# Country Report - Malaysia

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## 1. Introduction

The implementation of IPM principles and the practices in Malaysia was a gradual yet continual process. IPM had its beginning in the 1960s when several entomologists became increasingly concerned on the negative consequences of excessive use and misuse of pesticides in the plantations. Then the IPM concept was gradually put into practice in other crops: rubber (Rao, 1969), cocoa (Wood 1971; Conway, 1971), oil palm (Wood 1971), rice (Lim, 1970; Jusoh et al., 1980), and coconut (Ho et al., 1971; Ooi et al., 1975). To date, the IPM approach has created measurable impacts in the various crops in Malaysia. It can be said that development and promotion of IPM rests mainly with governmental agencies like DOA and MARDI, especially for non-plantation crops. On the other hand, private research and development set-ups belonging to major plantation agencies are usually involved with IPM of major pests of plantation crops. IPM programs on rice and *Plutella* (on cruciferous vegetables) (vide infra) are forerunners of Malaysian IPM endeavours and the programs on rice is actively implemented. But IPM programs on *Plutella* is rather slowed down due to poor cooperation from farmers. Currently pest control in oil palm, coconut and cocoa, is viewed in a much broader sense and emphasis is on integrated pest control approaches. Nevertheless, there are regular interactions between both government and private agencies to promote IPM throughout the country possibly for many crops.

## 2. Organisation and Funding Arrangements

### *2.1 Organisation*

Presently, National IPM committee has been formed to oversee the development and implementation of IPM on various crops. The responsibilities pertaining to the policy issues, research, extension and training are incorporated as key aspects of the terms of reference (as specified below) of the national committees. The organizational structure of IPM national committees in Malaysia is illustrated in Figure 1. The Chairman of the national IPM committee is the Secretary General of the Ministry of Agriculture with the DOA functioning as secretariat. The members of the National IPM Committee are from all other relevant agencies dealing with agriculture in Malaysia.

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***Terms of Reference of the National IPM Commitee***

1. To determine the policies and formulate guidelines on the implementation of the IPM approach for all crops in Malaysia.
2. To coordinate the planning and implementation of all IPM programmes.
3. To monitor and evaluate all IPM programmes.
4. To facilitate cooperation and communication among research bodies, implementers and policy makers.
5. To liase between international bodies in IPM (FAO, ACIAR, GTZ, IDRC, IIBC, ASEAN).
6. To establish the networking channel with other countries in the areas of IPM such as information exchange, training and technical/expertise assistance.
7. To evaluate and discuss relating to IPM and to forward recommendations to the relevant authorities.

### *2.2 Funding*

Currently, all IPM programmes are funded locally and majority of the activities are supported or funded by the Department of Agriculture without much aid from NGO and other donor organisations. Occasionally pesticides usage awareness campaigns are organized and funded by the chemical companies at regional level.

## 3. Training Achievements

### *3.1 Training of Agricultural Technician*

During the eighties and early nineties, not much attention was given on the pesticides application technology. From 1999-2000, 6 pesticide application technology courses were organized and a total of 180 agricultural technicians were trained. These technicians were from various states and workings on different crop were exposed to various pesticides application techniques. The training sessions include both theory and practical including pesticides application techniques, safe use of pesticides, timing of application and selective use of pesticides in managing paddy and vegetable crop pests. The technicians were trained with the intention that they will train the farmers and pesticides applicators after they have completed the training.

### *3.2 Training of farmers*

This training were done both formally and informally during the farmers meet sessions. In fact there were 9 briefing sessions were carried out to farmers whenever there is outbreak of pest in paddy areas.

## 4. Policy Developments

### *4.1 Pesticides subsidies*

Beginning year 1999, the department of agriculture has stopped providing subsidies for pest control activities. In the past, the department of agriculture distributes insecticides and fungicides for large-scale pest outbreaks in paddy areas. By stopping the pesticides subsidies, it has indirectly reduced the use of pesticides. Now, the farmers adopts the attitude of 'wait and see' for all pest control activities in their areas.

### *4.2 Development of IPM/ICM programs for new crops*

In 1999, commodity based IPM committee was initiated to further expand the utilization of IPM in fruit production. Though IPM on fruits is still in the early stage of development but it requires an immediate attention. The carombola industry in Malaysia is currently faced with having to meet European GAP standards because of large volume of carombola is currently exported there. Thus IPM or ICM have to be integrated into the broader concept of GAP in order for export industries to remain competitive and be acceptable to foreign markets.

Surveys being conducted with emphasis on the use of pesticides and fertilizer usage among the farmers. This will provide a baseline data on the existing situations on carombola farm so that improvements can be made. A review on the list of pesticides used on the farm is actively pursued and farmers are informed to replace the more toxic class 1 and class 2 pesticides to class 3 and class 4 pesticides. Biological pesticides such as *Bacillus thuringiensis* are being promoted for lepidopteran pests and correct selection/rotation of pesticideswith different biological mode of action to prevent resistance from developing.

### *4.3 Organic Farming for production food crops*

Organic agriculture is holistic production management systems which promotes and enhances agrosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes the use of management practices in preference to the use off-farm inputs, taking into account that regional conditions require locally adapted systems. This is accomplished by using, where possible, cultural, biological and mechanical methods, as opposed to using synthetic materials, to fulfill any specific function within the system.

In Malaysia, the Department of Agriculture, has been promoting the concept of organic farming during the last 2 years so as to reduce the effect of inorganic pesticides and fertilizers in the farm. So far there are already a total of 27 projects initiated by private sector covering an area of 131.5 ha being cultivated as organic farm. The details are as follows:

| State | No. of Organic farm | Hectare |
|---|---|---|
| Selangor | 4 | 10.8 |
| Negeri Sembilan | 10 | 90.0 |
| Melaka | 2 | 1.1 |
| Johor | 2 | 4.0 |
| Pahang | 6 | 11.6 |
| Sabah | 2 | 12.0 |
| Sarawak | 1 | 2.0 |
| Total | 27 | 131.5 |

A wide range of crops are being grown organically including leafy and fruit vegetables, bananas, maize and carombola. The Department of Agriculture is constantly monitoring on residue levels of food crops grown in these farms as a measure to promote the organic farming concept to other growers.

A Malaysian Standard has been prepared for the purpose of providing an agreed approach to the requirements which relate to the production of, and the labeling and claims for organically produced foods.

### *4.4 Accreditation of farm with GAP*

Accreditation of farms with Good Agricultural Practices is being pursued with the intention to promote further export of Malaysian agricultural produce to developed countries. The present guidelines and demands imposed by importers of developed countries on the prescribed farm activities require a detail record of farm activities and inputs before being considered for importation. Though this is a new program but it needs to be pursued further.

### *4.5 Zero burning policy during replanting of major crops*

Zero burning policy implemented by the government to control open burnings during replanting of crops to reduce air pollution especially during prolong dry weather. This policy forced the plantations to switch to other environmentally friendlier cultural method of disposing the unwanted plant materials. Chipping the trunks and fronds and stacking them along the alternate planting rows has also helped to provide organic matter required by the plants. In fact many estates has reduced the inorganic fertilizer application due to this change.

## *4.6 Pesticide Policy*

In Malaysia, the problems on pest resistance and resurgence in the seventies prompted the government to emphasize more on the implementation of integrated pest management (IPM) which took shape in the eighties. Here, the emphasis was more on the selective use of pesticides which is in harmony with the non target pests and environment. Those pesticides that were broad-spectrum in action and having long residual effect were either removed from the market or restricted in usage. The Pesticide Board of Malaysia, which is the pesticide-regulating authority is under the perview of DOA. The Board, banned a number of pesticides gradually during the last two decades. Table 2 shows the pesticides which have been voluntarily withdrawn by the parent company or partially/totally banned by the Pesticides Board over past twenty years (Yeoh, 2000).

**Table 1: Pesticides withdrawn or Partially/Totally Banned by the Pesticide Board of Malaysia**

| Pesticides | Action |
|---|---|
| Aldrin | Withdrawn by the parent company |
| Azinphos-ethyl | Withdrawn by the parent company |
| Diledrin | Withdrawn by the parent company |
| Endrin | Withdrawn by the parent company |
| Benomyl | Withdrawn by the parent company |
| Parathion-methyl | Total ban |
| Captafol | Total ban |
| Chlordane | Total ban |
| DDT | Total ban |
| Folpet | Total ban |
| Heptachlor | Total ban |
| Sodium | Total ban |
| Penthachlorophenate | Partial ban -not allowed for paddy |
| Endosulphan | Partial ban -not allowed on cocoa and pepper |
| Lindane (gamma-BHC) | Partial ban - allowed for palm oil and coconut only |
| Methomidophos | Partial ban - allowed for palm oil and coconut only |
| Monocrotophos | |

More recently, some of the organophosphate pesticides were banned or not approved for use on vegetables. These pesticides include methamidophos and monocrotophos that had been registered for use in vegetables but after review by the Pesticide Board have been banned based on their residue or toxicology problems. There are also those whose registration have been rejected by the Pesticide Board as being too toxic, e.g parathion-methyl. Concurrently, Farmers were advised not to use unregistered pesticides since doing so violates the Food Act 1984. The use of triazophos on vegetables has been voluntarily withdrawn by the parent company because of residue problems. The Pesticide Act 1974 and the Food Act 1985 were the guiding principles for the registration, production, management and application of pesticides in Malaysia. Pesticides introduced recently are more specific in their use and this may help minimize some of the problems caused previously.

# 5. Development in community IPM

In 1980, Malaysia adopted the *'Training and Visit System'* of Extension introduced by World Bank. The operation is similar to the 'The Farmer's Field School' being implemented in Indonesia and Philippines where agricultural technician meets the farmer groups weekly or biweekly during the whole cropping seasons especially for rice and vegetable cultivation to share and discuss their observation and plan out activities for the following weeks together with the help of subject matter specialists. It has been found very effective when introduced and later this expanded to all other areas. Through this system, IPM activities were easily organized and implemented especially in rice system.

In the early nineties, using this existing extension platform and via the established farmers groups, community farming or group farming projects (projek kelompok) were then initiated. Later, with the emphasis on commercialization to increase productivity of the existing agricultural farms has changed the focus and lead to weakening of the 'T&V' system and indirectly affected farmers participation and IPM implementations. Nevertheless, among the rice farming community, IPM has rooted deeply and farmers still participate in the decisions making based on economic threshold of pests and thus pesticides are applied only as and when required. Community IPM is being carried out in paddy areas with the support from the department of agriculture.

The involvement of school children and youth has contributed manpower/resource to the rice farming community and created interest among brigade members on field activities and sustainability of the natural environment. At present there are 618 brigades with 4,066 members from all the rice areas in Malaysia. Lately their participation has been very much reduced due to changing of interest amongst the students and less emphasis on brigade activities during weekends.

The stress on production efficiency and competitiveness among the vegetable growers has created entrepreneurs who are profit motivated thus less interested in holistic pest management and sustainable agriculture. In this situations, the entrepreneur don't make decisions on day to day farm operations but the workers do the planning and carry out pest control activities. This has often lead to the calendars based operation rather than pre-determined economic thresholds for pest control. But the trend on the use of class 3, 4 and biopesticides has increased among the vegetable growers.

# 6. Other Developments

## *6.1 Rice Production*

6.1.1 Biological control of rice field rats. Biological control of rice field rat, for example, *Rattus argentiventer* (Robinson & Kloss) by using barn owl, *Tyto alba* (Scopoli) has proven very successful in Malaysia. The erecting of nesting site in rice field started in early 1990 and to-date there is more than 4711 nesting sites/boxes throughout the country. The placement of nesting sites/boxes at various strategic sites within the rice fields has helped in increasing the bird's occupancy rate. The average occupancy rate is between 50-80% depending on the cropping season. Prior to the barn owl program, farmers had to rely heavily on baiting with rodenticides. However despite the heavy usage which cost approximately RM 30/ha/yr (=US$8), the average rice crop losses to rat activities remained high, reaching 10 -18% (per. Communication). One year after the implementation of the barn owl program, the quantity of baits distributed to farmers by DOA decreased from 42.8 t ton to 26.7t. By 1994, DOA stopped distributing baits to farmers. So, from a largely rodenticide - dependent strategy, there are already shifts in the approach of rat control to accommodate and integrate this new development, all in line with IPM philosophy. Probably, Malaysia was the first country in the world to erect nesting sites/boxes at strategic sites with the intention of using wild birds to control or reduce rat population within the rice fields.

6.1.2 Duck rearing in padi fields to control weedy rice and weeds. Ducks by virtue of their efficient way of scooping up the grains also scoop up seeds of weeds as well. In fact, no chemical methods could actually match the ability of ducks in ridding the field of weedy rice. It has become a reality that with the rearing of ducks in the paddy fields, less weedicides are needed in the early stage, thus reducing the cost of production. Further with the excreta from the ducks, the paddy grows even better. With this improved eco-system, additional income are now possible from selling of ducks. Since 1999, 230,000 ducks have been eared through this scheme. Ducks were also used to control the golden apple snail in infested areas.

6.1.3 Fish culture in rice fields to increase farmers income. The presence of aquatic plants and insect pests which are natural food for the fish, fish, could support about 4,000 fries per hectare. Hardly having to provide feed, a farmer could harvest adult size fish two weeks prior to the rice crop harvest. With the usual recovery rate of 40-60 % , i.e. harvesting of 1,600 adult fish, a farmer could realise a net income of about RM1,000 - RM1,500 per hectare per season. Since 1999, 400,000 fries have been released in some selected rice fields and with proper and careful supervision has helped to increase farmers income.

## *6.2 Vegetable Production*

- The current IPM technology for DBM is dynamic: as it is implemented it is also modified and improved upon as new research findings continually become available. Therefore, research support for the development of new IPM packages constitute a

fundamental aspect in ensuring the constant improvement and continued success of implementation of IPM of DBM. Now, IPM programs to control chilli virus on chillies is being developed and extensive field evaluation is being carried out.

- Currently farmers are using other innovative methods to control lepidopteran pests. The use of "yellow flood light" throughout the night had an influence on the growth of plant and insect population in some vegetables. The phenomena of using "yellow flood light" has been on the increase and farmers are investing a lot of money in integrating this system in their farming practices. Early observation indicates that farmers in this area able to produce healthy crops by using low toxic pesticides such as class 3 and 4 that has very short pre-harvest interval.

- Sex Pheromones are widely used to detect early and control pests such as *Plutella xylostella*, *Spodoptera litura* and *Spodoptera exigua*

- Evaluation on the use *Diadegma insulare*, a larval parasitoid of Diamond Back Moth (*Plutella xylostella*) in lowland is being carried out with the cooperation from Commonwealth Agricultural Bureau for South East Asia Regional Centre (CABI-SEARC). The first batch of 3000 *D.insulare* from Florida, U.S.A has undergone laboratory evaluation in line with local quarantine regulations. Further evaluations will be carried out soon once the second consignment arrives from U.S.A.

- Greenhouse planting/Aerophonic system/Fertigation-These technology of planting crops without soil are being practised and are expanded with the intention to reduce the pesticides usage. Sex pheromones and sticky traps are widely used to reduce pest populations within the greenhouse environment.

### *6.3 Fruit Production*

Communal based mass trapping being carried to reduce in-field fruit fly population within fruit orchards. Although this operation requires concerted effort from all the neighbouring farmers and dwellings but continuous mass trapping helps to reduce the endemic population provided other cultural control methods are carried out effectively.

## 7. Future Challenges

Although IPM is an old concept judging from the inception, its implementation has been rather a challenging task at the moment. The experiences gained from the development and implementation of IPM in rice, DBM/ crucifers, oil palm and cocoa have shown that Malaysia has, by and large, succeeded in advocating the principles of IPM. However, the adoption rate which is currently low among the farmers and growers, need to be improved to realize the full impact of these IPM programs.

The major drawback of IPM is that general recommendations are not possible for broad environments even within a single crop. The perception and utilization of IPM approaches should change from the 'package technology' to one of 'basket of tools and crop based technology' approach to be realistically acceptable to farmers with different problems and at different locations. There is also an unpredictable factor, ie., the constant changing of weather conditions especially in the tropical climate often affects the success rate of the IPM programs.

Experiences also indicated that IPM does not work well with *Bactocera dorsalis* (fruit flies) in Malaysia. *B. dorsalis* is found to infest many species of fruits and in all eco-systems including orchard, village and forest areas. Moreover, fruits are produced throughout the year making it conducive for the breeding of fruit flies throughout the year too. Most IPM programs in reducing the fruit fly population were found to be not satisfactory at the moment. IPM approaches are also limited in a situation where virus-vector complex exist. For example, in the case of Papaya Ringspot Virus and Citrus Greening, the whole crop need to be destroyed once the virus is detected on the plant and has potential to spread further and become epidemic.

Quarantine issues: The IPM technology development programs are constantly faced with new challenges with the presence of new invasive pests. With the implementation of AFTA and World Trade Organisation (WTO), we anticipate very high volume of agriculture fresh produce coming into the country, that will further increase the chance of exotic pests slipping into the country without being detected. We have already experiencing new species of pest, for example, leaf miner invading our ornamental crops. Once this pest is established, new resources and personnel has to be exploited which further affects the IPM technology development programs. Whenever there is a shift in the focus, the 'IPM ' gets weakened further.

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