



DEPARTMENT OF AGRICULTURE
BUREAU OF PLANT INDUSTRY

COWPEA

PRODUCTION GUIDE



Cowpea
Vigna unguiculata

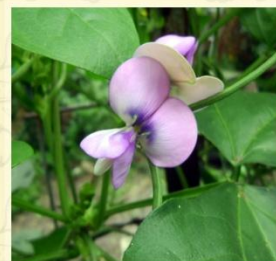


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The COWPEA Plant

Cowpea (*Vigna unguiculata* L. Walp) is an ancient crop originated and was domesticated in southern and central West Africa and then spread out throughout Africa, Asia, Europe, and the America. It reached south-west Asia in 2300 B.C. (Purseglove, 1976) but was not cultivated intensively in India until the late 18th century (Perrino et. al., 1993). However, the earliest intensive cultivation may have been in Greeks and Romans in Southern Europe in the 8th century B. C. (Tosti and Negri, 2002; Perrino et. al., 1993).

It is an annual herbaceous crop with varying growth forms. It may be erect, trailing, climbing or bushy, usually indeterminate under favorable conditions. The leaves are trifoliate and are usually green in color. It is a self-pollinating crop. Flower colors are white, dirty white, pink, pale blue or purple. Flowers open in the morning and close in mid-day and after blooming they wilt and collapse. The stems are straight, smooth or slightly hairy and sometimes tinged with purple. The pods are borne above the leaf canopy making the pods very visible. The seeds vary in size, color and shape. Usually the number of seeds per pod varies from 8-20 seeds. The pods may be erect, crescent-shaped or slightly curved.

Cowpea is one of the important legume crops not only in the Philippines but also in many countries of the world. This crop is highly adapted and cultivated around the world primarily for seed but also consume the young shoots/leaves, green and tender pods, immature seeds and mature dried seeds. The largest production of harvested dried seed is in Africa. Worldwide production of cowpea seeds is approximately 20 million acres. Based from the production data of the Bureau of Agricultural Statistics (BAS), about 11,381 hectares were utilized for vegetable legume crops including cowpea in 1995 with estimated production of 29,058 metric tons.

Cowpea is rich in potassium with good amount of calcium, magnesium, phosphorous, Vitamin A and C, thiamin, riboflavin, niacin, Vitamin B6, and panthothenic acid. It also has small amount of iron, sodium, zinc, copper, manganese, selenium and folate. Cowpea tones the spleen, stomach and pancreas. It helps induce urination and relieves damp condition like leucorrhea (Nutritional Value of Cowpea and Pigeon Pea). In other folkloric medicinal systems, various parts of cowpea plants (roots, leaves and seeds) are used for medical ailments including dysmenorrhea, epilepsy, headaches, constipation and chest pains (Philippine Medicinal Herbs stuartxchange.com/Paayap.html)

Cowpea is not only for human consumption but also for animal feed. The stems, leaves, and vines serve as animal feed and are often stored for use during the dry season. It is also a source of feeds for ruminant animals in the form of silage. It's adaptability to different types of soil and intercropping system, it's resistance to drought, and its ability to improve soil fertility and prevent soil erosion, makes it an important economic crop not only in the Philippines but in many developing countries.

CROP VARIETIES

BPI-Cp1, BPI-Cp3, BPI-Cp4 and PSB-Cp 5 are varieties released and approved for commercialization for its good pod quality, early maturity and moderate resistance to pests and diseases. These four varieties yield from 6.98 to 8.59 t/ha.



PSB-Cp 5



BPI-Cp 4



BPI-Cp 3

Figure 1. Varieties released and approved for commercialization

CULTURE AND MANAGEMENT

- A. **Soil.** Cowpeas are grown on a wide range of soil but prefer sandy soils which are less restrictive to root growth. It requires a pH of 5.5 to 6.8. Liming is necessary if the soil pH is below 4.5.
- B. **Climate.** It is a heat-loving and drought tolerant crop. The optimum temperature is around 30°C. It grows best during summer. For dry bean production, it should be planted from October to December.
- C. **Varietal Selection** – Planting right varieties adapted to a specific area may increase yield by as much as 20%. In the varietal selection, there are important considerations to look into:
- Adaptability to soil and climate
 - Maturity
 - Yield
 - Disease resistance and insect tolerance
 - Market/consumers demand



- D. **Land Preparation.** Prepare the field with 2 to 3 times plowing and harrowing. The land must not be water logged but well drained. This is to enhance good soil tilth for good seed germination. Set furrows 60 cm apart during dry season and 75 cm wet season.

- E. **Planting.** Cowpea is directly grown for seed. One hectare of seeds requires 10-12

kg/hectare. Drill the seeds in furrows at the rate of 15-20 seeds per linear meter. Thin out the seedlings 10 days after emergence.



- F. **Fertilization.** Before first plowing, apply 3 tons well decomposed manure per hectare. Before planting, apply 3 bags /ha of 14-14-14 as basal fertilizer and side dress with 1-2 bags of urea (46-0-0) at 1 month after planting. Muriate of Potash (0-0-60) should be applied at the rate of 1-2 bags during flowering stage. Foliar fertilizer should also be applied weekly, starting at flowering stage.
- G. **Organic fertilizer:** Fertilizer should be bio-degradable materials of microbial, plant or animal origins produced on organic farms such as vermicompost and processed chicken manure. Basal applications of organic compost of 5-10 tons/ha are needed for vegetable legume crops. Supplementary application of Fermented Plant Juice (FPJ) or Fermented Fruit Juice (FFJ) should also be applied twice a week up to flowering stage.



- H. **Weeding and Cultivation.** Off-baring and hilling-up can be done as early as two (2) weeks. Hand weeding shall be done as often as necessary. Even after flowering, spot weeding is still of much benefit to the crop.

- I. **Irrigation.** Field should be irrigated right after planting or whenever necessary using manual watering to have a uniform germination of







seeds. During dry season, weekly irrigation is recommended. Frequent irrigation is needed during flowering and pod development



stage.

PEST AND DISEASE MANAGEMENT

Table 1. Insect management in cowpea

Insect	Characteristic/Damage Done	Management
Aphids (<i>Aphis gossypii</i>) 	<ul style="list-style-type: none"> - aphids suck sap on stems, terminal shoots and petioles of seedlings, and on pods and flowers of mature plants. - heavy attack can cause death of young seedlings, stunting and delay in flowering of older plants. 	Use resistant varieties. Monitor build-up of aphids and natural enemies. Use neem seeds, soap or hot pepper extracts if necessary.
Pod borer (<i>Maruca vitrata</i>) 	<ul style="list-style-type: none"> - most important pod borer pest, causing severe damage to cowpeas. - Moths usually lay eggs on flower buds, flowers, or on terminal shoots of young plants. Young caterpillars may feed on any part of the flowers or foliage. Upon reaching maturity the caterpillars drop from flowers or pods onto the soil and pupate beneath the plant under leaf debris. 	Weekly application of neem seed proved to be more effective. Biological control using <i>Trichogramma</i> spp. parasitoid. Botanical spray of <i>Bacillus thuringiensis</i> . Grow repellent crops such as marigold, basil, onion and citronella. Chemical spray following the manufacturer's recommended rates.
Weevils (<i>Callosobruchus</i> spp.) 	<ul style="list-style-type: none"> - Adults are 2.0-3.5 mm long. They are also known as the cowpea seed beetles and are the principal storage pest of cowpea. 	Use neem seeds. Dry seeds for storage to a moisture level of 13%.
Beanfly (<i>Ophiomyia phaseoli</i>) 	<ul style="list-style-type: none"> - very destructive during seedling stage of the plant - adult is a minute jet black fly attacking the seedlings just after germination. The maggots feed as miners working down the petiole into the stem (boring holes on the leaves). <p>Severe damage – results to plant wilting and drying-up</p>	Botanical control using neem seeds, soap solution or hot pepper extract. If needed, chemical control for chewing insects.
Leafminer (<i>Liriomyza</i> sp.) 	<ul style="list-style-type: none"> - feeds on the green inner portion of the leaves leaving white zigzag lines. 	Conserve natural enemies like spiders, lacewings and syrphid flies. Provide yellow trap with used oil. Intercrop with suitable vegetables like eggplant and okra. Chemical control following the recommended rates.
Thrips (<i>Megalurothrips sjostedti</i> and <i>Frankliniella</i>) 	<ul style="list-style-type: none"> - During the pre-flowering period, nymphs and adults of this thrips may damage the 	Intercropped with corn, use neem extracts. Use resistant

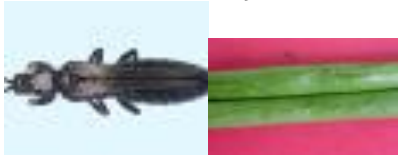



<p><i>schultzei</i>)</p> 	<p>terminal buds. However, the main damage is on the flower buds and flowers. Attacked flower buds become brown and eventually fall off, leaving behind dark red scars. Damaged flowers are distorted, malformed and show discoloration and may fall off. Infested pods are malformed.</p>	<p>varieties</p>
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Table 2. Disease management in cowpea

Disease	Characteristic/Damage Done	Management
<p>Mosaic virus</p> 	<ul style="list-style-type: none"> - the disease is caused by a virus commonly carried by aphids or plant lice, the virus may affect every plant in a field and reduce yield, quality, and selling price. The affected leaves usually have irregularly-shaped light green areas of various sizes. Some puckering and other alternation in leaf shape occur. 	<p>Keep the aphids under control. Use of resistant varieties is the most economical control measure. Seeds from disease free plants should be used. Rouging and burning of infected plants. Crop rotation in severe cases.</p>
<p>Fusarium wilt/ Root rot</p> 	<ul style="list-style-type: none"> - one of the most destructive of all roots organisms attacking beans, the disease is caused by the fungus (<i>Fusarium oxysporum</i>). Root disease prevalent after prolonged rain and water logged condition. Causes an internal rotting and brown discoloration of the vascular tissue inside the stem, followed by wilting, becomes yellow and usually die. 	<p>The most successful control of the disease is crop rotation. The use of resistant varieties is also one of the most economical measures. Plant in well-drained soils. Spray effective fungicides to control the disease infection in the field.</p>
<p>Rust</p> 	<ul style="list-style-type: none"> - disease of the leaves caused by <i>Uromyces phaseoli</i>. The first symptom appears as small white spots or flecks on the underside of the leaves. Within a few days, the spots break open into rust-colored pustules, about pinhead size. A week or so after the pustules appear, the entire leaf begins to turn yellow. Later it turns brown, dries up, and eventually falls off. 	<p>Use resistant varieties. Prune infected plant parts.</p>

For effective control, use resistant varieties and other measures like crop rotation, rouging and pruning of infected plant parts and planting of repellant and companion crops. Organic pesticides such as citronella extract, guyabano seed extract, luyang dilaw and perla soap can also be utilized to control and minimize pests for vegetable legumes, and if needed, the use of chemicals/fungicides will be the last resort in controlling pests and diseases of cowpea.

HARVESTING

For use as vegetable, pods are harvested 35-40 days after planting. Harvesting should be done at 2-3 days interval to prolong the productive life of the plants. Harvesting is done manually. Harvest the pod by

holding the stem end before twisting it free. To avoid weight loss, harvesting should be done early in the morning or during the cooler times of the day. The pods should be kept in a shaded area after harvest.

POST HARVEST HANDLING

Separate the marketable and non-marketable pods. Marketable pods are tender, straight, long and unblemished. Non-marketable pods are short, curved, damaged by insects or diseases and over the picking stage but can still be utilized as vegetable.

Packing

Pack in plastic sacks, thick lined bamboo baskets, polyethylene bags or wrap the harvested pods with fresh banana leaves. If cowpea pods cannot be sold or used for 1-3 days, store small quantities in moistened clay jars. Store pods at 12-15°C for not more than 2 weeks at 90% relative humidity if cold storage facilities is available. Keep the pods away from ripening fruits during transport and storage.

SEED PRODUCTION

Except for isolation and rouging, the cultural management techniques in seed production are similar to fresh pods production.

- A. Isolation.** The isolation distance depends on the nature of pollination of the crop, whether self or cross pollinated. The isolation distance of cowpea is 10-50 meters.
- B. Field Inspection.** It involves identification of a variety and removal of undesirable plants from the main crop through a process termed rouging. The undesirable plants may be weeds, plant of other crop species, plants of another cultivar of the same species, diseased plants and other off-type plants. Rouging should be done at least three times: first at pre-flowering stage; second at flowering; and third at pod formation.
- C. Harvesting.** Select plants that are vigorous and free from pests and diseases. Harvest pods when physiologically mature or when pods have turned brown. Harvested pods at 20 days after pollination will give the best quality seeds. It may be necessary to harvest 3 times a week at peak harvest. Dry pods should not be allowed to remain in the field to prevent shattering during sunny days rotting or sprouting of seeds within the pods during the rainy days. When dry pods remain longer in the field, these are also being exposed to insect pests.

Place the harvested pods under the sun for 2-4 days until brittle. Threshing is carried on by beating the pods enclosed in net bags or sacks and manually beat with a stick. Separation of seeds from the threshed pods is done by winnowing. Sort out small, wrinkled and seeds damaged by insect. Sun dry the seeds for 4-5 days. Before packaging and storage, seeds must have 10% moisture content (MC). Seeds must be packed in thick plastic, containers or aluminum foil, label with the name of the variety and date of planting then keep in a cool or storage area. In the absence of cold storage, seeds can also be stored in the refrigerator. If properly stored, viability of the seeds becomes longer.

Table 3. Cost and Return Analysis of Cowpea per hectare (fresh pods)

Items	Quantity	Unit	Rate/Unit	Amount
A. Labor (250/man-day)				
Mowing	4	hrs.	1500.00	750.00
Plowing (2x)	8	hrs.	1500.00	1,500.00
Manure application	4	MD	250.00	1,000.00
Harrowing (2x)	8	hrs.	1500.00	1,500.00
Rotavation	8	hrs	1500.00	1,500.00
Furrowing	2	MAD	500.00	1,000.00
Planting/basal fertilization	8	MD	250.00	2,000.00
Thinning	2	MD	250.00	500.00
Cultivation (Off-baring and hilling-up)	4	MAD	500.00	2,000.00
Irrigation (2MD-12x)	24	MD	250.00	6,000.00
Side-dressing	2	MD	250.00	500.00
Spraying	8	MD	250.00	2,000.00
Weeding (30MD-2x)	60	MD	250.00	15,000.00
Harvesting(hauling, upgrading and packing)	70	MD	250.00	17,500.00
Sub-total				P 52,750.00
B. Supplies and Materials				
Seeds	12	Kgs	300.00	3,600.00
Manure	60	bags	150.00	9,000.00
Fertilizer- Complete	3	Bags	1200.00	3,600.00
Urea	2	Bags	1300.00	2,600.00
Muriate of Potash	2	bags	2000.00	4,000.00
Fungicide				1,200.00
Insecticide				10,000.00
Harvesting/Packaging Materials				
- Sacks	300	Pcs	10.00	3,000.00
Sub-total				37,000.00
C. Power Cost (Electricity)				
Total Cost of Production				94,750.00
Net Income (P)				34,100.00
ROI%				35.9

Marketable yield = 8,590 kg/cropping

Price is P15.00/kg

Gross Income – P128,850.00

Table 4. Cost and Return Analysis of Cowpea per hectare (seeds)

Items	Quantity	Unit	Rate/Unit	Amount
A. Labor (250/man-day)				
Mowing	4	hrs.	1500.00	750.00
Plowing (2x)	8	hrs.	1500.00	1,500.00
Manure application	4	MD	250.00	1,000.00
Harrowing (2x)	8	hrs.	1500.00	1,500.00
Rotavation	8	hrs	1500.00	1,500.00
Furrowing	2	MAD	500.00	1,000.00
Planting/basal fertilization	8	MD	250.00	2,000.00
Thinning	2	MD	250.00	500.00
Cultivation (off-baring and hilling-up)	4	MAD	500.00	2,000.00
Irrigation (2MD-12x)	24	MD	250.00	6,000.00
Side-dressing	2	MD	250.00	500.00
Spraying	8	MD	250.00	2,000.00
Weeding (30MD-2x)	60	MD	250.00	15,000.00
Roguing (2x)	4	MD	250.00	1,000.00
Harvesting/hauling	70	MD	250.00	17,500.00
Seed extraction/cleaning/drying	50	MD	250.00	12,500.00
Seed sorting	12	MD	250.00	3,000.00
Seed packaging	2	MD	250.00	500.00
Sub-total				67,750.00
B. Supplies and Materials				
Seeds	12	Kgs	300.00	3,600.00
Manure	60	bags	150.00	9,000.00
Fertilizer- Complete	5	Bags	1200.00	6,000.00
Urea	5	Bags	1300.00	6,500.00
Muriate of Potash	2	bags	2000.00	4,000.00
Foliar fertilizer	2	kgs	500.00	1,000.00
Fungicide				1,200.00
Insecticide				10,000.00
Harvesting/Packaging/Drying Materials				
- Sacks	25	Pcs	10.00	250.00
- Sacoline*	30	Meters	50.00	750.00
- Net bag 22 in x 30 in	50	pcs	50.00	2,500.00
Sub-total				37,500.00
C. Power Cost (Electricity)				5000.00

Total Cost of Production				110,250.00
Gross Income (300/kg)				210,000.00
Net Income (P)				99,750.00
ROI%				90.5

Seed Yield- 700 kg

*may be used for two seasons

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