INSECT PEST MANAGEMENT IN RICE IN THE PHILIPPINES

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In recent years, the Philippines have witnessed a heightened interest in pest management as a tool to increase agricultural productivity. This is particularly so as it relates to rice, the most important agricultural crop of the country.

Pest problem is a grave one considering the great complexity of the tropical rice agro-ecosystem. In the succeeding pages I shall attempt to give you a briefing on the Philippine experience with rice insect pest management.

Overview of insect pest problems

The tropical climate of the Philippines is at the same time a blessing and a handicap. While it allows us to grow rice throughout the year, it also means that insect pests multiply continuously. Because of this, it should be apparent that insect pest management systems developed for temperate countries cannot be directly used under our conditions. The freezing rains and cold in temperate areas set the biological system back to zero each year. With this synchronization of insect pest development, it is generally much easier to understand and deal with some insect problems.

While the relatively recent development and adoption of high yielding varieties (HYVs) of rice have postponed the predicted famine in many rice growing regions of the world, they have also spawned serious problems. One that concerns us is that dealing with pest problems.

It is generally accepted that pests thrive better with the HYVs compared with the traditional varieties. This is hardly surprising when we consider that the former have evolved through long years of selection while in the development of the early rice HYVs, the main emphasis was merely to get the highest yield possible with little concern on pest resistance.

Some of the factors that complicated pest management in rice with the implementation of modern agro-technology are: monoculture of rice with limited genetic base over large areas which decreased the genetic and ecological diversity of the rice agro-ecosystem making it prone to pest outbreaks; creation of microclimates that favor certain pests due to dense vegetation caused by heavy HYV tillering, heavy fertilization, closer planting distance and continuous flooding of fields; and continuous cropping made possible by the advent of non-photoperiod sensitive varieties of rice and good artificial irrigation system.

Key rice insect pests

The most important insects number about six as shown in the following table with indications of the rice growth stages they affect:

Many of these key insect pests were very minor pests in the days when traditional rice varieties were being grown. With the advent of the high yielding varieties, certain rice insects have increased in importance.

The rice whorl maggot, *Hydrellia philippina,* has become an important pest of rice during the last decade in the Philippines, the period roughly corresponding to the time when the country shifted heavily to planting HYVs. *H. philippina* probably accounts for a far greater loss of the rice in the Philippines than the erstwhile very destructive *Nilaparvata lugens.* An estimated 15-25 percent of the crop could be lost to *H. philippina.* Its pervading presence in practically all of the rice growing areas of the country underscores its importance.

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Table 1 Key insect pests and rice growth stages affected

Insect Pests	Seedbed/ Seedling	Growth Stages Tillering	Booting	Flowering	Milk	Dough	Mature
1. Whorl maggot	X	X					
2. Brown planthopper	X	X	X	X	X	X	X
3. Green leafhoppers	X	X	X				
4. Stem borers	X	X	X	X			
5. Leaf folder			X	X	X	X	
6. Rice Bug				X	X	X	

X – Indicates insect pest could be serious at that particular growth stage.

The brown planthopper, *N. lugens* is considered by many people to be the most devastating of the relatively newly-important insect pests of rice because when present in large numbers, an entire area could be completely lost. In addition to directly damaging the crop by causing hopperburn, the insect also transmits grassy stunt disease and ragged stunt.

The first serious outbreak of the disease in the country occurred in 1973 and affected most of the rice-producing provinces of the country. Laguna province, which is known for progressive rice-farming and has an extensive planting of rice HYVs, was hit severely. An estimated yield loss of 150,000 metric tons (valued about US$20 million) from the brown planthopper and grassy stunt was chalked up that year by the Philippines.

The green leafhoppers, *Nephottetix* spp. are important pests during the first half of the crop growth (up to booting stage). Direct damage as hopperburn is a rare occurrence but the insect causes serious damage by the transmission of the tungro virus. Population increase of the green leafhopper has corresponded with the planting of HYVs in the Philippines and elsewhere in Southeast Asia.

There are five species of rice stem borers in the Philippines. Of these only two are of widespread importance. They are the yellow stem borer, *Tryporyza incertulas* and the stripped stem borer, *Chilo suppressalis.* They are considered the most important insect pests of rice by many.

The rice leaf folder *Cnaphalocrosis medinalis* is another rice pest that has increased in importance in recent years. The insect is usually serious between panicle initiation and the milk stage of grain development. Relatively little information is available about this pest presently but HYVs currently planted are found to receive heavy damage.

The rice bug *Leptocorisa acuta* damages the developing rice grains. Feeding in the early developmental stage of the grain results in chaffiness or empty grains while feeding during the dough stage causes spotting of the rice grain. The period of susceptibility to rice bug damage corresponds to about a month's time, from the milk stage to late dough stage of grain development.

Transfer of technology

The Philippines in 1973 launched an intensified rice production program called the Masagana-99 Program aimed at achieving self-sufficiency in the country's staple food. Masagana-99 is an expression of the hope of attaining a national average yield per hectare of 99 cavans (4.4 metric tons), a considerable increase over the average of 63 cavans (2.8 metric tons) per hectare prior to the program.

The key elements of this revolutionary program are as follows:

(1) Credit system requiring no collateral which allows farmers to get a loan per hectare which is presently pegged at ₱1,800 (U.S.$244) to finance labor costs and inputs like pesticides and fertilizers.

(2) Transfer of technology through deployment of more than 3,000 field technicians to teach farmers, through dissemination of information, and

(3) Through guaranteed price support.

A Philippine governmental agency called the National Food and Agriculture Council is charged with the responsibility of overseeing the Masagana-99 Program with assistance of other agencies of the government. There are three interagency committees involved in the Program as follows: a management committee, a pesticides technical committee, and a fertilizer technical committee. The committees develop recommendations for production and crop protection practices which are passed on to the farmers through extension officers and the mass media. Of primary interest to us would be the insect control recommendations as developed by the pesticides technical committee.

In the development of the insect control recommendation for the Masagana-99 Program we tried to utilize the principles and concepts of integrated pest control as far as available technology would allow. Despite serious drawbacks, we have developed one that is a blend of IPC and the conventional scheduled application of insecticides. The IPC influence is evident in the use of resistant varieties, use of economic threshold information, and timed application of insecticides for optimal effect. In summary, the following factors were given detailed consideration incorporating as much scientific information as is available in the development of recommendations.

(1) varietal resistance to pests and diseases
(2) economic thresholds
(3) minimum effective rates
(4) minimal hazards to farmers
(5) minimal environmental disruption

In the development of the Philippine recommendation for rice insect control under the Masagana-99 Program we have had also to contend with factors other than the technological in nature. Some of these important factors are as follows: (1) availability of trained technicians, (2) farmers, ability/knowledge, and (3) cost benefit analysis in the choice of insecticides.

The availability of trained technicians and the question of farmers' ability/knowledge influenced our decision in including as part of the recommendation the partial scheduled insecticidal treatment due to generally low-level competence in decision-making on the part of the technicians and the farmers. They are not yet ready to use economic threshold information in deciding when to treat with insecticides.

Certain insecticides were chosen due to cost/benefit considerations. The insecticides that were good against the largest number of major pests were favored over those with narrow spectrum of activity. Ideally this should lower the cost of insecticidal treatment and simplify the farmers' inventory of insecticides.

Summary

The technology and knowledge that we applied in the development of the Masagana-99 insect control recommendation were far from ideal. Pest management principles were used despite serious drawbacks and in the end, after the bits and pieces were put together, we have developed a recommendation that works. The recommendation undergoes an annual updating process to incorporate the latest developments in rice insect control knowledge and technology.

Discussion

Buchanan, R. (U.S.A.): You have given information on the Masagana-99 Program which started in 1973. You have also outlined the problems you faced. What have you actually achieved?

Answer: We have achieved self-sufficiency in rice after 3 years but at great cost. The repayment of non-collateralized credit is an important problem. On the other hand the technology and recommendations pertaining to pest control (insecticide application, for example) and the agronomic practices have become more sophisticated.

Kiritani, K. (Japan): 1) Is the use of broad-spectum insecticides the policy of your government or the farmer's choice? 2) As the use of broad-spectrum insecticides is harmful to the natural enemies it seems to be a problem of trade-off between broad-versus narrow-spectrum insecticides. How do you solve this problem? I believe that we should optimize not only in terms of benefit/cost but also risk/benefit.

Answer: 1) The use of broad-spectrum insecticides which are cheaper is neither government policy nor farmer's choice. The fact that the commercially available insecticides are largely broad-spectrum in nature leaves us without much choice but to select from among them. The main consideration, especially in the beginning of the program was the effectiveness of the control. 2) The problem of trade-off between broad- and narrow-spectrum insecticides as it pertains to our rice program cannot be solved properly due to the foregoing. However the risk/benefit angle was considered to some extent. The highly toxic insecticides were excluded from the program out of consideration for the farmer safety. We usually tend to cultivate resistant varieties while insecticides are applied only when needed.

Ishikura, H. (Japan): You mentioned the deployment of 3000 technicians for the purpose of technology transfer. Do you have any program to train these technicians so as to enable them to acquire the necessary knowledge on pest control?

Answer: In the beginning the training program tended to be haphazard. However recently we have developed a network of training centers such as the Philippine Training Center for Rural Development (PTC-RD) and the Regional Training Centers for Rural Development (RTC-RDs) scattered all over the country which have become operational. Through them, the Philippine government is pinning the hope of bridging the gap between research and actual field practice. The PTC-RD and the various RTC-RDs aim at upgrading the knowledge/skills of government technicians and farmers through innovative extension/communication approaches highlighting the practical aspects.

Mochida, O. (Japan): According to your presentation it appears that the brown planthopper (BPH) is one of the important pests of rice in the Philippines, although I believe that many farmers are cultivating BPH-resistant varieties. What is the situation of ragged stunt disease in the Philippines?

Answer: BPH was included in the list of key insect pests because until recently it was an important problem. However in the last couple of years, no serious outbreaks have been recorded in the Philippines, owing apparently to the wide-spread planting of BPH-resistant varieties. With regard to the BPH-vectored ragged stunt disease, its incidence has abated during the last years or so in the affected areas. Although infected plants can still be collected in the field, the disease is no longer important at present.

Chang, P.M. (Malaysia): How does the pesticide "subsidy" work?

Answer: We really do not have a pesticide subsidy scheme in our rice production program. We have a non-collateralized loan program that allows farmers to purchase their pesticides. They are supposed to pay back the government after harvest. As I mentioned previously, pesticides are used only when needed.

Dyck, V.A. (International Rice Research Institute, the Philippines): Under the Masagana-99 Program which makes provision for credit to buy pesticides, may a farmer purchase the insecticides any time he wants, i.e. whenever he may need an insecticide during a crop period?

Answer: Yes. The loan system is designed to provide such immediate and flexible service to farmers. This is important for the implementation of integrated pest management. But in practice, sometimes, farmers buy insecticides in advance of their use out of pressure from dealers and rural banks. It is difficult for the government to overcome such shortcoming.