

## Pigeon Pea

Material directly from Tropical Forages:  
[http://www.tropicalforages.info/key/Forages/Media/Html/Cajanus\\_cajan.htm](http://www.tropicalforages.info/key/Forages/Media/Html/Cajanus_cajan.htm)

### Scientific name

*Cajanus cajan* (L.) Millsp.

### Synonyms

*Cajanus bicolor* DC.  
*Cajanus indicus* Spreng.  
*Cajanus flavus* DC.  
*Cytisus cajan* L. [basionym]



### Family/tribe

Family: *Fabaceae* (alt. *Leguminosae*) subfamily:  
*Faboideae* tribe: *Phaseoleae* subtribe: *Cajaninae*.  
Also placed in: *Papilionaceae*.

### Common names

Congo pea, pigeon pea, red gram, yellow dahl (English); ambrévade, pois d'Angole (French); straucherbse (German); arhar, tuver (India); feijoa-guandu, guandú, guisante-de-Angola (Portuguese); cachito, gandul (Spanish); kachang (Asia).

### Morphological description

An erect woody, annual or short-lived perennial shrub or small tree, 1–4 m tall with a deep taproot (to 2 m). Young stems are angled and pubescent. Leaves trifoliate, alternate, set in a spiral around the stem; leaflets oblong, lanceolate, 2–10 cm long and 2–4 cm wide, pubescent; discolourous - green above, greyish-green below. Lateral petioles 2–3 mm long, terminal one 10–20 mm; stipules linear, 2–3 mm long. Flowers usually yellow, sometimes with purple or red streaks or plain red; calyx 10–12 mm long with 5 linear teeth. Pods flat, acuminate, pubescent, 5–9 cm long, 12–13 mm wide, containing 2–9 oval to round seeds varying in colour from light beige to dark brown. 16,000–18,000 seeds/kg.



### Distribution

Native to:

*Asia*: Afghanistan, Bangladesh, Bhutan, India, Sri Lanka.

*Africa*: Ethiopia, Kenya, Malawi, Tanzania, Uganda.



Now widespread and cultivated throughout tropics and subtropics.

## **Uses/applications**

Primarily grown as a grain crop for seed for human consumption (pulse, vegetable) with over 4 million hectares cultivated worldwide. The foliage may be cut and fed to livestock fresh or conserved. Stems are used for firewood. Foliage can be browsed but the branches are brittle and break as the animals pull the leaves. Can be used as a semi-permanent, perennial component in alley cropping systems. Grown as hedgerow for windbreaks, and as ground cover or shade cover for establishing plantation crops, e.g. coffee. Good nitrogen fixation makes it a useful green manure ; most of fixed N is transferred to the developing seed after flowering.

## **Ecology**

### **Soil requirements**

Can be grown on a wide range of soil textures, from sands to heavy black clays but needs free-drainage. Pigeon pea prefers pH of 5–7, but can tolerate pH 4.5–8.4. Can handle some Al. Pigeon pea is sensitive to high salinity.

### **Moisture**

As a crop, pigeon pea is very drought tolerant, able to grow with a dry season exceeding 6 months, and rainfall <300 mm, but does best with 600–1,000 mm AAR , and where elevated, in excess of 2,000 mm. Less suited to the humid tropics with poor tolerance of wet soils or flooding.

### **Temperature**

Pigeon pea is very tolerant of hot conditions; grows in temperatures >35°C when soil moisture and fertility are adequate, but generally grown in temperatures of 18–30°C. It can grow at altitude but growth is slowed by low temperature . Leaf cannot tolerate frost but may escape a light ground frost due to its height.

### **Light**

Prefers full sunlight but can tolerate some shading during the vegetative growth phase, which can result in etiolated stems. It is very sensitive to low radiation at pod development and requires full sunlight at this growth phase.

### **Reproductive development**

Pigeonpeas are day length sensitive requiring day lengths under 12.5 h for flowering and seed production. However, many varieties have been developed with different responses to daylength. Short varieties may start flowering only 60 days after planting while the taller woody species flower much later, from 180–250 days after planting.



## Defoliation

Leaf and young pods can be harvested and conserved, or fed fresh. Under good grazing management, pigeon pea has lasted up to 5 years. Regeneration of foliage is moderate when the plants are younger but becomes poorer as the plants become woody nearer the end of their life. Cannot tolerate frequent, severe cutting, or heavy defoliation as with continuous grazing, although regrowth occurs even when coppiced as low as 15 cm.

## Fire

Easily killed with fire.

## Agronomy

Link to website: [Guidelines for the establishment and management of sown pastures.](#)

## Establishment

In most developing countries pigeon pea is grown as an intercrop with cereals or legumes, which are harvested to avoid competition before the pigeon pea flowers and sets seeds. Pigeon pea does best when broadcast and covered or drilled into a well-prepared seedbed in rows 35 cm apart, at a depth of 2.5–10 cm., with a seeding rate of 0.5–4 kg/ha, or 5–7 kg/ha under irrigation. Can be planted into holes on a 2 m grid as a crop. Broadcast or planted in rows with a seed rate of over 20 kg/ha when sown as ground cover or for fodder. The plant density recommended for the later maturing highly branched fodder varieties is 50,000–60,000 plants/ha. Special inoculant is not required as it is promiscuous. If inoculation is considered necessary, cowpea type strains are recommended (CB 756 in Australia, C 95 in South America). Seedlings emerge 2–3 weeks after sowing, and growth is slow until the taproot develops. The plants do not compete well with weeds in the early growth stage and it is important to keep the crop weed free in the first 6 weeks after establishment. Seedlings are difficult to transplant but it can be propagated from stem cuttings.

## Fertiliser

Although a nitrogen fixing species, fertiliser is recommended at levels of 20–25 kg/ha N. Phosphorus is the most limiting factor for pigeonpea and applications of 17–26 kg/ha P can increase seed yield by 300-600 kg/ha. Most of the pigeonpea cultivars are susceptible to zinc deficiency. Applications of 2–4 ppm zinc as 0.5% zinc sulphate with 0.25% lime have been effective to over-come zinc deficiencies.

## Compatibility (with other species)

As a forage shrub, pigeon pea can be interplanted with grasses. Tall late flowering varieties are commonly grown as a food grain crop intercropped with sorghum or millet in the semi-arid tropics. Has grown well with *Chloris gayana* and been planted into pangola grass (*Digitaria eriantha*) pastures. When used in intercropping systems, the deep root system competes less with associated crops than some other legumes.



When cultivated as a food crop it is commonly intercropped with other grain legumes such as cowpea (*Vigna unguiculata*) and groundnut but is not generally sown with other legumes as a forage.

### Companion species

Grasses: *Chloris gayana*, *Digitaria eriantha*, *Cynodon dactylon*, *Melinis minutiflora*, *Sorghum* spp., *Zea mays* (intercropping).

### Pests and diseases

Susceptible to *Fusarium* wilt especially on wet soils. Seedpods and developing seed are severely attacked by *Heliothis*, pod borers (*Lycaena boetica*) and other caterpillars. Seeds are relatively soft and attacked by bruchid weevils during storage. Some reported resistance to root-knot nematodes, but resistance varies between cultivars.

### Ability to spread

No information available.

### Weed potential

No information available.

### Feeding value

#### Nutritive value

High quality leaf (10–15% crude protein), especially when developing seedpods are mixed with the edible stem fraction. Recent work on leaf fed to sheep in India indicated that older leaves have a higher nutritional value and sheep fed on young foliage did not gain weight as expected. However, threshing waste was an extremely nutritious feed for sheep.

#### Palatability/acceptability

Moderately unpalatable until stock become accustomed to the taste. Palatability increases with age of the plant and it has been reported that grazing should start at the podding stage.

#### Toxicity

No toxicity has been reported.

### Production potential

#### Dry matter

In semi-arid conditions in the drylands of Africa, fodder yield is usually in the order of 2 t/ha. However, DM yields may be up to 25 t/ha and may reach up to 40 t/ha with 100 kg/ha N under optimal conditions. Leaves remain on the plant under dry conditions. Good yields of wood for fuel although calorific value is low.



## Animal production

Cattle on pigeon pea pasture gained 0.7–1.25 kg/day at carrying capacity of 1–3.75 cattle/ha, with liveweight gains of 200–500 kg/ha/yr in Brazil.

## Genetics/breeding

$2n = 22$ . C. 60% autogamous. Mostly diploid, with some tetraploid and hexaploids.

## Seed production

Minimum soil fertility levels of about 56 kg N, 5 kg P, and 22 kg K are required to produce 1 tonne of seeds. Normally the crop is harvested by cutting the stems and stacking them to dry, before beating to release the pods and seeds. Cutting at above 15 cm height allows regrowth for a second crop. Seeds may also be harvested by hand picking, taking care not to cause much defoliation so as not to reduce flowering and podding and promote a second crop. Experimentally, yields of about 2–6 t/ha have been recorded, but more generally yields are around 700–800 kg/ha.

## Herbicide effects

Fairly tolerant of herbicides.

## Strengths

- Very drought tolerant.
- Dual purpose crop for grain and fodder.
- Tolerates low fertility soils.
- Excellent green manure for improving soil structure and quality.

## Limitations

- Short life as annual or weak perennial .
- Grazing cattle break brittle branches.
- Not very palatable.
- Not tolerant of frost nor waterlogged conditions.

## Other comments

An intensive breeding programme for grain and dual purpose pigeon pea types is underway at International Crops Research Institute for Semi-Arid Tropics (ICRISAT) in India, including the development of hybrids.

## Selected references

Duke, J.A. (1981) Handbook of legumes of world economic importance. pp. 33–37. (Plenum Press, New York).

Nene, Y.L., Hall, Susan, D. and Sheila, V.K (eds) (1990) The Pigeonpea. (CAB International Crops Research Institute for Semi-Arid Tropics, India).

## Pigeon Pea

<http://www.icrisat.cgiar.org/text/research/grep/homepage/pigeonpea/pigeonpea.htm>

<http://www.fao.org/ag/AGP/AGPC/doc/Gbase/data/Pf000150.HTM>



### Cultivars

Cultivars	Country/date released	Details
<p>Numerous cropping cultivars.            Two botanical varieties:            var. <i>flavus</i> is earlier maturing, shorter plants forming the tur cultivars of southern India.            var. <i>bicolour</i> is more perennial, late-maturing, large bushy plants, forming the arhar cultivars of northern India.</p>		
'FL81d'	Hawaii	Shorter, shrubbier type; resistant to root-knot nematodes ( <i>Meloidogyne incognita</i> ).
'Norman'	Hawaii	Shorter, shrubbier type; resistant to root-knot nematodes ( <i>Meloidogyne incognita</i> ).

### Promising accessions

Promising accessions	Country	Details
ILRI 16555	Ethiopia and Nigeria	Tall late flowering bushy type, well adapted to acid red low fertility soils.