parts with symptoms of damage by bean flies.



Stem fly

Nature of damage

Stem becomes to swell and split and reducing formation of lateral roots. Attacked plants produce adventitious roots in compensation. Young seedlings and plants under stress wilt and die.

Control Measures

i) Seed Treated with Chlorpyrifos @8ml/kg seed; ii) Soil application by Phorate 10 G @ 10 kg./ha; iii) Mulch (e.g. with straw and cut grasses) helps conserve moisture, promote adventitious root development and enhances tolerance to maggot damage; iv) Avoid planting beans near cowpea, soybean and many other leguminous crops, that may be the source of bean flies.



Black Aphids

Nature of damage

Aphids feed by sucking plant sap. Heavily infested plants usually have wrinkled leaves, stunted growth and deformed pods. Plants, in particular young plants, may dry out and die under heavy aphid attack.

Control Measures

i) Bio treat.-Inundative release of *Coccinella septempunctata* @ 1000 adult/400 sqm; ii) Practice a 2-3 year crop rotation without legumes; iii) Spraying the systemic insecticide like Dimethoate or Oxydemeton methyl @1 ml/liter of water.



Harvesting & threshing

The crop matures in 125-130 days. Plants are cut with sickles after attaining full maturity judged by severe leaf fall, changing colour of pods and hardness of the grains. Harvested materials after 3-4 days sun drying, is collected in bundles to the threshing floors. Threshing is done by beating with sticks or trampling under the feet of bullocks. The clean seed should be sun dried for 3-4 days to bring their moisture content at 9-10%.

Yield

A well managed crop can easily give 20-25qtls/ha yields under irrigated conditions of plain and 5-10 q /ha under rain fed conditions of hill with 40-50qtls/ha of straw for cattle's.

Recommendation to achieved higher production

- i) Deep summer ploughing once in 3 years.
 - ii) Seed treatment should be done before sowing.
 - iii) Application of fertilizer should be based on soil test value.
 - iv) Weed control should be done at right time.
 - v) Adopt integrated approach for plant protection.
- For technical information of crop production please contact to district KVK/ nearest KVK.
- To avail benefit from Centrally and State Government running schemes for crop production (ploughing, fertilizers, micronutrient, pesticide, irrigation equipment), agricultural implements, storage infrastructure etc., please contact to your DDA/SADO office.

For more information also visit

- M- kisan portal - <http://mkisan.gov.in>
- Farmers portal - <http://farmer.gov.in>
- Kisan Call Centre (KCC)-Toll Free No.-1800-180-1551
