

RABI PULSES*Chickpea, Lentil, Fieldpea, French bean, Lathyrus*

Rabi season pulse or Cool season food legumes are:

- *Chickpea, Fieldpea, Lentil, Lathyrus, Frenchbean, Fababeana*
- *They contribute 60% world pulse production*
- *28 million ha globally*
- *They are concentrated on temperate and sub-tropical climate*
- *Chickpea, lentil & lathyrus in developing countries*
- *Peas in developed countries*
- *Fababeana in both the areas but very minor crop*

CHICKPEA / BENGALGRAM

Cicer arietinum

- *Cicer* derived from ‘*Cicero*’ well known Roman family and ‘*arietinum*’ from ‘*aries*’ meaning ram’s head shape
- Gram, Bengal gram, *chana*
- Mostly used pulse in many products
 - Boiled, roasted, steamed, sprouted, flour made into many delicious food

World Scenario

Country	Million ha	Million t	t/ha
Africa (Ethiopia, Malawi, Morocco, Tanzania, Tunisia)	0.47	0.29	0.62
Mexico	0.11	0.15	1.44
Asia (India, Pak, Turkey, Iran, Myanmar)	11.0	8.04	0.73
India	7.10	5.75	0.81
Europe	0.18	0.12	0.67
Australia	0.22	0.27	1.25
Total	12.0	8.91	0.74

Indian Scenario

State	Million ha	Million t	t/ha
MP	2.68	2.48	0.92
Rajasthan	1.55	1.10	0.71
UP	0.97	0.89	0.92
Maharashtra	0.75	0.50	0.67
Haryana	0.35	0.28	0.80
Karnataka	0.35	0.15	0.44
Others	0.35	0.35	***

All India	7.10	5.75	0.81
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- Origin
 - Most probably from SE Turkey to N Syria
 - Cultivation dates back to 6250 BC
- Plant
 - Indeterminate, stems are branched
 - Primary, secondary and tertiary branches are there
 - Height of the plant may vary from 20-100cm
 - Roots are robust & strong
 - Single flower from each node
 - They produce flowers profusely but only 20-30% set as pod
 - No. of pods may vary from 30-150
 - No of seeds per pod 1-3
- Varieties
 - Two types *Desi* & *Kabuli*
 - *Desi* is small seeded
 - Angular shaped edge
 - Shape like chickens head
 - 90% of the world's cultivated
 - *Kabuli*, large and round seeded with white pale cream seed coat
 - Duration 90-180 days
 - CO 2, CO 3, CO 4 are 90days
 - All India – many varieties , *Vijay*, *Pusa 391*, *DCP 91-3* (HYV, High input response, 150d, 170mg seeds size)

FIELDPEA

Pisum sativum

- *Matar* in Hindi
- Third important cool season crop next to chickpea and French bean
- Cultivated in about 6.51 million ha world wide with 10.95 million t annually
- Distributed in Asia, Africa, Europe, N.America, & Auastralia
- Usually cultivated for dry pods and variety of snacks

World area production and productivity of Fieldpea

Country	Million ha	Million t	T / ha
Europe	3.28	6.77	2.06
France	0.53	2.57	4.84
Russian Federation	1.18	1.00	0.85
Asia	1.58	1.87	1.19
China	0.70	1.15	1.64
India	0.62	0.56	0.91
N C America	0.72	1.40	1.96
Canada	0.63	1.26	2.00
Australia	0.31	0.38	1.24
South America	0.12	0.10	0.82

World	6.52	10.95	1.68
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Indian scene of Fieldpea

State	Million ha	Million t	T / ha
UP	0.41	0.54	1.32
MP	0.19	0.08	0.41
Assam	0.03	0.02	0.61
Rajasthan	0.01	0.02	2.19
All India	0.73	0.72	0.95

- Origin
 - Mediterranean region of Europe & West Asia
 - Before 3000 BC
- Plant
 - There are two varieties
 - Gardenpea : P. sativum var. hortense
 - Fieldpea : P. sativum var. arvense
 - Annual herbaceous well developed tap root system plant
- Plant ... gardenpea
 - Flowers auxiliary, long peduncle, raceme with 1-2 flowers
 - Pods are variable length and breadth, curved/ straight
- Plant...Fieldpea
 - Flowers are purple or lavender colored
 - Short peduncle
 - Seeds smaller than garden pea, angular
- Varieties
 - Rachna, Pant Marter 5, HUP 2, DMR 11
 - Crop duration 110-140days
 - Seed weighs 160 – 240mg

LENTIL

Lens culinaris

- Masur
 - Consumed as dry seed
 - In India as flour, dal (boiled, smashed in to soup), several snacks and sweets
 - Rich source of ca, phosphorous and iron
 - Protein 24-26%
 - Also rich in vitamins
- Global area production
 - 5% of pulses
 - 3.3 million ha &
 - 2.9 million t
- Predominantly grown in Asia (80%)
- Also grown in N & E Africa, N-C America, S. Europe

Area in India

State	Area	Production	t/ha
UP	0.55	0.45	0.81
MP	0.49	0.24	0.48
Bihar	0.17	0.10	0.58
WB	0.05	0.04	0.84
Rajasthan	0.01	0.03	1.01
All India	1.34	0.88	0.66

- Origin
 - Mediterranean region
- The plant
 - Annual, herbaceous, short growing self pollinated legume
 - Stem highly branched, thin, slender
 - Basal part stem becomes woody as the plant grows.
 - Plant height varies from 15 – 75cm.
 - Duration 130-140days
 - Grain weight 18 to 33mg, mostly around 20-25mg
- Varieties
 - Broadly classified as microsperma and macrosperma
 - Microsperma are predominantly cultivated in India
 - Macrosperma are large sized grains cultivated in Mediterranean region
 - To mention some varieties in India
 - Pant L 406, 639, Pant L 4
 - DPL 15 and DPL 62

LATHYRUS

Lathyrus sativus

- Khesari, grasspea, chichlingpea
- It is minor pulse
- Mostly grown in residual soil moisture in rice fields
- Green leafy part is used as green fodder and dried as dal.
- The seeds contain BOAA (B-n-oxalyl-amino alanine), a neurotoxin causing lathyrism in human
- Seeds contain BOAA 0.1 to 2.5%
- Less than 0.2% is safe for human consumption
- *Area*
 - Very small area in the world except Nepal & Bangladesh
 - Countries cultivated area India, Iran, Middle East
 - In India 0.95 million ha with 0.58 million t
 - Major region in India is – Indo-Gangetic plains.
 - Over years the area declined
 - Ban in cultivation due to lathyrus
- *Plant*

- Herbaceous annual with well developed root system
- Inflorescence auxiliary, raceme with solitary flower
- Peduncle is long and the color of corolla varies blue to purple
- Pods are flat, 5 seeds/pod
- Varieties
 - BIO L 212 (<0.1%)
 - Yield potential 1.5 tonnes

FRENCHBEAN

Phaseolus vulgaris

- *Rajmash*, kidney bean, common bean etc.,
- In India
 - the fresh pods for vegetable is called as *faras* and dried pulse as *rajmash*
 - *More fleshy tender pods of round types with less string are for vegetables compared to flat pods*
 - *Dried seeds are highly nutritious*
- Area
- It is extensively cultivated in 5 major continents
- Brazil is the leading country
- In India it is only a minor pulse
 - Cultivated in hills during Kharif
 - Small areas in northern plain during rabi
- Origin
 - Highlands of middle America and Andes
 - Cultivated over a period of 7000-8000 years
- Plant
 - Annual, herbaceous
 - Stems has elongated internodes and may produce more nodes
 - Pods are usually slender and narrow
 - Size of the pods may be up to 20cm
 - Seeds may be oblong, globular, kidney shaped with variable colors
 - Varieties in India are : PDR 14, HUR 15, VL 63
 - Duration 110-120 days, seed weight around 400mg

Rabi pulses Management

(Chickpea, Lentil, Fieldpea, French bean, Lathyrus)

Soil

- All types of soil
- Poor to fertile
- Well drained soil is more suitable since sensitive to salinity and alkalinity

Field preparation

- As for other pulses except rice-fallows
- On heavy soils rough seed bed is suitable for chickpea
- For others medium tillage is sufficient

Seed treatment :

- For seed borne pests and diseases
- Rhizobium for nodulation

Season

- NW Plains – end of October
- NE Plains – Second fortnight of November
 - Soil moisture availability decides the time
 - Delay in sowing end with terminal drought

Seed rate

- Depends up on the size of the seeds & spacing
- Chickpea
 - 30 x 10 (33 m²) plants is general
 - If irrigated 25 x 10 cm (44 m²)
 - 80-85 kg for bold seeded (250mg) and 50-60 kg if 120-150mg
- Lentil
 - 40-45 kg (micro) and 55-60 kg for macro sperma seeds
- Field pea: 50-60 for small seeded and 80-90 for bold seeded
- French bean : 120-140 kg (350-450mg)
- Lathyrus: 80-100

Method of sowing

- Broadcasting and planking
- Drilling manually
- Seed drill sowing
- Broadcasting on standing rice crops (lentil & lathyrus)

Depth of sowing

- Since all cool season pulses are hypogeal can be planted deep depending on the moisture

Rabi pulses - Nutrient Management

Crop	Ecosystem	Planting time	N	P2O5	K2O	S
Chickpea	Rainfed	Normal	20	40	0	20
	Irrigated	Normal	20	60	20	20
		Late	40	40	20	20
Lentil	Rainfed	Normal	20	40	0	20
	Irrigated	Normal	20	40	0	20
		Late	30	40	0	20
Filedpea	Rainfed	Normal	20	40	0	20
	Irrigated	Normal	40	40	20	20
		Late	40	40	20	20
Frenchbean	Irrigated	Normal	100	60	20	20
Lathyrus	Rainfed	Normal	10	30	0	0

Water management

- All the crops are sown in residual soil moisture except Frenchbean
- They may face terminal drought

- One or two supplemental irrigation is needed
- May be moisture conservation practices
- IW/CPE ratio of 0.4 is reasonable for all
- Lathyrus rice-fallow crop, little chance

Weed management

- All methods to be employed
- Herbicides can also be as per kharif pulses

Cropping systems

- Cereal – legume is always good
- Cereals in Kharif
- They are also under mixed community with winter cereals like wheat and barley

Harvest

- Over ripening leads to great loss of yield
 - It is very serious in French bean
- Staggered harvesting is one way
- Cut entire plant and carry with moisture & then dry and thrash, clean
- Store the seeds at 8-10% moisture