Management of the Rice Black Bug
Rice Technology Bulletin Series

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Foreword

While some insecticides are reportedly effective in controlling the population of the rice black bug (RBB), *Scotinophara coarctata* (Fabricius), these require repeated use; are expensive; toxic to nontarget organisms; and adversely affect man and the environment. Moreover, the use of insecticide alone offers only temporary relief to the problem.

At the height of the RBB infestation in Palawan in 1982, the Provincial Government formed the Task Force Black Bug and orchestrated massive and intensive applications of insecticides in affected municipalities, but to no avail. This may have been due to the elimination of indigenous natural enemies in the area and to the ability of the RBB to survive and multiply on nonrice hosts.

In 1989, PhilRice led an interagency task force to contain the RBB infestation in Palawan. The use of tolerant variety IR1314, the release of parasitic wasps, and the implementation of strict quarantine measures contributed significantly to the suppression of RBB populations.

The current problem of RBB infestation in Mindanao, which started in 1992, and the Palawan experience are strikingly similar. In Mindanao, the RBB Task Force also implemented massive applications of insecticides to affected regions but RBB infestation still spread to the other regions in this island group. RBB population only started to go down in areas where synchronous planting was practiced in mid-1990s.

This bulletin offers a comprehensive and updated information about the biology of and management options for RBB. Strategies with less reliance on insecticides for the long-term management of RBB are discussed as well as techniques for monitoring field populations.

LEOCADIO S. SEBASTIAN
Executive Director
Rice Black Bug as Pest

Rice black bug (RBB), *Scotinophara coarctata* (Fabricius), is one of the most difficult pests to manage. Locally known as “itim na atangya”, the RBB attacks rice plants in the irrigated area at almost all stages of its growth, particularly from maximum tillering to ripening stage. Damage by this pest could result in severe to complete crop loss during heavy infestation.

The first reported incidence of RBB in the Philippines was in Bonobono, Bataraza, in southern Palawan in September 1979. A major outbreak occurred from March to June 1982, which later spread toward central up to northern Palawan, covering 4,500 ha of rice fields. Ten years later, RBB infestation was observed in Curuan, Zamboanga City in late June 1992, damaging about 2,070 ha of rice fields toward the end of the year. By March 1995, RBB has become a serious pest of rice in the region, including the Autonomous Region of Muslim Mindanao. In June 1996, RBB invaded Cotabato, Sultan Kudarat, South Cota-bato and Sarangani provinces. Outbreaks occurred in these areas in 1997 and in the following year, infestation was observed in Magsaysay, Davao del Sur.

In the Visayas, the pest was spotted in late 1998, particularly in Kabankalan, Negros Occidental. Then, in January 1999, it moved to Siquijor, and in September 1999, the RBB was observed in Bohol. From the Visayas, the RBB “went back” to Mindanao, in areas near Bohol. This year 2000, RBBs are reported to have settled in the Caraga region, where first infestation was observed in Alegria and Mainit, Surigao del Norte; Kitcharao, Agusan del Norte; and Sta. Josefa, Agusan del Sur. (Fig. 1)

Life Cycle

The female RBB deposits its eggs on the lower part of the leaves or on the basal part of the rice plant near the water surface. It lays about 200 eggs during its lifetime and watches the eggs until these hatch. The eggs are laid in mass of 40-60 eggs, with one egg measuring 1 mm long. The eggs are greenish when laid and turns pink when mature. The incubation period is from 3 to 5 days. (Fig. 2)
Fig. 1. Showing the rice black bug migratory trail in the Philippines (1982-2000).
The RBB nymph is light brown, with a yellowish-green abdomen and some black spots. It molts 4-5 times and reaches the adult stage in 25-30 days. The RBB adult, on the other hand, is brownish black, with few distinct yellowish spots on the thorax (chest area) that bears spines below the anterior (near the head) angles. It is oval-shaped and about 8-9 mm long. The RBB adult lives for up to 7 months and gives off an offensive odor, typical of stink bugs, when disturbed.

Primary and Alternate Hosts

Rice, *Oryza sativa*, serves as the primary host while the following plant species serve as alternate hosts of the rice black bug:

- Corn, *Zea mays* L.
- Taro, *Colocasia esculenta* Schott.
- Okra, *Hibiscus esculentus* L
  *Panicum amplexicaule* Rudge Pl. Guian.
  *Scirpus grossus* L.
  *Scleria sumatrensis* Retz.
  *Vigna unguilanta* L.
  *Typha angustfolia*
  *Echinochloa crus-galli*
  *Brachiaria mutica*
  *Panicum amplexicale*
Natural Enemies

Among the egg parasitoids, *Telenomus tripatus* was found to be most effective (Fig. 3). Although predators such as spiders, coccinellid beetles, crickets, and other predatory species abound in the field, these are not as efficient as parasitoids. These predators eat all other insects in the field. Another equally important beneficial organism of the RBB is the green muscardine fungus, *Metarhizium anisopliae*, which attacks the nymphs and the adults (Fig. 4).

![Adults of an egg parasitoid, *Telenomus tripatus* (10x).](image1)

**Fig. 3.** Adults of an egg parasitoid, *Telenomus tripatus* (10x).

**Fig. 4.** Adult RBB infected with *Metarhizium anisopliae*.

<table>
<thead>
<tr>
<th>Natural Enemy</th>
<th>Stage of RBB attacked</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Parasitoids</strong></td>
<td></td>
</tr>
<tr>
<td>Wasp</td>
<td></td>
</tr>
<tr>
<td><em>Telenomus tripatus</em></td>
<td>egg</td>
</tr>
<tr>
<td><em>T. cyrus</em></td>
<td>egg</td>
</tr>
<tr>
<td><em>T. chloropus</em></td>
<td>egg</td>
</tr>
<tr>
<td><em>Psix lacunatus</em></td>
<td>egg</td>
</tr>
<tr>
<td><em>Trissolcus basalis</em></td>
<td>egg</td>
</tr>
<tr>
<td><strong>B. Predators</strong></td>
<td></td>
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<tr>
<td>Ground beetle</td>
<td></td>
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<tr>
<td><em>Agonium daimio</em></td>
<td>egg, nymph, adult</td>
</tr>
<tr>
<td><em>Lycosa pseudoannulata</em></td>
<td>egg, nymph, adult</td>
</tr>
<tr>
<td><em>Oxyopes javanus</em></td>
<td>egg, nymph, adult</td>
</tr>
<tr>
<td><em>Tetragnatha virescens</em></td>
<td>egg, nymph, adult</td>
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<tr>
<td><em>Metioche vittaticollis</em></td>
<td>egg</td>
</tr>
<tr>
<td>Red ant</td>
<td></td>
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<tr>
<td><em>Solenopsis geminata</em></td>
<td>egg, nymph, adult</td>
</tr>
<tr>
<td><em>Micraspis crocea</em></td>
<td>egg, nymph</td>
</tr>
<tr>
<td><em>Stenonabis tagalicus</em></td>
<td>egg, nymph</td>
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<tr>
<td><em>S. tagalicus</em></td>
<td>nymph, adult</td>
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<tr>
<td><strong>C. Pathogens</strong></td>
<td></td>
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<tr>
<td>Fungus</td>
<td></td>
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<tr>
<td><em>Metarhizium anisopliae</em></td>
<td>nymph, adult</td>
</tr>
<tr>
<td><em>Beauveria bassiana</em></td>
<td>nymph, adult</td>
</tr>
<tr>
<td><em>Paecilomyces lilacinus</em></td>
<td>nymph, adult</td>
</tr>
</tbody>
</table>

Table 1. Major groups of natural enemies of the rice black bug.
Habitat

RBB nymphs and adults usually stay at the base of the plant (Fig. 5) during the day and move up to the leaves at night. But when the population is high, the RBBs stay at the leaves even during daytime (Fig. 6).

During periods of water stress, the bugs hide in soil cracks. This pest is more abundant in poorly drained rice fields around marshes. Asynchronous double cropping of irrigated rice with high levels of nitrogen seems to favor RBB outbreaks. The relatively small natural enemy complex of the RBB and the low availability of alternate hosts in the vicinity of rice fields seem to trigger frequent black bug outbreaks.

![Fig. 5. Rice black bugs at the base of the plant.](image1)
![Fig. 6. Rice black bugs on the leaves and panicles.](image2)

Factors Affecting Flight Activity

Full moon cycle affects the RBBs flight activity. This is significant to pest surveillance and forecasting. Checking for black bugs should take place 2 days before until 3 days after the full moon.

Quality of available food is another important factor. The bug’s flight activity increases when deprived of food. It is highly probable that migration and dispersal are less when the rice plants are readily available as food in the field.
Nature of Damage

Nymphs and adults suck the plants sap through the stems and nodes near the water surface. RBB feeding causes desiccation (dryness) in the plant; discoloration (reddish-brown or yellow) in the leaves; death in the upper leaves; and failure in young leaves to unfold. Plant growth is also stunted and tillering is reduced.

When infestation happens at the tillering stage, damage called “deadhearts” occur. Attack during the booting stage results in panicles with empty grains (similar to “whiteheads” caused by stem borer) or in underdeveloped panicles. RBB also feeds on panicles in the milking stage, causing direct damage to rice grains. Heavy RBB infestations may lead to “bugburn” and cause death in the plants (Fig. 7).

The dry season crop is damaged more severely than the wet season crop. Severe damage of the pest is usually observed after the heading stage especially when irrigation has been stopped during the maturation period.

Yield losses owing to RBB could be due to unfilled grains, decrease in tiller number, and less grains per panicle. At 10 RBB per hill, yield losses could range from 15 to 23%.

Management Options

A. During planting time

1. **Synchronous planting of varieties with the same maturity.** Plant rice varieties of the same maturity in a large contiguous area (barangay or village level) within a month of the regular planting time. This breaks the RBB’s life cycle and evades damaging level of RBB population.

2. **Direct-seeding of rice crop.** Direct-seeded rice crop has less number of tillers per hill which is not favored by RBB. Few tillers expose the RBB to sunlight and other mortality factors that prevent further increase of RBB population. (Fig. 8)
Fig. 7. Susceptible stages of the rice plant to and damage caused by rice black bug attack.
3. **Use of resistant/tolerant variety.** The recommended varieties are IR1314 and IR44526. However, these stopgap varieties are susceptible to tungro disease. Thus, these cannot be planted in areas where tungro is a problem. Another tolerant variety is C4-137.

**B. With standing crop**

1. **Monitoring.** Inspect rice fields weekly or twice a week throughout the cropping season for the presence of egg, nymph, and adult RBB. Monitor the base of 20 randomly selected rice plant hills. Employ control strategy when there are five or more RBB nymphs or adults per hill.

2. **Light trapping.** RBBs are strongly attracted to high intensity light. This phototactic characteristic of the bugs suggests that light trap can be used in managing the pest (Fig. 9, 10). Light trapping should be done at 2 days before until 3 days after the full moon (Fig. 11). Do this only where RBB population is not alarming. But during outbreaks, light trap should be set up every night to obtain the most number of bugs.

3. **Conservation of natural enemies.** Beneficial insects naturally abound in the field. Conserve these organisms by minimizing pesticide use. Beneficial insects help keep RBB population down.
Installation of the light trap in the field:

- Install light traps in areas near the rice field where you can easily collect the bugs.

- Use 20-watt fluorescent tubes or mercury bulbs mounted 5 m from the ground.

- Turn on the light from 6PM to 6AM.

- Collect the light trap catches before sunrise or early morning. After sunrise, RBBs become active and move to other fields. Place the collected RBBs in sacks until they die or bury the bugs in the soil.

Fig. 9. Light trap used to collect rice black bugs.

Fig. 10. Light trap catches of RBB at PhilRice Midsayap in North Cotabato.

Fig. 11. Light trap catches before, during, and after the full moon. (PhilRice Midsayap)
4. **Deployment of natural enemies.** The most common beneficial organisms observed in the field are *Telenomus triptus* and *Metarhizium anisopliae*. If these natural enemies cannot regulate RBB population even when conservation has been made, rear(grow) these organisms in the laboratory and release them repeatedly on the crop to keep RBB population down. Release the organisms early in the cropping season, before field populations of *T. triptus* appear. This is in order to establish the natural enemy population before it grows too large to control. Or, release the organisms during high RBB population. (Fig. 12, 13)

5. **Flooding.** Do this strategy when there are many egg masses in the field. Eggs that are submerged in the water for more than 24 hours will no longer hatch.

6. **Herding of ducks in the field.** Ducks feed on RBB. However, it is important to place the ducks in the field a month after transplanting or when the plants get established.

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**Fig. 12.** Field efficiency of *Telenomus triptus* against RBB during the vegetative and reproductive stages.

**Fig. 13.** Field efficacy of *Metarhizium anisopliae* against RBB.
7. **Sanitation.** Weeds serve as alternate hosts of RBB and their presence in the field could serve as food for RBB. Remove the weeds to minimize RBB infestation.

8. **Judicious use of insecticide.** This should be the last resort and should be used to a minimum so as not to affect the natural enemy population in the field. Before spraying, increase the water level from 8-12cm to disturb the RBB to move to the leaves.

### C. During outbreaks

1. **Light trapping.** The use of high intensity light (2000-3000 watts) or “super light” is recommended during RBB outbreaks. The light trap should be installed in areas heavily infested with the bugs, particularly on cemented pavements (e.g. basketball courts) or in places where rice grains are sun dried. Collection of light trap catches should be done while the light is on. Effective light trapping is from 8-12PM. Light trap should be mounted on 5-10m high bamboo pole. Super light covers a 5km radius.

2. **Plowing-under of heavily infested areas.** Submerge and plow under heavily infested fields to kill the eggs, nymphs, and adults and to prevent the spread of RBB into other areas.

### D. During harvest time

1. **Light trapping at the newly harvested area.** During harvest, RBBs move to other areas in search for food. Install high intensity light traps at the newly harvested area the night after harvest to get the maximum number of RBB adults. Female adults collected in the light trap are still reproductively active and has the capability to produce fertile eggs before they die.

2. **Plowing the field immediately after harvest and submerging stubbles under water until these decompose.** Greatest number of light trap catches occur during harvest when the RBBs start to move to other areas to look for food. So, plow and submerge the stubbles immediately after harvest to bury these insects, particularly the nymphs, under the mud/soil and to completely eradicate the bugs’ food source.
Authors/Subject Matter Specialists:
  Alejandra B. Estoy
  Eliseo H. Batay-an
  Hoai Xuan Truong
  Lina B. Flor

Managing Editor:
  Karen Eloisa T. Barroga

Photographer:
  Hoai Xuan Truong

Illustrator:
  Carlito N. Bibal

Layout Artist:
  Carlo G. Dacumos

For more information, contact:
  Crop Protection Division
  Philippine Rice Research Institute
  Maligaya, Munoz, Nueva Ecija 3119

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Its interdisciplinary programs include the following: (1) direct-seeded and (2) transplanted irrigated lowland rice; (3) hybrid rice; (4) rice for adverse environments; (5) rice-based farming systems; (6) rice and rice-based products; (7) policy research and advocacy; and (8) technology promotion. With these programs, PhilRice aims to develop and promote technologies that are ecosystem-based, location- and problem-specific, and profitable to the Filipino farmers.

DA-PhilRice Maligaya
Muñoz, 3119 Nueva Ecija
Tel: 63 (044) 456-0113, -0258, -0277, -0285, -0354
Tel/Fax: (02) 843-5122; 63 (044) 456-0112; -0649 local 261; -0651 local 511; -0652 local 515; -0653 local 529
e-mail: philrice@mozcom.com
URL: http://www.philrice.net

DA-PhilRice Los Baños
UPLB Campus, College, 4031 Laguna
Tel: 63 (049) 536-3631 to 33, -3635
Tel/Fax: 63 (049) 536-3515
e-mail: philrice@laguna.net

DA-PhilRice San Mateo
Malasin, San Mateo, 3318 Isabela
Tel: 63 (078) 664-2280, -2954
Tel/Fax: 63 (078) 664-2953
e-mail: philrice_isabela@digitelone.com

DA-PhilRice Batac
17 Tabug, Batac, 2906 Ilocos Norte
Tel: 63 (077) 792-4714
Tel/Fax: 63 (077) 792-4702
e-mail: philrice@ILN.CSI.com.ph

DA-PhilRice Midsayap
Bual Norte, Midsayap, 9410 North Cotabato
Tel/Fax: 63 (06422) 98178
e-mail: philrice@microweb.com.ph

DA-PhilRice Agusan
Basilisa, RTRomualdez, 8611 Agusan del Norte
Tel: 63 (085) 818-2277, -3377; (0918) 406-1145
Tel/Fax: 63 (085) 818-4477
e-mail: cvces001@cdo.philcom.com.ph