KHARIF CROPS OF ASSAM
RICE (Oryza sativa L.)
NORMAL AHU (Summer rice)
(Direct seeded)

Dry Seed Treatment:

Put seeds in a container and add any of the following fungicides according to the recommendation. Mix the fungicide thoroughly with seeds by agitating them for five minutes.

Fungicide	**Dose (g/kg seed)**	**Cost of fungicide to treat seeds required for one ha.**
Mancozeb	2.5	Rs. 71.00 (line sowing) Rs. 99.00 (broadcasting)
Captan	2.5	Rs. 88.00 (line sowing) Rs. 123.00 (broadcasting)

Plant Protection Measures :

A. Insect Pests :

i) Plant protection measures should be adopted against insect pest at their economic threshold as given in Table 1. Wherever threshold level is not mentioned, control measures be taken with the appearance of the pest.

ii) Insecticides should be used as per recommendation given in Table 2.

B. Root-knot Nematodes :

For control of root-knot nematode apply.

i) Carbofuran 3 G @ 3g/m^2 at the time of sowing

C. Disease :

i) Blast :

(a)Grow tolerant varieties, such as Govind, Cauvery, IR 36.

(b)Treat the seeds as mentioned under seed treatment.

(c)For control of blast-monitoring of blast is important to schedule spraying. Observe the top five leaves and if 5% leaf area is damaged take resort to spraying. Normally three sprays can control the disease. Spray Carbendazim or Thiophenate Methyle @ 1g/l of water at tillering stage (40-55 days after sowing) and subsequently give two sprays of Ediphenphos @ 1 ml/l of water at panicle initiation stage and when the tip of the panicle just comes out.

ii) Sheath blight disease : For control of sheath blight disease – spraying of two commercial plant-derived cymbopogon products viz. Wanis 20E @ 5ml/litre and Neemazal @3ml/litre is recommended for management of sheath blight disease of rice. The first spraying should be given as soon as symptom of the disease is observed in the field followed by a second spraying at 10 days interval.

iii) Bacterial leaf blight (BLB) :

a) Grow tolerant varieties, such as Govind and IR 36.

b) Aviod top dressing with nitrogen at panicle initiation stage if BLB has already appeared. Instead top dress with 10 kg of potash/ha or apply 5 kg of K_2O/ha in the form of foliar spray of 3% solution.

iv) Brown spot disease : Dry or wet seed treatment with Carbendazim @ 1 gm/kg of seed followed by one spraying of Mancozeb @ 2.5 g/litre or Ediphenphos @ 1ml/litre or Carbendazim @ 1g/litre at initial symptom development stage is recommended for managing the disease.

v) Bakanae Disease :

a) Soak seeds for 24 hours with Thiophenate-methyl or Carbendazim @ 1g/l/kg seed.
b) Rogue out the infected tillers (elongated, from the infected hills in the main field.

RICE
TRANSPANTED NORMAL AHU
(Summer rice)

Seed Treatment:

Wet method:

After seed selection, the seeds should be soaked directly in any of the following fungicidal suspensions for 24 hrs.

Fungicide	Dose **(g/kg seed)**	**Cost (Rs./ha)**
Mancozeb	2.5 g/l of water	Rs. 38.00
Captan	2.5 g/ l of water	Rs. 47.00
Carbendazim	2.5 g/ l of water	Rs. 33.00

One litre of fungicidal solution is required to treat 1 kg of seed.

a) Plant protection in seed bed :

i) As soon as one or two blast spots are seen, Carbendazim @ 1g/l or Ediphenphos @ 1ml/l of water is to be sprayed.
ii) In root-knot nematode - apply Carbofuran 3 G @ 3g/m^2 at the time of sowinsg.

For control of nursery insect pests any one of the following schedule is to be followed as and when necessary., Generally an insecticidal spray at 5-7 days after sowing is effective against most pests.

Insecticide	**Dosage (ml/m^2)**
Chlorpyriphos	0.1
Quinalphos	0.15
Monocrotophos	0.12
Phosphamidon	0.07
Endosulfan	0.14

High volume spray : 40 ml of water/m^2
Low volume spray : 13 ml of water/m^2

b) Preparation of seedlings for initial protection in main field :

The uprooted seedlings are washed and then the root portion is dipped in 0.2% solution of Chlorpyriphos (1 ml/l of water) along with 1% urea for 3 hours as a protective measure against stem borer, gall midge and hoppers.

Alternatively, Carbofuran @ 3g/m^2 is to be applied in the seed bed 5-7 days before uprooting of seedlings or spray Chlorpyriphos @ 0.05% in nursery 5 days before uprooting.

Plant Protection Measures in the Field:

A. Insect pests:

1) Plant protection measures should be adopted against insect pests at their economic thresh hold level as given in Table 1. Wherever thresh hold level is not mentioned, control measures should be taken with the appearance of the pest.
2) Insecticides should be used as per recommendation given in table 2.

B. Root-knot Nematode:

Same as direct seeded ahu.

D. Diseases :

Same as direct seeded ahu.

Pre-harvest treatment should be undertaken on standing crop for better grain quality (Same as in direct seeded normal ahu).

Table 1. Economic threshold level of different rice pests

Stage	Pest	Threshold/intensity
Nursery	Stem borer, Thrips, Case-worm	Moderate to severe
	Gall midge	-do-
Early Tillering	Stem borer	5% dead hearts or 1 egg mass/m^2
	Leaf folder	More than 1 damaged leaf per hill
	Whorl maggot	More than 2% damaged hills up to 30 days after transplanting
	Leaf and plant hopper Caseworm	5 to 10 insects per hill 1 to 2 barrel cases/hill
	Gall midge	1 gall/m^2 in endemic areas
	Hispa	1 adult or 1damaged leaf/hill
	Swarming Cater-pillar	1 larva/hill
Mid tillering	Stem borer	More than 5% dead hearts
	Leaf folder	More than 1 damaged leaf per hill
	Brown or white backed plant hopper	5 to 10 insects/hill
	Green leaf hopper	20 insects/hill
	Green leaf hopper (in tungro endemic areas)	2 insects/hill
	Hispa	1 adult or 1-2 damaged leaves/hill
	Mites	Light to moderate
Panicle initiation to booting	Stem borer	1 moth/m^2 or more
	Leaf folder	1 or 2 freshly damaged leaves/hill
	Brown or white backed plant hopper	5-10 insects/hill
	Green leaf hopper	20 insects/hill or more
	Mite	Light to moderate
Flowering and maturity	Stem borer	1 moth/m^2
	Brown or white plant hopper	5 to 10 insects/hill
	Swarming caterpillar	1 larva/hill
	Rice bug	2 bugs/m^2

SALI RICE
(Winter rice)

Seed Treatment:

A. Wet Method:

After selection, the seeds should be soaked directly in one of the following fungicidal suspensions* for 24 hours.

Fungicides	Dose (g/kg seed)	Cost of fungicide (Rs/ha)
Mancozeb	2.5g/l of water	Rs. 38.00
Captan	2.5g/l of water	Rs. 47.00
Carbendazim	2.5g/l of water	Rs. 33.00

*One liter of fungicide solution is required to treat one kg of seed.

Seed selection in water	**Fungicidal solution 24 hrs.**	**Incubation for 48 hrs.**

a) Plant protection in seed bed :

i) As soon as one or two blast spots are seen, Carbendazim @ 1g/l or Ediphenphos @ 1ml/l of water is to be sprayed.

ii) Root knot nematode : Same as in case of normal ahu.

iii) Root dip treatment of seedlings : The uprooted seedlings are washed and then the root portion is dipped in 0.02% solution of Chlorpyriphos (1 ml/l of water) along with 1% urea for 3 hours as protective measure against stem borer, gall midge and hoppers.

Alternatively, Carbofuran @ 3g/m^2 or Phorate or Diazinon 1g/m^2 is to be applied in the seed bed 5 to 7 days before uprooting of seedlings or spray Chlorpyriphos 20 EC @ 0.05% in the seed bed 5-7 days before uprooting.

Plant Protection Measures in the Field :

A. Insect pests :

i) Plant protection measures should be adopted against insect pests at their economic threshold levels as given in Table 1: Wherever threshold level is not mentioned, control measures should be taken with the appearance of the pests.

ii) Insecticides should be used as per recommendation given in Table-2.

iii) Bio-control measures against stem borer and leaf folder : 6-8 releases of Trichogramma japonicum and Tchilonis @ 50,000/ha/week starting from 30 days after transplanting gives significantly good control of rice stem borer and leaf folder respectively and a high level parasitism (30-60%) can also be recorded. The performance of Trichogramma is at par with the chemical control and not only in controlling the pest population, but also in fetching economic benefits.

Since Trichogramma is an egg parasitoid, its releases should be coincided with the egg lying activity of the pest. Timely releases are crucial. Releases should be made over the entire infested area throughout the egg laying period of the pests, which results in uniform and effective control**.**

Method of application : Each 'Trichocard' is to be cut in to 6-12 pieces and distributed over the entire field by fixing then to the plants by using a stapler or quick fix. The parasites emerging from these generally disperse themselves.

The most common pests are thrips (in the seeds bed) stem borer, hispa (in endemic areas of Sivasagar, Cachar, Karimganj and Kamrup), swarming caterpiller and gall midge. Amongst the diseases, blast, sheath blight and bacterial leaf blight are most common. Close surveillance is necessary for timely control of the pests.

B. Diseases :

i) Blast :

a) Grow tolerant varieties, viz. Monohar Sali, Prasad, IR 36, Pankaj.

b) Treat the seed as explained under seed treatment.

c) Monitoring of blast is most important to schedule spraying. Observe the top five leaves and if 5% leaf area is damaged take resort spraying. Normally three sprays can control the disease. Spray Carbendazim of Thiophenate Methyl @ 1g/l of water at tillering stage (30 days after sowing) and subsequently give two sprays of Ediphenphos @ 1ml/l of water at panicle initiation stage and when the tip of panicle just comes out.

ii) Bacterial leaf blight: Grow tolerant varieties, viz. Lakhimi and Mahsuri.

iii) Sheath blight: (i) Two sprays of Carbendazim (1g/l) should be given, first at appearance of symptoms and the other at 10 days after the first spraying. Mancozeb (2.5g/l) or Hexaconazole 5EC (2ml/l) can also be sprayed for controlling this disease.

(ii) Spraying of two commercial plant-derived Cymbopogon products viz. Wanis 20EC @ 5ml/litre and Neemazal @ 3ml/litre is recommended for management of sheath blight disease of rice. The first spraying should be given as soon as symptom of the disease is observed in the field followed by a second spraying at 10-12 days interval.

iv) Brown spot disease : Dry or wet seed treatment with Carbendazim @ 1gm/kg of seed followed by one spraying of Mancozeb @ 2.5 g/litre or Ediphenphos @ 1ml/l or Carbendazim @ 1g/l at initial symptom development stage is recommended for managing brown spot disease.

v) Bakanae disease : Soak the seeds for 24 hrs. with Carbendazim @ 1g/l of water of Thiophenate Methyl @ 1g/l.

Rogue out the infected tillers (elongated) from infected hills.

Management of Direct Seeded Late Sali :

- **b)** Field should be prepared just after recession of flood by ploughing, cross ploughing and laddering to bring it to a puddle condition.
- **c)** Sprouted seeds should be sown in lines 20 cm apart.
- **d)** A seed rate of 75 kg/ha should be maintained.
- **e)** Need based fertilizer application is advocated.
- **f)** Pre-emergence herbicide Butachlor (Punch) @ 2kg a.i./ha should be applied 2-3 days after sowing.
- **g)** Wherever water management is possible two irrigations at p.l. and flowering stages are recommended.

PEST MANAGEMENT PRACTICIES IN ENDEMIC AREAS WITH SPECIAL REFERENCE TO RICE HISPA

a) Destruction of initial population.
b) Destruction of alternate hosts (Dol, Uridol etc…)
c) Burning of stubbles after harvesting.
d) Deep ploughing during March- April.
e) Monitoring at regular intervals.
f) Avoidance of staggered planting.
g) Seeded treatment or root dip treatment.
h) Clipping of leaf tips before planting
i) Use recommended insecticides at proper dosage and spray volume. Add 1% urea and 2% potash to spray fluid.
j) Planting of moderately resistant varieties.
k) Spray 1% neem seed oil using sticker (23 g/litre).

BAO RICE
(Deep Water Rice**)**

Seed Treatment:
A. Wet method:

After selection, the seeds should be soaked directly in any one of the following fungicidal suspensions for 24 hours.

Fungicides	Concentration	Cost of fungicide to treatment the seed required for one ha
Mancozeb	2.5 g/l of water	Rs. 58.00
Captan	2.5 g/l of water	Rs. 88.00
Carbendazim	2.5 g/l of water	Rs. 62.00

One litre of fungicidal solution is required to treat one kg of seed.

** Trade names of available fungicides are furnished in the Appendix.

Seed selection in water	Fungicidal solution 24 hrs	Incubation for 48 hrs

B. Dry method:

Seeds and any one of the following fungicides are put in a closed container and then agitated for five minutes for thorough mixing.

Fungicide	dose	Cost of fungicide to treatment the seed required for one ha
Mancozeb	2.5 g/kg of seed	Rs. 58.00
Captan	2.5 g/kg of seed	Rs. 88.00

Plant Protection:

For control of field rats:

Apply dry poison baits in bait stations (broken earthen pot, coconut shell, bamboo cylinder etc.)

Bait formula :

1. Atta or wheat bran or maize crush 80g.
2. Gur 10g
3. Fried fish (or dry fish) 5g
4. Zinc pohosphide or warfarin 5g

For control of plant parasitic nematodes endemic areas Carbofuran @ 3g/m^2 (30 kg/ha) should be applied 5-7 days after sowing.

N.B. Showing of asra (shallow water rice) under puddle condition is recommended for zone 5.

Ufra disease control:

1. Burning of the stubbles and straw followed by several ploughings just after harvest.
2. Delay sowing upto mid April.
3. Apply Carbofuran granules @ 30 kg/ha at the time of sowing to reduce the active initial incoulum.
4. Use early maturing bao variety like 'Padmapani'

DISEASE REACTION OF RECOMMENDED RICE VARIETIES

Sl. No.	Varieties	Reaction of leaf blast	Reaction to BLB	Reaction to sheath blight	Remarks
Semidwarf :					
1.	Prasad	R			
2.	IR 36	R			
3.	Ratna	R			
4.	Pankaj	T	T	T	Resistant to heat and cold
5.	Biraj	S			
6.	Kmj 1-19-1	-			
7.	Govind	R	R		
8.	IR 50	R		S	
9.	Bala	R		S	
10.	Cauvery	T			

11.	Krishna	S			
12.	TTB 14-1	S			
13.	TTB 15-1	S			
14.	IET 6666(Lakhimi)	R	T	T	
Tall :					
15.	Monohar Sali	R	R	R	Resistant to sheath blight, not Suscepe-tible to brown spot and bakanae disease
16.	Mahsuri	S	T	S	
17.	Phulpakhri	T			
18.	Banglami	S			
19.	Rangadaria	S			
20.	Ahujaha	S			
21.	Kolasopila				
22.	Maibee	S			
23.	Dimro	S			

S = Susceptible, T = Tolerant, R = Resistant.

MAIZE

(Zea mays)

Seed Treatment :

Seeds should be dressed with Carbendazim @ 2g/kg of seed or Captan @ 2.5-3 g/kg of seed.

Plan Protection :

When infestation of stem borer is noticed, Fenitrothion 50 EC @ 1.0 l/ha of Diazinon 20 EC @ 1.5 l/ha in 200-250 litres of water should be sprayed with power sprayer or in 700-800 litres of water with hand sprayer. Alternatively, Endosulfan 1.5 l/ha should be sprayed with the same volume of water.

In areas where banded sclerotial disease (Rhizoctonia solani) is noticed, the plants should be sprayed with Carbendazim 0.05% (0.5 g/l water) @ 700 l/ha of spray solution at an interval of 12-15 days. Matured cobs can be protected from bird damage by tying cobs with leaves of the same plant.

FINGER MILLET (MARUA)

(Eleusine coracana)

Plant Protection : There is no major pest and disease in the marua crop. However, Triclazole/Ediphenphos/Carbendazim @ 0.1 percent significantly control blast disease which occurs sometimes.

BLACKGARM

(Vigna mango)

Diseases :

For control of leaf spot (Cercospora spp.) as soon as disease appears spray Coper Oxychloride @ 0.3% (1.8 – 2.0 kg/ha in 600-700 l of water) at an interval of 7-10 days. Alternatively Carbendazim @ 0.05% (300-350 g in 600-700 of water/ha) at an interval of 12-15 days should be sprayed.

Blight (Rhizoctonia solani) : On appearance of this disease Carbendazim @ 0.05% (300-350 g in 600-700 of water/ha) should be sprayed. This will control leaf spot and powdery mildew disease also.

Rhizoctonia Solani induced damping off, root rot and seedling blight can be effectively managed by seed treatment with slurry method using commercial formulations of Trichoderma spp. @ 5 g/kg of seeds.

B. Insect Pests :

i) Aphids/Jassids/Flea beetle : Spraying Malathion 50 EC @ 1.0 – 1.5 l/ha in 500-700 l of water controls these pests.

ii) The spread of yellow mosaic virus (YVM) can be checked by controlling white fly (Bemisia tobaci) as follows :

Two to three sprayings of Dimethoate or Endosulfan @ 2ml/l of water are to be given; first spray 10 days after germination and subsequent sprays at 15 days interval.

iii) For control of Meloidogyne incognita (Nematode) seed soaking with Carbosulfan 25 EC @ .01% for 6 hrs. should be applied.

GREENGRAM

Vigna radiate

Plant Protection :

A. Diseases :

i) **Leaf spot** (Cercospora spp) : As soon as disease appears spray Copper Oxychloride @ 0.3% (1.8-2.0 kg in 600-700 liters of water/ha) at an interval of 7-10 days. Alternatively Carbendazim @ 0.05% (300-350g in 600-700 liters of water/ha) at an interval of 12-15 days should be sprayed.

ii) **Blight** (Rhizoctonia solani) :On appearance of this disease Carbendazim @ 0.05% should be sprayed as stated above. It will also control leaf spot and powdery mildew diseases.

Rhizoctonia Solani induced damping off, root rot and seedling blight can be effectively managed by seed treatment with Slurry method using commercial formulations of Trichoderma spp. @ 5 g/kg of seed.

B. Insect Pests :

i) Aphids/jassids/Flea beetle : Malathion 50 EX @ 1.0-1.5 l/ha in 500-700 liters of water/ha should be applied. In addition Enolosulfan (0.07%) @ 2ml/l of water, phosphamidon (0.5ml/l of water is recommended forcontrol of the above pests.

ii) The attack by yellow mosaic virus (YMV) can be checked by controlling white fly (Bemisia tabaci) as follows : Two to three spraying of Dimethoate or Endosulfan @ 2ml/l of water are to be given, first spray 10 days after germination and subsequent sprays at 15 days interval.

iii) For control of Meloidogyne incognita (Nematode) seed soaking with Carbosulfan 25 EC @ .01% for 6 hrs.

COWPEA

(Vigna unquiculata)

Plant Protection :

A. Disease : No serious disease has so far been observed.

B. Insect Pests : Malathion 50 EC @ 1-1.5 litres mixed in 500-700 litres of water is to be sprayed in one hectare.

ARHAR
(Cajunus cajan)

Plant Protection :

Wilt : The pathogen inhabits is the soil and perpetuates. Rogueing of diseased plants and burning these partly helps in controlling the disease.

Insect Pests :
Pod borer/Apionborer/Flea betle/Leaf roller/: Malathion 50 EC @ 1.0-1.51 or Fenitroth-Jassid ion 50 EC @ 1.0-1.51 mixed in 500-700 Litres of water is to be sprayed in one Hectare.

To control pod and Apion borer, either of the above insecticides should be sprayed in 3 occasions from the time of flower initiation at an interval of 15 days. For control of Flea beetle, Leaf roller and Jasside, insecticides should be applied when they arrear.

SOYBEAN
(Glycine max)

Plant Protection:
A. Diseases:

Soybean seeds should be treated with Thiram @ 3 g/kg of seed. Soybean is susceptible to yellow mosaic virus. In order to stop spread of the vector of yellow mosaic disease in field, spray Dimethoate 30 EC @ 1 to 1.51 in 800 to 1000 l water/ha.

Rhizodonia Solani induced dry root rot in Soybean can be effectively managed by seed treatment with Trichoderma spp. By Slurry method @ 5 g/kg of seed.

B. Pests :

Spraying of Dichlorovos 100 EC @ 05 ml/l or Chlorpyriphos 20 EC @ 1 ml/l should be done against hairy caterpiller semi looper, leaf roller and flea betle.

SESAMUM
(Sesamum indicum)

Plant Protection :

Seeds should be treated with Carbendazim or Captan @ 2g of each fungicide/kg of seed against stem rot as well as phytophthora blight.

Alternatively seeds should be treated with a commercial formulation of Trichoderma spp. @ 5 g/kg of seeds against stem rot and phytopthora blight.

In phytophthorae blight endemic areas sesamum is to be rotated with cereals at every two years. In the case of phyllody disease, the infected plants should be rogued out.

In case of attack of shoot webber (Antigastra cataunalis) spray Dichlorovos 100 EC @ 0.5 ml/l or Monocrotophos 40 EC @ 1 ml/l.

Seed Treatment :

Treat the selected kernels with 3g of Thiram or Captan/kg of kernel.

Plant Protection :

1) Spray Carbendazim @ 0.5 g/l of water to control leaf spot (Tikka) disease. The first spray should be given as soon as the initial symptoms are detected followed by a second spray after 20 days of the first spray.
2) To control the major insect pests (i.e. aphid, leaf miner etc.) spray Phosphamidon 100 EC @ 1 ml/2 litre of water.

RICE BEAN *

(Vigna umbellate)

Plant Protection:

Insect pests: Jassids/Flea beetle/Hairy caterpillar. Spraying of Malathion 50EC @ 1.0-1.5 kg/ha in 500-700 l of water or dusting with Malathion 5% dust @ 20-25 kg/ha controls these pests.

GROUNDNUT

(Arachis hypogaea)

Plant Protection :

1) Spray Carbendazim @ 0.5 g/l of water to control leaf spot (Tikka) disease. The first spray should be given as soon as the initial symptoms are detected followed by a second spray after 20 days of the first spray.

3) To control the major insect pests (i.e. aphid, leaf miner etc.) spray Phosphamidon 100 EC @ 1 ml/2 litre of water.

SUGARCANE

(*Saccharum sp*)

Treatment of Setts :

Sets are to be treated before planting by dipping them in 0.2% solution of Captan, Mancozeb or 0.1% Carbendazim. In the process of treatment of setts when the solution gets reduced by about 50% it should be brought to the original volume by adding solution of equal strength.

Weed Control :

One weeding should be given within 30-35 days of planting followed by another within 60-90 days of spring plant crop. In October planted crops weeding should be done as and when necessary.

Pre-emergence application of 2, 4 –D (Na-salt) 0.8-1 kg a.i/ha followed by one weeding is economical as well as satisfactory. Alternatively Diuron @ 0.8-1 kg a.i/ha or Atrataf (Atrazine) @ 2 kg a.i/ha may be used as pre-emergence herbicide. About 500-700 litres of water will be required to spray one hectare with hand sprayer.

Or

For controlling weeds in plant crop, post emergence herbicide 2,4-D (amine-salt) 1.0 kg a.i/ha+Gramoxone 0.5 kg a.i/ha in ;mixture should be sprayed directly in between the rows after 3 weeks of planting.

Plant Protection :

a) **Termites, red ants and white grubs** :

Malathion 5% dust @ 20-25 kg/ha should be applied to the trenches/furrows before planting. Alternatively Chlorophyriphos 20 EC of 0.2% strength may also be used.

b) **Borers** :

Spread of stem borer attack in May-July can be checked by burying and burning of infested canes. Any of the following insecticides may also be used against these pests. Two to three rounds of fortnightly spraying starting from the rush of egglaying should be given.

Insecticides Technical names	Qnty. kg/bigha	Water requirement l/ha	
		Hand sprayer	Power sprayer
A) per hectare :			
Phosphamidon	400-500ml	800	200
Fenitrothion	1 – 1.5 l	1000	250
Endosulfan	1 – 1.5 l	1000	250
Monocrotophos	1.01 l	1000	250
B) Per bigha :			
Phosphamidon	60-70 ml	120	30
Fenitrothion	150-200 ml	120	30
Endosulfan	150-200 ml	150	35
Monocrotophos	150-200 ml	150	35

C) Wooly aphids, mealy bugs and thrips :

These pests can be controlled by the application of any one of the following insecticide as and when the pests appear.

Control measures against wooly aphids must be taken as soon as it appears to prevent shooty mould development.

Insecticides	Quty.	Qnty. of water in spray (l)	
		Hand sprayer	Power sprayer
A) Per hectare :			
Malathion	1.5 l	800	200
Phosphamidon	400-500 ml	800	200
Dimethoate	1.0 l	800	200
B) Per bigha :			
Malathion	200 ml	100-200	25
Phosphamidon	60-70 ml	120	30
Dimethoate	150 ml	150	25

Red Rot (Colletotrichum falctum) :

Red rot infested canes dry up and ultimately die. The canes become shriveled, the leaves and the leaf sheaths dry up and when the stem is aplit open characteristic reddening of internal tissue with white transverse bands are observed.

Disease free setts should be used to prevant the sprayed of red rot. Setts from diseased cane or diseased field should be avoided. Water stagnation in the field should be avoided and rouging of the affected plants should be practtised. Canes of the disease affected field should be harvested early and stubbles should be burnt. Field should be newly planted after 4-5 months. Rotooning should be discouraged.

Wilt (Cephalosporium sacchari) :

Measures recommended for red rot should be adopted.

Ratoon Management :

For better controlling of weeds in ratoon 2, 4-D (amine) 1 kg a.i/ha should be used as pre-emergence followed by the same as post emergence application after 3 weeks of stubble shaving.

Other cultural practices are same as in plant cane. Special attention should be paid on plant protection measures.

The ratoon crops can be raised profitably by proper management practices. Ratooning for more than two years usually makes the crop liable to greater damage by insect pests and diseases. Ratooning of red rot or heavy insect pest infested crop should be avoided.

JUTE
(Corchorus Sp)

Land Preparation:

In termite and cricket infested fields, the soil is to be treated with Malathion 5% dust @ 30 kg/ha.

Chemical Weeding :

Basalin @ 3 l/ha (commercial product) in 1000 litre of water is to be applied as pre-emergence spray 3 days before sowing. Dowpon @ 7.5k g/ha in 1000 litre of water should be applied 7-10 days after emergence of weeds for their effective control. Spraying should be done with flood jet nozzle (WFN 40) and the herbicide spray should not get direct contact with jute plants. This is applicable for line sown crops only.

Plant Protection :

A. Pests :

Jute hairy caterpillar, Semi looper, Yellow mite, Stem weevil.

(a) Hairy caterpillar egg masses and caterpillars are to be hand picked and destroyed by putting them in kerosene oil. For semi looper, perch may be fixed in Jute field or nearby to facilitate predatory birds to sit on.

(b) For control of these pests, Fenitrothion 50 EC 0.5% (1 ml in l of water) or Endosulfan 35 EC 0.07% (2 ml in L of water) or Monocrotophos 40 EC 0.06% (1.5 ml in l) should be sprayed 3 times, starting from mid June at 15 days interval or from first appearance of the pests, preferably in the upper portion of the plant. The volume of water to be used/ha (high volume sprayer) are 600,650 and 700 litres in 1^{st}, 2^{nd} and 3^{rd} spray respectively. In case of low volume sprayer 200-250 l/ha of spray solution should be used.

Cricket :

In the standing crop damage can be checked by poison baiting made of 10 kg of wheat or rice bran with 500g gur or molasses. Alternatively chloropyriphos 20 EC of 0.2% strength may also be used.

B. Diseases :

Root rot and stem rot, seedling blight and anthracnose.

(a) Seeds should be treated with Carbendazim @ 2g/kg of seed.
(b) Soil pH should be raised to 5.5 by application of lime.
(c) Application of potash should be increased up to 50 kg K_2O/ha.
(d) When disease appears, plants should be sprayed either with Carbendazim @ 1g/lt. or Mancozeb @ 3g/lt. of water.
(e) Jute-Rice crop rotation should be followed.
(f) Moderately resistant varieties like JRC 212 and JRC 7447, UPC 94 should be grown. Among the fungicides mentioned above, Bavistin is the most effective.
(g) For managing Damping off, Apex rot and seedling blight caused by soil borne Macrophomina Phaseolina, seed treatment with Slurry method using commercial formulations of trichoderma spp. @ 5g/kg is effective.

For Control of Meloidogyne incognita (nematode) : Apply Carbofuran 3G @ 2kg a.i./ha as soil application in furrows at the time of sowing.

JUTE
(Seed Crop)

Plant Protection :

For control of Jute semi-looper and hairy caterpiller, spray Endosulfan 0.07% (2ml/l of water) two to three times at 15 days interval from the first appearance of pests.

For control of stem and root rot, Carbendazim @ 1g/l water is to be applied for effective control of diseases.

MESTA

(Hibiscus spp)

Plant Protection:

A. Insect Pests :

For controlling jassids, two spraying at 15 days interval with Endosulfan (0.07%) or Phosphamidon (0.05%) or Dimethoate (0.06%) should be given during the vegetative phase of crop.

COTTON

(Gossypium spp)

Plant Protection :

After 30 days of sowing spray Endosulfan (Thiodan) 35 EC @ 2 ml/l of water at an interval of 20 days from first spray. Total 4 sprayings will be needed. For each spray 600-800 l spray solution will be required.

RECOMMENDATIONS OF INSECTICIDES (QUANTITY/HA) AGAINST IMPORTANT INSECT PESTS OR RICE

Insecticides	Stem borer	Leaf folder	Whorl maggot	Gall midge	Plant leaf hopper	Case warm	Army worm	Swarming cater pillar	Rice bug	Thrips	Termites	Mealy bug	Rice hispa
Chlorpyriphos 20 EC	1.0	1.0	1.0	1.0	1.0	-	1.0	1.0	-	1.0	-	-	1.0
Quinalphos 25 EC	1.5	1.5	-	-	-	1.5	1.5	1.5	-	1.5	-	-	1.5
Fenitrothion 50 EC	1.0	1.0	-	-	-	-	-	-	-	1.0	-	-	-
Monocrotophos 40 EC	1.25	1.25	-	-	1.25	1.25	1.25	1.25	1.25	1.25	-	1.25	1.25
Carbbofuran 3 G	30	-	30	30	30	-	-	-	-	-	-	-	30
Phorate 10 G	10	-	-	10	10	-	-	-	-	-	-	-	-
Diazinon 10 G	10	-	-	10	10	-	-	-	-	-		0.65	0.65
Phosphamidon 10 EC	0.65	-	-	-	-	-	-	-	-	-	-	40	-
Phosalone 35 EC	-	1.5	-	-	-	-	-	-	-	1.5	-	1.5	-
Carbaryl	-	-	-	-	-	-	1.5	1.5	-	-	-	-	1.5
Dichlorovos 100 EC	-	-		-	-	-	0.5	0.5	-	-	-	-	0.5
Endosulfan 35 EC	-	-	-	-	-	1.4	1.4	-	-	0.75	-	-	1.4

Methyl Parathion 50 EC		-	-	-	-	-	-	-	-	-	-	-	1.5
Malathion 5% dust	-	-	-	-	-	-	-	-	20	-	-	-	-
Endosulfan 4% dust	-	-	-	-	-	-	-	-	25	-	25	-	-

Dose for EC formulations is in litres/ha and for granules and dusts in kg/ha.
High volume spray : 375 to 400 litres of water/ha; low volume spray : 100 litres of water/ha.

Package of practices on rice hispa management

To manage the rice hispa, the following strategies are suggested :

Monitoring

1. As the initial population build up of hispa takes place on *boro* and early *ahu* from February onwards, appropriate protection measures must be taken when the population reaches economic threshold level (ETL) 1 adult or 1 damaged leaf/hill.
2. Routine monitoring at weekly intervals must be taken up from April onwards to detect the initial population build up in and around rice fields followed by similar surveillance in July onwards. Similar monitoring is advisable for the next year in the rice hispa affected regions during middle of February to April.

Cultural Control :

3. Draining of water at the time of population build up for 2 to 3 days may help in decreasing rice hispa population.
4. Weed free cultivation may be encouraged.
5. In areas where rice is not widely gorw during *boro* and *ahu* season, small, swamply areas and roadside pits having alternate hosts may serve as the breeding pockets of rice hispa during February to April. Such infested pockets are easily identifiable from long distance because of their characteristic withered conditions and burning appearance. These pockets are also not very large in size. Therefore, it is advisable to destroy these weeds by mechanical methods (cutting and burning). This operation will minimize further multiplication and dispersal of adults into the rice crop. Use of insecticides cannot be advocated because the swarms are used as grazing fields and natural fisheries.
6. Whenever and wherever possible, staggering of transplanting should be discouraged; early transplanting helps to escape rice hispa attack.
7. After harvesting of rice, burning of stubbles in November-December may be encouraged so as to kill the hibernating adults.
8. Deep ploughing of rice hispa-affected-fields during February and March may be encouraged.

Mechanical Control

9. Clipping of leaf tips of seedling before transplanting must be done.
10. As a mechanical method of control, clipping and destroying of affected leaves up to about 6 inches from the top should be strongly encouraged. These leaves contain eggs, larvae and pupae.
11. A public support must be created to manage this pest. Collection of adult in rice field, hand picking of grubs in the roadside swamps and pits may be encouraged among school children and village youths.

Biological Control

12. October spraying may be avoided, as the natural enemies are maximum during this period. Considering bio-efficacy of *Beauveria bassiana* (Bals.) Vuill. Against rice hispa in the field, apply *B. bassiana* impregnated RHSDRB medium @ 3 kg/ha. On preparing the solution in water containing liquid detergent, the solution will contain 10^7 spores/ml.

Chemical Control

13. Initial protection of the seedlings in the main fields may be provided by following standard package of practices (apply carbofuran 3 g/m^2 in the moist seed bed 5-7 days before uprooting if seedlings). Seedlings may also be prepared by dipping the

root portion in 0.25 solutions of chloropyriphos (1ml/lit. of water) along with 1% urea for 3 hours.

14. All the currently recommended insecticides are effective; however, based on superior performance of chloropyriphos and quinalphos, use of these insecticides may be encouraged. However, considering the toxicity of endosulfan to aquatic fauna, its use may be restricted to irrigated condition, though endosulfan is still listed as an effective insecticide.
15. Spraying operation shall be done during early in the morning and late in the afternoon as the feeding and mating and oviposition are maximum during this period.

Awareness Campaign

16. Training the student and youths on rice hispa problem must be taken up. Bringing people to an understanding of the rice hispa problem is the best way to deal with this problem. No programme is more successful than the degree of commitment made by the people involved.
17. Farmers must be educated on the importance of applying recommended insecticides at proper dose and spray volume. Many insecticides at the dose below the recommended one do not work, rather it produce some undesirable effects, such as development of resistance, resurgence (abrupt increase of target pest) and secondary pest outbreak.

APICULTURE

DISEASE AND ENEMY MANAGEMENT

Several diseases, viz., and fungal, bacterial, viral and protozoan diseases infect honeybees. Out of these, viral and protozoan diseases are most serious one in Assam.

Sac-brood disease:

This is a viral disease caused by Thai-sac strain and the symptoms of this disease are

1. The larvae become pale; after that brownish-black and gradually dries up.
2. The punctured capping with dead pupa within the cell.
3. The infection is usually in worker, seldom in drone and spread by drifting nurse bees.

Control:

Dequeening and Requneening :

Creating broodlessness for sometime by dequeening and again requeening through production of new queen cell. Infected colony should be treated with antibiotics like Teramycin, 250 mg @ one tablet per 4 lit. of sugar syrup.

Nosema disease :

Nosema disease is found in adult *Apis mellifera*. Colony. The infected bees show the symptom of crawling, disjointed wings and midintestine becomes swollen with pale colour.

The treatment with Entakon – M mixed with sugar @ 250 mg/4 litre of sugar syrup will give effective control. Against fungal disease, proper aeration and exposure to the sunlight proses to be effective.

NATURAL ENEMY

All most half a dozen natural enemies such as lizard, wasp, waxmoth, cockroach, birds, ants and mites infest on honeybee colonies. Out of them, waxmoth and predatory wasp are most serious enemies.

Waxmoth, *Galleria mellonella :*

Waxmoth lays eggs on the stored combs or on the spare combs in the colony. Larvae develop feeding on wax and pollen in comb cells. Wax moths are most active in summer and rainy seasons. To manage this pest; store combs by removing extra combs from the colony. Fumigate stored combs in air fight space (in hive chambers, sealed between with mud or dung) and treated with acetic acid or formalin. But fumigation with sulphur smouldering in most effective. Removal and destruction of infected portion of the comb. The biocontrol practice with the treatment of Bt formulation Delfin var. Kurstaki @ 0.5 gm/100 ml. of water per hive will give effective control of in pest.

Predatory wasp:

Among the wasps, the burrowing (*Vespa magnifica.*) and aerial (*Vespa cinta*) are two common species in Assam, which predate on honeybees. To protect the colonies from the wasp, can practice such as destruction of wasp nest in the vicinity of the apiary and artificial net covering with the nylon net having 1 cm mesh size over the bee hive. Colonies are found to be effective.

For controlling bee mites honey bee colonies should be exposed to the sunlight and in acute cases chlorobenzilate (Folbex) fumigation given effective control. Sulphur dusting @ 200 mg/hive on top bars of frames is also effective.

Pesticidal Poisoning to honey bees :

In order to protect the honeybees from pesticide poisoning eco-friendly pesticides, which are less toxic to honeybees against of targeted pest should be recommended. Moreover the time of application of pesticide on flowering crops should be done in the afternoon when the bee activity stops in the field. Some of the bee friendly pesticiees with inorganic and organic compositions are Oxydemeton methyl, Endosulfun, Decis, Neem oils and botanicals. Biopesticides such as Bt. Formulation, NPV etc. which are having less or no residual toxicity. Such pesticides may be incorporated in the integrated pest Management Packages.

RECOMMENDATION OF BT. FORMULATION AGAINST WAXMOTH

Waxmoth, *Galleria mellonella* is one of the most serious pests of honeybee causing severe damage to the colonies. Various remedial measures such as cultural, chemical were adopted without havingany full proof effect. In order to have effective management of this pest, biocontrol experiments with Bt. Formulation, Var. Kurstaki @ 0.5 per cent controlled the waxmoth effectively. Hence, Bt. Var. Kurstaki 0.5 gm/hive/litre of water has been recommended against *Galleria mellonella*.

New technical and trade names of pesticides

Technicla name and formulation	Trade name
INSECTICIDES **ORGANOCHLORINE GROUP :** 1. Endosulfan 35 EC	 Devisulfan, Endocel, Endosan, Hexasulfan, Speed, Endoveer, Thiodan, Asafan
ORGANOPHOSPHORUS GROUP : 1. Dichlorovos 76% w/w/, EC 2. Dimethoate 30 EC 3. Fenitrothion 50 EC 4. Melathion 5% dust, 50 EC	 Grovan, Vepomin, Divap-100, Alphavip Daragor 30 EC, Diveer, Demacin, Rogor, Taragog Sandothion, Rentokil, Folthion-50, Sumithion, Acothion. Malaphos, Alphathion, Rickthion, Malataf, Agrithion 50, Hilthion, Cythion

5. Monocrotophos 40 EC	Sulfos, Phoskil, Monovip, Monosaan, Monofos, Monicin
6. Phosphamidon 100 EC	Phosmin, Sumidon, Hydon, Deecron, Daracron
7. Quinalphos 5% G, 25 EC	Flash, Quinocin, Bayrusil, Krush, Quinaltaf
8. Chlorpyriphos 20 EC	Blaze, Chlorosan, Gold 25 EC, Classic-20,
9. Phorate 10 G	Dursban
10. Parathion methyl 20% dust 50 EC	Forcin, Phoril, Volphor
11.Oxydemeton-methyl 25 EC dust, 50 EC	Agro Gold2%DP,Kemidol,Metacid 50,Sutacid
12. Oxydemeton methyl 25 EC	Hymax,Sritox25,Metamol250,Superkiller 25EC
13. Fenithion 100 EC	Metasystox
14. Diazinon 10 G	Lebaycid – 1000
15. Formothion 25 EC	Doviginon, Ditaf, Suzon, Vinash
16. Phosalone 35 EC	Sandothion, Anthiomix Zolone 35 EC.
CARBAMATE GROUP : **1.** Carbaryl 5% dust, 10% **2.** 2. Carbofurn 3G	Savidol 4:4G, Taffin 5% DP, Taffin 50% WDP Difuran 3G, Carbogram, Furin, Hexafuran, Carbofuran
ACARICIDES : **Organocholorine group :** 1. Dicofil 10%, 5% EC	Hycofol, Dicomol 185, Hexakel
Organophosphrus group 1. Ethion	Veer, Acaron, Gromit, Tafethion, Mit505, Fosmite

New table on Pesticides and Formulation Registered for use in the country and list of Banned pesticides

LIST OF PESTICIDES/PESTICIDES FORMULATIONS BANNED IN INDIA

A. Pesticides Banned for manufacture, import and use (24nos.)

1. Aldrin
2. Benzene Hexachloride
3. Calcium Cyanide
4. Chlordane
5. Copper Acetoarsenite
6. Dibromochloropropane
7. Endrin
8. Ethyl Mecury Chloride
9. Ethyl Parathion
10. Heptachlor
11. Menazone
12. Nitrofen
13. Paraquat Dimethyl Sulphate
14. Pentachloro Nitrobenzene
15. Pentachlorophenol
16. Sodium Methane Arsonate
17. Tetradifon
18. Toxafene
19. Aldicarb
20. Chlorobensilate (Use banned w.e.f. 17.7.2003)
21. Dieldrine – (Use banned w.e.f. 17.7.2003)
22. Maleic Hydrazide – (Use banned w.e.f. 17.7.2003)
23. Ethylene Dibromide – (Use banned w.e.f. 17.7.2003)
24. TCA (Trichloro acetic acid) – (Use banned w.e.f. 17.7.2003)

B. **Pesticide/Pesticide formulations banned for use but their manufacture is allows for export (3 nos.)**

25. Nicotin Sulfate
26. Phenyl Mercury Acelate
27. Captafol 80% Powder – (Use banned w.e.f. 17.7.2003)

C. **Pesticide formulations banned for import, manufacture and use (4 nos.)**

1. Methomyl 24%L
2. Methomyl 12.5%L
3. Phosphamidon 85% L
4. Carbofuron 50% SP

PESTICIDES RESTRICTED FOR USE IN INDIA

Sl. No.	**Name of Pesticides**
1.	Aluminium Phosphide
2.	DDT
3.	Lindane
4.	Methyl Bromide
5.	Methyl Parathion
6.	Sodium Cyanide
7.	Methoxy Ethyl Mercuric Chloride (MEMC)

Technical and Trade Names of Fungicides/Antibiotics/Plant products/Antagonists

Technical name	**Trade name**
A. INORGANIC COPPER COMPOUNDS	
Copper oxychloride :	Blitox-50, Fydtolan, Kilex, Fycop, Nagcoper, Dhanucop, Fycop
B. ELEMENTAL INORGANIC SULPHUR COMPOUNDS	
Wettable sulphur :	Hexasul, Thiovit, Sulfex.
C. ORGANIC SULPHUR (CARBAMATES)	
Mancozeb :	DithaneM-45, IndofilM-45, Udthane M-45
Ziram :	Cuman L
Thiram :	Thiram-75 WP
Zineb :	Dithane Z-78
D. HEYEROCYCLIC NITROGENOUS COMPOUND	
Captan :	Captan 75 WP, Captaf 75 WP

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E. MISCELLANEOUS FUNGICIDE

Dinocap	:	Karathane, Arathane

F. ORGANOPHOSPHORUS COMP0UND

Ediphenphos		Hinosan
:		

G. SYSTEMIC FUNGICIDE

Carbendazim		Bavistin 50WP, Bevistin 5G, Derosal
:		50WP, Dhanustin 50 WP
		Vitavax
Carboxin		Fongoren
:		Topsin- M 70 WP, Roko 75 WP
Pyroquilon	:	Calixin 80 EC
Thiophanate methyle		Beam
:		Tilt
Tridemorph	:	Kitazin 50 EC
Tricyclazole	:	Sitara 5EC, Hexazole 5EC, Montaf 5EC,
Propiconazol	:	Cantaf 5EC
IBP	:	Antracol
Hexaconazole		
:		
Propineb		
:		

Technical name		**Trade name**

H. COMPANION FUNGICIDE (Mixture)

Metalaxyl 8% + Mancozeb 64%	:	Ridomil MZ72, Krilaxyl MZ72, Unilax,
		Matco, Master
Carbendazin 12% + Mancozeb 63%		Saaf, Campanion, CM 75
:		Curzate M8
Cymoxanil 8%+ Mancozeb 64%	:	Quintal 50 WP
Carbendazim 12% + Iprodione	:	

I. ANTIBIOTICS

Streptomycin sulphate +Teracyclin	:	Streptocyclin

J. FUNGAL ANTIBIOTICS

Validamycin	:	Sheathmar

K. PLANT DERIVED PRODUCTS

Neem products		Achook, Neemazal, Neem Gold
:		Wains
Cymbopogon products		
:		

L. ANTAGONISTS

Pseudomonas flurescens based product		Biofor-PF (Jaiva Kiran)
:		Pseudocon
		Biocure-B
P. fluorescens + Bacillus subtilis		Bicure F, Tricho-X-P, Viricon-L, Guard,
Trichoderma spp. based products	:	Ecofit, Ecoderma Biocon .

Technical and Trade Name of Herbicides :

Technical name and Formulation		Trade name
HERBICIDES :		
1.	2,4-d	FERNOXONE, 2, 4-d/28l
2.	BUTACHLOR	PUNCH, Delchlor
3.	Fluchloralin	Basalin
4.	Diuron	Karmex, Dalapon
5.	Atrazine	Atrataf
6.	Dalapon	Wowpon, Dalapon
7.	Isoproturon	Graminor, Arelon, Tauras, Delron
8.	Simazin	Tafazine
9.	Methabenzthiazuren	Tribunil
10.	Pretilachlor	Rifit
11.	Anilofos	Arozin, Aniloguard

Technical and Trade Names of Rodenticide, Fumigants and Nematicide :

Technical name and Formulation		Trade name
RODENTICIDES :		
1.	Aluminium Phosphide	Celphos, Phostoxin, Quickphos
2.	Zinc Phosphide	Ratox, Zinc Phosphide
3.	Anticoagulant	Ratafarin, Rodafarin Warfarin
NEMATICIDE :		
Carbofuran		Furadon
MICRONUTRIENT FORMULATION:		Tracel, Agromin, Borax Sulphate, Zinc Sulphate

Banned Pesticides *:

As per information received vide GOI's letter No. 8-20/97-CIR II dtd. 19-08-97.

1. Aldrin
2. Calcium Cyanide.
3. Chlordane
4. Copper Aceto arsenite.
5. Dibro Mochloropropans (DC CP).
6. Endrin.
7. Ethyl Mercury Chloride.
8. Ethyl Parathion.
9. Heptachlor.
10. Menazon.
11. Nicotine Sulphate-Manufactured in India for Export.
12. Nitrofon.
13. Paraquate dimethyl sulphate.
14. Pentachloro nitrobenzene (PCNB)
15. Penta chlorophenol (PCP)
16. Phenyl Mercury Aectate (PMA)
17. Sodium Methane arsonate (MSMA)
18. Tetradifon.
19. Toxaphene.
20. BHC.

* The above mentioned banned pesticides if erroneously included in the PoP bulletin may be substituted with other suitable chemicals.

Pest Management Rating of Commonly Used Insecticides

Insecticide	Mammalian	Nontarget Toxicity				Environmental Persistence	Overall Rating
		Fish	Bird	Bee	Average		
Azinphos-methyl	4	3	2	4	3.0	3	10.0
BT	1	1	1	1	1.0	1	3.0
Carbaryl	2	1	1	4	2.0	2	6.0
Carbofuran	5	2	5	5	4.0	3	12.0
Carbophenothion	4	2	4	4	3.3	2	9.3
Chlorpyrifos	3	3	3	5	3.7	3	9.7
Cryolite	1	1	1	2	1.3	4	7.3
Demeton	5	2	5	2	3.0	2	10.0
Diazinon	3	2	5	4	3.7	3	9.7
Dicofol	2	1	2	1	1.3	4	7.3
Dischlorvos	-	Toxic	-	Toxic			
Diflubenzuron	1	1	1	4	2.0	4	7.0
Dimethoate	3	1	4	5	3.3	2	8.3
Endosulfan	4	4	2	2	2.7	3	9.7
EPN	4	2	3	4	3.0	4	11.0
Ethuion	3	2	3	-	-	2	7.0
Fenvalerate, Permethrin	2	4	2	5	3.7	2	7,7
Malathion	2	2	1	4	2.3	1	5.3
Methomyl	4	4	3	4	3.7	2	9.7
Methoprene	1	1	1	2	1.3	2	4.3
Methoxychlor	1	3	2	1	2.0	2	5.0
Mevinphos	5	3	5	4	4.0	1	10.0
Naled	2	2	3	4	3.0	1	6.0
Ovex	1	2	1	1	1.3	4	6.3
Oxydemeton-methyl	3	2	4	2	2.7	2	7.7
Phorate, Quinalphos	5 -	4 safe	5 -	2 toxic	3.7 -	3 -	11.7
Phosphamidon	4	1	5	3	3.0	2	9.0
Stirofos	1	4	1	4	3.0	1	5.0
TEPP	5	2	5	5	4.0	1	10.0
Trichlorfon	2	1	2	1	1.3	1	4.3

N.B. (A) Lower the rating safer the insecticides.

(B) The insecticides viz, endosulfan, phorate, stirofos, fenvalerate, methomyl are highly toxic to fish, hence their use should be restricted in fish cum paddy culture.

(C) Insecticides such as azinphos-methyl, carbaryl, carbufuran, carbophenothion, chloropyriphos, diazinon, fenvalerate,
diflubenzuron, dimethoate, mevinphos, EPN, methomyl, malathion, naled, stirophos, TEPP, dichlorovos and quinalphos are highly toxic to bees, hence their use should be restricted in the oilseeds, vegetables and fruit orchards.
D)All insecticides mentioned in the list are not necessarily constituted our recommendations and the rating is based on available literature.

Package of practices for Rodent management

A. For Rice

1. Synchronous planting/harvesting
2. Bund trimming (>20cm).
3. Regular trapping with local bamboo traps preferably one month after transplanting.
4. Clean cultivation to reduce alternate source of food particularly weeding of tall weeds on bunds such as *Eleusine indica*.
5. Two applications of bromadiolone 0.005% was cake, first at panicale initiation stage and second at milky stage of rice crop.
6. Poison baiting is also essential for rodent pest management. Prebait prepared out of 1 kg cereal + 20 gm vegetable oil + 10 gm dried fish may be applied @ 10 gm/live burrow for 3 days. This treatment should be followed by application of Zinc phosphide @ 25gm/kg bait on the 4^{th} day.