

TECHNOGUIDE ON COTTON PESTS AND THEIR MANAGEMENT



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FOREWORD

Cotton is a soft, fluffy staple fiber that grows in a boll, or protective case, around the seeds of the cotton plants. It is being cultivated for its fiber which is most often spun into yarn or thread and used to make a soft, breathable textile. The sustainable production of cotton is hindered by the prevalence of pests and diseases in cotton plantations throughout the country. This technoguide on cotton pests and their management has been developed as a result of intensive researches conducted over the years to aid cotton producers in identifying all the pests and diseases that affect cotton farms and how to manage them.

This technoguide enumerates and describes all cotton insect pests, arthropods, natural enemies and cotton diseases and their management. It is intended for all involved in the cotton industry especially the cotton production specialists, trainers, field technicians and cotton farmers.

It is hoped that this material will benefit all who are engaged in cotton production.



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COTTON INSECT PESTS

Cotton Leafhopper

Amrasca bigutula Ishida

Hemiptera: Cicadellidae



Both the nymphs and adults are destructive. The insect rasps the leaf surface and sucks the exuded sap making the leaves turn yellow. The leaf edges curl downward making the leaf edges appear burned.

The eggs are hardly visible because they are fixed on the leaf midrib, petiole and even in young stems. They are banana-shaped, whitish to bluish white in color. The nymphs are yellowish to greenish in color. The adult is yellowish green. The forewings shine with conspicuous dark spot on the posterior half.

Cotton Bollworm,

Helicoverpa armigera (Hubner)

Lepidoptera: Noctuidae



The larva is the destructive stage of the insect. It feeds on the terminal buds, squares, flowers and bolls. It bores on bolls, completely or partially destroying them. When it partially bore into the bolls, the hole serves as entry point for microorganisms which results to boll rotting.

Color of the larva varies from yellowish to greenish, reddish brown, pinkish, orange and occasionally blackish.

Average larval period is 24 days and its average developmental period from egg to adult is 42.5 days.

The moth is light brown with darker brown spots on the forewing and a darker marking at the edge of the hindwing. Oviposition is highest during still moonless night.

Flowerweevil,

Amorphaidea lata Motschulsky

Coleoptera, Curculionidae



Both the grub and adult are the destructive stages of the insect. The eggs are deposited on the base of the petals and immediately after hatching, the grub bore directly into the ovary, feed on the tissues and completely destroy the ovule. Infested flowers shed 4 -5 days after infestation.

The adults emerge and infest the newly opened flowers where they feed and also lay eggs. The peak of flowerweevil infestation occurs in the late morning (10:00 AM). They stay in the flower overnight and then transfer to the newly-opened flowers the following day. The adult feed on the basal parts of the petals and stamina columns. Mating takes place within the flowers but does not interrupt the flowerweevil from feeding.



Pink bollworm,

Pectinophora gossypiella (Saunders)

Lepidoptera: Gelechiidae



The moth is grayish brown and they live for around 12 days by feeding on flower nectars. The eggs are laid on the growing tips of the plant but mostly on the fruiting parts especially the bracts. Eggs laid are white then change to reddish brown to blackish when about to hatch.

The larva is the destructive stage which is pinkish especially at the later instar. Newly hatched larvae search for squares or young bolls and once inside the fruiting structures, they are inconspicuous and protected from predators and contact insecticides. They feed and stay inside the squares and by the time the bloom is formed, they have already eaten the anther and spin a web which keeps the petals from being fully open, thus forming rosette flowers. Larval period ranges from 7-14 days.

The larvae also infest young bolls and feed on immature seeds, thereby lowering the quality and quantity of seedcotton yield. Late infestation also occurs allowing the insect to be carried over in storage.

OTHER INSECT PESTS AND ARTHROPODS

Cotton aphids

Aphis gossypii Glover
Homoptera: Aphididae



The insect feed on young leaves by sucking the plant sap. Infested leaves curl and ultimately result to stunted plants. Produce sooty mold that results to sticky cotton which is of inferior quality.

Spiny bollworm

Earias vitella F.
Lepidoptera: Nolidae



The larva feed on plant tip which cause wilting of the mainstem. It also feed on squares and young bolls. Affected plants produce lateral branches where fruiting forms develop but may result to a delay in the growth of the plants.

Cotton Semi-looper

Anomis flava F.
Lepidoptera: Noctuidae



The larvae feed on leaves and sometimes on squares.

Cutworm

Spodoptera litura (F.)
Lepidoptera: Noctuidae



The eggs are laid in mass. The larvae feed mostly on leaves and sometimes on fruiting forms.

Mealybug

Ferrisia virgata (Cockerel)
Hemiptera: Pseudococcidae



The insect suck the plant sap. Seriously attacked plants are stunted or may wither and die.

Cotton stainer

Dysdercus cingulatus
Hemiptera: Pyrrhocoridae



The insect feed on young and older bolls. Young bolls shrivel while old bolls are deformed and the lint becomes discolored which ultimately reduce quality.

Cotton thrips

Thrips tabaci Lindemann

Thysanoptera: Thripidae

The insect rasp and puncture the surface of the leaf and sucks the sap. Few weeks after infestation, the leaves turn yellow to brown in color and later dry up prematurely.

Spidermites

Tetranychus sp.

Class Arachnida, Order Trombidiformes: Tetranychidae



The arthropods suck the plant sap and especially attack the leaves. Infested areas are covered with fine red webbing. The feeding damage result to drying up of the leaves.

THE NATURAL ENEMIES

Trichogramma

Trichogramma chilonis Ishii



These are insects which parasitize eggs of Lepidoptera specifically eggs of the cotton bollworm. Parasitized eggs turn black and do not hatch into larva.

Ichneumonid wasps

Camponotus sp. and *Campoplex rufigastor*

These are ichneumonid larval parasites of the early instars of the cotton bollworm.



Tachinid flies



These are larval-pupal parasite of the later instars and pupae of the cotton bollworm.

They lay eggs on the bollworm larvae and allow continued development of the host until the parasite is released as a maggot. Some parasitized larvae reach the pupal stage where the parasite emerges.

Goniozus triangulifer

This is a bethylid wasp which parasitizes the larvae of the pink bollworm. It has a black body and transparent wings.



Other parasites

Microplitis manilae

This is a braconid larval parasite of the early instars of the cotton bollworm and cutworm. The parasite emerges while the host larva remain alive but is weak and eventually die after two days.

Braunsia sp.

This is a braconid wasp and a larval-pupal parasite of the leaf folder (*Homona coffearia*). Signs of parasitization are not discernible until the adult parasite emerge from the host's pupa.

Brachymeria sp.

This is a larval-pupal parasite of spiny bollworm. It parasitize the late instar larva and the adult emerges from the host's cocoon.

Xanthopimpla sp.

This is an ichneumonid wasp which parasitize the larval stage of the pink bollworm. Parasitized larvae becomes abnormal from where the parasite emerge.

Predators

Earwig

Euborellia annulata Fabr.



This is a predator of the eggs and early instar larvae of the cotton bollworm as well as the grubs of flowerweevil.

Coccinellid beetle

Menochilus sexmaculatus and *Coelophora inaequalis*



These insects prey on the cotton aphids.

Syrphid fly

Ischiodon scutellaris



Image from www.projectnoah.org

Merle Shepard, Gerald R. Carner, and P.A.C. Ooi, Insects and their Natural Enemies Associated with Vegetables and Soybean in Southeast Asia, Bugwood.org - <http://www.invasive.org/browse/detail.cfm?imgnum=5368152#sthash.grT17WqR.dpuf>

The larval form of this insect prey on the cotton aphids.

Spiders



These arthropods prey on the early instars of the cotton bollworm and on various insects associated with cotton.

Other beneficial arthropods

Staphylinids



Vespid



Mycetophilids



Lacewing



Large black ants



Geocoris bug



MANAGEMENT OF THE COTTON INSECT PESTS

Insect Pest Monitoring

1. Survey for insect pests weekly starting at 21 Days After Planting until 104 DAP.
2. Select randomly, one after the other 20 sample plants and observe for the presence or absence of the insect pests.
3. Know the plant part to inspect for each insect pest

Insect Pest	DAP	Plant Part to Inspect on the sample plant
Aphids	22 - 91	3 leaves taken from the top, middle and bottom portion
	92 - 126	Highest open boll
Leafhopper	22 - 91	3 leaves taken from the top, middle and bottom portion (also observe for sucking damage)
Bollworm larvae	22 - 63	Whole plant
	64 - 91	Whole plant
	92 - 105	The second sympodial branch below the plant terminal
Thrips	22 - 63	Plant tip (Top 5 cm of the plant)
	64 - 105	3rd leaves
Flowerweevil/ Pink bollworm	Flowering period	Flowers (Between 9 to 10 AM)
Mites	43 - 63	3 rd leaves
Defoliators	43 - 91	3 rd leaves
	92 - 105	3 rd leaves

4. Distance between sample plants will be dependent upon the size of the farm in order to cover the whole area, hence a predetermined number of steps will be set (example 20steps). The first sample plant should be away from the dike. The pest observer will walk up one row and down another row, but never across the rows.

5. Record observations in the sampling sheet. After completing the survey on the 20 sample plants, compute for the total for each kind of insect pest.
6. Compare the running total with the Critical Pest Level (CPL) in order to arrive at a decision whether to spray or not.
7. If the total is above CPL, spray the recommended insecticide for the insect pest to be controlled.

Critical Pest Levels for cotton insect pests

PEST	DAYS AFTER PLANTING	CRITICAL PEST LEVEL (Based on 20 sample plants)
Bollworm larvae	22 - 63	2 plants with bollworm
	64 - 91	1 plant with bollworm
	93 - 105	1 plant with bollworm
Leafhopper	22 - 91	5 plants with leafhopper and with sucking damage
Aphids	22 - 91	6 plants with aphids
	92 - 126	2 highest open bolls with honeydew
Thrips	22 - 63	4 plant tips with thrips
	64 - 105	2 third leaves with thrips
Flowerweevil/ Pink bollworm	Flowering period	1 adult flowerweevil
Mites	43 - 63	6 third leaves with mites
Defoliators	43 - 91	7 third leaves with feeding damage
	92 - 105	6 third leaves with feeding damage

Other Management Options For Cotton Insect Pests

SAMPLING SHEET

Date of sampling _____
 Name of Farmer _____
 Area Planted _____

SAMPLE NO.	BW	LH	APH	THR	PBW	FW	MIT	DEF	NAT ENE
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
TOTAL									

Legend:

BW - Bollworm	THR – Thrips	MIT – Mites
LH – Leafhopper	PBW – Pink bollworm	DEF - Defoliators
APH - Aphids	FW - Flowerweevil	NAT ENE – Natural enemies

1. Close season planting – planting all fields in a cluster (1 km radius) within one month to minimize carry-over of damaging insect populations to the late-planted areas.



2. Use resistant varieties – plant varieties resistant to leafhopper in order to delay insecticide application that favors preservation and increase in population of natural enemies.
3. Use of trap crops – plant single rows of tomato, tobacco or corn in the cotton field at an interval of 15 to 20 rows of cotton. This is to divert the cotton bollworm away from the cotton plants. Regularly check the trap crops for bollworm infestation and handpick the bollworms or spray the plants when necessary.



4. Proper fertilizer and water management – apply only the recommended amount of fertilizer and irrigate at the proper time and right quantity to avoid excessive growth of the plants which makes the cotton plants very attractive to insects for egg deposition and feeding.

5. Physical destruction of flowers damaged by flowerweevil – squeeze the flowerweevil on the flower once it is observed. In addition, collect shed flowers damaged by flowerweevil and crush and later burn them in order to kill the grub inside the flower. Do this continuously for two weeks in order to get rid of the initial population and prevent build-up of flowerweevil population.



6. Flower-to-flower dusting with ash or sand or insecticide spraying – start dusting or spraying on the first occurrence of flowerweevil at least once a week preferably between 9:00 o'clock until 12:00 noon when the flowers are still open with the flowerweevils inside.



7. Sundrying seedcotton – sundry the seedcotton after harvest to drive the pink bollworms out from the seedcotton and eventually killed due to heat. Sundrying also improves the quality of the fibers.
8. Field sanitation – cut and plow under all plant residues after harvest to kill remaining insect pests and deprive the few survivors of food source during the cotton off-season.

DISEASES OF COTTON & THEIR MANAGEMENT

Damping-off

This is the most important and destructive seedling disease of cotton. It kills 50=80% seedlings under cool and moist weather. Under ordinary conditions, infection in the field is less than 5%.

Causal Organism: *Sclerotium rolfsii* Sacc.

Rhizoctonia solani Kuhn

Pythium debaryanum Hesse

Phytophthora spp.

The first two pathogens are the most common and widespread in the cotton growing areas in the Philippines.



Symptom: Diagnostic symptom is the falling-over of the seedling as a result of being girdled at or just below the soil line. Infected stem is discolored, reddish brown, gradually sink and finally topple over and die. When the soil is heavily infested with the pathogen, the roots are also infected. Under favorable environment, mycelia and sclerotial bodies (fungal structures) can be found at the base of the infected seedlings.

Management:

- a. Thorough land preparation to provide good drainage.
- b. Avoid planting when the soil is too wet to prevent disease development.
- c. Use of resistant variety such as UPL-C2 and PSB-Ct4 (CRDI-1).
- d. Plant more seeds per hill to ensure good population stand.
- e. Delay thinning as recommended (14 to 27 DAP).

- f. Collect seedlings that topple over and burned to avoid the formation of sclerotial bodies. These structures may remain dominant in the field for five years even when subjected under adverse conditions.
- g. Use fungicide as seed treatment. The following are the recommended fungicide.

COMMON NAME	BRAND NAME	RATE (g/li water/kg seed)
Captan	Orthocide 50 WP	20-40
Captan	Captan 50 WP	20-40
Benomyl	Benlate 50 WP	30
Thiophanate Methyl	Fungitox 70 WP	20
Chlorothalonil	Daconil	30
Mancozeb	Dithane M-45	20

In irrigated areas, it is recommended that seeds should be soaked in fungicide solution for 6-10 hours before planting. While in rain fed areas, dry coating the seeds with fungicide solution (g/200 ml of water/ kg seed) is recommended.

Fusarium Wilt



Cotton wilt is a typical fungal vascular disease. It is a serious disease in highly acidic soils with low potash and other nutrients. The disease is prevalent in the production areas of Conel and Klinan 5, General Santos City and Klinan 6, Silway 7 and Sulit, Polomolok, South Cotabato.

Causal Organism: *Fusarium oxysporum f. sp. vasinfectum* (Atk) Synder and Hansen

The causal fungus is soil-borne that survives in soil with high organic matter. The pathogen may be transmitted by water and seed. The casual fungus may also be recovered from delinted seeds obtained from infected cotton plants.

Symptom: Early symptom on seedlings is the vein-clearing in the leaves followed by necrosis of the inter-veinal tissue and death of the leaves. The affected parts ultimately die and fall off. The bare stem soon blackens and dies.

The first symptom in older plants is stunting, followed by yellowing, wilting and dropping of the leaves. Leaf discoloration first appears near the margin of the blade, and then the affected areas enlarge causing the leaves to drop.

The diagnostic symptom is the browning and blackening of the woody tissues especially when a stem is cut crosswise, the discoloration is usually found in a ring beneath the bark. Wilting occurs gradually. Wilted plants die without producing bolls or produce smaller bolls which open permanently.

Management:

1. Rotation of cotton with rice, corn, sorghum or other crops not affected by the pathogen to reduce inoculum level.
2. Uproot and burn infected plants.
3. Do not use the seeds derived from diseased plants.
4. Gather the cotton trash after harvest and burn them to reduce the source of inoculum.
5. Do not plant cotton in severely affected areas.

Anthracnose

This is a disease affecting seedlings, leaves and bolls.



Causal organism: The causal fungus, *Glomerella gossypii* (Southw.) Edg. is a seed-borne pathogen

Symptom: Infected seedlings may be killed before or after emergence or they may survive and overcome the disease. If seeds are infected, the radicle is damaged resulting to cessation of elongation to complete deterioration of the radicle. Another symptom is the sub-root, wherein severely diseased plants survived and produce shallow lateral roots above the stub of the tap root.

Leaf symptoms appear as small, circular, water soaked, brown, sunken spots which later become irregularly shaped and later fall off leaving the stems bare.

In bolls, lesions start as small, circular brown and when under favorable conditions, the spots enlarge rapidly covering the whole boll. Rotted bolls are hard and brown with discolored lint.

Management:

- Seeds for planting should be taken from disease-free plants.
- Control of weed species that serve as alternate host. i.e grasses
- Prune the plant extremities with disease symptoms and burn the trash of the infected field after harvest.

Diplodia Boll Rot

Losses due to the disease range from 10-14%. The disease is very common in Mindanao in dense plants with poor aeration.

Causal Organism: The disease is caused by an air-borne fungus, *Diplodia gossypina* Cooke

Symptom: The symptoms first appear as small, dark brown, circular, water-soaked, sunken spots on the surface of the bolls. The boll becomes completely infected in two to three days, turns black and rotten. Later, infected bolls dry up and turn into a black hard mass slightly splitting apart the carpels at the tip.

Management:

- Follow the proper distance of planting to allow good aeration.
- Avoid applying too much nitrogen to prevent excessive growth.
- Control insects which attack the bolls because an injury on the boll surface facilitates infection.
- Remove and burn infected plant parts.
- Defoliation of bottom leaves.

Bacterial Blight or Angular Leaf Spot, Black Arm & Boll Rot



The disease is serious in humid regions where there is high rainfall. It spreads rapidly by means of wind-blown rain, irrigation water and insects. The causal bacterium infects the cotton leaf, leaf petiole, stem and boll.

Causal organism: *Xanthomonas malvacearum* (E.F.S) Dowson. The causal organism is a bacterium which is carried through the seed and easily disseminated by insects, wind, splashing rain and water.

Symptom: On the true leaves, the symptoms appear as water-soaked lesions in the under surface. The lesions are limited in the veinlets giving their characteristics angular appearance, hence the name angular leaf spot. As the lesions progressed, bacterial ooze are exuded to form a dry film on the discolored lesions. Infected area finally becomes dry and sunken.

On the leaf petiole, the symptom is elongated and sunken. Lesions turn black with age, hence it is called black arm.

On the bolls, the disease appears as distinct water-soaked, circular to irregular areas in the pericarp which later turn brown to black.

When infected boll is opened, lint is brown, soft and mushy with disagreeable smell.

Management:

- a. Seeds for planting should be taken from disease-free fields.
- b. Use of resistant variety such as UPL-C2.
- c. Plow under or cut and burn diseased cotton plant/debris after harvest.

Fusarium Boll Rot



Casual organism: The disease is caused by the fungus *Fusarium 7* Sheldon var. *majus* Wr. And Rkg. This fungus can live as saprophyte in the soil.

Symptom: Infected flowers and young bolls readily rot, turning black. Older bolls, though infected, rot slowly and continue to open with pinkish lint.

Management: Field sanitation to reduce the sources of inoculum.

Sclerotium Stem Rot

The disease is more prevalent during the squaring and bolling stages of the cotton plant especially in irrigated areas.

Causal organism: The disease is caused by a fungus, *Sclerotium rolfsii* Sacc., one of the causal organisms of damping-off.

Symptom: The disease affects the stem at or just below the soil line. The bark in the affected area turns reddish brown, shrinks slightly and finally rots or decays. The rotting develops around the stem from the base to a few centimeters upwards. The base of the plant may be completely girdled. Under conditions of high humidity, white fungal growth and sclerotial bodies develop on the ground close to the plant. The leaves wilt and the plant finally die.

Management:

- a. Thorough land preparation in order to bury the sclerotial bodies of the fungus.
- b. Clean culture by eliminating the weed hosts of the fungus.

Ascochyta Blight

The disease attacks the seedlings before the first true leaves appear.

Causal organism: The disease is caused by a seed-borne fungus, *Ascochyta gossypii* Syd.



Symptom: Early symptoms are small, circular, white spots on the cotyledons and leaves. The lesions are enlarged turning brown and often drop out, leaving a shot-hole appearance. Additional infections showed girdle stem killing the terminal buds and adjacent stem tissues resulting in loss of stand.

Management:

- a. Seed treatment with fungicides like those used against damping-off.
- b. Seeds for planting should be taken from diseases-free plants.

Alternaria Leaf Spot



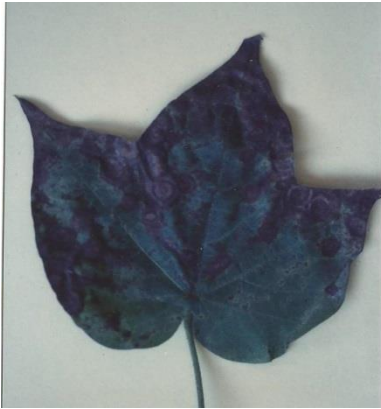
The disease is more severe on older plants and prefers cotton plants under stress.

Causal symptom: The disease is caused by *Alternaria gossypium* Thum

Symptom: On the leaves, bolls and bracts, the symptoms consist of circular necrotic appearance. The lesions are at first small and brown with reddish purple borders. Later, these lesions enlarge and coalesce forming large irregular spots. Severe infection results in defoliation.

Management: Field sanitation to reduce sources of inoculum.

Helminthosporium Blight



Causal organism: The disease is caused by a fungus, *Helminthosporium gossypii* Tucker.

Symptom: Leaf spots vary in size and shape. They may be circular, zonated or irregular brown lesions that occur near the leaf margin. Severe infection leads to defoliation and stunting of the plant.

Management:

- a. Field sanitation to reduce source of inoculum.

Areolate Mildew

The disease is common in cool and humid areas. Target of infection is limited to the leaves.

Causal organism: The disease is caused by the fungus *Ramularia aerola* Ath.

Symptom: The disease is generally present on the lower surface but occasionally appears on the upper surface of the leaves. The spots are white, turning yellowish to brown with age, vein limited, angular and often with conspicuous white or frosty fungal growth on the surface. Affected leaves fall prematurely. Repeated defoliation results in stunting of the plants.

Management: Cutting and burning of infected cotton leaves and plant debris after harvest.

Root Knot

The disease is destructive on cotton grown in light soil.

Causal organism: It is caused by the root-knot nematode, *Meloidogyne* spp. The immature larvae infest cotton plants by invasion through the soft root tips. After entering the tip, the larvae push their way between cells.

Then they become stationary and feed by puncturing the cell walls and sucking out the juices from the outside cell. The affected cells grow much larger and proliferate to form knots or galls.

Symptom: The characteristic knots or galls are formed in the roots where the galls appear as beads on a string. Round to elongated swellings up to one inch in diameter may develop in older roots and in severe cases the roots may be clubbed.

Above ground symptoms, though not distinct, resemble drought injury or nutrient deficiency. The affected plants are yellowish, stunted and wilt readily in hot, dry weather. Heavy infestations are usually accompanied by extensive rotting of the root system and the plants may be killed.

Management:

- a. Crop rotation with cereals or other non-host plants before or after cotton to reduce nematode population.
- b. Flooding the field for two weeks before land preparation to kill most of the nematodes.
- c. Fallow the field for about six months to reduce nematode population.

WEEDS ASSOCIATED WITH COTTON



Abutilon indicum L.

Local name:

Ilocano – Pallo-pallot
Tagalog – Malbas, Malis
Bisaya - Taratakopes,
Balupang



***Ageratum conyzoides* L.**

Local Name:
Ilonggo – Baho-baho,
Kanding- kanding
Bicolano – Kulong-kogong
Babae
Tagalog – Bulak-manok
Ilocano – Bangbangsit
Marakalding

***Cleome viscosa* L.**

Local name:
Ilonggo – Kolo-kamatis
Tagalog – Apoy-apoyan
Sili-silihan
Ilocano – Tantandok



***Euphorbia heterophylla* L.**

Local name:
Ilocano – Kanaka
Tagalog - Pintado

***Amaranthus spinosus* L.**

Local name:
Ilonggo – Kulitis
Bicolano – Kulitis
Tagalog – Kulitis
Bayambang
Ilocano – Kalunai
Kuantong



***Vernonia cinerea* L.**

Local name:
Ilonggo – Kolong-kogon
Tagalog – Tagulinau
Ilocano - Agas-moro



***Trianthema portulacastrum* L.**

Local name:
Ilonggo – Ulisiman, Ayam
Cebuano – Ayam
Tagalog – Toston
Ilocano – Tabtabukol
Kantataba

***Portulaca oleracea* L.**

Local name:
Ilonggo – Alosiman,
Olasiman
Bicolano – Alusiman
Tagalog – Olasiman
Ilocano - Ngalgug



***Rottboellia cochinchinensis* L.**

Local name:
Ilonggo – Bugang
Cebuano – Bukal
Tagalog – Agingay
Ilocano – Marapagay, Sagisi



***Echinochloa colona* (L.) Link**

Local name:
Ilonggo - Guinga
Tagalog – Pulang puwit
Bulang
Ilocano – Dukayang
Dukdukayang



Cynodon dactylon (L.) Pers

Local name:
 Cebuano – Kapot-kapot
 Tagalog – Kawad-kawad
 Ilocano – Bakbaka



Cyperus rotundus L.

Local name:
 Cebuano – Onod-onod
 Tagalog – Mutha
 Ilocano – Barisanga

Management of Weeds in Cotton

Weeds in cotton can be managed through mechanical, cultural and chemical means.

1. Control weeds through intertillage cultivation. This can be done by off-barring and hilling-up operation or by the use of spike-tooth harrow passed along the furrow.
2. Handweeding of weeds that are left along the furrows near the base of the plants.
3. Mulching rice straw in the lowland following minimum tillage practice to control weeds. Mulching material deprives the weed seeds of sunlight thus preventing them to emerge.
4. Chemical control – Spray pre-emergence herbicide along furrows after planting prevent germination of weed seeds. A broad spectrum post-emergence herbicide may also be sprayed before land preparation especially if the field is heavily infested with grasses.

Table 1. Estimated cost and return of one hectare rainfed cotton farm.

	QTY	UNIT PRICES	VALUE (P)
I. Material Inputs			7,900.00
Seed	10	60	600.00
Fertilizer, T-14	2	950	1,900.00
Fertilizer, 46-0-0	2	1200	2,400.00
Pest control, assorted	3	1000	3,000.00
II. Labor Inputs			15,100.00
Land preparation	2	2500	5,000.00
Furrowing*	2	350	700.00
Planting/Basal Fert.*	8	200	1,600.00
Replanting/thinning*	2	200	400.00
Off-barring*	2	350	700.00
Hilling-up*	2	350	700.00
Sidedress fertilization*	2	200	400.00
Spraying*	3	200	600.00
Harvesting*	1000	5	5,000.00
TOTAL PRODUCTION COST (P)			23,000.00
TOTAL CASH COST (P)			12,900.00
GROSS INCOME (P)	1000	25	25,000.00
RETURN ABOVE CASH COST (P)			12,100.00

Note: Seedcotton yield of 1,000 kg/ha shall be attained by strictly following the RCPT.

* Non-cash cost = farmers' equity on labor cost

Table 2. Estimated cost and return of one hectare irrigated cotton farm.

PARTICULARS	QTY		UNIT PRICES	VALUE (P)
I. Material Inputs				15,790.00
Seed	15	kg	60	900.00
Fertilizer, T-14	3	bag	1050	3,150.00
Fertilizer, 46-0-0	3	bag	980	2,940.00
Pest control, assorted	4	spraying	1000	4,000.00
Fuel & Oil	120	li	40	4,800.00
II. Labor Inputs				23,500.00
Land preparation (tractor rotavation)	1	passing	5000	5,000.00
Furrowing*	2	MAD	500	1,000.00
Planting/Basal Fert.*	8	MD	250	2,000.00
Replanting/thinning*	2	MD	250	500.00
Off-barring*	2	MD	500	1,000.00
Hilling-up*	2	MD	500	1,000.00
Sidedress fertilization*	2	MD	250	500.00
Irrigation*	12	MD	250	3,000.00
Spraying*	6	MD	250	1,500.00
Harvesting*	1600	kg	5	8,000.00
TOTAL PRODUCTION COST (P)				39,290.00
TOTAL CASH COST (P)				20,790.00
GROSS INCOME (P)	1600	kg	25	40,000.00
RETURN ABOVE CASH COST (P)				19,210.00

Note: Seedcotton yield of 1,600 kg/ha shall be attained by strictly following the RCPT.

* Non-cash cost = farmers' equity on labor cost