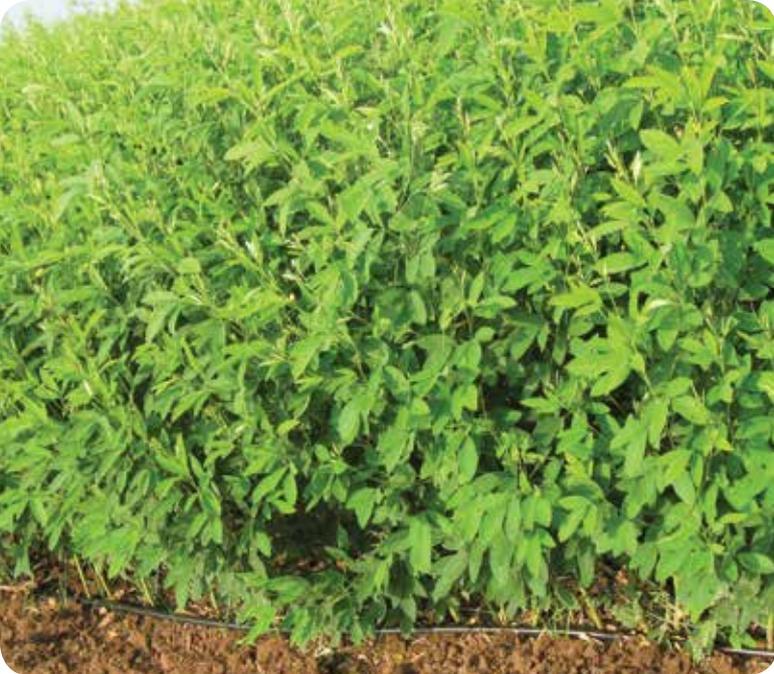




Irrigation Solution
PIGEON PEA
With Jain Technology™



Jain Irrigation Systems Ltd.
Small Ideas. Big Revolutions.®



Soils

- Pigeonpea requires light textured, well drained soil, though, it is grown on a wide range of soils.
- Soil should be neutral in pH (6.5-7.5).

Climate

- Pigeonpea is mainly grown in tropical and sub-tropical climates.
- It is highly susceptible even to light frost.
- It can tolerate heavy rains provided waterlogging does not take place.
- It has the capacity to tolerate moisture stress to a great extent because of the deep root system.

Spacing

- When pigeon pea is grown in the cool post rainy season in India, it matures sooner and do not grow tall than when it is sown at the beginning of the rainy season.
- Long duration varieties of pigeon pea are tall, spreading and occupy the field for about 250-270 days.
- These varieties are planted at wider row spacing of 90-120 cm and about 30 cm between the plants particularly under rain fed conditions.
- Under irrigated conditions Grow early maturing varieties are more popular as they fit well in double cropping systems with other crops.
- In case of April planted pigeon pea, a row spacing of 90-20 cm is recommended as the vegetative growth is much higher than June planted crop.
- Depending upon the size of seed and spacing, 15-25 kg/ha seed of pigeon pea is sufficient.
- To obtain satisfactory yields in the post rainy season the crop requires 12-30 plants/m².
- Since soil moisture often becomes limiting factor is the post rainy season, yields tend to decline beyond a certain population.
- Maximum yield can be obtained at 12 plants m² and any further increase in population led to decline in yield.
- Evidences are also available for no variation in yield from 33-45 plant m² depending on soil type and its moisture holding capacity.

Varieties

Variety	Season	Crop Duration (days)	Yield (q/ha)
Palnadu LRG 30	Kharif	170-180	20-25
	Rabi	120-130	
<i>Suitable for all districts in A.P. Seeds has medium bold size with brown colour</i>			
Maruthi ICP 8863	Kharif	155-160	20
<i>Up straight growth it contains medium bold size seeds. It is resistant to wilt this can be grown on paddy field bunds.</i>			
ST 1 or	Kharif	170-175	20-22
C11	Rabi	120-130	
<i>It is suitable for Telengana Districts. The plant has medium height with extensive branching The flowers are yellow with red streak The seeds are long round shape with thick red colour.</i>			
Abhaya	Kharif	160-163	20-22
ICPL332	Rabi	120-125	
<i>Plants grow straight with excess pods. Seeds are medium bold with brown colour. It is resistant to pod borer attack</i>			
Lakshmi	Rabi		
ICPL85063	kharif	160-180	18-20
<i>The plant is bushy in appearance with excessive branching. It is resistant to wilt</i>			
MRG 66	Kharif	180	22-24
<i>The plant is bushy in appearance with excessive branching. It is resistant to wilt.</i>			
HY3-C	Kharif	190-200	16-18
<i>The flowers are red in colour. The pods are medium breadth with white colour seeds. Green pods are used for preparing curries. It is suitable for Telengana area.</i>			
Durga ICPL84031	Kharif	115-120	15
<i>High yielding short duration variety. It is resistant to macrophomina wilt and also pod borer attack. It is suitable for kharif in north Telangana districts of A.P.</i>			
PRG 100	Kharif	145-150	20
<i>It is suitable for Chalka soils of Rayalaseema districts as a rainfed crop. It is resistant to wilt.</i>			



Sowing Time

- Pigeonpea is a traditional Kharif crop sown in June-July with onset of monsoon in various agro-climatic zones.
- Short duration varieties of pigeonpea are now becoming popular in the irrigated area.
- These varieties are harvested much earlier than the occurrence of frost/cyclones and can also be fitted well in to multiple cropping systems.
- Planting of early pigeonpea before the onset of monsoon in the month of June is recommended for higher yields
- Planting with onset of monsoon was the optimum because the earlier plantings emulated the reproductive phase during the period of heavy rainfall which ultimately caused drop of flowers and pods.
- Delay in planting reduces the yield of pigeonpea
- Delay in planting, caused reduction in the duration of crop, plant height, number of branches and pods.
- However, the impact on the protein content was low.

Method of Sowing

- Pigeonpea is generally broadcasted.
- Line sowing is superior over broadcasting. Broadcasting results in uneven plant population which ultimately results in low yield.
- In such areas where temporary water logging take place, planting on ridges is recommended..

Intercrop with Pigeon Pea

- Pigeonpea + Sorghum – Kharif
- Pigeoepa + Pearl millet- Kharif
- Sorghum+ Pigeon pea –Rabi
- Pigeonpea+ Maize - Kharif

Land Preparation

- Pigeon pea being a deep rooted crop respond well to proper tilth.
- A deep ploughing by soil mold board plough followed by 2-3 discing and harrowing followed by planking is essential.
- Weeds should be removed.

Water Management

- Pigeon pea is mainly grown in the monsoon season under rain fed conditions.
- Being a deep- rooted crop, it is capable of extracting moisture from deeper layers in the soil.
- However, under long periods of moisture stress, it may respond to irrigation as well.

Irrigation

Drip Irrigation for Pigeon Pea

Inline drip line, turbo aqua or turbo line are suitable for Pigeon pea.

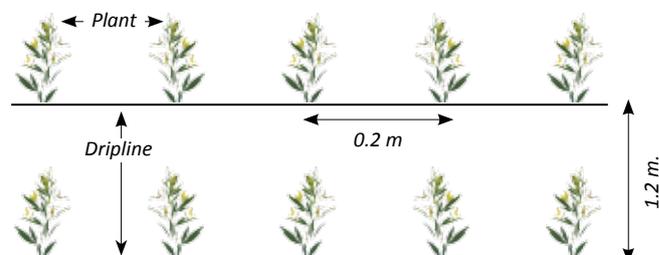
- Laterals are spaced at the row spacing of the crop. 90, 100, and 120 cm.
- Depending upon soil type dripper spacing is determined.

For sandy or murram type soils	30 cm
For medium soils	40 cm
For heavy (clayey) soils	60 cm.
- Dripper discharge 4 lph

Water requirement of Pigeon Pea for Kharif and Rabi season.

Pigeon Pea kharif							
	E mm	ETP mm	kc	k p	WR mm	at 90 %Eff	l/ha/day
MAY	6.70	4.6900	0.4000	0.5000	0.9380	1.0422	10422
JUNE	5.50	3.8500	0.9000	0.9000	3.1185	3.4650	34650
JULY	5.30	3.7100	1.1500	1.0000	4.2665	4.7406	47406
AUGUST	6.20	4.3400	0.8000	1.0000	3.4720	3.8578	38578
SEPT	4.70	3.2900	0.5500	0.8000	1.4476	1.6084	16084
Adjust Rainfall							
Pigeon Pea Rabi							
SEPT	4.70	3.2900	0.4000	0.5000	0.6580	0.7311	7311
OCT	4.00	2.8000	0.9000	0.9000	2.2680	2.5200	25200
NOV	3.60	2.5200	1.1500	1.0000	2.8980	3.2200	32200
DEC	3.40	2.3800	0.8000	1.0000	1.9040	2.1156	21156
JAN	4.10	2.8700	0.5500	0.8000	1.2628	1.4031	14031
Adjust Rainfall							

Layout of Dripline



Fertigation

Fertigation Schedule for Pigeon Pea		
Fertilizer recommendation	8:20:15/ac	
At Planting	AIIP	125kg SSP
	Rhizobium Culture	2 kg/ac
5 Days after germination	4 kg N	10 kg Urea
At first flower	4 kg N	10 kg Urea
	5 Kg K	8.5 kg MOP
20 days after first flower	5 Kg K	8.5 kg MOP
40 days after first flower	5 Kg K	8.5 kg MOP

Integrated pest and disease management is recommended.

IPM for Pigeonpea

- 1) The cultural practices, starting from selecting the disease-free and robust planting material.
- 2) Right sowing time.
- 3) Deep tilling to weeding out unwanted vegetation and soil-borne pests and pathogens
- 4) Crop hygiene, keeping clean field and practicing hygiene by workers will contribute significantly in controlling crop pests.
- 5) The pest surveillance and monitoring exercises based on frequent visits to the fields and sweeping with insect nets,
- 6) Observing the movement of the pests using pheromone traps, light traps and sticky traps, and deciding on a spraying schedule with botanical insecticides (neem- based products).
- 7) The need-based application of safe botanical insecticides not only cuts the costs, but also helps in reducing the pollutant load in the environment.
- 8) The use of biological agents to manage the pests is another important aspect of IPM. Spiders and preying mantises can be effectively used in managing pests.
- 9) Friendly birds are good custodians of crops, and they help manage the number of serious insect pests within the thresholds. By providing suitable perches the birds could be encouraged to visit the crop fields.
- 10) By growing "antenna" crops such as corn (maize) and sorghum (jowar or 'chulam') have also helped in attracting the birds to crop fields as bio-control agents.
- 11) Castor and sunflower planted around the field of acts as insect traps.
- 12) Raise as intercrop in Sorghum and millet.
- 13) By raising companion crops along the main crops the pest could be managed well. While, the trap crops help in trapping the pests in them, other plants with strong aroma, such as fennel and garlic, help in repelling the pests.
- 14) The pests can be managed well by judiciously following the mixed-cropping pigeonpea (marigold or sorghum), alley cropping (marigold, softwood trees like sesbania) and border cropping (marigold, Castor) with suitable crop varieties.
- 15) The light traps are mostly used for monitoring the pest movements in the fields.
- 16) Use NPV for caterpillar Control.

IPM for Disease control

1. The cultural practices, starting from selecting the disease-free and robust planting material.
2. Right sowing time.
3. Deep tilling to weeding out unwanted vegetation and soil-borne pests and pathogens

4. Crop hygiene, keeping clean field and practicing hygiene by workers will contribute significantly in controlling diseases.
5. Promote early maturing Pigeonpea varieties with resistance to sterility mosaic, Blight and wilt.
6. Follow rotation with or Sorghum or Millet.
7. Apply *Trichoderma viride* at the rate of 2kg in 50 kg FYM to the soil before sowing.

Diseases of Pigeon pea and their control

Redgram Wilt *Fusarium udum*

Most destructive disease. Throughout the crop cycle the crop is susceptible.

Use Tolerant varieties like Maruti (ICP 8863), Lakshmi (ICP 85603), Durga (ICPL 84031) PRG 100, Mukta, Prabhat, Sharda. Crop rotation with Tobacco, Castor, or Sorghum. Soil solarization before planting. Seed treatment with *Trichoderma viride* + 3 g thiram per kg seed. 2kg of the mixture mixed with FYM to be applied to the field.

Phytophthora blight *Phytophthora drechsleri*

A devastating disease. Young plants are killed. Galls develop on stems. Soil borne disease. Cloudy weather favour infection.

BDN 1, ICPL 150, ICPL 288, ICPL 304 and KPBR 80-1-4 are resistant. Seed treatment with 4g *Trichoderma viride* formulation + 6g Metalaxyl/kg seed. Follow up with a spray of Metalaxyl 2g/l.

Dry Root Rot *Rhizctonia bataticola* *Macrophomina phaseolina*

Serious problem of Late-sown crop. More Susceptible at Reproductive Stages.



LRG 66, ICPL 86005, ICPL 86020, ICPL 87105, ICPL 91028 are tolerant. Seed treatment with 4g Trichoderma viride formulation + 3g Thiram/kg seed. 2kg of the mixture mixed with 50 kg FYM to be applied to the field.

Powdery Mildew *Oidiopsis taurica*

White powdery growth on leaves and flowers. Defoliation when infection is severe. Cool climate congenial for disease.

Spray wettable sulphur @ 1g /l water

Sterility Mosaic *Sterility Mosaic Virus*

Serious problem in India. Patches of deep green plants that do not flower.

Eriophid vector spreads the disease. ICPL 87119, ICPL 227, Jagruti and Bahar tolerant. Spray Dicofol 3ml/l or sulphur 3g/l to control the vector.

Insect pests on pigeon pea

Gram Caterpillar *Helicoverpa armigera*

Throughout the year Peak attack in September to March- Feeds on all green tissue

A Combination of control measures Pheromone traps Use H-NPV virus solution Neem extract (1ml/l) Endosulphan or Pyrethroids (1-2ml/l) Shake the plant and collect all larvae from the ground and destroy.

Plume moth *Exelastis atomosa*

Peak attack November- March Larvae bore into buds.

Spray Endosulphan, Quinalphos, Carbaryl (1-2ml/l)

Green Pod Borer *Etiella zinckenella*

High infestation when temperature is high. Larvae feed on mature seed

Spray Endosulphan, Quinalphos, Carbaryl (1-2ml/l)

Spotted pod borer *Mauca tesulalis*

Major pest of the crop Larvae webs together leaves buds and pods. Bores into pods.

Spray Endosulphan, Quinalphos, Carbaryl (1-2ml/l)

Pod Fly *Melanagromyza obtusa*

Major pest of Pigeonpea Maggot feeds on developing grain. Completes life cycle in the seed chamber and flies out as adult through hole made on fruit wall.

Spray monocrotophos 1ml/l for larvae Spray endosulphan to control adults 2ml/l.

Blister beetle *Mylabris pustulata*

Adult feed on flowers.

Adults can not be killed by insecticides. Handpicking and killing in kersene mixed with water.

Jassids *Empoasca kerri*

Leaf infection. Reduced yield.

Single application of Dimethoate 1ml/l to reduce population.

Aphids *Aphis craccivora*

Infection high in cooler climate. Nymphs and adults colonise on young shoots and pods. Affects development pods and seeds.

Coccinellid predators control aphids. Apply dimethoate 1ml/l or phosphomidon 1ml/l.

Leaf Webber *Grapholita critica*

Minor pest.

No chemical application. Remove and destroy the webbed leaves.



Weed Management

- The growth of pigeon pea is quite slow during first 45-60 days after sowing. For short duration crop first 30 days in critical
- Two weedings, one at 25 days of another at 45 days after sowing, were found to be sufficient.
- Among herbicides, lasso @ 1.0 kg a.i./ha was found to be quite effective

Cultural methods

- Hand weeding 25 - 45 days after sowing is better control measure.
- Intercropping with sorghum and maize suppress weeds in long duration crops.
- With short season crops growing short stature crops such as cowpea, green gram, black gram, groundnut and soy bean serve as smoother crops to weed.

Harvesting

- Green pigeon pea pods are harvested for different purposes. Near cities where they can be readily marketable they are harvested for sale as vegetable.
- Fully developed, bright green seed is preferred, so pods should be harvested just before they start losing their green colour, it is important to remember that the appearance of pods at their stage varies between cultivars.
- Dry seeds of Pigeon pea are harvested when the pods are fully ripe and have turned yellow but before the pods start shattering.
- Harvesting is usually done manually by using sickle to cut plants and vines, but occasionally by machines and is followed by drying and threshing.
- Harvested material is dried under the sun in the threshing yard for about a week, depending on the weather conditions.
- Threshing is done both manually and mechanically.
- In some places mechanical threshers are used.

Storage Practices

- Storage of food grains is an important aspect of Post Harvest Technology.
- Storage losses are considerably higher in pulses than in cereals.

- Pigeon pea is usually stored for long periods to ensure availability of whole seed at the time of sowing, and as a dhal to meet consumer requirement.

Benefits of drip irrigation for Pigeonpea

- Increases yield upto 100%
- Reduces water used for irrigation up to 55%
- Allows uniform high % germination
- Helps in early planting which is a pre-requisite for IPM
- Allows for a Summer crop (pest free environment)
- Early and uniform maturity
- Controls weed growth as water is applied only to the root zone in case of drip.
- Creates opportunity for high value rotation crops

Dos

- Ensure good drainage in the field.
- Adopt drip irrigation.
- Compulsorily apply organic manure as per recommendation
- Select high yielding, disease and pest tolerant variety suitable for each location.
- Strictly follow the irrigation schedule given by the engineer.
- Follow the drip system maintenance schedule given by the engineer.
- Compulsorily weed/ inter-cultivate, timely operation helps in crop growth.
- Follow the precautions while operating the drip system as explained by the engineer.
- Follow disease and pest control measures timely and effectively.
- Apply sprays in the evening or early morning only.

Don'ts:

- Don't over irrigate the crop at anytime.
- Don't spray the crop under hot sunlight.

Frequently asked questions (FAQ's)

1. Can I use drip method of irrigation for Pigeon pea ?
Yes. Drip irrigation is suitable both as regular irrigation or as life saving irrigation.
4. Can I take an intercrop with drip irrigation?
Yes. As per the practice existing in the area.

Crop yields on depend on Climate, Soil and Management and therefore can't be guaranteed by the company

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