IPM For Sustainable Rice Production And Food Security In Malaysia

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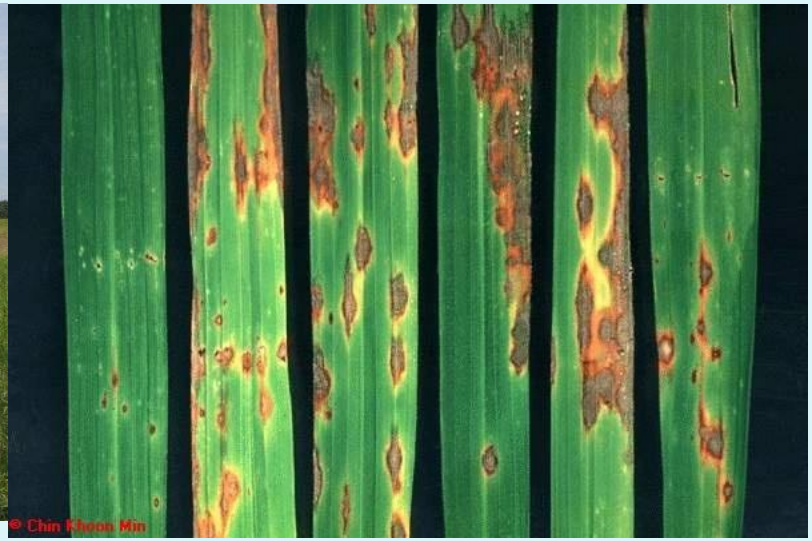
Rice In Malaysia

- The rice industry in Malaysia ranks third after oil palm and rubber in terms of hectarage
- Yearly rice production is 1.7 million tons valued at RM 2.2 billion
- Rice consumption for 2011 is 2.3 million tons
- Self-sufficiency level is 70%
- The balance 0.6 million tons is imported from Thailand, Vietnam, India and Pakistan

The paddy crop is susceptible to attack by a large number of insects and diseases



However, only a few of them are capable of causing considerable damage to the paddy crop resulting in reduced growth and yield

Widespread outbreaks are rare but frequent occurrence of localized and sporadic outbreaks

Severe infestations usually occur during the dry season

Natural enemies play a major role in controlling paddy pest population

Integrated Pest Management (IPM)

- To sustain rice production and the nation food security, DOA has embarked on IPM as an approach to manage pests and diseases

- The DOA started on IPM to manage rice pests and diseases following the outbreak of brown planthopper in Tanjung Karang rice irrigation scheme in 1977

Integrated Pest Management (IPM)

Definition

A pest management system that, in the context of the associated environment and the population dynamics of the pest species, ultilises all suitable techniques and methods in as compatible a manner as possible and maintains the pest population at levels below those causing economic injury

Integrated Pest Management (IPM)

Advantages:

- Protects flora and fauna and environment
- Reduces build-up of pest resistant to pesticides
- Reduces pesticide residue problem in harvested produce
- Reduce pesticide poisoning among farm operators and workers
- Reduces farmer operating cost and increase farm returns





Biodiversity

- Describes the richness and the variety of living organism
- It covers the variation within each species, as well as the relative abundance of difference species
- Decrease in biodiversity, as in monoculture crops such as rice, increases instability and therefore invites pest attack and outbreaks





Important Facts About Paddy Ecosystem

- Special type of Wetland
- High rate of disturbance
- Subject to extremes in temp
- Supports adapted & adjusted flora & fauna
- Habitat for fish, birds and mammals
- Helps maintain AQUATIC BIODIVERSITY





Why it's important to understand paddy ecosystem?

- To let natural enemies play their role
- To maintain a good balance
- To check chemical disturbance & prevent BPH outbreaks
- To avoid pollution





Conserve natural enemies

- Predators: various sp of spiders, Lycosa, Argiopes etc; Microvelia, Cyrtorhinus, Coccinelids, Carabids, Dragonflies
- Parasites: Oligosita, Anagrus, Dryennids
- Pathogens: Hirsutella, Beauvaria





IPM In Rice

DOA has all along focussed on these activities for IPM implementation in rice

- Training and extension
- Development of IPM package
- Surveillance and diagnostic
- Demonstration plots

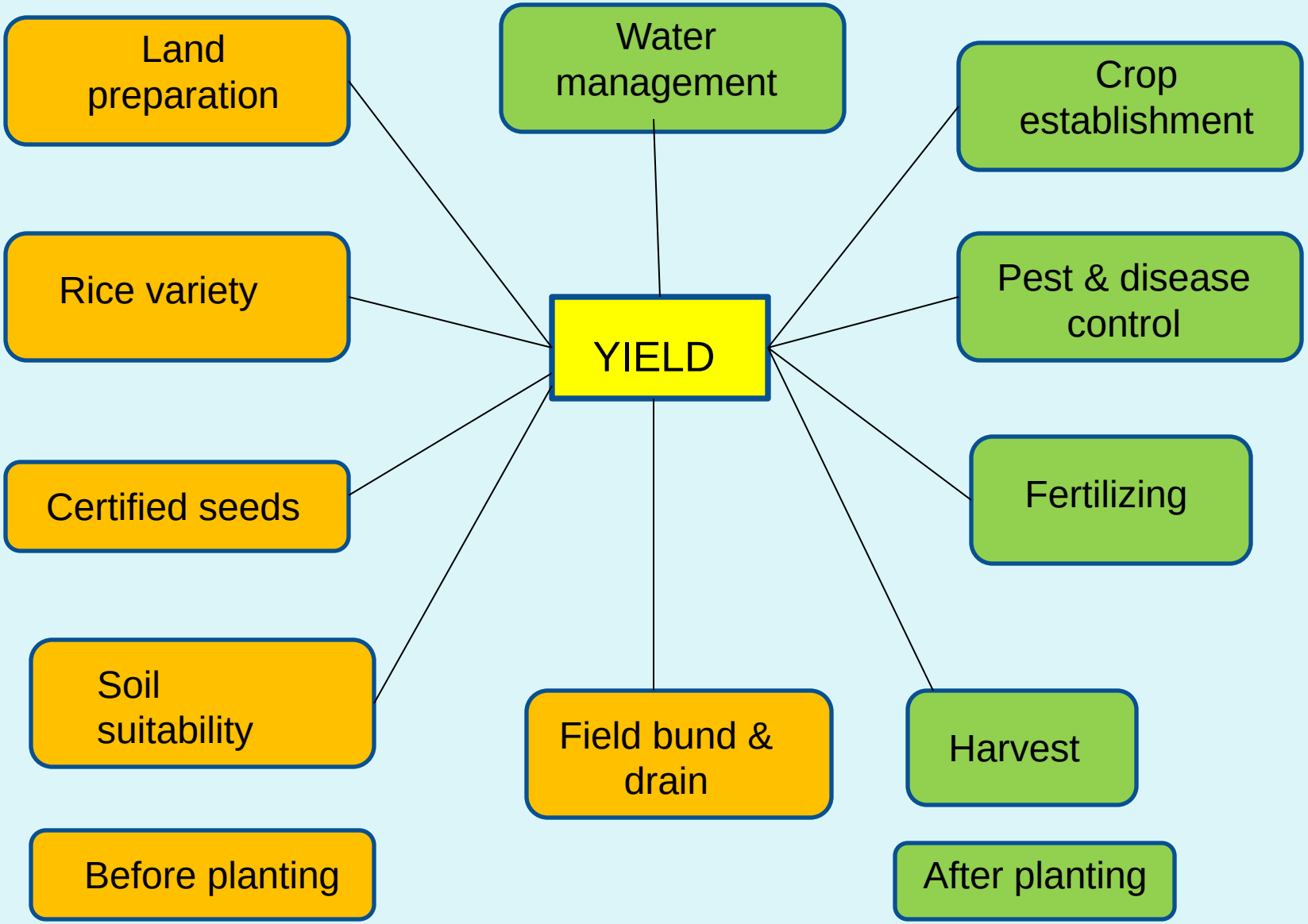




Training

- Essential to empower rice–growers to implement IPM in their respective fields
- Conducted via SPTP (Sistem Pengembangan Teknologi Pertanian)
- Focus on
  - Pest surveillance & Natural enemies
  - Non- chemical control methods such as cultural, physical, mechanical and biological method
  - Pesticide application technology

10 Rice Yield Determinants



IPM Activity Calendar

Pest Surveillance / Monitoring

- Farmers carry out their own surveillance or monitoring of rice crop plant for pest and diseases, supervised by DOA officer
- Monitoring for pest and diseases as well as natural enemies done visually
- Suspected diseases infected rice leaves are analysed in the DOA laboratory via Biolog, ELISA and PCR for disease presence
- Control measures carried out when pest number or disease incidences exceed the economic threshold level, ETL

Visual counting the natural enemies and pests and disease incidences

Biolog analysis

ELISA analysis

Pests And Diseases

- Some 17 pests and diseases attack rice crop plant
- Debilitate growth and inflict heavy yield losses
- Brown plant-hopper, rice blast disease, golden apple snail and weedy-rice can completely wipe out rice crop.





Bena Perang (*Nilaparvata lugens*)

Serangan Bena Perang (*Nilaparvata lugens*) Tahun 2010/2011

NEGERI	MUSIM I / 2010		MUSIM II / 2010		MUSIM I / 2011	
	Terlibat	Musnah	Terlibat	Musnah	Terlibat	Musnah
Perlis	824.50	0.00	0.90	0.00	0.00	0.00
Kedah	2539.04	0.00	1163.00	0.00	75.20	0.00
Pulau Pinang	150.10	150.10	441.50	0.00	0.00	0.00
Perak	385.35	0.00	228.70	0.00	278.00	0.00
Selangor	47.14	0.33	19.70	0.00	10.53	0.00
Negeri Sembilan	0.00	0.00	2.45	2.10	0.00	0.00
Melaka	0.00	0.00	0.00	0.00	0.00	0.00
Johor	0.00	0.00	0.00	0.00	0.00	0.00
Pahang	0.00	0.00	0.00	0.00	0.00	0.00
Terengganu	50.00	0.00	0.00	0.00	0.00	0.00
Kelantan	9.75	0.75	36.75	0.85	0.00	0.00
JUMLAH	4005.88	151.18	1893.00	2.95	363.73	0.00

Siput Gondang *Pomacea* (*Pomacea spp*)

Serangan Siput Gondang *Pomacea (Pomacea spp)* Tahun 2010/2011

NEGERI	MUSIM I / 2010		MUSIM II / 2010		MUSIM I / 2011	
	Terlibat	Musnah	Terlibat	Musnah	Terlibat	Musnah
Perlis	402.00	0.00	310.07	0.00	224.59	0.00
Kedah	879.70	0.00	532.00	0.00	762.20	0.00
Pulau Pinang	113.90	113.90	160.20	0.00	91.00	0.00
Perak	178.75	0.00	572.91	0.00	96.00	0.00
Selangor	166.03	0.00	290.75	0.00	70.36	0.00
Negeri Sembilan	0.00	0.00	1.85	1.10	0.00	0.00
Melaka	0.00	0.00	90.08	0.00	14.10	14.10
Johor	0.00	0.00	0.00	0.00	0.00	0.00
Pahang	10.85	10.85	0.00	0.00	58.00	0.00
Terengganu	0.00	0.00	0.00	0.00	0.00	0.00
Kelantan	80.56	6.01	156.31	11.21	0.00	0.00
JUMLAH	1831.79	130.76	2114.17	12.31	1316.25	14.10

ULAT DAUN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Serangan Ulat Tahun 2010/2011

Ulat Gulung Daun (*Cnaphalocrosis medinalis*), Ulat Layar (*Nymphula depunctalis*), Ulat Ratus (*Spodoptera mauritia*) dan Ulat Batang (*Scirpophaga incertulas*)

NEGERI	MUSIM I / 2010		MUSIM II / 2010		MUSIM I / 2011	
	Terlibat	Musnah	Terlibat	Musnah	Terlibat	Musnah
Perlis	1349.97	0.00	0.00	0.00	15.80	0.00
Kedah	7504.87	0.00	5427.65	0.00	672.45	0.00
Pulau Pinang	165.40	0.00	158.70	0.00	9.50	0.00
Perak	32.04	32.04	36.67	36.67	20.00	0.00
Selangor	557.85	0.00	237.53	0.11	101.12	0.00
Negeri Sembilan	0.00	0.00	14.39	3.79	0.00	0.00
Melaka	50.20	0.00	29.53	0.00	2.54	0.00
Johor	0.00	0.00	0.00	0.00	0.00	0.00
Pahang	232.00	0.00	2.00	2.00	3.60	0.00
Terengganu	169.00	0.00	0.00	0.00	0.00	0.00
Kelantan	93.97	1.66	0.00	0.00	0.00	0.00
JUMLAH	10155.30	33.70	5906.47	42.57	825.01	0.00

TIKUS
(*Rattus argentiventer*)

Serangan Tikus Tahun 2010/2011

NEGERI	MUSIM I / 2010		MUSIM II / 2010		MUSIM I / 2011	
	Terlibat	Musnah	Terlibat	Musnah	Terlibat	Musnah
Perlis	282.50	0.00	0.00	0.00	272.21	0.00
Kedah	2272.90	0.00	2200.00	0.00	612.65	0.00
Pulau Pinang	34.40	34.40	787.00	0.00	1.00	0.00
Perak	7.66	0.00	39.15	0.00	38.00	0.00
Selangor	155.93	1.30	170.06	1.53	78.36	0.00
Negeri Sembilan	0.00	0.00	5.62	3.87	0.00	0.00
Melaka	0.00	0.00	1.30	0.00	2.44	0.00
Johor	0.00	0.00	0.00	0.00	0.00	0.00
Pahang	0.00	0.00	17.00	17.00	15.00	0.00
Terengganu	5.00	0.00	0.00	0.00	0.00	0.00
Kelantan	41.70	4.30	51.70	18.21	0.00	0.00
JUMLAH	2800.09	40.00	3271.83	40.61	1019.66	0.00

IPM

Methods

- Legislative
- Physical
- Mechanical
- Cultural
- Biological





Plant Quarantine Act 1976

Provisions Under Act

- To ensure rice seeds imported into country are free from pest and diseases
- To ensure farm machinery do not carry and spread pests and diseases

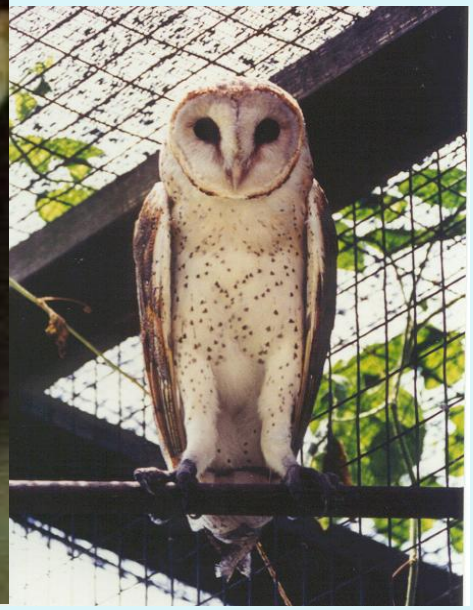
CULTURAL METHOD

Proper soil preparation and water management, to be a large extent, help control pests, diseases and weeds

Use of certified clean, healthy seeds provide a head-start for a healthy, vigorous rice plant growth

Application of correct amount of fertilizer and at the right time contribute to healthy and vigorous rice plant growth that can withstand pest and disease attack.

Use of natural enemies to control rice pests



Barn Owl

The DOA help increase the natural population of barn-owls by erecting houses and perching poles

Economic Threshold Level (ETL) Of Rice Pests And Diseases

Pest/ Disease	ETL
Brown planthopper	10/hill
Whitebacked planthopper	25/hill
Green leafhopper	1/hill
Black bug	2/hill
Nezara	2/hill
Kesing	2/hill
Leaf-folders	3 larvae/hill
Stem borer	3 larvae/hill
Rat	3 tiller/hill

Pesticide Usage

- Farmers apply only when pest or disease exceed ETL
- Farmers use soft pesticides consisting of synthetic pyrethroid or biopesticides
- Practice spot spraying and not blanket spraying
- Alternate use of systemic pesticide with contact pesticide
- Avoid spraying pesticide on rice plant less than 40 days old

IPM Package for Golden Apple Snail

Collect and destroy eggs and snails

Burn stubble and straw to destroy snails (**DOE approval needed**)

Land levelling to avoid puddles

Plant rice mechanically

IPM Package for Golden Apple Snail

Place net-trap at water inlet/outlet

Dig drain along perimeter to attract snails and destroy

Put up stakes to attract snails to lay egg and destroy

Use baits (jackfruit skin, cassava leaves, kangkong etc.) to attract snails and destroy

IPM Package for Golden Apple Snail

Releasing ducks to control snail

Ensure farm machinery are clean

IPM Package for Golden Apple snail

Last resort, use chemicals to kill snails

- Metaldehyde
- Niclosamide

IPM for Weedy rice Control

Remove stubbles and straw by burning

Spray pre-plant herbicides if required

Good land preparation

IPM for weedy Rice Control

Transplant mechanically

Or

Sow pre-germinated rice seeds in water

Or

Drum seeding

IPM for Weedy-Rice Control

Use clean, healthy certified seeds

Removing weedy-rice panicle

IPM For Weedy rice control

- Clearfield Rice - A rice variety introduced to overcome weedy rice problem
- Use together with pesticide OnDuty
- OnDuty kills weedy-rice and most other weeds but leaves the Clearfield rice intact

Rice IPM Model Farms

ACTIVITIES

Rice IPM Model Farms

ACTIVITIES


Farmer surveillance brigade

Farmer Pest Control Brigade

Farmer in full protective attire before start of spray operation

They are also trained in safe & judicious of pesticide

They are also trained in the proper techniques of pesticide application

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Farmer Pest Control Brigade

DOA IPM PROJECT IMPACT

Social Impact - Enhances farmer technical competency and awareness on safe & judicious use of pesticide

- Build a close rapport between all those in involved in the project

Economy Impact – Reduce use of pesticides and thus reduce operating cost and give higher returns

Enviroment Impact – Avoids prophylactic spraying and safe guards rice eco-system & natural enemy population

- No environment pesticide contamination

Constraints in adoption of IPM

> Determining ETL in the field is tedious. Often farmers find it difficult to follow procedure

> Training not based on farmers needs. They may not be able to follow or adopt the recommendation given to them

> Cultural management practices differ from area to area. The package has to be flexible and modifiable to suit the cultural management system of a particular area

Conclusion

√ IPM benefits are many and an ideal solution for sustainable rice production and rice food security in the country

√ However, all relevant stakeholders that is the policy-makers, Extension agents & farmers themselves must show strong commitment for successful implementation IPM on rice

THANK YOU FOR LISTENING