

SEED ENTERPRISE MANAGEMENT INSTITUTE (SEMI)s

Seed Production Field Diagnostics

Short Course

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Pest Risk Analysis



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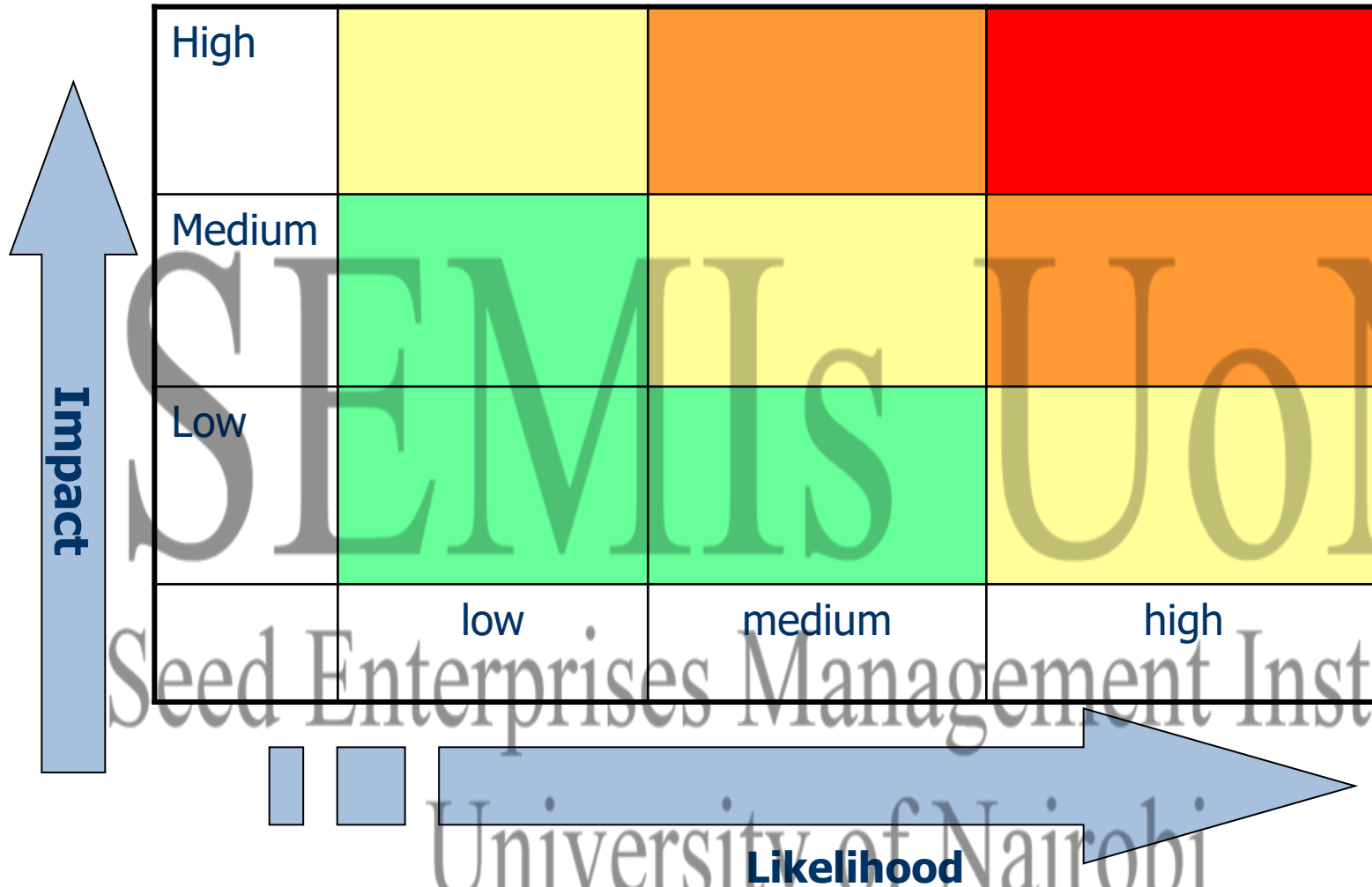
OUTLINE

- What is a Risk?
- What is a plant pest?
- PRA at international arena
- What is PRA?
- Who does PRA?
- Where is PRA done?
- When is PRA done?
- Why is PRA done?
- How can PRA be done?

What is Risk?

- Risk is a Combination of likelihood and impact of a hazard
 - How likely an event(hazard) is to happen, and how much of an effect it would have.
- So...
 - If an event cannot occur it cannot have an impact and there is no risk.
 - If an event is likely to occur but it will have no impact then there is no risk.

Risk presentation matrix



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Pest Risk Analysis

Qualitative risk analysis matrix

	Economic/environmental/social consequences				
Likelihood	Negligible	Low	Medium	High	Extreme
Extremely high	H	H	E	E	E
High	M	H	H	E	E
Medium	L	M	H	E	E
Low	L	L	M	H	E
Negligible	L	L	M	H	H

E – Extreme risk; H – High risk; M – Moderate risk; L – Low risk; N – Negligible risk

Crossing the road example



- 1. The likelihood of being hit crossing from A to B
- Impact on health of being hit by fast car



- 2. The likelihood of being hit crossing from C to D
- Impact on health of being hit by a slower car

What is a plant pest?

- Plant pest
 - Any species, strain or biotype of plant, animal or pathogenic agent injurious to **plants** or **plant products** - *Glossary of phytosanitary terms, ISPM No. 5*
- organism harmful to plants including bacteria, fungi, insects, mites, other plants, nematodes and viruses.
- IPPC recognizes direct and indirect plant pests

Direct and indirect pests

Direct pests: consume or cause diseases to plants



Colorado beetle



Phytophthora ramorum



Pine wood nematode

Indirect pests: indirectly injurious to plants, e.g. through competition, or by harming those species which are beneficial to plants, such as earthworms or pollinators



Japanese knotweed



New Zealand Flatworm



Southern hive beetle
Aethina tumida

Examples of pest introductions into Kenya

Crown gall, *Agrobacterium tumefaciens*

Origin - Detected in Kenya in 1995 probably from Israel

Host range - Serious pest of mainly roses affecting Roots, stems

Spread - International - Seedlings, Roots, Stems, Growing medium accompanying plants



Cypress aphid *Cinara cupressi*

Origin and spread, Introduced into Kenya in 1991. Carried in timber with bark, cones (fruiting body) and propagating/ornamental material (Xmas trees)

Host range Attacks *Cupressus spp.* (Cypress), *Juniperus spp.* (Junipers)



Blue gum chalcid, *Leptocybe invasa*

Origin and spread - Origin – Australia. - Introduced into Kenya (Western Kenya) in Nov 2002

Host range - Attacks *Eucalyptus spp.*

Spread - Movement of infested vegetative material



Twig galls leading to deformity on branches



Blue Gum Chalcid Adult



Water hyacinth



Georg Goergen/IITA Insect Museum, Cotonou, Benin

Larger grain borer



Fruit fly



Golden nematodes



Tuta absoluta



Maize Lethal necrosis disease



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Quarantine Pest

- a **pest** of potential economic importance to the **area endangered** thereby and not yet present there, or present but not widely distributed and being **officially controlled**
- For the endangered area the pest
 - Is not present there and has potential economic importance, or
 - Is present but not widely distributed and is officially controlled

IPPC pests of plants

- IPPC recognizes two categories of regulated plant pests
 - Quarantine pest
 - Regulated non-quarantine pest

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World Trade Organization (WTO)

- Responsible for establishing rules of trade between nations
- IPPC is the recognized international standard setting body for plant health under the WTO-SPS

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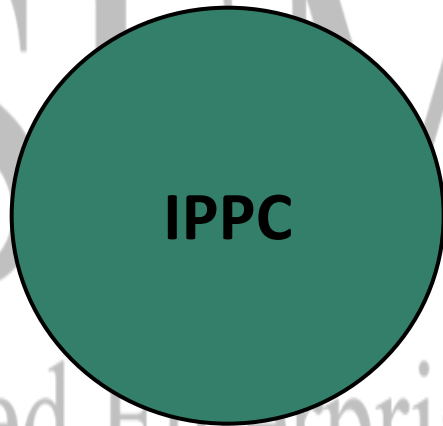
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WTO - SPS Agreement

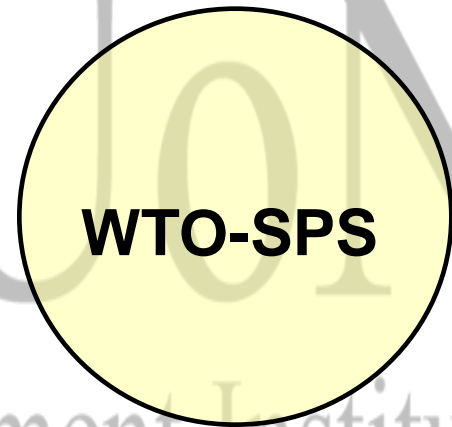
Phytosanitary measures should be:

- consistent with international standards
- justified by scientific principles and evidence
- harmonized to the extent possible
- transparent / notified / non-discriminatory
- only as restrictive as necessary to meet the appropriate level of protection.

International regulatory framework



The IPPC makes provision for trade in a plant protection agreement...



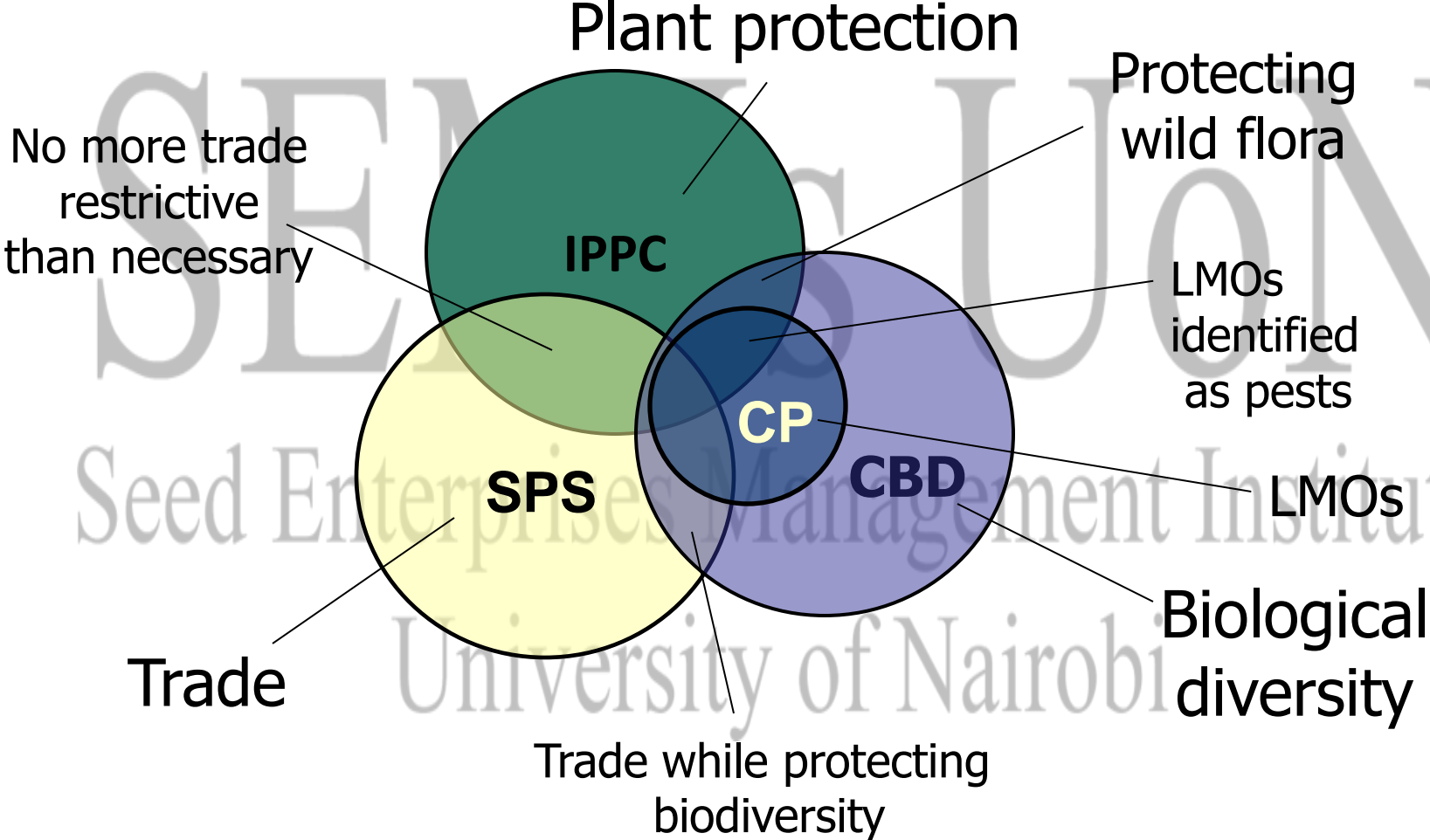
...the SPS makes complementary provisions for plant protection in a trade agreement

Other international agreements

- Convention on Biological Diversity (CBD)
 - Protecting biodiversity
 - Invasive alien species
 - Cartagena Protocol on Biosafety
 - Genetically modified organisms

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International regulatory framework



What is PRA?..../1

- The process of evaluating biological or other scientific and economic evidence to determine whether an **organism** is a **pest**, whether it should be regulated, and the strength of any **phytosanitary measures** to be taken against it

- *Glossary of phytosanitary terms, ISPM No. 5*

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Therefore,

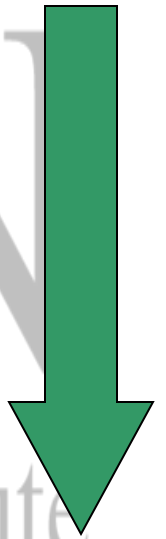
Pest Risk Analysis (PRA) is a process of:

- investigation,
- evaluation of information and
- decision making

with respect to a certain pest to avoid or reduce the probability of entrance or establishment of the pest into the country

Who does PRA?

- Nations (NPPOs)
- Regional Plant Protection Organisations (RPPOs)
- Trading Blocs (EU, ECOWAS)



People



Why is PRA done?..../1

- To evaluate and manage risk from specific pests and internationally traded commodities
 - Identify and assess risks to agricultural and horticultural crops, forestry and the environment from plant pests
 - To create lists of regulated pests
 - To produce lists of prohibited plants and plant products
 - To assist in identifying appropriate management options

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Why is PRA done?.../2

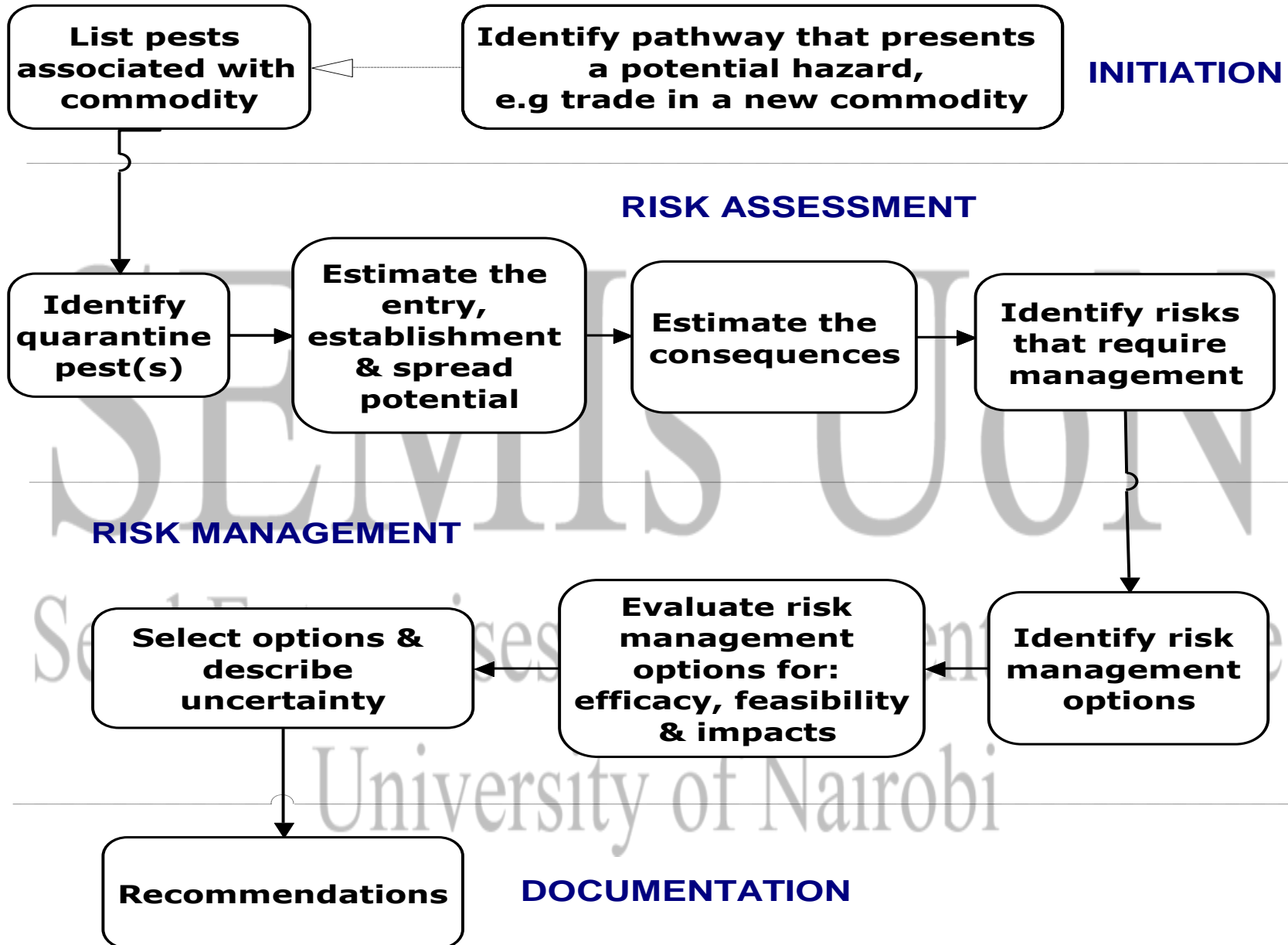
- Answers following questions:
 - Is the organism a pest?
 - What is the likelihood of the entry and establishment?
 - Might the pest have an unacceptable impact?
(economic, environmental, social)
 - If so, what can be done to avoid / inhibit unacceptable impacts?

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Stages in Pest Risk Analysis (PRA):

- Stage 1 – **PRA initiation** => identifying the pest(s) & pathways of quarantine concern.
- Stage 2 - Risk assessment => begins with categorization of individual pests to determine whether the criteria for a quarantine pest are satisfied; followed by evaluation of probability of pest entry, establishment, and spread, and potential economic consequences.
- Stage 3 - Risk management => identifying management options for reducing the risks identified at stage 2. Management options are evaluated for efficacy, feasibility and impact in order to select those that are appropriate.

Pest Risk Analysis



When is PRA done? (Initiation)

3 Ps to initiation

- Pest
- Pathway
- Policy

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Pest-initiated PRA.../1

- Following detection of pest in consignments
- Outbreaks inside or outside of the PRA area
- Request for pest to be imported for research
- Overseas pest spread
- Identification of an organism not previously known to be a pest
- Identification of a pest that may require phytosanitary measures

Pest-initiated PRA.../2



- Uses a pest as the basis for the PRA
- All possible pathways need to be considered

Thrips palmi (Thysanoptera)

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Pathway-initiated PRA.../1

- Commonly new trade pathways
- Identification of a pathway that presents a potential pest risk

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Pathway-initiated PRA.../2

- Uses a pathway as the basis for the PRA
- Additional PRAs are necessary for any pests that are identified as potential quarantine pests



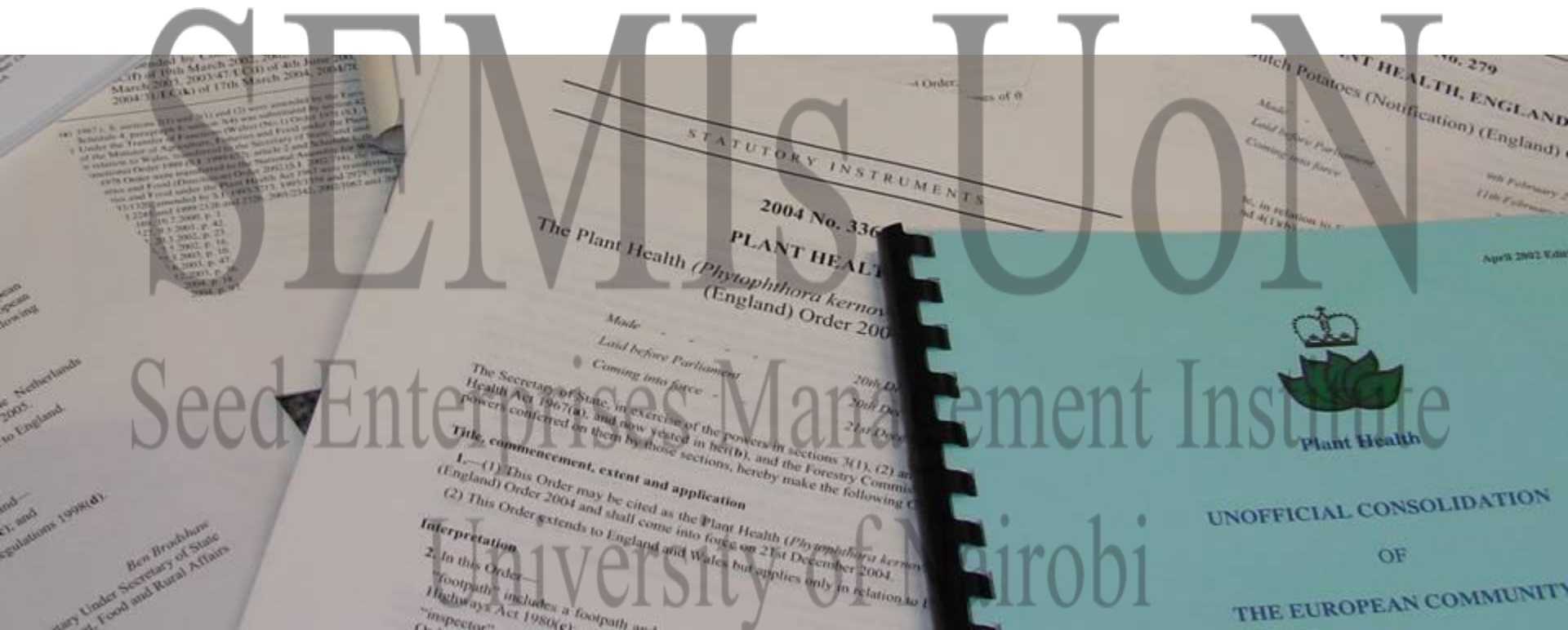
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Policy-initiated PRA...1/

- Review or revision of existing phytosanitary policies and priorities



Policy-initiated PRA...2/

- A requirement for a new or revised PRA originating from policy concerns will most frequently arise in the following situations:
- Review phytosanitary regulations, requirements or operations
- A proposal made by another country or by an international organization (RPPO, FAO) is reviewed
- A new treatment or loss of a treatment system, a new process, or new information impacts on an earlier decision
- A dispute arises on phytosanitary measures
- The phytosanitary situation in a country changes, a new country is created, or political boundaries have changed.

Stage 2: Pest Risk Assessment

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The process for pest risk assessment can be broadly divided into three interrelated steps:

1. Pest categorization
2. Assessment of the probability of introduction and spread
3. Assessment of potential economic consequences (including environmental impacts).

1. Pest Categorization

- Quarantine pest
- Regulated non-quarantine pest

Conclusion of pest categorization

- Pest has the potential to be a quarantine pest, the PRA process should continue.
- Pest does not fulfill all of the criteria for a quarantine pest, the PRA process for that pest may stop.
- Insufficient information, the uncertainties should be identified and the PRA process should continue

2. Assessment of the probability of introduction and spread

This involves assessment of the following:

- i. Probability of entry of a pest
- ii. Probability of establishment
- iii. Probability of spread after establishment

i) Probability of entry of a pest

- Identification of pathways for a PRA initiated by a pest
- Probability of the pest being associated with the pathway at origin
- Probability of survival during transport or storage
- Probability of pest surviving existing pest management procedures
- Probability of transfer to a suitable host

ii) Probability of establishment

- Availability, quantity and distribution of hosts in the PRA area
- Environmental suitability in the PRA area
- Potential for adaptation of the pest
- Reproductive strategy of the pest
- Method of pest survival
- Cultural practices and control measures

iii) Probability of spread after establishment

- Suitability of the natural and/or managed environment for natural spread of the pest
- Presence of natural barriers
- The potential for movement with commodities or conveyances
- Intended use of the commodity
- Potential vectors of the pest in the PRA area
- Potential natural enemies of the pest in the PRA area

3. Assessment of potential economic consequences

Direct pest effects - types, amount & frequency of damage, crop losses (yield and quality), rate of spread, rate of reproduction, control measures (including their efficacy and cost), and effect on existing production practices

Indirect pest effects - effects on domestic and export markets, changes to producer costs or input demands, changes to domestic or foreign consumer demand feasibility and cost of eradication or containment, capacity to act as a vector for other pests, resources needed for additional research and advice, social and other effects.

Conclusions from Pest Risk Assessment

- Used to decide whether risk management is required and the strength of measures to be used.
- Since zero-risk is not a reasonable option, the guiding principle for risk management should be to manage risk to achieve the required degree of safety that can be justified and is feasible within the limits of available options and resources.

Stage 3: Pest Risk Management

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Pest Risk Analysis

- **Pest Risk Management** - process of identifying ways to react to a perceived risk, evaluating the efficacy of these actions, and identifying the most appropriate options.
- Overall risk is determined by the examination of the outputs of the assessments of the probability of introduction and the economic impact.
- If the risk is found to be unacceptable, then the first step in risk management is to identify possible phytosanitary measures that will reduce the risk to, or below an acceptable level.
- Measures are not justified if the risk is already acceptable or must be accepted because it is not manageable (as may be the case with natural spread).

Identification and selection of appropriate risk management options

Appropriate measures should be chosen based on their effectiveness in reducing the probability of introduction of the pest.

The choice should be based on the following considerations:

- Phytosanitary measures shown to be cost-effective and feasible
- Principle of "minimal impact" – not restrict trade
- Reassessment of previous requirements
- Principle of "equivalence" - different phytosanitary measures with the same effect
- Principle of "non-discrimination" - phytosanitary measures should not be more stringent than those applied within the PRA area

Pest Risk Analysis

E = Extreme risk - specific action is immediately required to reduce risk

H = High risk - specific action is required, generic risk treatment plans should be adopted as soon as possible in the interim.

M = Moderate risk - adoption of generic risk treatment plans will reduce the risk to suitable levels.

L = Low risk - manage through routine procedures.

N = Negligible risk.

**Case study: PRA for French
bean seed from USA to Kenya:
value of PRA to trade**

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PRA initiation

- This risk assessment was developed to assess the risk of *C. flaccumfaciens* pv. *flaccumfaciens* due to importing bean seeds, *Phaseolus vulgaris* L. from the US into Kenya.
- Entry of this commodity into Kenya presented the risk of introduction of *C. flaccumfaciens* pv. *flaccumfaciens*.
- *C. flaccumfaciens* pv. *flaccumfaciens* became one of the most important bacterial diseases of beans in the USA, causing up to almost total losses in some years.

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PRA Process

- The risk assessment identified that *C. flaccumfaciens pv. flaccumfaciens* is likely to follow the pathway of beans from the US into Kenya, with a high risk potential.
- It was concluded that the important mitigation measures against this pest remained within the US.
- A bilateral agreement was signed with the following provisions:

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Scope of the Bilateral agreement

- Document contained the conditions under which KEPHIS may issue permits for importation of bean seeds from the USA into Kenya.
- Outlined the responsibilities of the agreeing parties in implementing this arrangement.
- Agreement also btm the Kenyan bean seed importers who are involved in the importation of the bean seeds from the US and KEPHIS.

General agreement.../1

- Imports will only be allowed from facilities that have been approved by APHIS (APHIS Authorized certifying officials will verify that the consignments' field inspection reports and laboratory seed test reports all reference the same seed lot number(s).
- US exporters to ensure that a copy of respective laboratory reports **MUST** accompany the PC and be present on arrival in Kenya.

General agreement.../2

- On arrival, KEPHIS will verify all the accompanying documents and carry out sampling and testing for *C. flaccumfaciens pv flaccumfaciens*.
- All other seed import requirements will also have to be complied with.
- All consignments not complying with import requirements will either be destroyed or re-shipped to the country of origin at the cost of the importer

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KEPHIS Responsibilities

- KEPHIS will issue seed import permits, inspect, sample and test the consignment on arrival.
- KEPHIS will monitor the farms, inspect the crops during active growth, sample and conduct laboratory seed (plants as well) tests to confirm freedom from *C. flaccumfaciens pv flaccumfaciens*.
- KEPHIS will monitor that the consignments will be planted in the farms details of which has been provided by the supplier.

Seed importer responsibilities../1

- Seed Importers will ensure that their suppliers of bean seed in the USA comply with the requirements as agreed upon between KEPHIS and APHIS
- ensure that the supplier understands all the documents that should accompany the seed consignment to Kenya
- facilitate monitoring of the farms which plant these consignments and meet the costs of monitoring, sampling and testing.

Seed importer responsibilities.../2

- ensure that the growers understand and comply with all the requirements as agreed.
- provide all the relevant details about the growers to KEPHIS
- Ensure the growers do not offer third party sale of seeds.

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Current status

- So far we have not had a case of non compliance with the agreement
- All bean seed consignments from the US at ports of entry are tested for pest before release—no positive sample been reported so far
- **KEPHIS** also been undertaking on farm monitoring for the pest and taking suspected specimen samples for lab testing

THANK YOU

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