



# KI PHNGIT JINGIM BA İADA NA KI KHÑIANG BAD JINGPANG HA KI JINGTHUNG (Bio - pesticides & Bio - control Agents)



# KI JINGTHUNG & JINGSUMAR

Ki Syntiew bad ki Khniang kiba ai Jingmyntoi bad Jingiada

*Kine ki syntiew bad ki khniang kiba pyni harum ki pynduna ia ki jingjolor bad jingwanboi jong ki khniang sniew kiba ju wanrah iaka jingduhnong ia ki nongrep. Ki long ruh kum ki paralok mariang ba pynduna iaki khniang ha lyngkha/ kper.*

## KI SYNTIEW BA LONG PARALOK



**COSMOS**



**SUNFLOWER**



**ZINNIA**



**SNAP DRAGON**

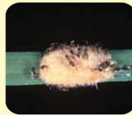


**MARIGOLD**



**MORNING GLORY**

## KI KHNIANG BA LONG PARALOK



**TELENOMUS**



**CHAROPS**



**DAMSELFY**



**FUNGAL DISEASES**



**GONIOSUS**



**LADY BEETLE**



**MEADOW GRASSHOPPER**



**XANTHOPIMLA**



**GRUB**



**MIRD BUG**



**OPHIONEA**



**WATER BUG**



**SPIDER**



**PAEDERUS**



**WOLF SPIDER**



**DRYINID**

Ka 'Biological control' kadei ka rukom ai jingĩada ia ki jingthung na ki khñiang bad jingpang da kaba pyndonkam da ki dawai ba shna na ki phngit jingim bad ruh da kaba pyndonkam da ki paralok jong ki nongrep kum ki khñiang kiba bam ia kiwei pat ki khñiang kiba pynjutor ia u jingthung. Kane ka rukom ai jingĩada kam ktah ne pynjot ia ka mariang ne ia ka jingkoit jingkhiah.

- Ka biological control kadei kawei na ki bynta ba kongsan jong ka 'Integrated Pest Management' kaba long ka lad ban teh lakam ia ka jingbun jong ki khñiang kiba pynjutor ia ki jingthung.

### **Ki jingmyntoi jong ka biological control**

- Ka biological control ka iarap ban pynduna ia ka jingtah ia ki sawdong sawkun jong ka mariang, ki tyllong umdih, ka koit ka khiah kaba mih na ka jingpyndonkam bad synreit pathar ia ki dawai karkhana ne ki dawai chemical.
- Kam long kum ki dawai karkhana kiba trei kam naphang hynrei kine ki treikam beit thik tang ha ka bynta jong u jingthung kaba ngi synreit.

### **Ki jingduna jong ka biological control**

- Ka biological control ka donkam ia kiba la nang ban plan bha (experts)
- Ka kham shim por ban treikam. Haba ngi pyndonkam da kane ka dawai ba shna na kine ki phngit jingim na ka bynta ki jingthung jingtep, ngin nym iöhi ia ka jingtreikam kaba hakdak kumba long haba synreit da ki dawai karkhana.

### **Kaei kaba ngi dei ban leh?**

- Ngı dei ban buh jingthoh ia kiei kiba ngı lah dep leh khnang ba ngin sngewthuh kham bha ia ka jingtreikam jong kine ki Bio-control agents (phngit jingim).



## Kaei kaba ngim dei ban leh?

- Ym dei ban pyndonkam lang ha kajuh ka por ryngkat bad ki dawai pyniäp khñiang kiba na karkhana (chemical).

Watla ka biological control ka kham shimpor haba ïanujor bad ka jingpyndonkam ia ki dawai karkhana, hynrei ki jingmyntoi ba ngi ioh na ka jingbymktah jong ka ia ka koit ka khiah u briew, ka mariang, ki tyllong umdih bad ka jinglah ban pynduna ia ka jingpyn-donkam ia ki chemical, kine hi kidei kiba la biang eh ban pynlong ia ki nongrep ban pyrshang ia ka.

## Ki dur jong ki khñiang kiba long ki paralok jong u nongrep (Biological Control)



Fig.1 Khñiang taksi (Ladybird beetle)



Fig. 2 Khñiang taksi (Ladybird beetle)



Fig. 3 Ñiang kynthah um (Dragon fly)



Fig.4 Thapbawa (Spider)



Fig.5 : Hyposoter ebininus



Fig.6 Preying mantis (Ñiang sharynten)



Fig.7 Green lacewing

## I. Ki Trichogramma

Ki *Trichogramma* kidei ki khñiang kiba rit haduh katta katta kiba wan na ka iing ki ngap. Ki im kum ki mangkariang ha ki pylleng jong kiba bun ki khñiang thapbalieh. Ki *Trichogramma* kynthei ki kha ia ki pylleng jong ki ha ki pylleng jong ki khñiang thapbalieh. Ki treikam da kaba bam ia ka khangai napoh bad ki pyniäp noh ia ka thapbalieh ha ka por ba ka dang long pylleng. Ynda la dei ka por ki mih noh na ka shynrong jong ka pylleng thapbalieh bad ki sa pynroi ialade ha kane ka rukom. Uwei u *Trichogramma* u lah ban pyniäp haduh kumba 90-100 tylli ki pylleng jong u thapbalieh.

**Ki jait *Trichogramma* badon ha State Bio-Control Laboratory (SBCL), Upper Shillong bad ka kam ba ki trei:-**

Don 4 jait ki *Trichogramma* ba ngi pynroi ha SBCL. Kine ki long:-

1. *Trichogramma chilonis* – Une u jait u äada na u ‘ñiangkli sla ha u kba, u ‘ñiang ksam hapoh u kynphad, ‘ñiangksam jyntang ha u riewhadem, bad kiwei kiwei.
2. *Trichogramma japonicum*- Une u äada na u ‘ñiangksam jyntang jong u kba.
3. *Trichogramma brassicae*- Une u äada na ki thapbalieh kubi.
4. *Trichogramma pretiosum*- Une u ai jingäada na kiba bun ki ‘ñiang samthliew ha ki jhur bad na ka bynta u ñiangkhung ha u riewhadem.

**Ka rukom pyndonkam:**

1. Ngai ai ia ki *Trichogramma* ha ka rukom kum ki card
2. Ot ia kane ka card na ki laiñ ba la dep dro ha kata ka rukom ba phin ioh 24 tylli ki lyngkhot na iwei i card

- Pyndait ia i lyngkhot ha ka bynta ba shadien jong u sla bad iwei i lyngkhot na iwei pat idei ban ia jngai kumba san haduh phra mitar eiei
- İa u kba ngi hap pyndonkam ban pyndait hapoh jong i klat plastic bad sa leit buh ha lyngkha ban iada na u slap.
- Donkam ban pyllait 3 sien ha ka samoi jong u jingthung. Ar tylli ki card ha ka sien ba nyingkong, ar tylli ki card ha ka sien ka ba ar bad shi card ha ka sien balai. Leh kumne bad pyniapher ia kawei ka sien pyllait na kawei pat da kumba 15 sngi eiei.



Fig. 8 *Trichogramma*



Fig.9

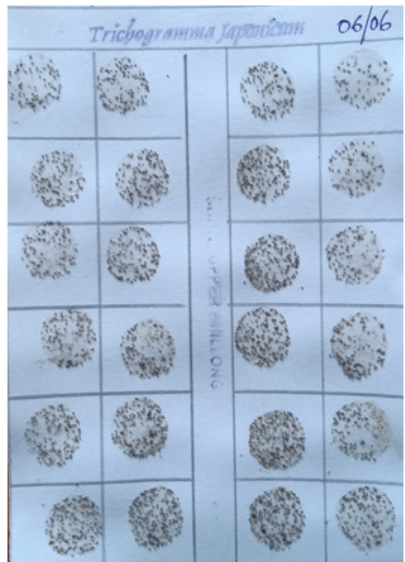


Fig.10 *Trichogramma* spp.



Fig.11  
Kumno ban buh ia ki Tricho card



Fig.12

## II. Ki *Metarhizium anisopliae*

- Ki *Metarhizium anisopliae* kidei ki phngit jingim kiba lah ban shem haka khyndew bad ki pynduna ia ki khñiang kiba pynjulor ia ki jingthung.
- Ki ksam shapoh ka met jong ki khñiang bad ki pur ruh kum ki tit ha ka met jong ki khñiang. Ki treikam da kaba pyntytkhong ia ki bynta ba shapoh jong ki khñiang bad ki sa pyniapher suki suki.

**Ki *Metarhizium* ki lah ban pynäap ia ki khñiang kiba don ha ka khyndew kum ki 'ñiangbyrnai, 'ñiangkhung bad kiwei pat ki jait ksaiñ.**

**Kumno ban pyndonkam?**

- (a) **Ha ki symbai:** Khleh shi shamoit sha ka dawai bad saw shamoit ka um ha ka shi kilo u symbai. Khleh milai bha nangta sa ieh khadsan haduh arphew minit. Hadien khadsan ne arphew minit weng bad thad ha ka jaka ba dum sngi. Nangta sa thung kumba ju thung.
- (b) **Ba shu synreit:** Khleh shi shamoit sha ka dawai ha ka shi litar ka um. Synreit da ka pump. Ym dei ban pyndonkam da kajuh ka pump ba phi pyndonkam ban synreit dawai karkhana/chemical.
- (c) **Ha ka khyndew:** Shuwa ban thung, synreit ia ka khyndew da kaba khleh shi shamoit sha ka dawai *Metarhizium* ha ka shi litar ka um.
- (d) **Ha ka sboh:** Ha ka jaka ba dum sngi shim shi kilo ka dawai bad 100 kilo ka eit masi ba lah tyrkhong lane ka sboh ñiut. Synreit daka um, khleh bha ia ki bad tap da ka plastic. Ieh beit kumto haduh 3 taiew. Kylla ia kane ka jingkhleh man ka ar ne lai sngi. Da peit bha ia ka jingsngem jong ka sboh ba kadei ban long kat ban biang. Hadien shiphew haduh khatsaw sngi phin ioh ia ka sboh ba la pur da kine ki dawai. Sa pyndonkam ia kane ha kajuh ka rukom ba phi ai sboh ia u jingthung.
- (e) Kiar ban ai dawai chemical ha kajuh ka por ba phi pyndonkam ia kine ki dawai.

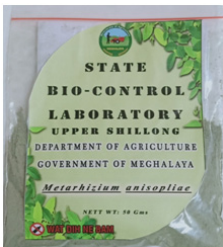


Fig.13



Fig.14



Fig.15

*Metarhizium anisopliae*

### III. Ki Pseudomonas fluorescens

- Ki Pseudomonas fluorescens ki don ia ka bynta ban pynheh pynsan ia ki jingthung.
- Ki lah ruh ban ai jingiada ia ki jingthung na ki jingpang.
- Lah ban shem ia ki ha ka khyndew, um bad ha ki jingthung ruh.
- Ki iada ruh ia ki symbai ban lait na ka jingphuh tit lane na ka jingpyut.

**Ki Pseudomonas fluorescens ki lah ban ai jingiada na ki jingpang pyut tynrai/thied, iapbieij, iapjlop, iapkyniur bad kiwei kiwei de.**

#### **Kumno ban pyndonkam?**

- Ha ki symbai:** Khleh shi shamoit sha ka dawai bad saw shamoit ka um ha ka shi kilo u symbai. Khleh milai bha nangta sa ieh khadsan haduh arphew minit. Hadien khadsan ne arphew minit weng bad thad ha ka jaka ba dum sngi. Nangta sa thung kumba ju thung.
- Ha ki sara:** Khleh shi shamoit sha ka dawai ha ka shi litar ka um. Wieh ia ki thied jong ki sara ha kane ka jingkhleh kumba khadsan haduh arphew minit. Weng ia ki sara bad thad ia ki haba dum sngi kumba khadsan haduh arphew minit. Nangta sa thung kumba phi ju thung.
- Ba shu synreit:** Khleh shi shamoit sha ka dawai ha ka shi litar ka um. Synreit da ka pump. Ym dei ban pyndonkam da kaju ka pump ba phi pyndonkam ban synreit dawai karkhana/chemical.
- Ha ka khyndew:** Shuwa ban thung, synreit ia ka khyndew da kaba khleh shi shamoit sha ka dawai Pseudomonas ha ka shi litar ka um.



(e) **Ha ka sboh:** Ha ka jaka ba dum sngi shim shi kilo ka dawai bad 100 kilo ka eit masi ba lah tyrkhong lane ka sboh ņiut. Synreit daka um, khleh bha ia ki bad tap da ka plastic. Ieh beit kumto haduh 3 taiew. Kylla ia kane ka jingkhleh man ka ar ne lai sngi. Da peit bha ia ka jingsngem jong ka sboh ba kadei ban long kat ban biang. Hadien shiphew haduh khatsaw sngi phin ioh ia ka sboh ba la pur da kine ki dawai. Sa pyndonkam ia kane ha kajuh ka rukom ba phi ai sboh ia u jingthung.

(f) Kiar ban ai dawai chemical ha kajuh ka por ba phi pyndonkam ia kine ki dawai.



Fig.16 *Pseudomonas fluorescens*



Fig.17 *Pseudomonas fluorescens*

#### **IV. Ki Trichoderma**

- Ki *Trichoderma* kidei ki phngit jingim kiba lah ban shem ha ka khyndew.
- Ki sngewtynnad ban shong ha ki thied jong ki jingthung.
- Ki iarap ban pynkjit jingbam na ka khyndew.

**Ki Trichoderma ki lah ban ai jingüada na ki jingpang kum ka iapbieij, pyut tynrai bad kiwei de ki jingpang.**

**Kumno ban pyndonkam?**

(a) **Ha ki symbai:** Khleh shi shamoit sha ka dawai bad saw sham-oit ka um ha ka shi kilo u symbai. Khleh milai bha nangta sa ieh khadsan haduh arphew minit. Hadien khadsan ne arphew

minit weng bad thad ha ka jaka ba dum sngi. Nangta sa thung kumba ju thung.

- (b) **Ha ki sara:** Khleh shi shamoit sha ka dawai ha ka shi litar ka um. Wieh ia ki thied jong ki sara ha kane ka jingkhleh kumba khatsan haduh arphew minit. Weng ia ki sara bad thad ia ki haba dum sngi kumba khatsan haduh arphew minit. Nangta sa thung kumba phi ju thung.
- (c) **Ba shu synreit:** Khleh shi shamoit sha ka dawai ha ka shi litar ka um. Synreit da ka pump. Ym dei ban pyndonkam da kajuha ka pump ba phi pyndonkam ban synreit dawai karkhana/chemical.
- (d) **Ha ka khyndew:** Shuwa ban thung, synreit ia ka khyndew da kaba khleh shi shamoit sha ka dawai Trichoderma ha ka shi litar ka um.
- (e) **Ha ka sboh:** Ha ka jaka ba dum sngi shim shi kilo ka dawai bad 100 kilo ka eit masi ba lah tyrkhong lane ka sboh ŋiut. Synreit daka um, khleh bha ia ki bad tap da ka plastic. Ieh beit kumto haduh 3 taiew. Kylla ia kane ka jingkhleh man ka ar ne lai sngi bad peit bha ia ka jingngem jong ka sboh ba kadei ban long kat ban biang. Hadien shiphew haduh khatsan sngi phin ioh ia ka sboh ba la pur da kine ki dawai. Sa pyndonkam ia kane ha kajuha ka rukom ba phi ai sboh ia u jingthung.
- (f) Kiar ban ai dawai chemical ha kajuha ka por ba phi pyndonkam ia kine ki dawai.

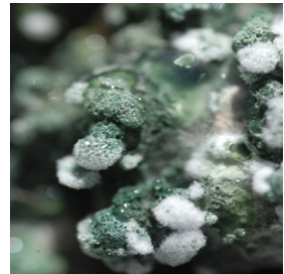


Fig.18 *Trichoderma harzianum*



Fig.19 *Trichoderma harzianum*

LADA PHI DONKAM JINGTIP SHAPHANG KI  
JINGTHUNG, JINGREP LANE BAN PYNKIT IA  
KI MAR REP SHA IEW?

PHONE  
**1917**  
KHLEM BAILUT



Phone Sha Une U Nombor Khlem Bailut “1917”  
(Sngi Nyngkong haduh Saitjain)  
Naduh 7:00 Baje Mynstep Haduh 7:00 Baje Janmiet

JINGAI JINGTIP | PYNKIT PYNBAH | PYNIAID IEW



