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Pigeonpea (Red Gram, Tur, Arhar)

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INTRODUCTION

Red gram, (Arhar) commonly known as red gram or tur is a very old crop of this country. After gram, arhar is the second most important pulse crop in the country. It is mainly eaten in the formof split pulse as 'dal'. Seeds of arhar are also rich in iron, iodine, Red gram is a protein rich staple food. It contains about 22 percent protein, which is almost three times that of cereals. Red gram supplies a major share of protein requirement of vegetarian population of the country. Essential amino acids like lycine, threonine, cystine and arginine etc.

Botanical Name - *Cajanus cajan* (L.) Millsp.
Synonym - Red gram, Tur, Arhar
Origin - Africa
Chromosome number - (2n = 22)

Nutritive value			
Protein	- 22.3 %	Calcium	-73 mg/100 g
Fat	- 1.7 %	Phosphorus	- 304 mg/100 g
Minerals	- 3.5 %	Iron	- 5.8 mg/100 g
Fiber	- 1.5 %	Moisture	- 13.4%
Carbohydrate	- 57.6 %	Calorific value	- 335 Kcal/100 g

Climate Requirement

Climate Requirement Pigeon pea is predominantly a crop of tropical areas mainly cultivated in semi arid regions of India. Pigeon pea can be grown with a temperature ranging from 26°C to 30°C in the rainy season (June to October) and 17°C to 22°C in the post rainy (November to March) season.

Soil type & Field Preparation

It is successfully grown in black cotton soils, well drained with a pH ranging from 7.0-8.5. Pigeon pea responds well to properly tilled and well drained seedbed. A deep ploughing with soil turning plough in fallow/waste lands, zero tillage sowing under intensive cropping system and Broad Bed Furrow/Ridge-furrow planting in low lying as well as intercropping areas is recommended.

Sowing Time & Method

Early Maturing varieties- First fortnight of June; *Medium & Late Maturing Varieties*- Second fortnight of June. Line sowing by seed drill or desi plough or by dibbling on the ridge and beds, both are recommended as per the area.

State-wise recommended Varieties

State	Varieties
Madhya Pradesh	JKM-189, TJT-501, JKM-7, TT-401, BSMR-175, ICPL-87119, BSMR-736
Haryana	Paras, Pusa-992, UPAS-120, AL-201, Manak, Pusa-855, PAU-881
Punjab	AL-201, PAU-881,Pusa-992, Upas-120
Uttar Pradesh	Bahar, NDA-1, NDA-2, Amar, MA-6, MAL-13, IPA-203, UPAS 120
Rajasthan	UPAS-120, PA-291, Pusa-992, Asha (ICPL-87119), VLA -1
Uttarakhand	VLA-1, PA-291, UPAS 120

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

Seed Rate & Spacing

Early Maturing Var. - 20-25 kg/ha (Row to Row-45-60 cm & Plant to Plant-10-15 cm) Medium/Late Maturing Var.- 15-20 kg/ha (Row to Row- 60-75 & Plant to Plant-15-20 cm)

Seed Treatment

Fungicide: Thiram (2gm) + Carbendazim (1gm) or Thiram @ 3 gm or Tricoderma virdie 5- 7g /kg of seed; *Culture:* Rhizobium and PSB culture 7-10 g /kg seed.

Method of Sowing

Three systems of sowings are practiced for pigeon pea. The common is flat sowing, the other methods are broadbed-furrow (BBF) for extra-early group and ridge-and-furrow for the late maturity group. The raised beds or ridges also provide better aeration and nodulation in comparison to the flat sown crop. At ICRISAT a broad bed and furrow system is used for sowing extra-early genotypes, and ridges-and-furrows are used for medium and late duration genotypes.

Cropping system:

Important cropping systems followed are:

(i) Maize–Pigeonpea (Rabi); (ii) Pigeonpea-Urd-Wheat;(iii) Pigeonpea-Sugarcane;(iv) Mung +Pigeonpea-Wheat;(v) Pigeonpea (early)-Potato-urdbean.

Inter-cropping

Pigeonpea is commonly intercropped with a wide range of crops. In India, it was estimated that 80 - 90 % of the pigeonpea were intercropped:

a) With cereals (sorghum, maize, pearl millet, finger millet and rain-fed rice).
b) With legumes (groundnut, cowpea, mung bean, black gram, soybean).
c) With long-season annuals (caster, cotton, sugarcane, and cassava).

Fertilizer and Manure application

The doses of fertilizers should be determined based on the results of soil test. All the fertilizers are drilled in furrows at a depth of 5 cm. and at the side of 5 cm. from seed. Apply 25-30 kg N, 40-50 kg P_2O_5, 30 kg K_2O per ha area as Basal dose at the time of sowing.

Irrigation and Drainage

Being a deep rooted crop, it can tolerate drought. But in case of prolonged drought there is need of three irrigation 1st at branching stage (30 DAS) 2nd one in flowering stage (70 DAS) and 3rd at the time of podding stage (110 DAS). A pre-requisite for the success of pigeonpea is proper drainage. Ridge planting is effective in areas where sub-surface drainage is poor. This provide enough aeration for the roots during the period of excess rainfall.

Weed control

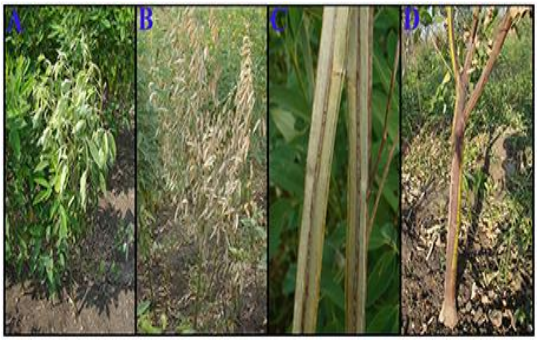
The first 60 days is very critical and harmful for the arhar crop. Two mechanical weedings one at 20-25 days and another at 45-50 days after sowing but before flowering. The Pre- emergence application of Pendimethalin @ 0.75- 1 Kg a.i. per ha in 400-600 liter of water.

Plant Protection MeasuresDisease

The important diseases of Pigeon pea are Wilt, Sterility mosaic disease, Phytophthora blight, Alternaria blight, Powdery mildew. Symptoms of these disease and their suitable control measures are given below:

Wilt Symptoms

Xylem gradually develops black streaks, dark purple bands appear on the stem surface plants extending upwards from the base. Main stem of such plants is split open, intensive blackening of the xylem can be seen. In humid weather, a pinkish mycelial growth is commonly observed the basal portions of the wilted plants. It may be seen in seedling, flowering & vegetative stage.



Control Measures

(i) Seed Treatment with Trichoderma viride @ 10 g/kg of seed or Thirum (2 gm) + Carbendazim (1gm)/kg of seed; (ii) Soil application-T. viride–2.5 kg/ha + 50 kg of well decomposed FYM
or sand at 30 days after sowing; (iii) Mixed cropping with sorghum; (iv) Grow resistant varieties like Amar, Azad, Asha (IPCL-87119), Maruthi, C-11, BDN-1, BDN-2, NP-5, JKM-189, C-11, JKM-7, BSMR-853 & BSMR-736 etc.

1. Sterility mosaic disease

Vector: Aceria cajani

The affected plants are stunted due to shortening of internodes.

The auxiliary buds are stimulated to grow and the branches are crowded at the top giving bushy appearance.

Mainly three types of symptoms are associated viz. severe mosaic in leaflets with complete sterility , mild mosaic with partial sterility and ring spots characterized by a green island surrounded by a chlorotic halo.

Management

- Rouging out infected plants up to 40 days after sowing.
- Spraying with Fenazaquin @ 1 ml/ litre soon after appearance of the disease and if necessary repeat after 15 days.
- Grow resistant varieties like Pusa-885, Asha, Sharad (DA11),Narendra Arhar1, Bahar, BSMR-853, BSMR 736, Rajeev Lochan, BDN-708.

2. Phytophthora blight

Symptoms

- Phytophthora blight resembles damping off disease as the seedlings die suddenly
- Infected plants have water-soaked lesions on their leaves.
- Brown to black, slightly sunken lesions on their stems and petioles.
- Lesions girdle the main stems or branches which break at this point.

Brown to black sunken lesion on the stem

Complete drying of the plant

Control Measures

(i) Seed treated with Metalaxyl 35 WS @3 g/ kg of seed; (ii) Crop rotation should be followed; (iii) Grow resistant varieties like ICPL 7916/ 12055/12114/12161, JKM-189, JA-4 etc.

Alternaria blight

Symptoms: Symptoms appear on all aerial part of plants are small, circular, necrotic spots that develop quickly, forming typical concentric rings. The spots are initially light brown and later turn dark brown. In severe infection, defoliation and drying of infected leaves, branches and flower buds.

Control Measures

Spray the crop with Mancozeb 75 WP @ 2 g/liter or Carbendazim 50 WP @ 1g/liter of water; ii) Cultivation of pigeonpea on ridges with proper drainage system and avoiding the sowing in heavy soil helpful in disease management; iii) Grow resistant varieties like DA- 2, MA 128-1, MA 128-2.

Insect-Pest

1. **Pod borers**

Nature of Damage

The caterpillars destroy buds, flowers and pods. Larva feeds on pods by making holes, and is seen feeding with the head alone inside and rest of the body hanging out. If flowers and pods not available, larvae will feed on foliage also

Control Measures

- First spray can be taken up with thiodicarb 75 WP 0.6 g or profenophas 50 EC 2 ml or methomyl 40 SP 0.6 g per litre of water to control eggs.
- Second spray to be done with spraying of 5 per cent neem seed kernel extract
- Third spray to be done with viral pesticide, HaNPV at 100 LE /acre along with 0.5 per cent jaggery and 0.1 per cent boric acid.

2. **Tur Pod fly**

Nature of damage:

- Defoliation in early stages.
- Larva's head alone thrust inside the pods and the rest of the body hanging out.
- Pods with round holes.

Control Measures

- Dimethoate 30% EC 1237 ml/ha
- Emamectin benzoate 5% SG 220 g/ha

Harvesting & Threshing

With two third to three fourth pods at maturity judged by changing their colour to brown is the best harvesting time. The plants are usually cut with a sickle within 75-25 cm above theground.

Harvested plants should be left in the field for sun drying for 3-6 days depending on season.Threshing is done either by beating the pods with stick or using Pullman thresher. The proportion of seed to pods is generally 50-60%.

Yield

With use of improved technology of agronomic practices pigeon pea may yield about 25-30q/ha from irrigated condition and 15-20 q/ha from un-irrigated condition. (depending upon maturity group of variety and climate) and 50-60 q/ha of sticks for fuel, as well.