Vigna unguiculata

Scientific name

*Vigna unguiculata* (L.) Walp.


*Vigna unguiculata* is found throughout the tropics with some 150-190 species. Classification of cultivated cowpea is now based on five so-called cultivar-groups (cv.-gr., also "cultigroups"): *Unguiculata*, *Biflora*, *Sesquipedalis* (= the former subspecies *unguiculata*, *catjang* and *sesquipedalis*), *Textilis* and *Melanophtalmus*.

Synonyms

*Vigna sinensis* (L.) Savi

*Vigna sinensis* Endl.

*Vigna catjang* (Burm.) Walp.

Family/tribe


Common names

cowpea, caupi, southern pea, tua dam, kunde, niébé, blackeye pea, alacín, pericillo, caritas, cabecita negra, macassar bean, rope bean, frijol (Venezuela), Augenbohne or Kuhbohne (Germany).

Morphological description

Variability in plant morphology of the different accessions is high. There are three types according to their uses: for grain, forage or dual-purpose. *V. unguiculata* is a herbaceous, prostrate, climbing, or sub-erect to erect annual, growing 15-80 cm high. Leaves are alternate, trifoliolate with petioles 5-25 cm long. The lateral leaflets are opposite and asymmetrical, while the central leaflet is symmetrical and ovate. Inflorescence racemose, flowers white, cream, yellow, mauve or purple. There are accessions with determinate and with indeterminate growth habit. Pods 10-23 cm long with 10-15 seeds/pod. Seeds are variable in size and shape, square to oblong and variously coloured, including white, brown, maroon, cream and green, commonly in the range of 5,000-12,000 seeds/kg.

Distribution

Native to:

West Africa, where the highest genetic diversity and the most primitive forms of wild *V. unguiculata* occur, was probably the primary centre of domestication.

Today, cowpea is cultivated throughout the tropics and subtropics between 35ºN and 30ºS, across Asia and Oceania, the Middle East, southern Europe, Africa, southern USA, and Central and South America.

Uses/applications

Cowpea is one of the most widely used legumes in the tropical world. The grain is used widely for human nutrition, especially in Africa. It is one of the most important tropical dual-purpose legumes, being used for vegetables (leaves and flowers), grain, as fresh cut-and-carry forage, and for hay and silage. Mixing of different cowpea varieties for food and feed purposes is common in northern Nigeria. The species has a high potential as a green manure. It can be incorporated into the soil or spread on the soil surface 8-10 weeks after sowing, and can provide the equivalent of 80 kg/ha N to a subsequent crop. In trials, maize grain yields, associated with the use of cowpea as green manure, have been doubled compared to unfertilised control treatments. Also, maize grain yields were 30% higher than those from treatments which had 80 kg/ha of inorganic N fertilizer applied. Estimates of fixed nitrogen from cowpea often range from about 50 to in excess of 100 kg/ha.

In Australia, cowpea is grown as a green manure crop in coastal sugarcane areas, as a forage or dual-purpose grain and forage crop in coastal and subcoastal southern Queensland, and as a grain crop from central Queensland to central NSW.

Cowpea has the potential to make excellent hay. When grown specifically for this purpose, quality can equal lucerne hay. Even in smallholder systems, when used as a dual-purpose legume, residues can be used as animal feed or for soil enhancement. E.g. in West Africa cowpea hay is an important product for sale in local markets. Excellent hay, and particularly silage, can be made by harvesting a mixed crop of cowpea and forage sorghum or millet.

*V. unguiculata* subsp. *dekindtiana* may have potential as a forage plant. Some accessions have been evaluated for use as ley pastures on alkaline clay soils in southern Queensland in recent years. Yields have reached 6 t/ha in the first year and usually match the yields of other well-adapted legumes. However there was little seedling regeneration in the second year at all sites and so there appears to be little advantage in this subspecies over late flowering cowpeas or lablab (*Lablab purpureus*). Other legumes such as burgundy bean, *Macroptilium bracteatum*, are likely to be of more value if short-term phase legumes pastures of 2-3 years are being sought.

Ecology

Soil requirements

Adapted to a wide range of soils from sands to heavy, well-drained clays, with a preference for lighter soils that allow good rooting. Wide range of pH including very acid (pH 4), low-fertility soils. Better adapted to strongly acid soils than either *Lablab purpureus* or...
**Mucuna pruriens**. Grows well also on heavy textured strongly alkaline soils. Does not tolerate extended flooding or salinity.

**Moisture**

Moderately tolerant of drought but excessive soil moisture is harmful, reducing growth and favoring infection by fungal diseases. Nevertheless, well adapted to a wide precipitation range (650-2,000 mm). For forage, annual rainfall regimes of 750-1,100 mm are preferable. As a food crop for humans, often grown in annual rainfall regimes as low as 400 mm. Extended water logging or poor drainage should be avoided.

**Temperature**

Very susceptible to frost; grows well only in warm seasons with 25-35°C as optimum temperature. Grows from sea level up to 1,500 m asl, depending on latitude.

**Light**

Moderate adaptation to shade.

**Reproductive development**

The different cowpea accessions can show wide variation in reproductive development. Some may start flowering 30 days after sowing and are ready for harvest of dry seeds 25 days later; others may take more than 90 days to flower, and 210-240 days to mature. Many cultivars mature uniformly although there are determinate and indeterminate genotypes. Indeterminate types are particularly useful in smallholder farming systems where a supply of fresh leaves and flowers, over an extended period of time enables a sustained supply of vegetables for the household. Determinate types are better for machine harvesting. Cowpea is mostly a quantitative short-day plant, but there are also day-neutral cultivars. Planting out of season or taking seed of photoperiod sensitive genotypes to different latitudes, may inhibit seed set.

**Defoliation**

When seasons are suitable and when sown relatively early, the best forage types will regrow after grazing. Grazing should be light to ensure that the plant frame is retained and damage is limited.

**Fire**

Not tolerant of fire.

**Agronomy**

Guidelines for the establishment and management of sown pastures.

**Establishment**

Sowing arrangement according to intended use: for fodder and green manure, 30-60 cm between rows and 10-15 cm between plants are suitable; required seeding rate about 20 kg/ha. Other seeding rates reported are 10-40 kg/ha when sown in rows and up to 90 kg/ha when broadcast. Most common 20-50 kg/ha. Sowing depth 3-5 cm. Seed is soft so germination is usually rapid if moisture and temperature are adequate. *V. unguiculata* subsp. *dekindtiana* usually has a high proportion of hard seed, and may need scarification prior to sowing. Promiscuous in its rhizobial requirements. Annual grasses and some broadleaf weeds can be controlled by a pre-sowing application of trifluralin which is the only herbicide registered for use on cowpea in Australia.

**Fertiliser**

Responses have been recorded to P, K and S as well as molybdenum on poor fertility soils.

**Compatibility (with other species)**

Grows well in association with cereal crops through intercropping.

**Companion species**

Is widely used in intercropping of the major African cereals, maize, sorghum and millet.

**Pests and diseases**

Susceptible to a wide range of diseases and pests (including post-harvest), particularly those attacking the grain. Cowpea acts as host to pests of *Phaseolus* beans. The most important disease in Australia is phytophthora stem rot (*Phytophthora vignae*).

**Ability to spread**

Commercial cowpeas are soft seeded annuals and have little potential for survival in the soil.

**Weed potential**

None.
Feeding value
Nutritive value
High nutritive value: CP in green foliage 14-21% and in crop residues 6-8%, in grain 18-26%; IVDMD of foliage >80%. IVDMD of residues after grain harvest 55-65%.

Palatability/acceptability
Very palatable, high intake.

Toxicity
None for ruminants; for monogastrics, trypsin inhibitors and some content of tannin need to be taken into account. 20-25% of grain in diet fed without treatment seems not to pose a problem. Heat treatment reduces trypsin inhibitors.

Production potential
Dry matter
Vegetative DM production 3-10 t/ha in 8-12 weeks; grain production 250-4,000 kg/ha.

Animal production
Very few studies available; when fed as supplement, 10-20% increase in milk yield (Colombia) and 50% higher animal LWG (67 g/day with sheep) are reported (West Africa).

Genetics/breeding
$2n = 22$; primarily self-pollinating.

Seed production
Large variation in seed production depending on cultigroup, landrace and use.

Herbicide effects
No information available.

Strengths
- Multi purpose legume providing leaf, grain and forage.
- Improves soil fertility.
- Ease of establishment.
- Very high nutritive value and high palatability.
- Adaptation to a wide range of soils, better adaptation to acid soils than other crops used for green manure.
- Drought tolerant.
- High yields in a short period of time.
- High seed production.

Limitations
- Pest and disease susceptibility, host for pests of Phaseolus beans.

Selected references


## Internet links


## Cultivars

<table>
<thead>
<tr>
<th>Cultivars</th>
<th>Country/date released</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td>'Red Caloona'</td>
<td>Australia, 1975</td>
<td>A small red seeded, dual purpose type suitable for grazing and/or grain production; it is moderately fast maturing (110 days from sowing to maturity). Has effective tolerance to phytophthora stem rot.</td>
</tr>
<tr>
<td>'Ebony PR'</td>
<td>Australia, 1996</td>
<td>A grazing type suited to Australia's subtropical, coastal high rainfall areas or irrigation (i.e. dairy farms or cane rotations). Has effective tolerance to phytophthora stem rot.</td>
</tr>
<tr>
<td>'Acalaflora', 'Meringa'</td>
<td></td>
<td>Late maturing lines selected for forage production.</td>
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<tr>
<td>'Banjo', 'Big Buff', 'Holstein'</td>
<td></td>
<td>Grain cowpea varieties with erect to semi-erect growth habit selected for early maturity, grain yield and seed size</td>
</tr>
<tr>
<td>'Mississippi Pinkeye Purple Hull'</td>
<td></td>
<td>USA Active breeding program in US. The Jefferson Institute can provide a complete list of seed sources and recommended varieties</td>
</tr>
<tr>
<td>Commercial cultivars grouped by variance in bean shape, size and color: Blackeye pea types incl. Southern peas types (several varieties in southern US), Browneye peas, crowder peas, Cream, White acre type, Caly types, Forage types.</td>
<td>USA</td>
<td>Active breeding program in US. The Jefferson Institute can provide a complete list of seed sources and recommended varieties</td>
</tr>
<tr>
<td>Numerous local cultivars, such as 'Verde Brasil' and 'Sinu', to fill specific ecological niches in different countries.</td>
<td>South and Central America</td>
<td></td>
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<tr>
<td>'Pituca', 'CNC0434', 'EPACE-6'</td>
<td>Brazil</td>
<td>For intercropping.</td>
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<tr>
<td>'Minica'</td>
<td>Guyana</td>
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## Promising accessions

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<tr>
<th>Promising accessions</th>
<th>Country</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>The following advanced varieties are being tested in South and Central America for use as forages and green manure (ITA numbers): IT90K-2842 IT99K-391 IT95K-1088/4 IT95K-1088/2 IT86D-716 IT93K-637/1 Pasa 9611 CIDICCO 2</td>
<td>Colombia, Costa Rica, Honduras and Nicaragua</td>
<td>Accessions selected for broad adaptation, herbage and grain yield and green manure effects; now tested with farmers. More accessions under advanced evaluation.</td>
</tr>
<tr>
<td>IITA variety IT93KZ-4-5-6-1-6</td>
<td>Colombia, Costa Rica, Honduras and Nicaragua</td>
<td>Accessions selected for broad adaptation, herbage and grain yield and green manure effects; now tested with farmers. More accessions under advanced evaluation.</td>
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<tr>
<td>Resistance to Striga in Abomey plateau of southern Benin where the local varieties are highly susceptible.</td>
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<td>Tested on a range of clay soils in the subtropics with first year yields comparable with many other well-adapted legumes, even in very dry years.</td>
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</table>

![Variation in seed shape and colour.](image_url)
Maturing plants.

Foliage and pods.

Alley cropping cowpea with maize (*Zea mays*) in Sri Lanka.

Foliage and flowers of subsp. *dekindiana*.

Foliage and flowers of subsp. *dekindiana*.

Sprawling, twining habit of subsp. *dekindiana*.

Maps of areas with high importance for cowpea.