

MANAGEMENT OF MALAYAN RICE BLACKBUG (*Scotinophara coarctata*) USING BIOLOGICAL CONTROL AGENT IN THE ISLAND PROVINCES OF THE PHILIPPINES

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Introduction

The Malayan Rice Black bug is a serious invasive pest of rice (*Oryza sativa*) affecting some of the islands of Philippine Archipelago. It belongs to Order *Hemiptera* and Family *Pentatomidae*. Its scientific name is *Scotinophara coarctata* (*Fabricius*). Formerly, it is known as *Podops coarctata* (Griet and Lever, 1969).

Like most Asians, the Filipinos have rice as their staple food though we have some islands in the Visayas where they prefer corn. Rice is the most important crop to majority of our farmers and to many landless workers who derive income from working on others rice fields. The per capita consumption of milled rice per Filipino is 100 kilograms per year and the population of the Philippines now is about 85,000,000.

The pest has been known as serious pest of rice in Malaysia as early as 1920s (Corbett and Yusope, 1920; South, 1926; Dammerman 1929 and Miller and Pogden, 1930). In the Philippines, the insect was known only during the infestation in 1979 at Bataraza, Palawan Island. At that time, the Crop Protection Division, Bureau of Plant Industry led the management of the pest using rice tolerant variety and chemical control. Later, the variety was found to be susceptible to Tungro Virus and since Integrated Pest Management is already an active program in the Department of Agriculture, cultural control was left alone. That time IPM allows judicious use of pesticide which unlike today, Philippine IPM is based on biological control. Some farmers used insecticide but not all. Due to poverty, they cannot afford to buy. Later, the infestation was gone especially in areas where there is little insecticide application or none at all. They

noticed that in those areas, the population of the wasp *Telenomus* had increased.

Due to active trading, the pest continues to spread. The pest goes with the light of the trading vessels plying from island to island. The pest is also very attracted to bright light. This time, the Philippine Rice Research Institute takes the lead. In 1989 until today, they are the one in the forefront since rice is their assigned commodity. They are practicing IPM approaches including quarantine measures, with less reliance to insecticide since from past experiences, they have learned that pesticides complicate problems rather than control with regards to pests. This may be due to the elimination of indigenous natural enemies in the area and the ability of the rice Black bug to survive in non-rice host.

Though the rice Black bug is not yet completely eradicated, in areas where there were outbreaks before, the Filipino farmers are now very knowledgeable on how to manage them. They can now tolerate the presence of Rice Black bug in their respective areas with the enhancement and application of its natural enemies and cultural management application.

The Pest

The Malayan Rice Black bug (RBB), *Scotinophora coarctata*, is quite difficult to manage. It attacks rice plants in irrigated area from early vegetative to maturity. The most susceptible stage is from maximum tillering to ripening stage. Damage by this pest could result to severe crop loss or complete yield loss during heavy infestation.

First infestation occurred in Palawan in 1979 which was followed by major outbreak in 1982 covering 4,500 hectares of rice fields. In late 1992, RBB was observed in Mindanao Island specifically Zamboanga City damaging about 2,070 hectares. Three years later (1995), the pest invaded the whole of Region 9 including the Autonomous Region of Muslim Mindanao (ARMM). In 1996, the pest was observed in Region 12 and an outbreak followed a year later. At present, the pest is already a part of the ecology of the whole Mindanao Island.

The pest was spotted in the Visayas in late 1998 particularly in Negros Occidental. It then spread to Siquijor Island then to Bohol. The pest is now the

center of attention in Iloilo Island now with some reports that it is already spotted in the southernmost part of Luzon.

The Life Cycle of the Pest Malayan Rice Black bug (RBB)

The pest has an incomplete metamorphosis which means from egg, it will become nymph and to adult stage.

The female deposits its egg on the lower part of the leaves or on the basal part of the plant near the water surface. It lays about 200 eggs during its lifetime compared to 680 eggs as was observed by other authors in other country. They are laid in mass of 40-60 eggs. Oviposition takes place after 12-17 days from mating. Female protect its eggs until they hatch by covering them with its body. The eggs are greenish when newly laid and will turn pink when mature. They will be hatched in 3-4 days.

The RBB nymph molts 45 times and said to have passes 5 nymphal instars which are completed in 25-30 days. Its nymph is colored light brown with a yellowish-green abdomen and some black spots. It was observed that the nymph development is longer during dry season. Like the adults, they remain at the bases of the rice plants during daytime and feed at night.

The RBB adult is brownish black with few distinctly yellowish spots on the thorax that bear spines below the anterior angles. It is oval shaped and about 8-9 mm long. They are very well adapted to variable conditions and may stay alive for seven months. The adults may survive through out the period and between seasons by resting hidden and inactive in soil cracks, grassy areas or in any area where relative humid atmosphere seems to provide a good shelter. The adult gives off an offensive odor when disturbed.

Adults are attracted to street lights and full moon when they congregate and fly in search of a new area for invasion. Large number of the pest is carried by strong winds and land on new area or vegetation. Both nymph and adult feed during daytime and mainly at the base of the rice stem but they may feed on panicles during evening, early morning or an overcast day.

During daytime, the adults are lethargic and avoid sunlight. A behavioral characteristic of RBB is their ability to stay underwater when disturbed though more than two hours submersion will cause them death.

Nature of Damage

The nymphs and adults suck the plants sap through the stems and nodes near the water surface. This mode of activity causes the plant to loss water, discoloration, death in the upper leaves and failure of young leaf to open. Plant will have stunted growth and the tillering of the plant is disturbed and reduced. When this happens during tillering stage, the damage called dead heart occurred while if the pest attacks during booting stage, the resulting damage is empty panicle similar to whiteheads caused by stem borer. RBB feeds also during milking stage affecting the rice grains. Severe infestations during this stage will result to a condition called bug burn and will lead to death.

Dry season damage by RBB is more severe than wet season. It usually occurs after heading stage when irrigation water is reduced during the maturation period. It is said that RBB nymph takes longer time to mature during dry season thus causing more damage to rice.

Millions of pesos due to yield loss had been incurred since RBB invade the Philippines. Yield losses in relate to unfilled grains, decrease in number of tillers and less grains per panicle. It was observed that at 10 adult RBB per hill of rice plant will cause yield loss ranging from 15% to 23%.

Management of the Pest

The Philippines employs Integrated Pest Management with emphasis on biological control and none use of pesticide against the Malayan Rice Black bug. Since the outbreaks in Mindanao, lesson learned that pesticide is not a good management option for the pest. Through the KASAKALIKASAN, the IPM Program of the Philippines, which is based on biological control, affected and to be affected farmers are being trained in the management of the pest. The Philippine Rice Research Institute (PhilRice) and the DA IPM Program are working hand in hand to overcome the damage caused by RBB.

PhilRice is responsible for training the Specialists who will train the trainers while KASAKALIKASAN trains the farmers thru Farmer Field School (FFS). In areas where RBB is a problem, FFS for rice always include intensive discussions on RBB and how to manage it. It even includes simple field research where participant farmers will conduct experiment on how to solve their major problem on RBB management. As a standard protocol, an FFS always starts with an AgroEcosystem Analysis or AESA, the most popular term among FFS farmers. When a farmer graduated from a Farmer Field School, he already has the skill to face the enemy, the RBB. The skill he acquired thru field experience during FFS which lasted for the whole season of the crop, from land preparation to harvesting.

Management Options

A. During Planting Time

Cultural management

- synchronous planting of varieties with the same maturity
- direct seeding of rice crop
- use resistant/tolerant variety

B. With standing crop

Cultural management

- monitoring
- flooding
- sanitation

Mechanical management

- light trapping

Biological control

- conservation of natural enemies (by not using pesticide)
- deployment of natural enemies
- herding of ducks

C. During outbreaks

Mechanical/Physical

- light trapping
- plowing under of heavily infested areas

Chemical

- judicious use of insecticide

D. During harvest

Mechanical/Physical

- light trapping
- plowing field immediately and flooding to submerge stubbles until they decompose

Biological control

- herding of ducks

Among the control options, biological control is the most applied and popular to farmers. The biological control agents consist of egg parasitoid, predators and pathogen.

The most common beneficial organisms in the field are *Telenomus triptus*, an egg parasitoid and the green muscardine fungus, *Metarhizium anisopliae* which is an insect pathogen. Other predators like spiders, coccinellid beetles, crickets and other predatory species also abound which also help in the management of RBB population though they are not as efficient as the first two. Ducks also help in the control but their use is very limited. The ducks can be pastured only when the rice plants are already established in the paddy.

The Biological Control Agent

A. *Telenomus triptus*

This wasp is a very aggressive egg parasitoid which is naturally present in the field. Its population is enhanced by not spraying pesticide. When this biocontrol agent cannot regulate RBB population, farmers are asked to rear or thru a rearing laboratory, they can place orders for several releases in their respective fields. The farmers can release adults or parasitized pupae.

B. *Metarhizium anisopliae*

It is also known as the green muscardine fungus. Like *Telenomus*, it is naturally present in the field. It is also being mass reared in the different rearing laboratories throughout the country. Farmers can also get supply of the fungus from them. The preparations is compose of inoculated corn or palay media place inside a bags with spore concentration of 1×10^8 . The farmer will use the filtrate of this preparation for spray.

Status of the Pest

The RBB is not yet completely eradicated which is really impossible when one cannot get rid of its primary host, the rice plants. Other reasons are 1) it can adapt very well to variable conditions, 2) it can stay alive for several months and between seasons in a relative humid atmosphere, and 3) has a number of alternate hosts around the field. Some of the alternate hosts are *Zea mays*, *Colocasia esculenta*, *Hymenache pseudointerrupta*, *Panicum amplexicaule*, *Scirpus grossus*, *Scleria sumatrensis*, *Vigna unguilanta*, *Typha angustifolia*, *Echinochloa crus-galli*, *Brachiaria mutica* and *Panicum amplexicale*.

The pest which started in Palawan Island in 1982 then spread to some provinces of Mindanao in 1992, then to the Visayas Islands in 1998, then back to some Mindanao provinces again in 2000 and now it's already at the tip of the southernmost part of Luzon. RBB is a strong flyer and very much attracted to full moon. Yet, we are able to keep its spread slower and damage manageable primarily because of two biocontrol agents, *Telenomus* and *Metarhizium*.

RBB is now a part of the ecology of the areas where the pest outbreaks occurred. Farmers can now tolerate its presence in their field. They are unanimously sold to the idea that pesticide is not an effective management control for RBB. They all believe that biocontrol agents like *Telenomus* and *Metarhizium* coupled with cultural management can solve their problems on RBB.

Conclusion

Scotinophara coarctata can be managed effectively with the use of biological control agents *Metarhizium anisopliae*, the green muscardine fungus and *Telenomus triptus*, the egg parasitoid. The use of these biocontrol agents must be coupled with suggested cultural management and full cooperation of concerned stakeholders for effective management, FOR PEST DOES NOT RESPECT BOUNDARIES AND COMMUNITY ACTION IS AN IMPORTANT FACTOR.

References

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