

# Brief Descriptions and Holistic Cultivation of Field Pea

Anil Kumar<sup>1</sup>, Narender Kumar<sup>2\*</sup>, Morajdhwaj Singh<sup>3</sup> and Sonu Kumar<sup>4</sup>

<sup>1,2</sup>Department of Agriculture Dolphin (P.G.) Institute of Biomedical & Natural Sciences, Dehradun

<sup>3</sup>Department of Horticulture, Dolphin (P.G.) Institute of Biomedical & Natural Sciences, Dehradun

<sup>4</sup>Department of Horticulture, CCS Haryana Agricultural University, Hisar

Corresponding Author - [narenderp.path@gmail.com](mailto:narenderp.path@gmail.com)

## Introduction

Pea is the English name. Various names are using as a synonym for pea in Indian local languages *i.e.*, Muttar (Hindi), Motor (Bengali, Assamese), Badachana (Oriya), Paltaani (Tamil), Desavati, Batani (Telgu), Vatana (Gujrati, Marathi) and Mattri (Punjabi).



In the UK, Pea was grown for vegetable in the middle ages. In America, pea was introduced soon after Columbus and later on a winter type pea was introduced from Austria in 1922. Pea was taken to China in the first century.

Probably, pea originated in south-western Asia and spread to the temperate zones of Europe. But, on the basis of genetic diversity, four centers (Central Asia) of pea origin have been recognized. Some archaeological evidence of the use of field peas dating from 8000 BC has been found in Fertile Crescent. The first cultivation of peas appears to have been in Western Asia from where it spreads to China and India. Some Greek and Roman authors also mentioned its cultivation as a pulse and fodder crop. Pea domesticated about 10,000 years ago.

## Uses

Pea is in the group of foods known as legumes and incredible source of nutrients. Legumes like pea are also referred to a poor man's meat as they are good source of proteins. This crop is also plays a recognized role in restoring soil fertility.



Fig. Various recipes with green pea

## Nutritive value

Components	Amount (per 100 g)
Fat	00.10 g
Protein	22.50 g
Carbohydrate	62.10 g
Fibre	04.00 g
Copper	00.23 mg
Calcium	20.00 mg
Iron	01.50 mg
Magnesium	34.00 mg
Phosphorus	13.90 mg
Potassium	79.00 mg
Sodium	07.80 mg
Sulphur	95.00 mg
Vitamin A	139 IU
Riboflavin	07.20 mg
Thiamine	00.25 mg
Vitamin C	09.00 mg
Nicotinic acid	00.80 mg
Oxalic acid	14.00 mg
Moisture	72.00 g
Calories	93.00

Source: Das (2013)

## Area and Production

The major field pea producing countries are Russia, China, followed by Canada, Europe, Australia, United States raise over 4.5million acres are major exporters of peas. In India pulse crop occupy an area of about 29.81 million ha with production 25.42 million tonnes and productivity about 8.53 q/ha (DES,2017-18). In Uttarakhand pulse productivity is 8.74q/ha(DES 2017-18) and about 7.7% are under irrigated pulses. Pea (*Pisumsativum-vararvense*) is 3<sup>rd</sup> most important pulse crop of India grown throughout the country. It is grown as winter vegetable in the plains of Northern regions and as summer vegetable in hills. Major.Pea producing states are Uttar Pradesh (49%), Maharashtra, Madhya Pradesh and Bihar.

## Botanical Description

Pea plant is an annual herbaceous legume that belongs to family Fabaceae. This family is also known as pea family. Pea plant can be bushy or climbing with slender and hollow stems which attach to a substrate using tendrils with tap root system with nodules on the surface.

### Roots

Pea plant has branched tap root system having root nodules due to presence of nitrogen fixing bacteria. First and second order lateral roots appear acropetally on the taproot. The root system of the legumes is less extensive than that of cereals. At every developmental stage, most of the roots (up to 90%) are located in the upper soil layer.

Pea nodules arise from cells adjacent to the root pericycle. *Rhizobium legumino-sarumbv. vicaelive* saprophytically in soil and attracted towards the plant rhizosphere.

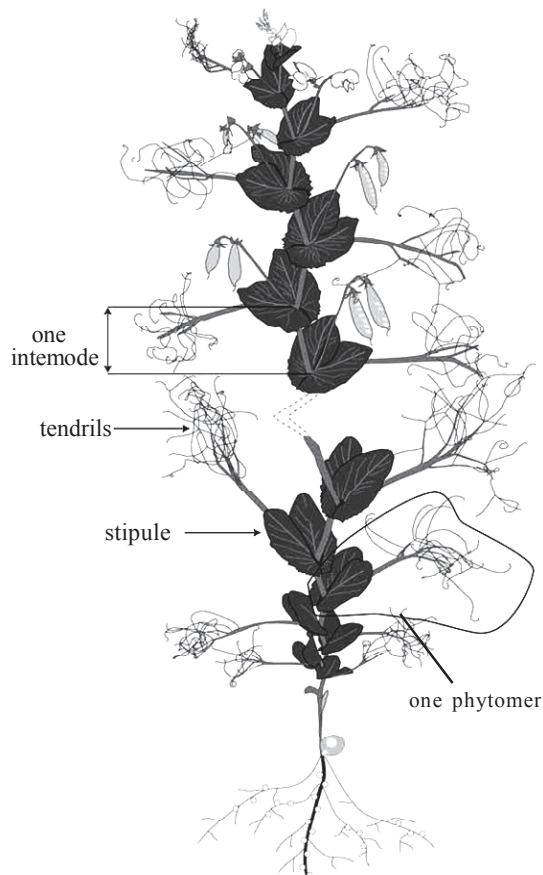


Fig. Botanical description of pea plant

## Stem

Stems are erect and climbing, one to three feet high, young stems densely pubescent, somewhat angular, and herbaceous, green and branched.

Phytomers constitute the stem which acts as the functional unit of the pea plant. It consists of an internode, a leaf and an axillary meristem.

## Leaves

Alternate, petiolate, stipulate, stipules 1/4 to 1/2 inch long attached near the base, compound leaflets dark green, entire, acuminate, and pubescent on both the sides, reticulate venation. Leaves are in three pair of leaflets and the terminal one is modified into a branched tendril.

## Inflorescence

The flower inflorescence of pea is known as Racemes. Flower may be reddish, purple and white in colour. The white colour of flower is due to presence of fewer pigments. Flower contains about 5 Sepals and 5 petals. 10 stamens are present in which nine stamens are fused to form a bundle and 10<sup>th</sup> one is posterior and free.

Flowering usually begins 40-50 DAS. Flowering is normally 2-4 weeks depending on the flowering habit and weather during flowering.

## Fruit

The fruit of pea plant is known as legume. When a legume has one or two seeds, it is also known as pod. Each legume can range in size from 4-15 cm long 1.5- 2.5cm wide. Each legume contains 2-10 seeds.

## Seed

Seeds are globose or angled, smooth or wrinkled, whitish, grey, green or brownish.

## Genetical Description

Mendal was choosing pea as an experimental model. He was not just a botanist and plant breeder. He was the first to apply

calculus of ratios to a biological situation. He began his study on a total of 34 distinct varieties of pea. On the basis of these findings, Mendal proposed the two fundamental principles of genetics, the *law of segregation* and the *law of independent assortment*.

Pea is diploid with chromosome number  $2n=14$ . There are mainly 3 types of peas that are commonly eaten:

1. Garden or Green pea (*Pisumsa-tivum*L.).
2. Snow peas (*Pisumsativum* var. *Macrocarpon*).
3. Snap peas (*Pisumsativum* var. *Macrocarpon* ser. *Cv.*)

In peas induced tetraploids were developed by colchicine treatment of seeds and seedlings. The induced auto tetraploids had low fertility but with increased seed content (11.1- 21.7%). However auto tetraploids were not useful for cultivation.

## Cultivation

### Sowing time and soil

In India Field pea is sown in month of October to 1<sup>st</sup> fortnight of November as it is a cool season crop and it can be grown in variety of soil but a well-drained loamy soil free from excessive soluble salts with pH range of 6.5-7.5 is suitable for successful cultivation of the crop.

### Seed rate

Seed rate required for tall varieties is 70 - 80 kg/ha and dwarf varieties is 100 kg/ha. Field pea can be sown at depth of 4-5cm with spacing 30×10cm.

### Cultivars

Rachana, Indra (K.P.M.R.-400), Shikha (K.F.P.D.-103), Malviya Matar-15, Malviya Matar-2, J.P.-885, PusaPrabhat (D.D.R.-23), Pant Matar-5, Adarsh (I.P.F.-99-15), Vikas (I.P.F.D.-99-13), Jay (K.P.M.R.-522), Sapna (K.P.M.R.-144-1), Prakash, Hariyal, Paalathi

Matar, Pant P.-42, Aman, I.F.P.D.-10-12.

### Irrigation

It is grown in rainfed/unirrigated conditions on residual soil moisture. One or two irrigation at 45 DAS and if needed at pod filling stage may be the best recommended irrigation schedule.

### Nutrient management

In field peas the recommended dose of nitrogen (20-30 kg/ha), phosphorus (40-60 kg/ha) and potassium (20-30kg/ha) required. 20 kg sulphur per ha is best suited for better growth and fungal diseases. Use the FYM or vermi compost for maintenance organic content and good soil health.

### Plant protection measures

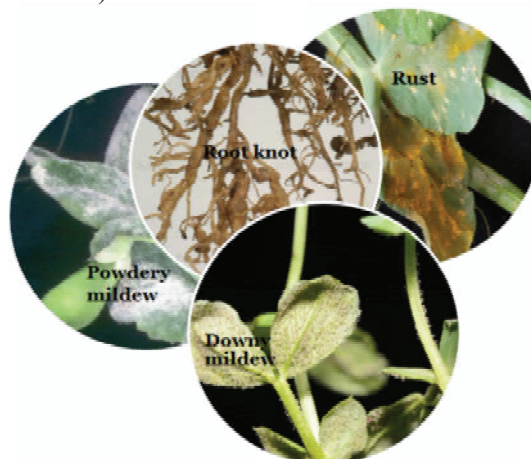
#### Weed management

Weeds are unwanted and undesirable plants which compete with main crop plants for space and nutrition. Main weeds of pea crop are *Chenopodium album*, *Phalaris minor*, *Avena ludoviciana*, *Anagallis arvensis*, *Convolvulus arvensis*, *Melilotus alba*, *Fumaria parvifolia*, *Galium aparine*, *Medicago denticulate*, *Phalaris minor*, *Poa annua*, *Polygonum convolvulus*, *Rumex dentatus*, *Spergularia arvensis*, *Stellaria media*, *Trigonella polycerata*, *Lepidium sativum* and *Cyperus rotundus*. The field pea should be free from weeds for the period of 40-45 DAS. Integrated approach of weed management is always welcomed. Chemical strategy integrated with sowing strategy, crop rotation, biological management and hand weeding which increase crop yield.

#### Diseases management

Pea crop is adversely affected by number of diseases. Main diseases in pea are wilt-*Fusarium oxysporum* f. sp. *pisi*, Fusarium root rot-*Fusarium solani* f. sp. *pisi* and damping off/seedling rot-*Rhizoctonia solani*, *Pythium* spp. (soil borne fungal diseases); pea cyst

nematode-*Heterodera goettingiana*, root knot-*Meloidogyne incognita* and root lesion nematode-*Pratylenchus penetrans* (nematode diseases); gray mould-*Botrytis cinerea* (IPS) and *Sclerotinia fuckeliana* (PS), Powdery Mildew-*Erysiphe pisi*, downy mildew-*Peronospora viciae*, white mould-*Sclerotinia sclerotiorum* and rust-*Uromyces fabae* (air borne fungal diseases); bacterial blight-*Pseudomonas syringae* pv. *pisi* and brown spot-*Pseudomonas syringae* pv. *syringae* (bacterial diseases); Alfalfa mosaic disease-AMV, Bean leafroll disease-BLRV, Pea enation mosaic-PEMV, Pea streak disease-PeSV, Red clover vein mosaic-RCVMV and Pea seed borne mosaic-PSbMV (viral diseases).



The management of disease can be done through cultural i.e., crop rotation, changing in sowing date, destruction of plant debris, soil solarization, use of resistant cultivars; chemical and biological management. Cultural and biological strategies are mostly effective at initial stage, specially at sowing time of crops and they can not manage the disease in standing crop and even after appearance of disease. Use of resistant cultivar is also reasonable and easy method for disease management but due to development of new strain among the pathogens, resistant may be break down to susceptible one.



Chemical strategy is very effective but also delicate to environmental pollution, residual effect in grain and killing the non-target organisms. Development of fungicide resistance in plant pathogens is a major obstacle of chemical strategy when use continuous and separately. Therefore, all the methods have some limitations and draw back and due to least efficiency of single strategy of disease management, integration of various strategy (Integrated Disease Management= IDM) is the foremost need for management of plant disease in near future of agriculture. IDM act as safeguarding against the longer

package of practices, field peas can produce 20-25q/ha of grain and straw (irrigated) and 10-15q/ha in rainfed conditions.

### Insect management

Main insects of pea are semilooper (*Thysanoplusia orichalcea*), pod borer (*Helicoverpa armigera*), aphids (*Acyrtosiphon pisum*), stem fly (*Ophiomyia phaseoli*) and pea leaf miner (*Chromatomyia horticola*).

Insect pests should manage by IPM (Integrated Pest Management) strategy just like IDM (Integrated Disease Management).

### Insect pests of pea

Order	Family	Insect pest	Common name	Affected host part	Crop stage
Lepidoptera	Noctuidae	<i>Thysanoplusia orichalcea</i> <i>Helicoverpa armigera</i>	Semilooper Gram pod borer	Leaves Pods	Pod formation- pod maturity Pod formation- pod maturity
Hemiptera	Aphididae	<i>Acyrtosiphon pisum</i>	Aphid	Sap sucker on leaves, shoot	Vegetative
Diptera	Agromyzidae	<i>Ophiomyia phaseoli</i> <i>Chromatomyia horticola</i>	Stem fly Pea leaf miner	Stem Leaves	Seedling- vegetative Vegetative-pod maturity

Yadav and Patel (2015)

term risks of environmental pollution, hazard to human health and reduced agricultural sustainability.

### Harvesting and Yield

Field pea should be harvested when they are fully ripe and threshed after sufficient drying in the sun. Field peas should be combined with seed moisture of 14-20%. The clean seeds should be sun dried for 3 to 4 days to reduce the moisture content up to 9-10% to be safely stored in appropriate beans. With improved

### Conclusion

The present article briefly describes the uses, ecofriendly crop production and protection of peas along with physiological characteristics. Pea is the *Rabi* crop can be grow for multi-purpose like vegetable, pulse, fodder etc. For production and protection of pea, mostly strategies are used as safeguarding against the longer term risks of environmental pollution, chemical hazards to human health and reduced agricultural sustainability.

