Impact of Invasive Alien Species (IAS) on Agriculture Industry and Biodiversity in Malaysia

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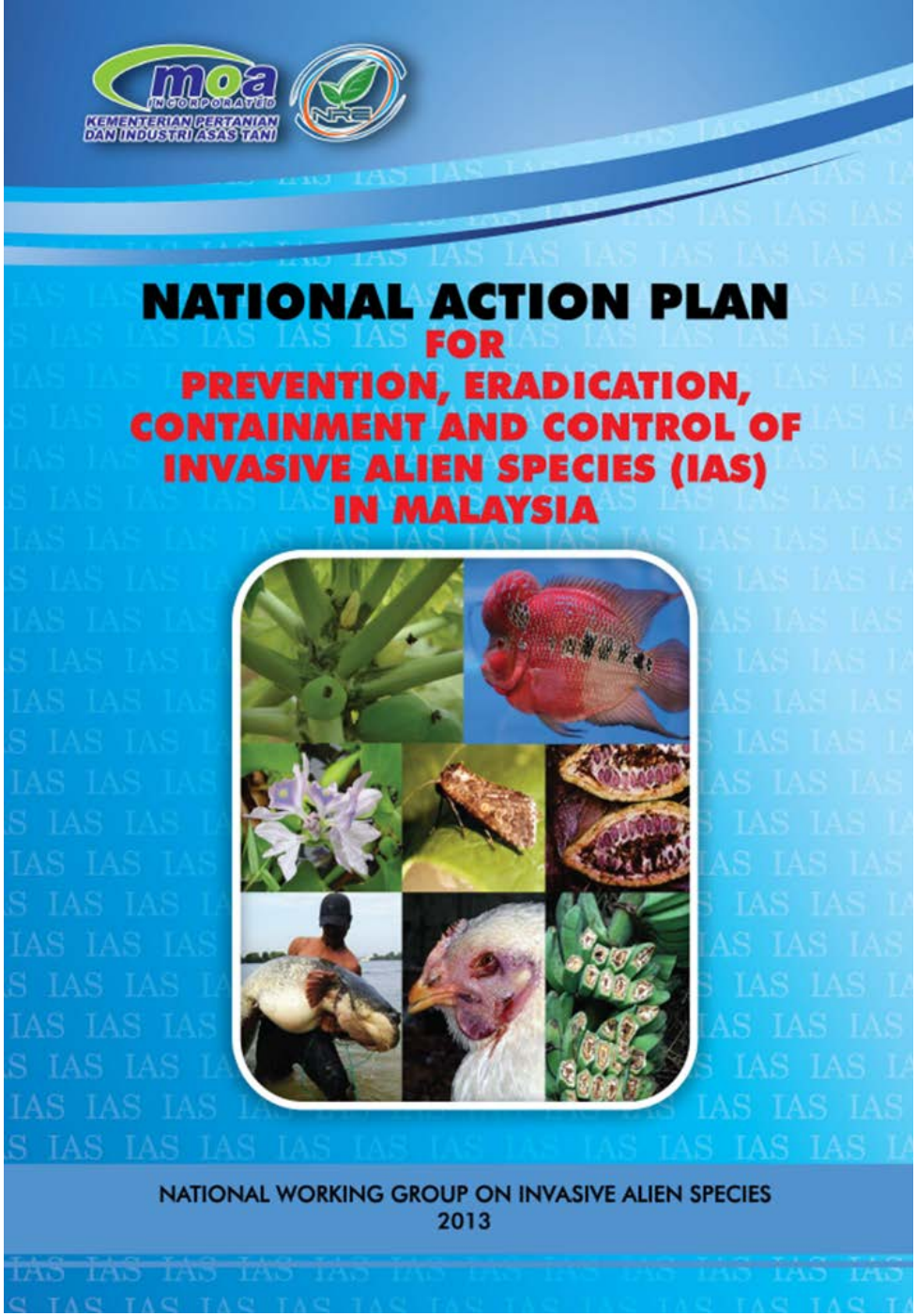
Definition of IAS

IAS is an introduced species and established in areas outside its natural distribution of an area or country

More than 100 invasive species have not been reported to occur in Malaysia that are listed by Global Invasive Species Program (GISP)



In 2013, The National Working Group on Invasive Alien Species has Listed Top 10 Invasive Species than occurred in Malaysia

TOP 10 IAS DI MALAYSIA (2013)

Agriculture & Foresrty Sector	Wildlife and animal Sector	Fishery Sector
Koster's curse *(Clidemia hirta)*	HPAI-Highly pathogenic avian influenza *(Paramyxovirus)*	Mitten cr… (*Eriochei…*
Siam Weed *(Chromolaena odorata)*	*Bacillus anthracis (Anthrax)*	Ma… (*C… …folia*)
Citrus Greening Disease *(Candidatus Liberibacer asiaticum)*	Q Fever (*Coxiella burnetii*)	…ck bass *…nla ocellaris*)
Trumpet tree/ Snakewood *(Cecropia peltata)*	Red-eared slider *(Trachemys scripta elegans)*	African Catfish (*Clarias gariepinus*)
Itch Grass (*Rottboellia cochinchinensis)*	Nipah virus *(Henipavirus)*	Zebra mussel (*Dreissena polymorpha*)
Beet armyworm *(Spodoptera exigua)*	Hors… *(Equin…*	Red claw crayfish (*Cherax quadricarinatus*)
Cocoa Pod borer (Conopormorpha cramerella)	New… …-worm (*C… …ominivorax*)	Flower horn *(Cichlasoma rajah)*
Papaya Ring Spot Virus	…t Nile virus *(Flavivirus)*	Common Carp (*Cyprinus carpio*)
Golden Apple Snail *(Pomacea canaliculata)*	Bufo toad *(Bufo marinus @Rhinella marina)*	White shrimp (*Litopenaeus vannamei*)
Banana Bacterial rot *Ralstonia solanacearum Comple…*	Brown tree snake *(Boiga irregularis)*	Suckermouth catfish (*Plecostomus sp.*)
Papaya Dieback (*Erwinia papayae)*		

In the process of updating the IAS list

Impact of IAS on Crops

Cocoa Pod Borer
(*Conopormopha cramerella*)

Golden Apple Snail
(*Pomacea spp.*)

Papaya Bacterial Rot
(*Erwinia papayae*)

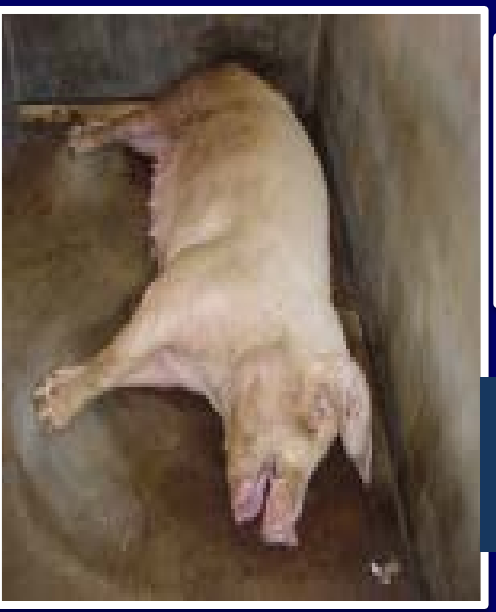
Banana Bacterial Rot
Ralstonia solanacearum Complex

Red Palm weevil
Rhynchophorus ferrugineus

Impact of IAS on Animal Sector

H5N1
(Avian Influenza)

WEDNESDAY, FEBRUARY 12, 2014
Malaysia - Bird Flu News Malaysia Reports First H7N9 Case Outside China
- Health officials announced an H7N9 avian flu infection in Malaysia today, the first case detected outside of China, along with eight other cases—one in Hong Kong and seven more from the mainland.



Nipah Virus
(Henipavirus)

In 1998, Nipah Virus outbreak in pig and febrile encephalitis among pig farmers is a good example.
The outbreak was controlled through the culling of >1 million pigs. Total lost to the Industry. Annual turnover-RM 500 mill/yr

Impact of IAS in Fishery Sector

2013: Top 10 Invasive Aquatic Species (IAS)	
1	Pacu (*Mylopus/Myleus/Colosomma*)
2	Flower Horn (*Cichlasoma spp*.)
3	Peacock bass (*Cichla ocellaris*)
4	African Catfish (*Clarias gariepinus*)
5	Zebra cichlid
6	Alligator gar (*Atractosteus spatula*)
7	Red Claw crayfish (*Cherax quadricarinatus*
8	Common Carp (*Cyprinus carpio*)
9	Piranha
10	Suckermouth catfish (*Plecostomus* sp.)

Keli Africa
(*Clarias gariepinus*)

Why IAS is important

- Caused enormous economic losses and the livelihood of farmers
- Created complex far reaching challenges to the competent authorities-DOA, DOF, DVS and others
- Rapid transportation/movement provided IAS to move quickly and spread rapidly
- Malaysia is also signatory to the Conservation of Biological Diversity (CBD) and is committed to develop national strategies for managing IAS (DOA is the secretariat for IAS)

Impact of IAS on crops in Malaysia

1. Direct losses to Agriculture Industry, affected livelihood of farmers

3. Environmental Effect

(use of pesticides: river pollution, etc)

IAS IMPACT

2. Increased Cost in Controlling IAS

Declining in local Biodiversity

eg. Changes in weed dominance

Human and Animal Health affected

Cocoa Pod Borer (*Conopormopha cramerella*)

- **Discovered in Sabah (1980) & in Melaka (1986)**
- **RM15 million spend to control and contain**
- **Not successful & currently spread throughout Malaysia.**

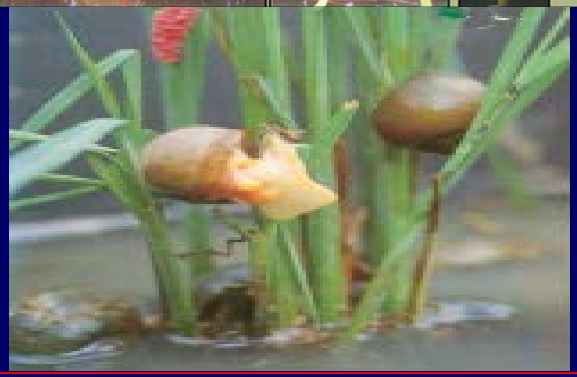
Year	Area(ha)	World Leading Producer	Production Volume mtan/yr (Dried cocoa bean)
1989/90	414,000	4	243,000
2006/07	29,200	12	33,000
2011	20,550	?	4,000
2015	16,328	?	3,645

PADDY

Rumput Padi Burung Echinochloa crus-galli)

1980's – Tabur Terus, mula merebak hampir semua kawasan padi
Kos Racun Rumpai?????

Golden Apple Snail (*Pomacea spp.)*



1985- Siput Gondang Emas
2015-Hampir semua kawasan padi
- Ethyl Acetate????

Estimated Losses= RM 200 mil/year :Competition, delayed maturity etc..

Estimated losses=RM 50 mil/year :refilling, delayed maturity, uneven growth etc.

Papaya- 2 important diseases

Papaya Ring spot Virus

- Discovered- 1991- Johor.
- Stunted growth, low yield and poor quality fruit.
- RM500,000 spent on controlling and containing activities.
- Economic Losses- > RM10 mil

Papaya Black Rot (*Erwinia malativora*)

- Discovered 2003 - Johor
- Spread to the whole country including Sabah.
- Export of papaya has drastically declined

Yield Losses:

1200plt/ha x 90kg/plt xRM1.50/kg =RM162,200 x >300 ha

= RM 48 million

Economic losses- > RM100 mil

BANANA BACTERIAL WILT COMPLEX

(Ralstonia solanacearum race 4-Blood disease)

First detected in 2007 and affected the banana industry both table and processing variety

Spread to both West Malaysia and Sabah

By 2011:>9900 ha affected (1100pltx15kg/plt/RM1.80)=RM 29700/ha

Estimated Loss= 9900haxRM29,700= RM 294 million

Economic losses= > RM 400 million

Red Palm Weevil

Rhynchophorus ferrugineus

Rhynchophorus vulneratus

Attack 17 palm species worldwide.

Malaysia- First discovered in 2005 in Pengkalan Cepa Airport, Kelantan.

2006- Ulu Tapai, Terengganu and spread to most northern states of Peninsular Malaysia. Ornamental palms are affected

Symptoms of borer attack and tunneling the trunk

More than 300 ha of coconut has been destroyed

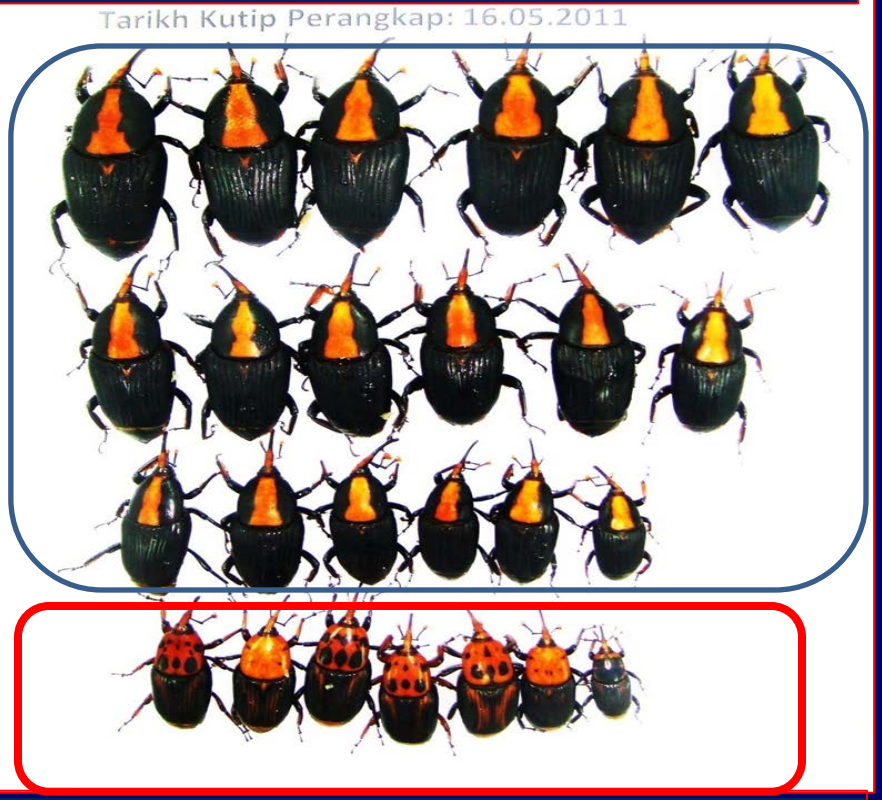
Estimated losses-RM 6mil

Phylogenetic Variation
Red Palm Weevil

Rhynchophorus ferrugineus

Genetically identical

Rhynchophorus vulneratus



Rhynchophorus ferrugineus

Parthenium Weed - Reported (2013) (*Parthenium hysterophorus*)

- One of the world's worst weed
- Competes with crops for nutrients and space
- Affects human health in several countries

LOCATED: All states EXCEPT Kelantan and Terengganu

Kedah is most serious

CURRENT STRAGEY: Contain and Eradicate

In Malaysia-

Cost of control-manageable

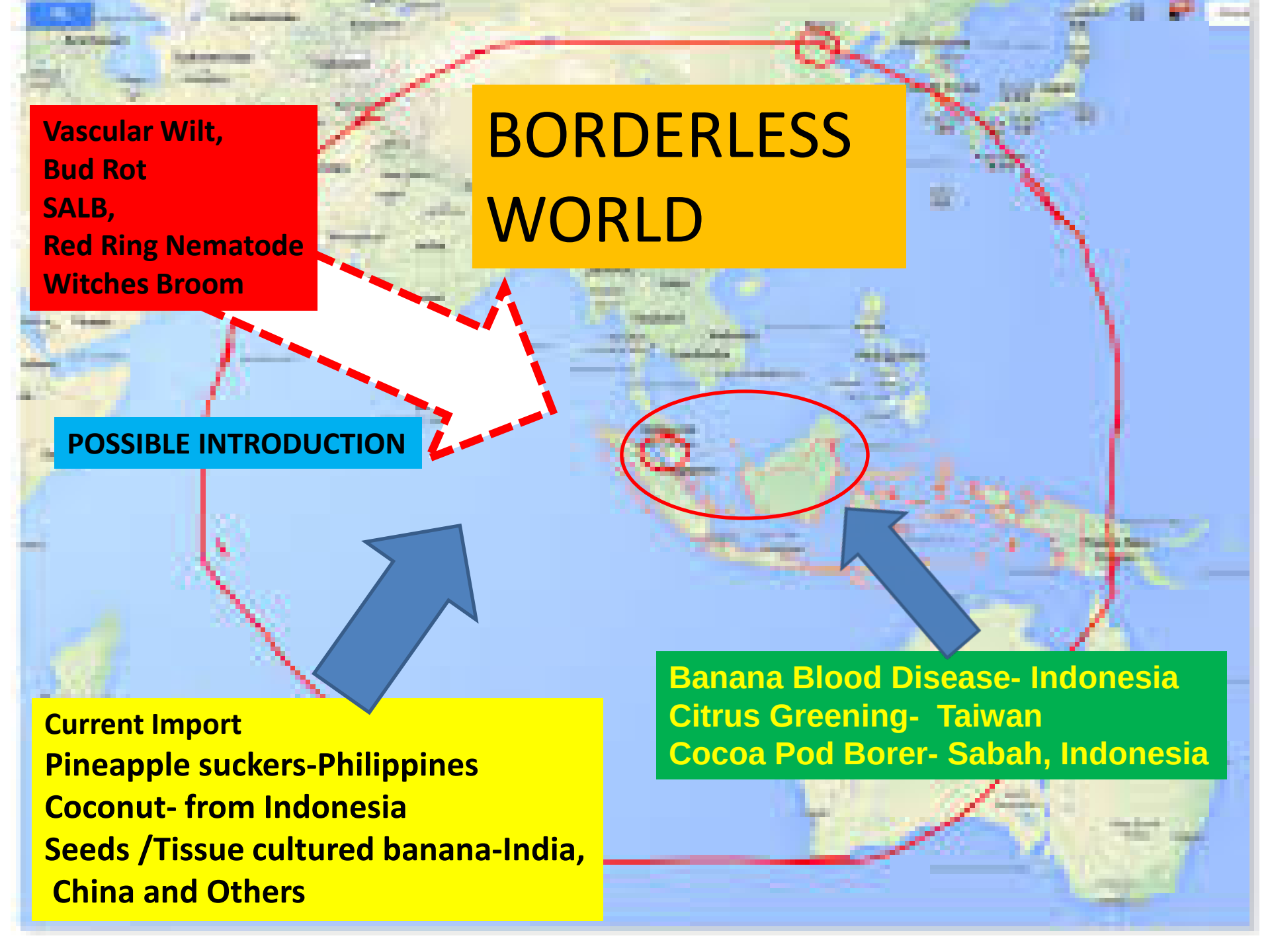
Economic losses- ??

Estimated Yield Loss (2011)-Plant Sector

Crop	Area (Ha)	Invasive Alien Species	Area (Ha) Infested/ destroyed	Estimated losses (RM)
Papaya	2,197	*Black rot of papaya* *Erwinia papayae*	103	10.3 million
Banana	24,189	*Banana Bacterial rot* *Ralstonia solanacearum* race 2 and 4 (moko & blood diseases	9,922	129 million
Coconut	50,000	*Rhynchophorus ferrugineus*	500	6 million
Padi	250,000	*Echinochloa crus-galli* *Pomacea* spp	200,000	250 million

Economic Losses- Plants Sector

Crop yield losses	• Estimated crop losses RM 0.5 - RM1 billion/year
Increased in Production Cost	• Increased in production cost RM700- 900 million /year Eg. Increase cost of rice production 10%-15% (weed and golden apple snail)
Other Impacts due to IAS	• Increased use of pesticides • Environmental impact due to Pesticides • Impact on human, flora and fauna


Vascular Wilt,
Bud Rot
SALB,
Red Ring Nematode
Witches Broom
BORDERLESS WORLD
POSSIBLE INTRODUCTION
Banana Blood Disease- Indonesia
Citrus Greening- Taiwan
Cocoa Pod Borer- Sabah, Indonesia
Current Import
Pineapple suckers-Philippines
Coconut- from Indonesia
Seeds /Tissue cultured banana-India,
China and Others

Exotic Pest and Diseases of Concern

Oil Palm

Vascular Wilt and Bud Rot

Rubber

South America Leaf Blight (SALB)
(Microcyclus ulei)

Coconut

Red Ring Nematod
Bursaphelenchus cocophilus

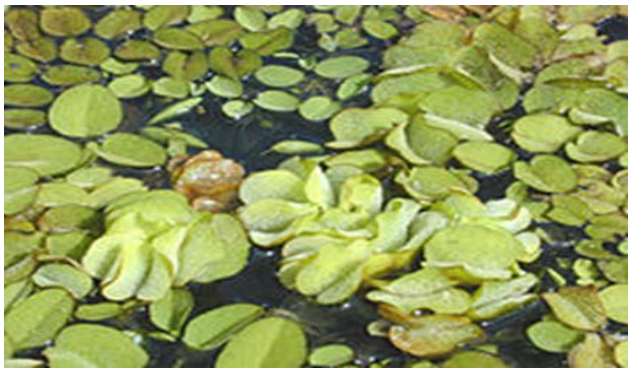
Cocoa

Witches Broom
(*Moniliophthora perniciosa)*

More than 40 IAS has been discovered and the economic impact is not well documented

Examples

- *Diamondback moth (Plutella xylostella L.):*
- *Promecotheca nucifera* –coconut leaf miner
- Bacterial Rot on Pitaya
- Sacbrood virus disease on honey bee
- *Mikania micrantha (Selaput tuggul)*
- *Monochoria vaginalis and Eichhornia crassipes*
- *Salvinia molesta (now serious in Sabah)*
- *Many Others*




TERIMA KASIH