Asia-Pacific
Economic Cooperation

APEC WORKSHOPS ON BUILDING BIOSECURITY PLANNING AND SURVEILLANCE CAPACITY FOR APEC MEMBER ECONOMIES

August 15-20, 2005
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LIST OF PAPERS AND PRESENTATIONS

B. SURVEILLANCE CAPACITY WORKSHOP

APEC Agricultural and Technical Cooperation Working Group

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Workshop Summary and Recommendations

APEC Workshop on Surveillance Capacity

Pathways from Borders to Rural Agricultural Zones

Dr Paul Pheloung
Office of the Chief Plant Protection Officer,
Australian Government Department of Agriculture, Fisheries and Forestry

A particular challenge to effective plant health surveillance is to detect a rare occurrence of a plant pest before it becomes common. This applies regardless of whether the purpose of the surveillance is to provide early warning of the presence of a new pest, to provide evidence that the pest is not present in an area or to provide reliable knowledge on the true extent of an infestation as a pre-requisite to attempting eradication.

The likelihood of finding a pest, if present, is greatly improved if the surveillance methodology is based on an analysis of potential pathways for introduction and spread. In other words, look for the pest where you would be most likely to find it.

A simple example of the application of this principle is to conduct surveillance for a pest in a crop that is the host of the pest or, using climate similarity modelling, in areas where the climate is suitable for pest establishment. This approach is reasonable for monitoring the prevalence of an established pest in order to make pest control management decisions, but the approach may not be appropriate if the objective is to detect the presence of a new pest. The path from introduction to a cropping situation can be quite long and the pest will probably have had time to establish to a point where eradication is very difficult or impossible.

Pathway analysis can help to target surveillance by helping to identify what to look for and where to look for it.

Early Detection

Identifying target pests

The commodities that are imported and the source of those commodities will determine what associated pests might be introduced with trade. In addition to being present in the country of origin, the pest would need to infest or infect the part that is traded, such as the fruit. A well known risk are timber pests that infest or infect the materials the commodity is packed in, such as wooden cartons, or the pest may simply reside as hitchhikers on the containers or vessels.

A commodity based pest risk analysis is perhaps the best documented approach to identifying pests that could be the target of a surveillance program. This analysis would also take into account the effectiveness of measures employed prior to export and at the border to manage the risk. Consideration of previous experience, such as the detection of pests during border inspection or previous border breaches, can

provide direct evidence that the risk is real and warrants a post border surveillance program.

Identifying sites to survey

The post border fate of an imported commodity should provide some guidance on where to survey for a pest. As an example, after clearing quarantine at the border, containers are transported to various premises in the metropolitan area for unpacking. The goods in the container, packing materials, and the container itself may harbour pests that could find suitable conditions for establishment in the vicinity of the premises. We describe these sites as *secondary* risk sites (the border is the *primary* risk site). Other examples would be importing nurseries, post entry quarantine facilities and businesses, such as timber mills, that operate close to ports and provide suitable hosts and conditions for pest establishment.

The next stage in the pathway for pest introduction are the *tertiary* risk sites which could include transport corridors, distribution points such as wholesale markets, first stop accommodation such as campsites for international travellers, golf courses, military camps and garbage dumps. These tertiary sites would extend into peri-urban areas where small scale market gardens and farming operations may occur.

The *quarternary* risk sites are the agricultural production areas and forests, the end point of a pest incursion.

Where a survey methodology can actively attract a pest of concern, the need to identify sites based on a pathway analysis becomes less critical. For about a decade, Australia has maintained traps for exotic fruit flies and Asian gypsy moth in ports of entry throughout the country. The traps are arranged in a grid within a set radius of each port. The spacing of traps within the grid is based on a technical assessment of the effective range of the pheromone lures used.

Communication

The third element of a program is to identify and then engage people that are associated with the pathway to introduction of a pest, at primary, secondary and tertiary risk sites. These would include travellers, staff employed at the shipping terminals, container warehouses, business owners, military personnel. The key elements are to raise awareness of the risk of introducing new pests, provide information on what to look for (eg pamphlets and pest information sheets) and provide a reporting mechanism such as a telephone hotline. The reporting mechanism would need to have the capacity to respond to reports, particularly diagnostic capacity.

Application of these principles in Australia

The Northern Australia Quarantine Strategy (NAQS) is a program of the Australian Quarantine Inspection Service (AQIS) that has operated for over 20 years. Pathway

analysis for the introduction of both plant and animal and pests determines how the the program is delivered. This is reflected in the development of NAQS target pest lists, which focus on pests that are already established in Australia's nearest neighbours to the north, and the location and frequency of surveillance activities by NAQS scientists. The Torres Strait Islands are close to Papua New Guinea and the risk of movement of pests with people or by natural means (eg wind) is very high. NAQS surveys are consequently very frequent on these islands.

We are in the process of implementing a hazard site surveillance program in the major port of entry of each state, employing the principles described above. This will include systems to record the activities so that the effectiveness of the measures can be assessed. In an early detection program, most of the work will (hopefully) not result in a detection of a new pest. Nevertheless records of negative results can help to quantify the level of confidence that quarantine measures are effective and the pathways for pest introduction are effectively managed.

Response

Upon detection of a new pest, it is critical that an attempt is made to determine the likely pathway of introduction, and then to apply trace forward and trace back analysis. This analysis will indicate where best to conduct surveillance to determine the full extent of the pest.

The response to a detection of citrus canker on a citrus production property in Queensland in 2004 illustrates this principle. The pest was first detected in a quaternary risk site, a place of commercial fruit production in an isolated part of central Queensland. A reliable trace back pathway analysis could not be done however, records of the exchange of planting material and nursery stock enabled a trace forward analysis to determine that only one pathway, the movement of nursery stock out of an orchard adjacent to the infected property, had the potential to lead to a spread of the disease. A surveillance program was conducted to thoroughly examine trees in orchards that were linked to the infected area and fortunately no evidence of citrus canker was found. Surveillance in the pest quarantine area (PQA), linked properties in another area in Queensland and in citrus blocks sampled from throughout Australia provided assurance both domestically and internationally that the pest was confined to the PQA.

Similarly, a fundamental component of the branched broomrape eradication campaign in South Australia involves annual surveys not only within the defined pest quarantine area but in other properties that have been linked to infected properties because of movement of machinery between these properties.

As an example of a successful trace back, powder post beetle (*Minthea reticulata*) was detected in timber used in the construction of a house in Cairns. This was traced back to infested timber in a timber yard. Both occurrences were treated and the pest eradicated from Australia.

Conclusions

The principles of pathway analysis as a means of optimising plant pest surveillance is a well understood component of a response to a pest incursion, but has not been well applied to post border surveillance for the early detection of the arrival of new plant pests. A national program that applies these principles in urban areas is being implemented in Australia.

Why Survey for Plant Pests

Graeme Evans & Teresa McMaugh

Structure of the Presentation

- Overarching Reasons for plant surveys
  - Biosecurity
  - Trade and Quarantine
  - Pest Management
- General surveillance
- Specific surveys:
  - Detection
  - Monitoring
  - Delimiting

Developing Pest Lists/Host Lists

- Done to establish baseline data on pests in a crop
- Required for PRA purposes (ISPM 2)
- Lists of alternate hosts – also important for PRA purposes

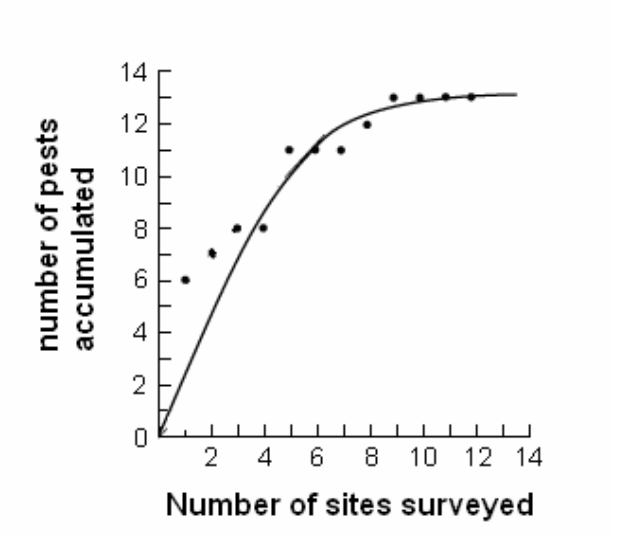
When is a Pest List Finished

- Presence of pests varies
  - From site to site
  - Over time
    - Seasons
    - Growth stage of crop
- Developing species accumulation curves will help to identify when a pest list is finished

Developing Species Accumulation Curves

- Record number of new pests collected at different sites
- Plot accumulated number of pest species against site surveyed
  - Repeat in different production areas
  - Seasons
  - Growth stages of crop

A Species Accumulation Curve



General Surveillance

- Does not involve field surveys
- A term used to describe the compilation of all existing information about the distribution of pests (see ISPM 6).
  - Specimen-based records
  - Publications, journals, reports

Detection Surveys

- *A survey conducted in an area to determine if pests are present (ISPM 5)*
- Involve looking for pests if not known to be present in the area
- Carried out for
  - Developing pest lists/host lists
  - Establishing PFA's, PFPP, PFPS
  - Early detection of pests in areas vulnerable to new pest invasions
  - Examine for quarantine breaches

Monitoring Surveys

- *…on going survey to verify the characteristics of a pest population (ISPM 5)*
- Carried out to
  - Assist with pest management
  - To establish and monitor an Area of Low Pest Prevalence (ALPP)

Delimiting Surveys

- *……survey conducted to establish the boundaries of an area considered to be infested or free from a pest (ISPM 6)*
- Usually carried out to determine the boundaries of an infestation

  - rather than to define an area that is free from a pest
- Differ from other surveys in how sites are selected.

- The main difference between delimiting surveys and other surveys is how sites are selected. The initial detection site is used as a starting point to determine how the pest arrived, where it originated and where it may have spread. Determining where the pest may have spread will determine where surveying and resources for managing the pest need to be focused.

Results of the questionnaire Surveillance

Asia-Pacific Economic Cooperation

CAB International

- **Is there a national database of plant pest records?**

20% of economies have no national database. For those economies that do have a database, it is easily accessible by NPPO

- **Legal requirement for anyone identifying a new pest in the country to report it to the NPPO?**

Only 50% of economies require new pests to be reported

CAB International

How many of the crops grown in the country are officially surveyed regularly?

On average 75% of crops are regularly surveyed

But

the range is between 27% & 100%

One economy did not survey crops but targeted specific pests.

Most countries undertake both targeted and random surveys

The frequency of staff training varied. Some economies trained staff twice a year, others once every 3-4 years

Most pest records conform to ISPM standards in most economies. However, only 40% of economies used GIS to specify pest location

And

Only 70% of economies had this information on a computerised retrieval system

80% of all NPPOs publish and distribute information on pests detected and their distribution.

Only 50% of economies have national standards or guidelines for the declaration of:

Pest free areas

Pest free places of production

Pest free production sites

However 78% of economies have the expertise to declare pest free areas

Examples of pests for which pest free areas have been established are:

- Mango seed weevil
- Citrus canker
- Khapra beetle
- Some fruit flies

In conclusion

- Most economies seem to have adequate surveillance capacity.
- However, the use of GIS and easily accessible databases is not so common.
- The questionnaire did not ask what other information economies held in their database e.g. photos

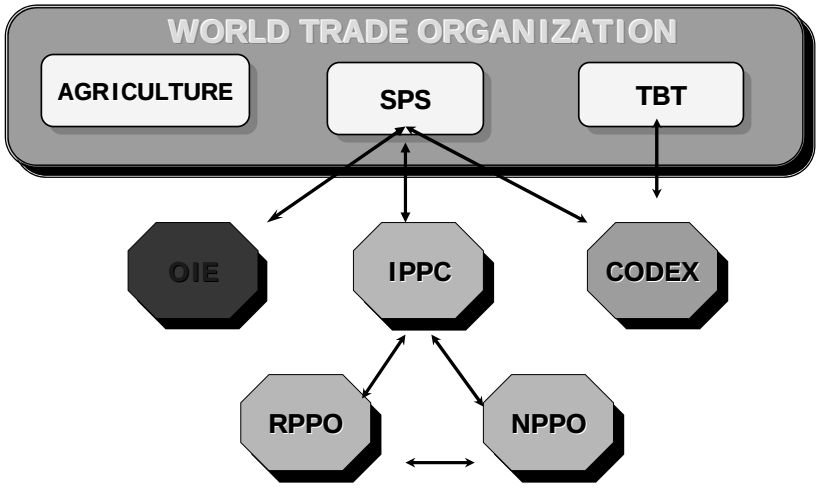
In conclusion

- Declaration of pest free areas, production sites etc. has not been done in most economies.
- A few had PFAs for only 1 or 2 pest species.
- Very few economies have declared pest free areas of production or production sites
- The reasons were not clear – a topic for discussion?

Role of Surveillance in Accessing International Markets

Asna Booty Othman

GLOBAL SYSTEM FOR AGRI-FOOD TRADE



Responsibilities of a National Plant Protection Organization

- **Surveillance** of growing plants including areas under cultivation, wild flora and plants in storage or in transportation

  requires collaboration with relevant scientific institutions

- *reporting the occurrence outbreak and spread of pests and their control*
- *to respond urgently to the introduction of a new destructive pest*
- *to determine which pests should be regulated*
- *to develop a pest list for trading partners on request*

Responsibilities of the NPPO

- The protection of endangered areas and the designation, maintenance and surveillance of pest free areas and areas of low pest prevalence.

-cultivated areas, natural vegetation and forests,

-the environment from direct or indirect effects

-allows for exports from areas of low or no pests without treatment

Principles for protection of plant health as related to International trade.

Surveillance : Contracting parties have a responsibility to collect and record data on pest occurrence and absence to support phytosanitary certification and technical justification of their phytosanitary measures.

Pest listing

Contracting parties " Shall to the best ablility established and update list of regulated pests...

(article VII. 2i)

Pest Reporting

Contracting parties….shall cooperate … to the fullest practicable extent in… the reporting of the occurrence, outbreak or spread of pests that may be of immediate or potential danger… to other contracting party.

Information exchange

Contracting parties have a responsibility to provide information specified in the IPPC

List of Regulated pests (article VII.2i)

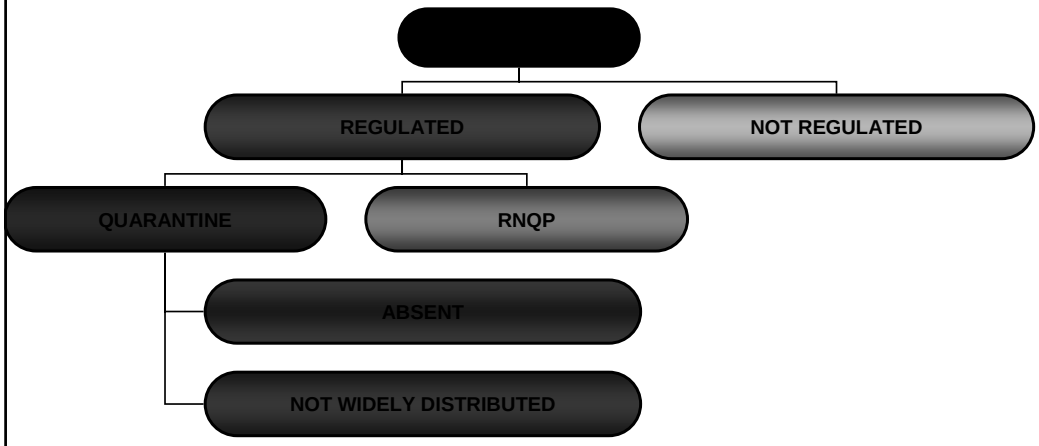
- Pest reporting(article IV.2b and VIII .1a) (IPSM 17)
- Pest status (article VII.2j) (ISPM 8).

Guidelines for surveillance ISPM 6

Definition

An official process which collects and records data on pest occurrence or absence by survey, monitoring or other procedures.

IPPC PLANT PESTS CATEGORIES



Surveillance

2 major types

1. General surveillance
2. Specific surveillance

1. General Surveillance

Sources

- NPPO or designated institution acting as national repository for plant pest records
- research institutions, universities, scientific bodies
- producers, consultants
- museums, general public,
- scientific and trade journals
- contemporary observations
- regional and international sources

2. Specific Surveys

- Detection- presence or absence
- Delimiting- to establish boundaries of infested or non infested area
- Monitoring- ongoing survey to verify characteristics of a pest population

Role of surveillance

- Host – Pest list
- Pest records
- Pest status
- Pest reporting
- List of regulated Pest (ISPM19)

Importing country use of information

- conduct a pest risk analysis (PRA) on a pest in another country
- establish phytosanitary regulations to prevent the entry, establishment or spread of a pest
- conduct a PRA on a non-quarantine pest in their own territory with a view to regulating it.

Exporting country use of information

- comply with import regulations
- meet requests for information from other countries for the purpose of PRA on pests in their territory

Phytosanitary Measures

- Must apply
- Only when necessary
- Minimal impact
- Not trade restrictive
- Consistent with international standard
- Based on sc. principles and evidences
- Harmonised to the extent possible
- Transparent / notified / non discriminatory
- Safe trade , to meet the ALOP.
- Justify and defend decision avoid dispute
- Evaluate decision of others.

Pest reporting

1.To communicate immediate or potential danger

- immediate danger -one that has already been identified (pest already regulated) or is obvious on the basis of observation or previous experience
- potential danger- identified as the result of a PRA.

2.To communicate change in pest status

3.Provide information on other pests

Pest reporting:

-allows countries to adjust as necessary their phytosanitary requirements and actions to take into account any changes in risk.

-provides useful current and historical information for operation of phytosanitary systems.

-facilitates technical justification of measures

- helps to minimize unjustified interference with trade

Recommended Reporting Practices

Accurate reports are an essential part of the international cooperation to facilitate trade. Failure to discover and report pests, or inaccurate, incomplete, untimely, or misinterpreted reports can lead to the establishment of unjustified trade barriers, or to the introduction and/or spread of pests.

PFA and ALPP

Establishment, maintenance and verifying PFA and ALPP. (ISPM4, ISPM 10)
CP should ensure that their phytosanitary import requirements take into account the status of areas in exporting countries.

Systems to establish pest freedom

- **General surveillance**
  - -scientific and trade journals
  - -unpublished historical data
  - -contemporary observations
- **Specific surveys**
  - -detection surveys
  - -delimiting surveys

Phytosanitary measures to maintain pest freedom

- **Regulatory action such as**
  - listing of pest on quarantine pest list
  - specification of import requirements into a country or area including buffer zones
  - restricting movement of produce
- **Routine monitoring**
- **Extension advice to producers**

Checks to verify pest freedom

For verification and internal management, the continuing pest free status should be checked after the PFA has been established and phytosanitary measures for maintenance have been put in place.

- *ad hoc* inspection of exported consignments
- requirement that researchers, advisers or inspectors notify the NPPO of any occurrences of the pest
- monitoring surveys

Documentation and Review

The establishment and maintenance of a PFA should be adequately documented and periodically reviewed.

- data assembled to establish PFA
- phytosanitary regulations applied
- technical details of surveillance systems used
- various administrative measures taken in support of the PFA
- delimitation of the PFA

Market Access

1. New Market Access Submission.
2. Market Access Maintenance.
3. Market Access Improvements.

New Market Access Submission

- **Preparation of Tech. Document**
  - Pest Management Surveillance / Pest list / data sheet
- **Conduct PRA by recipient country.**

New Market Access Maintenance

- Activities to maintain existing markets in responses to external threats resulting in non-viable trade or trade slow down or market closure

New Market Access Improvements

Improvements to existing market access protocol for on going trade.

- New surveillance data
- Review Phytosanitary measures
- Modification / Removal

Pest Eradication Program

- one of the main activities is surveillance.
- to verify successful and assurance to trading partners.
- survey data to meet their phytosanitary requirements.

6. Transparency

The NPPO should on request, distribute reports of pest presence, distribution, or absence derived from general surveillance and specific surveys.

DOMINO EFFECT

surveillance

⇩

pest listing

⇩

pest categorisation

⇩

pest risk analysis

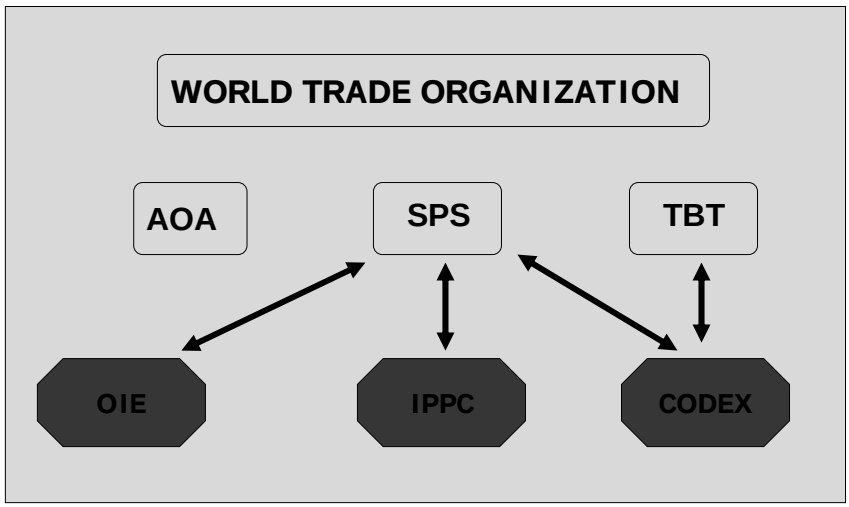
⇩

scientific justification for phytosanitary measures

Sanitary and Phytosanitary (SPS) Measures

The Cost of Compliance

GLOBAL SYSTEM FOR AGRI-FOOD TRADE



SPS measures

	To Protect	From	Agency (Reference Pt)
1	**Plant Health**	**pest, diseases & pathogens**	**IPPC**
2	**Animal Health**	**zoonotics & plant carried diseases**	**OIE**
3	**Food Safety**	**risks from additives, contaminants, toxins, pathogens in feed and beverages**	**CODEX**
4	**A Country**	**Social and Economic damage caused by entry, establishment or spread of pests**	**Govt**

A Country's Sanitary and Phytosanitary Measures)

- **Apply only when necessary**
- **Based on scientific principles**
- **Must not be maintained without sufficient scientific evidence (Article 2 (2))**
- **SPS must also not arbitrarily or unjustifiably discriminate between countries**
- **SPS cannot be applied in a manner that would constitute a disguised restriction on international trade (Article 2 (3))**

Requirements For Market Access

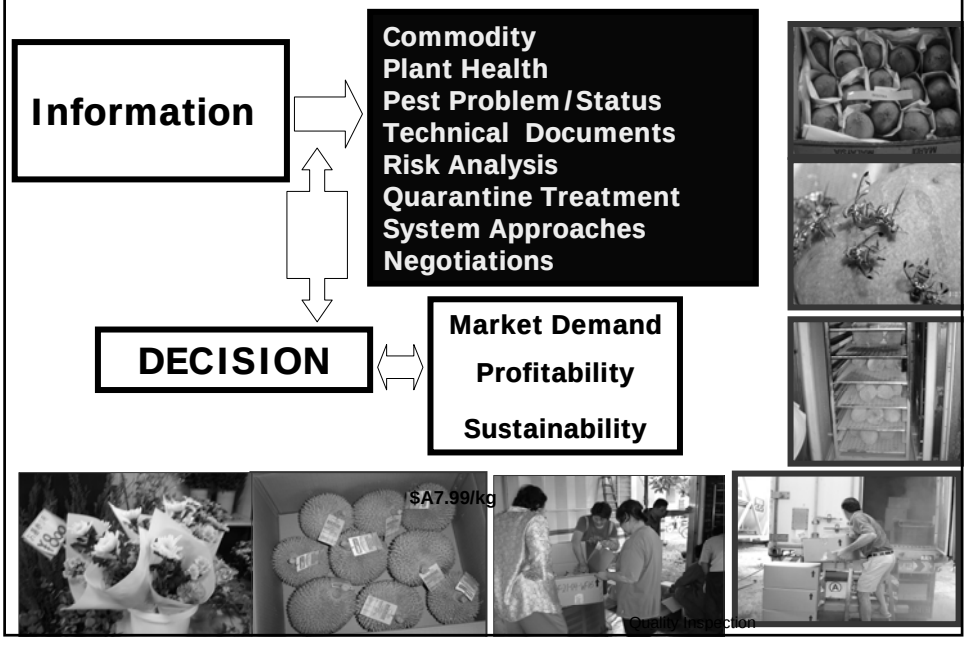
Phytosanitary

1. Import Requirements: eg. PRA, Low Pest Prevalence
2. Production Methods and Processing
3. Compliance (Quarantine Treatments)
4. Phytosanitary Certification

Sanitary

1. Risk Assessments
2. Inspection & accreditation of establishments
3. Production Methods and Processing
4. Import Documentation & certification
5. Inspection and entry clearance
6. Quarantine
7. Sampling and testing

Processes involved for Market Access



COST OF COMPLIANCE

- PRA
- TREATMENT FACILITIES
- INFRASTRUCTURE INVESTMENT
- ACCREDITATION
- ISPM 15

Article 5:Pest Risk Analysis (PRA)

Done Prior to importation of any agricultural goods.

Based on ISPM Nos. 2, 11, 21

e.g. to export Crysanthemum and Pineapple to Australia

PRA by Biosecurity Australia

Crysanthemum = AU$ 60,000 (about 1 year)

Pineapple = AU$ 40,000 (2 years and not yet approved)

PRA for SALB

- **Brazil wants to export fruits (Apple, orange, Grapes) to Malaysia and the region**
- **The consignment can be a 'PATHWAY' for SALB to be introduced into the region.**
- **The region need to do PRA on SALB.**

  Already spent US$ 150,000 (over a period of > 2 years)

  (may take 5 years to resolve the issue)

E.g of COST IMPLICATIONS to carry out PRA

- Thailand's durian to Australia - 9 years (1991-2000)
- Malaysia's durian to Australia - <1 years
- Malaysia's pineapple to Australia - not yet (2 years)
- China's potted plants in growing medium to U.S.A - 6 years
- Thailand's milled Rice to Mexico - 3 ½ years
- China's longan to U.S.A - 3 Years

Conducting a PRA, for a commodity is a long and tedious process and expensive.
Requires: Technical Information, research studies, consultation, expertise, Bilateral discussion

COST- RANGES FROM US$ 50,000 – FEW MILLIONS

Treatment Facilities

- **Exporters have to establish facilities to meet treatment requirement for pest disinfestation**
- **Countries impose specific treatment for export of same product, e.g for Papaya:**

  Japan - Vapour Heat Treatment (US $ 200,000)

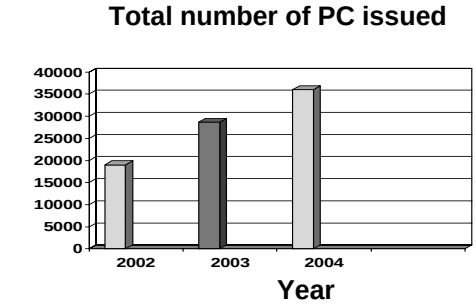
  China - Hot water Treatment (US $ 100,000)

  Others - ? ? E.g irradiation

ACCREDITATION COST

- **Cost to Malaysia to carry out surveillance for (" Low Prevalence of White Rust Disease")**
- **= US $ 7,000 (T&T and salary)**
- **= US$ 20,000 (For AQIS to visit and accredit the farms)**
- **Additional infrastructure cost for farm/ packing house improvements (>US$ 200,000)**

Cost Implication ISPM 15: Wood Packaging Material



Long Horned Beetle

Pinewood Nematode

ISPM 15 - COST OF COMPLIANCE

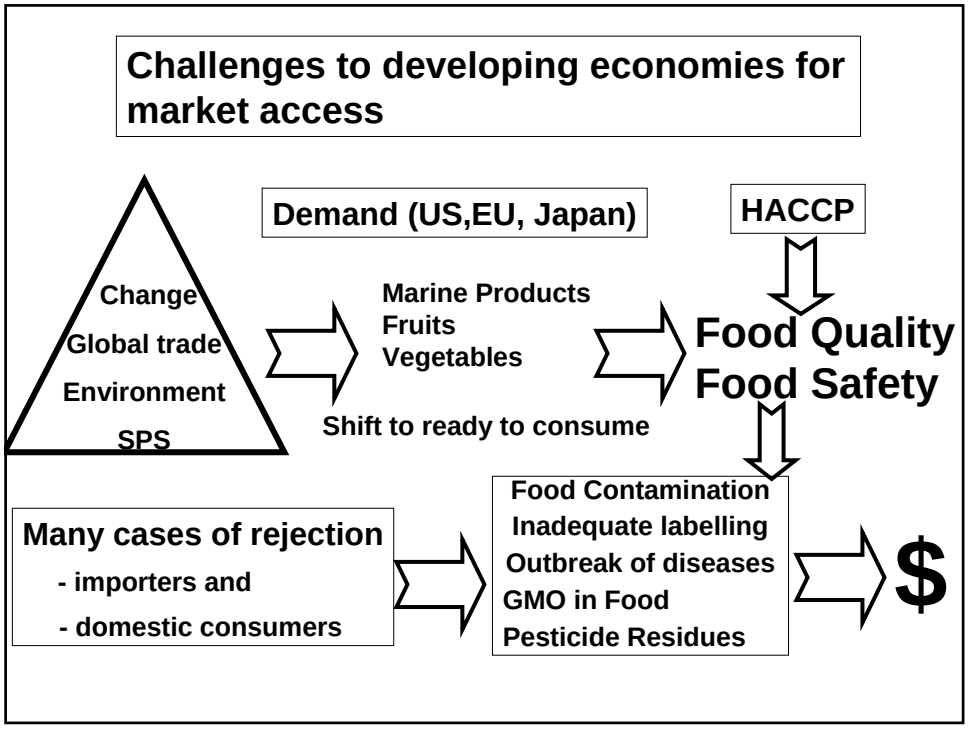
- Cost increase by 15 -20 %
- Increase in cost for industry not normally regulated
- Losses due to time factor
- Service providers unjustifiably increase cost of treatment
- Some less developed economies do not have treatment facilities – trade disrupted

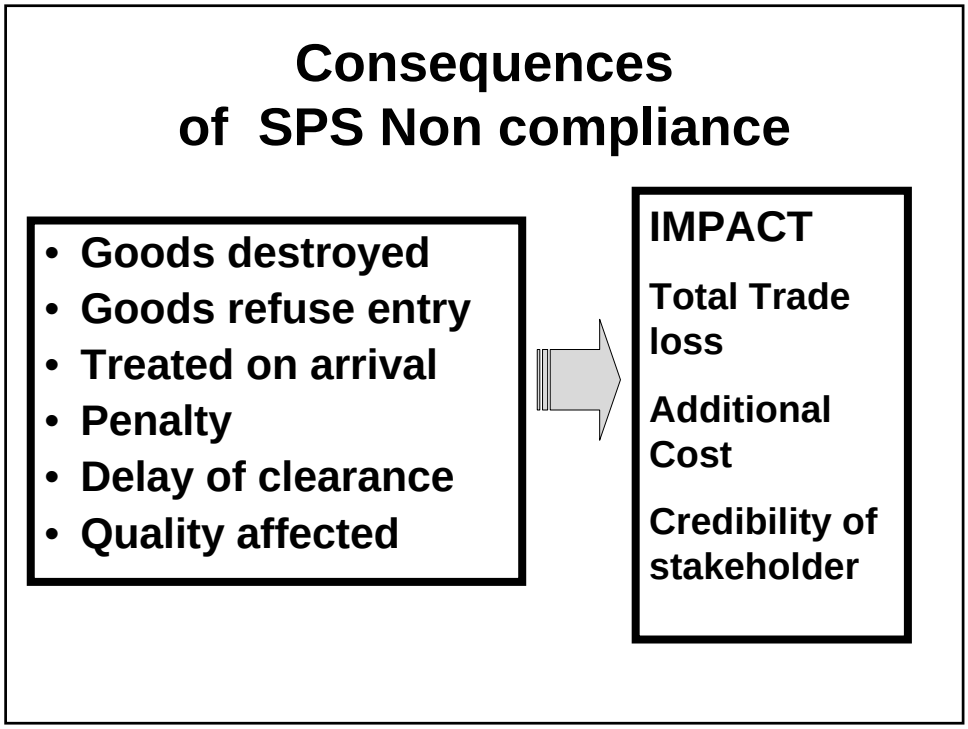
Challenges of Developing Economies :

- **Lack of Regulatory framework to take into account SPS commitments**
- **Uncoordinated organisation/administration for implementing SPS measures**
- **Inadequate infrastructure to implement SPS measures**
- **Limited Knowledge Base**
- **Lack of funds for implementation**
- **Inability to effectively participate in Standard Setting Committees**
- **Inadequate SPS information Data Base**
- ***Limited benefits derived from the SPS Agreement**

To Improve Market Competitiveness Requires:

1. **Further Strengthening of national food control system**
   - **Food Quality and Quality Assurance scheme**
2. **Plant and Animal Health Infrastructure**
   - **Surveillance, Inspection and approval procedures**
3. **Farm Improvement (Good Agricultural Practice)**
4. **Phytosanitary Accreditation Scheme for Farms & Packing House**
5. **Efficient marketing chain (Refrigeration facilities)**
6. **Transportation (competitive air cargo charges)**


Challenges to developing economies for market access
Demand (US,EU, Japan)
HACCP
Change
Global trade
Environment
SPS
Marine Products
Fruits
Vegetables
Food Quality
Food Safety
Shift to ready to consume
Many cases of rejection
- importers and
- domestic consumers
Food Contamination
Inadequate labelling
Outbreak of diseases
GMO in Food
Pesticide Residues
$


Consequences
of SPS Non compliance
• Goods destroyed
• Goods refuse entry
• Treated on arrival
• Penalty
• Delay of clearance
• Quality affected
IMPACT
Total Trade loss
Additional Cost
Credibility of stakeholder

To implement SPS

1. **Administrative Set Up**
   - **reorganize or revamped**
   - **adequate number of staff**
2. **Legal Framework (Legislation)**
   - **national legislation to take into account international standards / requirements**
3. **National Capacities**
   - **– expertise to carry out : research on crop protection and quarantine treatments, PRA, diagnostic, surveillance etc**
   - **Adequate Funds**
   - **Establishment of plant health information and pest reference collection**

Introduction to the Surveillance Guidelines

Graeme Evans and Teresa McMaugh

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INTRODUCTION

Most international trade in food products is conducted under the rules of the World Trade Organization (WTO) as set out in the Agreement on the Application of Sanitary and Phytosanitary (SPS) Measures. It has become increasingly apparent that trade in these commodities is constrained by deficiencies in the basic infrastructure underpinning plant health, particularly in the developing countries that have not enjoyed the same growth in exports of agricultural commodities as the developed countries. The problem arises because developing countries often lack the technical capacity and resources to:

- Survey for pests to provide baseline data on the health status of plant industries;
- Accurately and rapidly identify pests;
- Database records of pests and retrieve this information when needed; and
- Detect and control invasive pests.

Responding to the problem in the ASEAN region, the Office of the Chief Plant Protection Officer (OCPPO) has developed a program of work that focuses on building the arthropod pest collections, plant disease herbaria and plant pathogen collections in Member countries. The Office has been supported in this endeavour with generous assistance provided by the Australian Agency for International Development (AusAID).

The rationale for the work on building these important biological collections is to address the Australian Government's policies of promoting the liberalisation of international trade and of addressing pest threats off-shore. The work program also reflects a growing awareness in many countries of the threats posed by invasive alien species and the opportunities to mitigate pest threats through biosecurity planning, robust quarantine action and a capacity to address exotic pests that cross national borders.

Well-populated collections of arthropod pests and plant pathogens contain multiple entries of the same pests from different hosts and from different geographic and production areas, and represent the pests that exist in a country. A capacity to survey for plant pests is critical to populating pest collections. With this in mind, the OCPPO has been collaborating with countries of the ASEAN region to build the capacity of plant health scientists to survey for plant pests. A manual providing guidelines for surveying for plant pests in south east Asia and the Pacific was seen as a useful approach. The Australian Centre for International Agricultural Research (ACIAR) and the Rural Industries Research and Development Corporation (RIRDC) generously supported the task of writing of the guidelines. The project was led by Dr Teresa

McMaugh, with support provided by her colleagues in the OCPPO and national and international collaborators.

Developing the Guidelines

In November 2004, a workshop as convened in Australia that was attended by thirty-five plant health scientists from Australia, south east Asia, the Pacific and the to discuss the content, scope and direction of the guidelines and the needs of regional plant health scientists in order to target the guidelines to the correct audience. Recommendations from the workshop participants were that the guidelines:

- Align with international standards and requirements, such as the FAO ISPMs, where possible
- Provide clear guidance as to how to comply with the standards
- Be instructive and simple
- Be 'guidance' rather than a 'manual' which could be enforceable and constraining
- That the guidelines not provide detailed information on statistics or specimen collection as these can be found elsewhere.
- That the guidelines place strong emphasis on reporting the survey
- That the guidelines contain case studies of surveys that are performed in the region

Content of the guidelines

- The guidelines target plant pest surveillance in crops and forests where pests include weeds, plant pathogens, insects and their allies.
- The guidelines use the terms and definitions in ISPM 5 to align with international standards for plant pest surveillance.
- The guidelines cover:
    - Designing Specific Surveys
    - Designing General surveillance plans

With more details in chapters on:

- Detection surveys
- Monitoring surveys
- Delimiting surveys
- Reporting the results (Figure 1)

An appendix has been included of 23 regional and Australian survey case studies.

- The main guidance is provided on how to design, implement and analyse specific surveys for plant pests. This is laid out in 21 steps that can be followed according to the purpose and nature of the survey to be designed (Figure 2).
- Advice is provided as to how to approach such aspects as identifying field sites, applying statistics, collecting specimens, coping with field conditions, data analysis and reporting.

Availability of the guidelines

- The final draft has been completed and is being edited by the funding body, ACIAR.
- The guidelines are to be translated in Thai, Vietnamese, Bahasa and Spanish in CD format.

- ACIAR will publish and distribute the guidelines.
- The guidelines will be made freely available to people in developing countries.

Figure 1. Chapter structure of the guidelines.

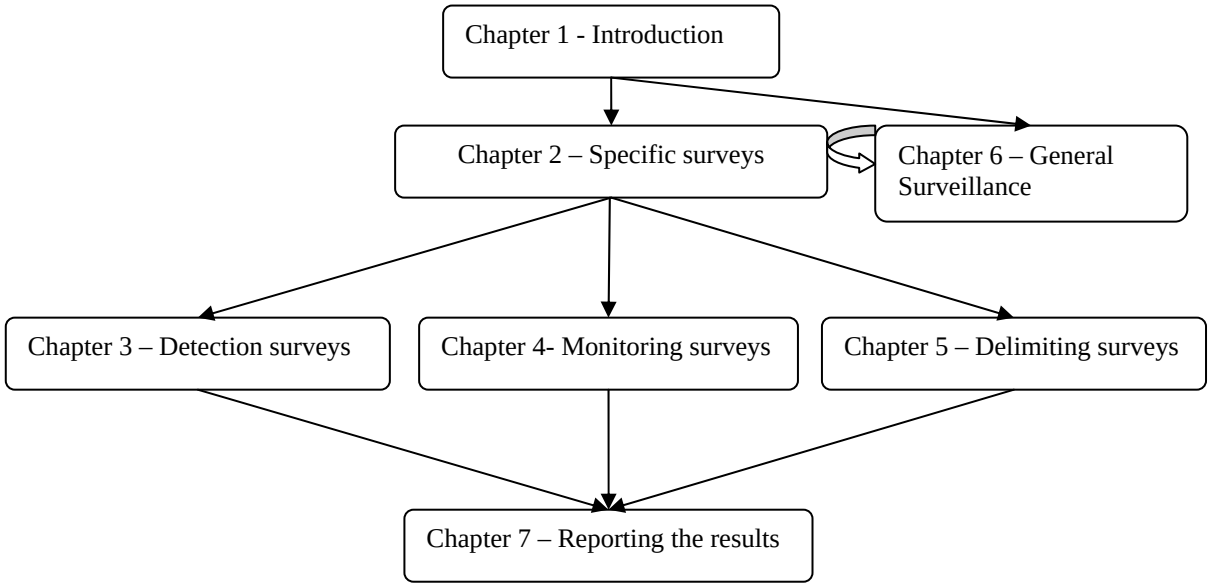
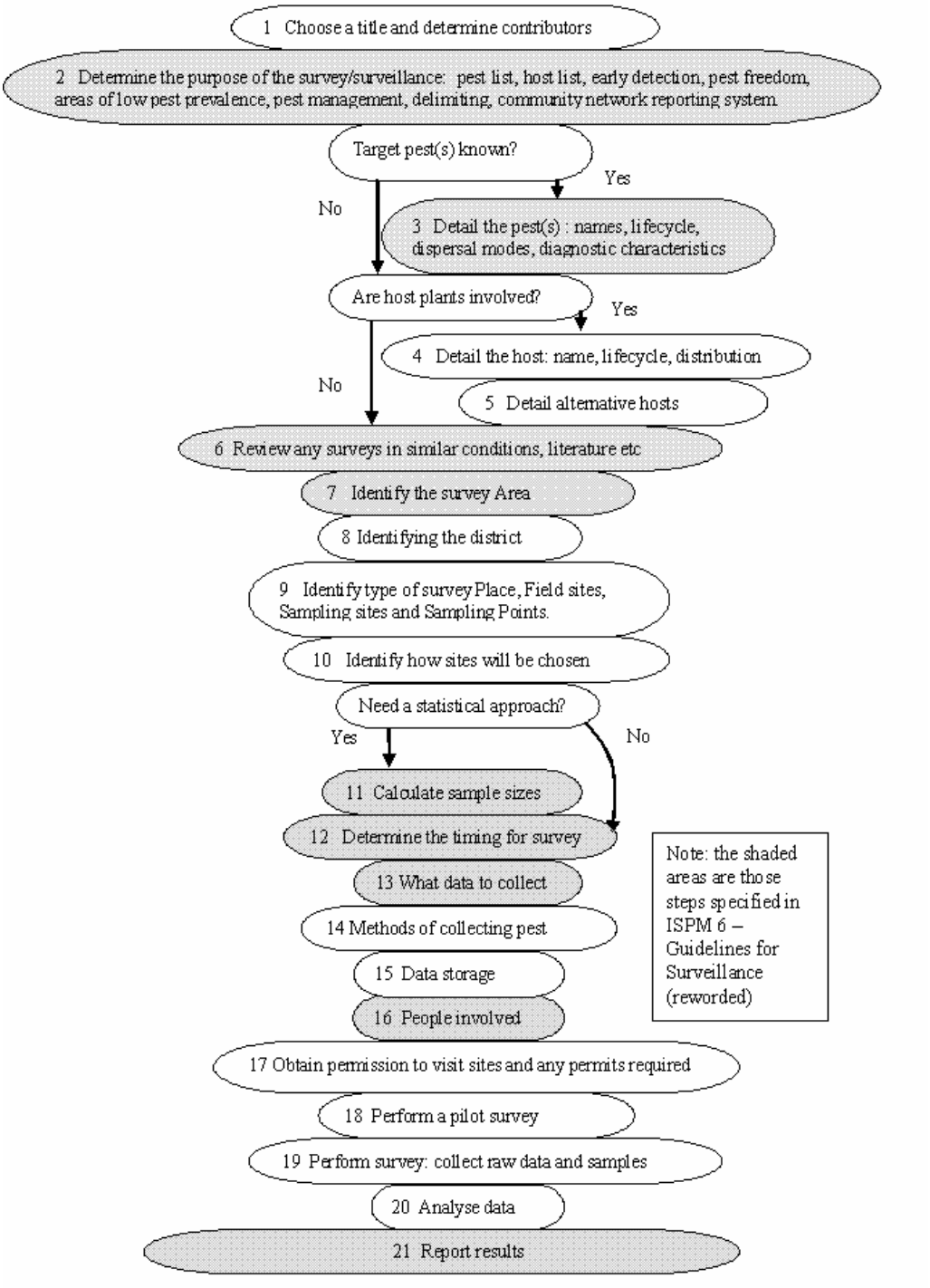


Figure 2 : The components of designing a specific survey in 21 steps.



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STATISTICS IN PEST SURVEILLANCE

Building Biosecurity Planning and Surveillance Capacity For APEC Member Economies, 15-20 Aug 2005

Kalaivanan Nadarajah

Abundance of Raw Data

- Millions of raw data from surveillance (from systematic sampling)
- Temporal data
- Spatial data
- Population and Sample data
- Remote sensing
- Calculate basic statistics → create a map

2

Guide lines -Teresa McMaugh

- ISPM - delimiting survey-outbreak, detection survey-noxious, general surveillance - info on regular pest, monitoring survey – specific pest-pop /ongoing
- general surveillance – early detection
- designing survey
- Target pest list – concern list, incursion, risk assessment, production, quarantine pests etc.
- Eg. Rice pests surveillance system – reduce economic loss
- Can develop MOP for each country based on local needs
- Farm size, type of pest and type of survey

3

Statistical Application

- Survey Design
- Site selection
- Pests list -prevailing
- Forms
- Accuracy of survey methods; sweep net, vacuum, trap (light t., hormone t.), visual counting etc.
- Sampling, Level of processing & analyzing data
- Confidence and Validity

4

Statistical Tools

- SAAS, QM, SPSS etc
- Excel Spread sheet, dBase
- Mapping software
- Sampling tables, random no.
- Linear programming
- Forecasting
- Hypothesis Testing, Regression Models

5

Presenting Averages – No Good !

- Averages to conclude pest status!
- Averages to make control decisions!
- Averages only for compiling data for a small plot or say 10 hills of rice from a spot
- Info on Spread of data is important for mgt
- Details on variables, measurement, accuracy and confidence level

6

Data Presentation

- Array (simplest) → can create class interval
- Frequency distribution → histograms
- Measure of central tendency → mean, median, mode
- Measure of variability → range, SD, variance, CV
- Measure of data → Level of Scale;
  - nominal, ordinal, interval & ratio

7

Principles to explore!

- Descriptive statistics from raw data
- Inferential – inductive statistics from samples
- Sampling and methods accuracy
- Hypothesis testing & testing models
- Forecasting (time series data)

8

Sampling – Random/Systematic

- Sampling -Full, Random, Stratified, Systematic, insect trap
- Stratified random sampling to select number of plots in each district / village
- Simple random sampling to choose plots
- W, U or zigzag to collect samples
- Stratification (better option)
  - Expert opinion-when, frequency, where and how
  - Discriminately
  - Practicality- Manpower,,Physical factors,Urgency,Cost factors

9

Sampling – Random

- Simple random sampling to choose plots - random no. table in p.46 (several ways of selecting no. from the table of 5 digits)
- Systematic sampling within the plot !
- Sampling frame
- Sample size eg. From Krejcie & Morgan's
- Look out for selection bias, counting bias, recall bias, sampling error
- Sample size for measuring the proportion of sites infested with pests –GPPS p.56
- No. of plots infested with pest? expressed in %
- To cal. no.of pest/unit area – count of pests /unit area & where pests are numerous, consider scale of coverage or scores

10

Actual / Design / Estimated Pest Level

- Actual Pest level – true pest pop or true proportion of infest units
- Estimated pest level – from survey
- Design pest level - from pre-survey estimate (0-100%) to determine sample size. If over estimated – sample no. too low!
- Statistical confidence is the probability that the actual pest level will be within the range of the design pest level.
- Monitoring Survey. Design pest prevalence 20%,CI=0.95,Z=1.96(Normal distribution)
- Sample size = (1.96 / 0.05) 2 x 0..2 (1- 0.2) = 246
- Design threshold of 95% acceptable p.57,58

11

Confidence Level

- Eg. Pest status 20% CI 95% means $\pm$ 5%, actual pop is likely to occur within the chosen level of CI eg. 46.5% (95% CI:44.2-48.8).
- 95% detection threshold is considered acceptable
- Confidence is usually expressed as an interval of values within which the actual prevalence is likely to occur with the chosen CI.
- Eg. A pest level of 46.5% with a confidence of 95% can be expressed as: 46.5% (95% CI: 44.2-48.8%)

12

Sampling – Systematic

- Walking and examining hosts in a W, diagonal or zigzag pattern across the field makes sampling sufficiently random to chosen sites (GPPS p.44)
- Sample no. is proportionate to the population
- Move the starting point by one row to avoid repeat
- Every 10th row, 3rd farmer, 2nd canal etc
- Independence – intervals of sampling and expected pest distribution. Eg. Regularly spaced out sites should not coincide consistently with the presence or absence of a pest (GPPS,p.43)

13

Record Forms

- Farmer level processing (mgt unit)
- Center level processing (monitor pest levels, practices, controls within a locality)
- Regional /national level - monitoring & advisory
- Format – standardization for processing/comparing
- What data to record – GPPS p.64 Eg. GPS grid….
- Design a form – GPPS p.65
- Consider sample size, coverage, practicality, date, position /GPS Xref & format for input to PC
- Scale of intensity & smallest unit

14

Central tendency: mode and median

- Mode: Most frequent mark (Note: there may be multiple mod

Statistics

mark

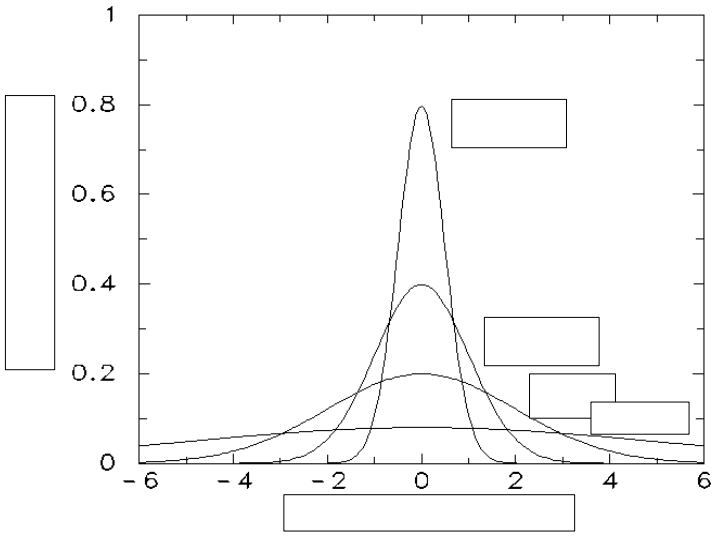
N	Valid	87
	Missing	0
Mean		54,62
Median		56,00
Mode		55[a]

a. Multiple modes exist. The smallest value is shown

- Median: score from the middle of the list when ordered from lowest to highest. Cuts data into halves (doesn't take account of values of all scores but only of the scores in middle position).

15

Spread of distributions



16

Spread of the population: variance measures

- Variance: sum of squared deviations from the mean

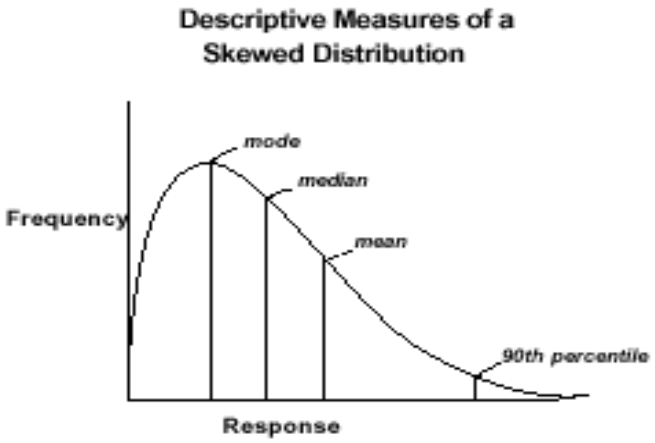
  Variance = $\frac{\sum (X-\mu)^2}{N}$

- Standard deviation: square root of variance

$$\sigma = \sqrt{\frac{\sum (X-\mu)^2}{N}}$$

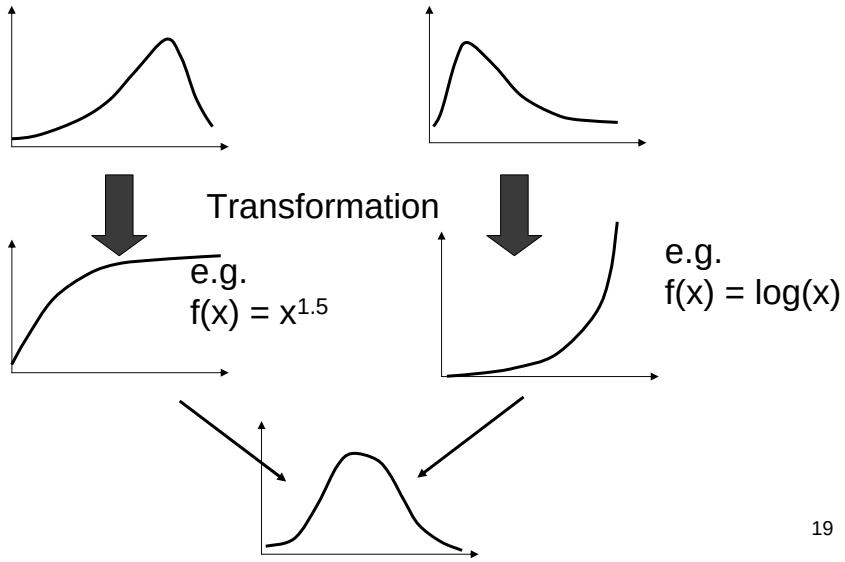
17

Skewed distributions and measures of central tendency



18

What kind of tranformation?



19

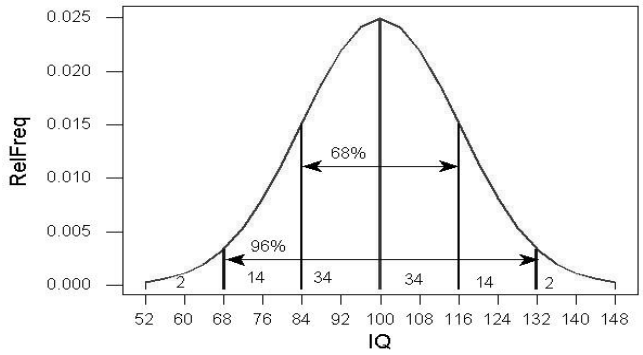
Standard Normal Curve

- Since all normal distributions have the same normal curve we can use standard normal curve to analysis this distribution, take advantage of the symmetry & the SN table
- The standard normal curve; mean= 0, standard dev = 1. The values along the X-axis is given a Z score.
- Changing x values into Z score
  (how far fr mean)
  $$z = \frac{x - \bar{x}}{s}$$
- SD is also none the Std Error
- Total area under curve is 1, area to left of a Z score (%) or % of values bet say Z=2.0 to -2.0!

20

Normal distribution (Gaussian distribution)

- Example: IQ scores, mean=100, sd=16



Mean = Median = Mode

21

Data Analysis

- Basic statistics to describe pest pop
- Estimate confidence of data collected
- Create map
- Examine changes in pest location and density over time

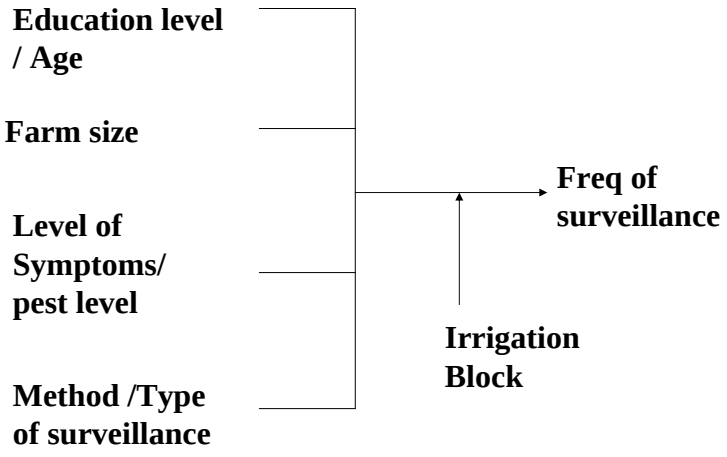
22

Hypothesis testing

- Quantitative statement about a pop or statistical statement about the probability distribution of a random variable
- Type 1 &Type II error – test must minimize errors by sample size and significant level
- Answers questions about a population or subject of study.
- How is **pop of BPH** influenced by plant pop, fertilizer rate, crop age, other pest pop, rainfall etc.
- How is the **Frequency of surveillance** influenced by factors such as farmers edu level, age, farm size, pest symptoms, method of surveillance etc.

23

Theoretical Framework



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Dependent and independent variables

- Independent variable:
  - Variable(s) manipulated by the experimenter
  - experimenter determines the values it will assume
  - Independent variables may have a number of different levels
- Dependent variable:
  - Subject of Study Eg. Frequency of surveillance, BHP pop, Staistical Application in Surveillance

❖Important that you measure the right thing and not something else!(validity)

25

- Cross tabs to tabulate the diff gps of var both dependent and indep to test how they group or match
- Pearson Chi Sq. tests – to investigate the rel bet 2 nominal var
- Independent sample T test – to investigate if there is a diff bet 2 gps of independent var for a particular test var.
- One way ANOVA – to investigate if there is a sig diff bet gps of >2 (eg. Irri blocks) on pest level (interval scale)
- Linear Regression – to explain how much of the variance in Freq of surveillance is explained by ind var such as

26

Hypothesis Testing 2

- Directional or non directional
- Directional hypo. Postulates a sig. + or – relation bet 2 variables.
- Linear Regression analysis – to establish which factor contributes sig. to the variance in surveillance freq.
- Multiple Regression Analysis – to regress all 3 independent var. to explain if all 3 var together will sig. explain the variance in surveillance freq.

27

Testing Relations – various tests

- Pearson correlation matrix
- Regression model
- T test – any sig difference bet 2 groups eg. High & low education gp. on the Freq of surveillance at least 1 on interval or ratio scale
- One way ANOVA to see if there is any differences bet > 2 gps Eg. Types of surveillance (3 types)
- CHI SQ to prove relationship (strength of rel. between 2 variables in nominal scale Eg. Block A and Block B with Freq of surveillance.

28

Testing Relations – Level of scale

- Perform cross-tabs for all to visualize relations
- Surveillance freq – both **interval** & nominal data (high/low)
- Edu level / age – **nominal** (high-low)
- There Is no **rel** bet SF and the diff Edu level / age (SF is dep on the diff Edu levels!)

  (i)T-test - any sig. diff in mean values, interval & nominal

  (ii) Cross tabs & Chi sq test sig relationship? using both nominal.
- There is no **sig diff** in SF bet the diff Edu level / age (There is a sig + corel bet SF & the edu gps)

  (i) T-test using SF interval and Edu. Nominal

  (ii) Cross tabs and chi sq. using both nominal
- There is no **rel** bet SF and the diff Surveillance methods (Eg. 3 methods) or (4 diff irri blocks)

  One-way ANOVA - any sig. diff in mean values, interval & nominal

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Research Hypothesis

- Is there **any correlation** bet SF and farm size – use bivariate Pearson correlation (-1.0 to 1.0)
- The 4 independent variables of edu level, farm size, sur methods & symptom level will sig. explain the diff in Freq of Surveillance
  - Regression-multiple correlation – R^2 value
  - F statistic produced is sig.
- Level of Symptoms/ pest level Is more important than others in in significantly explaining the differences in the Freq of Surveillance
- Farmers with a larger farm will show higher SF?

30

Null-hypothesis H_0

- phrased to negate the possiblity of a relationship bet. the independent and dependent variables
- If the null-hypothesis is true, there is no interaction bet dependent & independent var.
- Alternative hypothesis contradicts null-hypothesis
- Statistical tests of significance
- If that probability is sufficiently low, the null hypothesis can be rejected - provides evidence for conlcuding (with a specified risk of error) that there are no real differences between conditions in the population

31

Variables

- Define variables
- Measure variables. Can convert interval scale to nominal scale eg. high-low
- Use t-test for groups of 2 & one-way ANOVA for gps of >2.
- Refer theories and research work
- Do descriptive study – don’t explore concepts yet unless you are ready!

32

Forecasting

- Moving average provides a more prominent trend than the raw data
- Trend line eg. Y= a+bT, alone not accurate
- Forecast = T x C x S (multiply the different index)
- Use data from 1st, 2nd, 3rd season etc

33

Validity/Data collection/ Pre test

- To ensure that measures are adequate and representative and actually taps the concept, criteria and construct are evaluated for validity.
- Face validity of instrument used – done by experts
- Goodness of measure
- Method of data collection
- Pretest

34

Regression Pest/Surveillance Models

- University and research bodies produce unlimited regression models on many pests, surveillance
- Test it out !
- Can't adopt for other pests

35

Challenges – Operationalize Statistics

- Constrains- physical & logistical. Eg.small farms, low edu level of farmers cf. to Australia
- Process data at nearest office/center - Insists on localized data process and recommendations
- Feed-back to farmers on survey summary
- Make available statistical tools and com. Tools
- National electronic repository on survey data
- ISPM standards, protocol, standardize systematic sampling by crop, stratified random sampling
- Experiment with Hypothesis testing to make recommendations

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INSECTS AND OTHER ARTHROPODS SPECIMEN COLLECTION

1.0 Introduction

1.1 The class Arthropoda includes insects, spiders, mites and their relatives is the most successful group of organisms on the planet. Insects alone accounted for about 55% of all known species (Barrowlough, 1992). There is a great significant in the study of arthropods. It inhabits every terrestrial habitat on the planet and plays a major role in the evolution and maintenance of biotic communities. They are primary beneficial organisms such as pollinators, predators, parasites, consumers and recyclers of decaying organic matter and integral components of the food webs of vertebrates and others invertebrates. However, a small numbers of arthropods are responsible for enormous economic losses annually attacking crops and ornamental plants, cause damage to our food and clothing and vectoring diseases, that effect cultivated plants, pests, livestock and ourselves.

1.2 The purpose of colleting arthropods is to preserve the diagnostic features for identification and for display in museum or exhibition. However, the collection records are significant important to assess or measure biodiversity and provide reliable evidence of the plant health status of a country. These records are the foundation for developing conservation strategies, policies for domestic and international quarantine and for developing pest management strategies at farm level. A country that cannot provide an adequate description of their pest species status of its agricultural industries is at disadvantage when negotiating access to foreign markets. Extensive biological collections and records are the key for developing countries to negotiate the developed countries on a level playing field.

1.3 This paper provides a summary of the methods and techniques used to collect and preserve insects and other arthropods specimen for study. Many of the methods covered have not change for the last hundred years except specialized techniques that became available in the last few years or decades. Most of the specimen collection techniques were extract from the manuals written by Steyskal et al. (1986), Martin (1977) and Upton (1991).

2.0 What Insects and other arthropods to be collected

2.1 Because of their incredible diversity, insects, mites and other related groups vary widely in their habitat, collecting requirement and methods. The species and amount of specimens to collect depend on the purpose for which the materials are intended. When starting a collection, every specimen they can find should be collected. However, for preparing pest lists and plant health status determination only specimens that are related to the commodity are collected.

2.2 The minimum number of specimens per species should be 20 specimens but larger numbers are required if there are variation on the color, shape or biotype. If adults and immixtures are present, specimen should collect of all life stages. Excess specimens can be discarded or exchanged but it is not always possible to collect additional specimens when needed. Frequently insects and mites cannot be identified accurately from immature stages and it is necessary to rear them to adult stage to obtained precise identification.

3.0 Collecting Methods and Equipment

3.1 Collecting methods may be divided into two broad categories. In the first, the collector actively searches out the insects and mites using nets, aspirators or beating sheet. In the second, the collector participates passively and permits traps to do the works. Both approaches may be used simultaneously. The use of variety of collecting methods will help in maximize the number of specimen taken especially when briefly visiting is schedule to the selected areas.

3.2 The equipment used to assemble a general collection need not be elaborate or expensive. In many instances, an insect sweeping net and several killing jars will suffice. However, for more effective sampling of a particular fauna, a more complete set of tools should be prepared and place in collection bag or vest. The following items are usually include in the general collection's bag:

1) Forceps
2) Vials containing alcohol or preservative
3) Killing jars of various size
4) Small boxes or containers for storing specimens
5) Small enveloped for temporary storage of delicate specimens
6) Gel caps for tiny specimens
7) Aspirators
8) Absorbents tissues
9) Notebook and writing equipment
10) Strong knife for opening gall, seed pods
11) A pair of scissors for cutting labels
12) A small fine brush (camel's hairs) to pickup minute specimens
13) Bags for storing plant material, rearing material or Berlese samples.
14) Hand lens

3.3 The items may be modified or added accordingly base on the type of insects or mites to be collected. A small digging tool or trowel may be useful for the collection of soil insects or pruning saw for collection insect trunk borer.

3.4 In addition to the items in the collection bag, tools such as insect sweeping net, traps of various types, insect cages and berlese funnel are needed to assist in the effective collection of arthropods.

4.0 Temporary storage of arthropod specimens

4.1 After specimens have been collected, often time is not immediately available to prepare them for permanent storage. There are several ways to keep them in good condition until they can be prepared properly. The method used depends largely on the length of time that the specimens may have to be store temporarily:

i) Refrigeration and freezing

4.2 Medium to large specimens can be left in tightly closed bottles for several days in a refrigerator and remain in good condition for pinning. Avoid condensation of the water vapor by placing absorbance paper in the bottle.

ii) Dry Preservation

4.3 Hard-bodied specimens can be place in small boxes, paper tubes, triangles or envelopes for an indefinite period, allowing them to become dry. When they are ready to be pinned, place the specimens in a relaxing box so that their body parts may be rearranged or repositioned.

iii) Papering

4.4 Papering method is the placing of large adult specimens of Lepidoptera, Trichoptera, Neuroptera and Odonata with their wings folded together in folded triangles or small rectangular envelopes make of glassine paper. The specimens can be kept for weeks, when they are dry. The specimens should allow to relax before pinning.

iv) Liquid preservation

4.5 Preserving arthropod specimens in alcohol is a complex subject. The technique varies from one group to another. For example, spiders preserve well in ethanol but tend to become too flaccid in isopropyl. The opposite is true for many myriapods. In general, 70 percent ethyl alcohol is used to preserve soft-body insects such as aphids, springtails, thrips, mayflies or silverfish and many immature insects such as caterpillars, beetle and wasp larvae. If placed on pins, most soft-bodied insects will shrivel or decompose. Prior to preserving soft-bodied specimens for the long term, their color must be “fixed” or they may fade or blacken. The “fixing” process prevents, reduces or delays color change.

iv) Preservation for molecular studies

4.6 In general, specimens for molecular study should be collected in 95 percent or absolute ethanol to preserve the DNA and other molecules. For longer storage, the specimens should be thoroughly dehydrated by changing the alcohol a couple of times.

5.0 Mounting insects and Mites

5.1 Specimens are mounted so that they may be handled and examine with the greatest convenience and with least possible damage. Well-mounted specimens enhance the value of a collection and its research value depends on how well they are prepared. Although the style and technique of mounting vary from one to another, the method discuss below are currently accepted practices.

i) Direct Pinning

5.2 Direct pinning refers to the insertion of a standard insect pin directly through the body of an insect. This standard pin is a specialized pin made of stainless steel and come in several sizes from 00 to 7.

5.3 The proper way to pin an insect depends on the type of insect that you have collected. The pin is position just slightly to the right of the midline of the insect. Specimens should also be level and squarely mounted on the pin. The use of a pinning block will help in obtaining proper height and positioning.

5.4 Very small insects (less than 3/16 inch) should either be pinned with tiny needles or glued on their right sides to tiny triangles paper. The latter procedure is called pointing. When pointing, first push a regular insect pin (No. 2 or 3) through the butt end of the triangle. Level the triangle by pushing the pin through the hole in the highest step of your pinning block. Bend the tip of the paper triangle slightly downward with a forceps and touch it to a tiny drop of glue or clear fingernail polish. Pick up the small insect carefully with forceps and mount it by touching it on its thorax (right side) to the drop of glue. Adjust the insect so that it remains squarely in position, and then allow the glue to dry.

5.5 When pinning butterfly, moth dragonfly or grasshopper, the wings had to be spread. Spreading is done on a spreading board. Before you begin to work, cut several thin strips of paper about 1/4" wide and 8"-10" long. Once these are ready, pick up the insect by the thorax and carefully push a pin through the middle of the thorax. Adjust the position of the specimen on the pin and make sure that it is level for both on the sides and in both front and back using the pinning block. When ready transfer the specimen to the spreading board and adjust the width of the groove in the spreading board to be just slightly wider than the body of the specimen and the bases of the wings are just level with the top of the two side pieces. Slip a paper strip between the wings and use it to force the wings on one side down into position. Pin the ends of the paper down to hold the wings loosely in place. Do the same with the wings on the other side and both hindwing.

5.6 Note carefully that the rear edge of the two forewings should make a perfectly straight line across the back. The hindwings should be pinned so that the rear edge is held just slightly away from the abdomen. Position antennae with pins and if the abdomen has drooped, prop it up with pins so that it dries in a natural position.

ii) Mounting specimens for microscope study

5.7 Small size mites, thrips, whiteflies, aphids, scale insects, fleas, parasitic wasps and many other insects, as well as the necessity to clearly seeing minute details of larger insects, requires examination under a compound microscope at high magnification. Such specimens or parts of specimens must therefore be specially prepared and place temporarily or permanently on microscope slides.

5.8 Generally, the specimens go through a clearing process in making them more transparent. In certain cases, staining is necessary to make colorless or transparent tissue visible. The sample is later mount in lactic acid for temporary mounting or canada balsam for permanent mount. However, there are also specialized mounting media for certain insects and mites such as hoyer mounting media.

6.0 Labeling Insects

6.1 A collection has little value unless each insect is label accurately and properly. Labeling must be done as soon as possible after collecting, pinning and mounting to avoid loss of vital information. Their precise collection locations, habitats, and data on plants on which they were found are important documentation.

6.2 Label can be written with the computer and print them off or hand written with fine point pen. Trim labels with a sharp paper cutter so the edges are nice, clean, and flat rectangles.

Two labels should be placed on the pin below each insect specimen. Both labels should be of the same size and lined up parallel to the length of the body of the insect. The insect head should be at the left and the label should read from left to right. However, in the case of "pointed" specimens, the labels should be parallel to the length of the point. The top label should have the name of host, plant part, district and state in which the insect was collected, the collection date and the name of the collector. The lower label should show the order, family and insect scientific name.

7.0 References

Barrowlough, G.F. 1992. Systematics biodiversity and conservation biology pp. 121-143. In, N Eldredge ed. Systematics, ecology and the biodiversity crisis. Columbia University Press. New York 220pp.

Martin, J.E.H. 1977. The insect collecting in the tropics 66 pp. Cent. For Oversees Pest Res., London.

Steyskal, G.C., W.L. Murphy, and E.M. Hoover eds 1986. Insects and mites: Techniques for collection and preservation. U.S. Dept. of Agric.. Misc. Pubs. No 1443, 103pp.

Upton, M.S. 1991. Methods for collecting, preserving and studying insects and allied forms. Australian Entomological Society Misc. Pub. 3 4th ed. Brisbane 86pp

PLANT PATHOGEN COLLECTIONS

CAB International

Plant disease herbaria are dual collections, containing specimens of both the host and pathogen –

- **Dried or preserved specimens**
- **Culture collections**

CAB International

Collecting plant disease specimens –

- Symptoms to look out for
- Samples for isolation of pathogen

CAB International

Populating a disease herbarium -

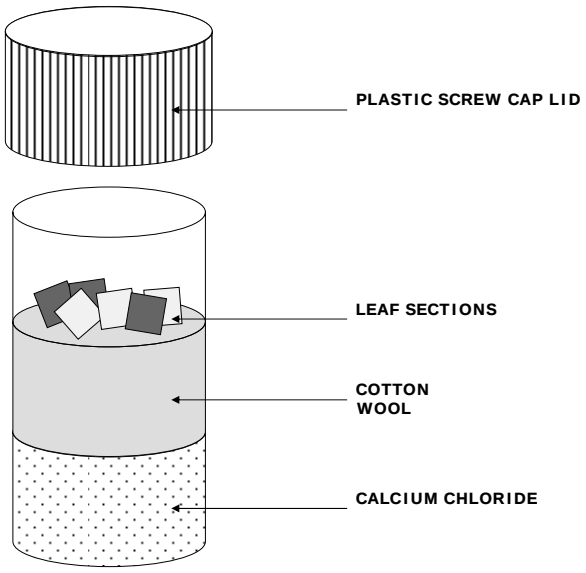
- Collect specimens with full range of symptoms
- Record relevant information
- Handling & transport from field
- Speed of delivery

CAB International

Processing for plant pathogen collections -

- Sample collection
- Isolation
- Identification
- Preservation

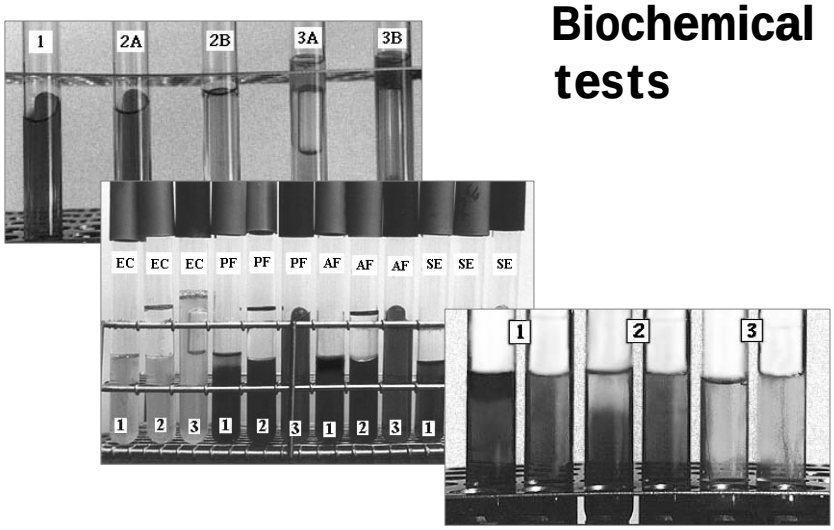
CAB International

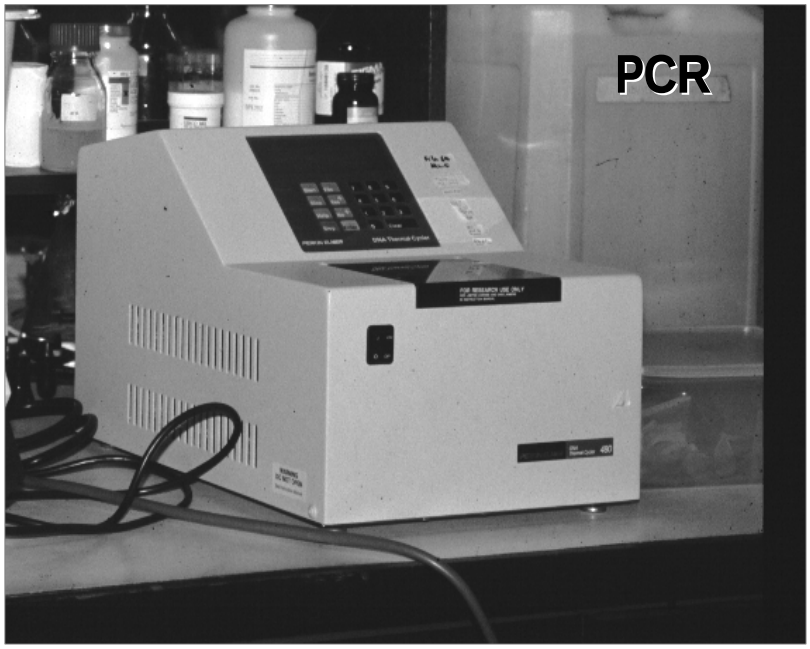


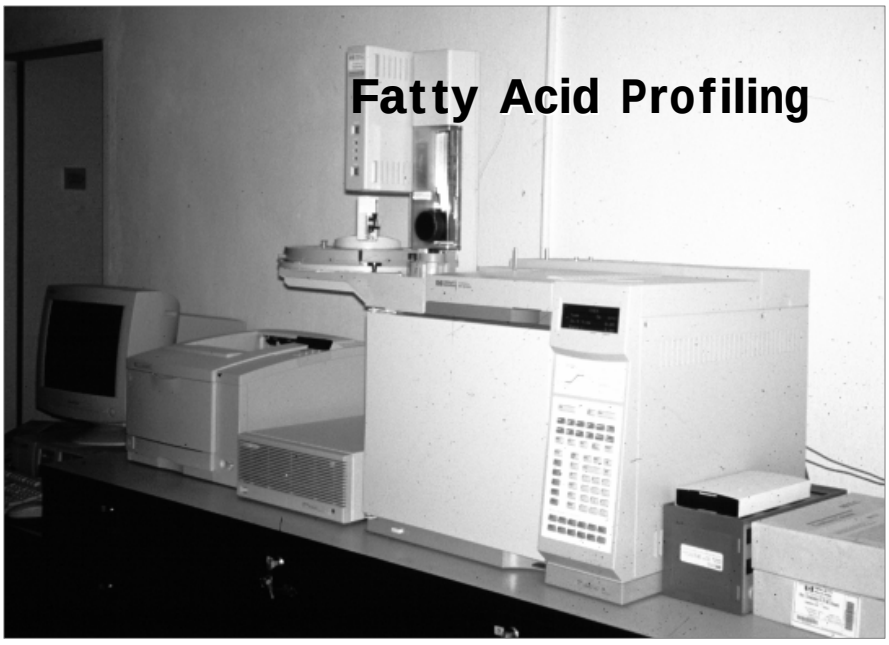
Identification Methods

- Light and other microscopy
  - Phenotypical Methods
  - Indicator & Selective Media
  - Serological Methods
  - Molecular methods
  - Identification Kits & Systems

Biochemical tests

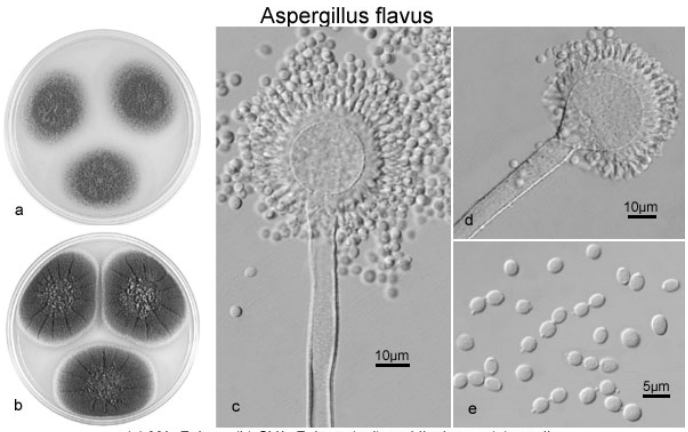



PCR


Fatty Acid Profiling

Metabolic Profiling

Metabolic Profiling for fungi-



(a) MA, 7 days; (b) CYA, 7 days; (c,d) conidiophores; (e) condia.
(a-e) CBS 282.95.

Recording specimen details –

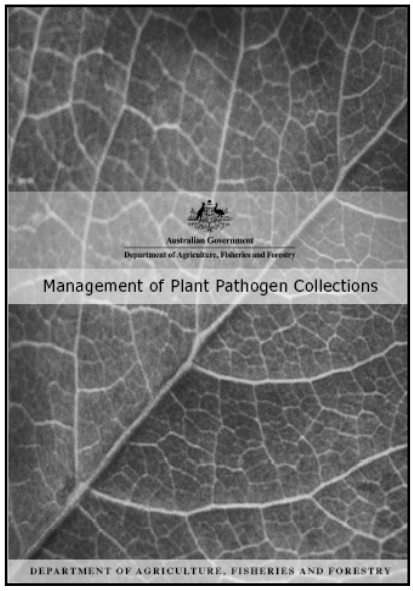
- Date & place of collection
- Name of collector & contact details
- Name of host plant (incl. variety, plant age, etc)
- Symptoms
- Plant parts affected
- Number or percentage plants affected
- Distribution of affected plants (single, grouped, scattered, etc)
- Other relevant information (soil type, weather, agrochemical applications, etc)
- Sample reference number

CAB International

What constitutes a pest record, from ISPM 8 –

- Scientific name
- Life stage or state
- Taxonomic group
- Identification method
- Collector & collection date
- Collection location details
- Host scientific name
- Host damage
- Prevalence
- Bibliographical references

CAB International



Managing plant disease records -

- Common standards
- Distributed network ?
- Compatible with heterogeneous systems
- Funding

CAB International

SURVEILLANCE:
CONSIDERATIONS IN THE FIELD

Soetikno S. Sastroutomo

What are the benefits of surveillance?

- **Enhance prospects for early detection**
- **Minimise costs of eradication**
- **Necessary requirement for the country to meet the treaty obligations of the WTO and SPS Agreement (ISPM 6)**

Types of surveillance systems

- **SPECIFIC SURVEYS: important for establishing whether particular pests are present in each state/region over a defined period of time, and if so, where these occur**
- **GENERAL NON-TARGETED: are based on recognising normal versus suspect plant material or based on several information sources, wherever it is available**

SPECIFIC SURVEYS

- Includes detection, delimiting and monitoring surveys
- These are official surveys and should follow a plan which is approved by the NPPO:
  a. definition of the purpose
  b. identification of the target pest(s)
  c. identification of scope
  d. identification of timing
  e. target commodity (in the case of commodity pest lists)
  f. survey methodology and statistical basis

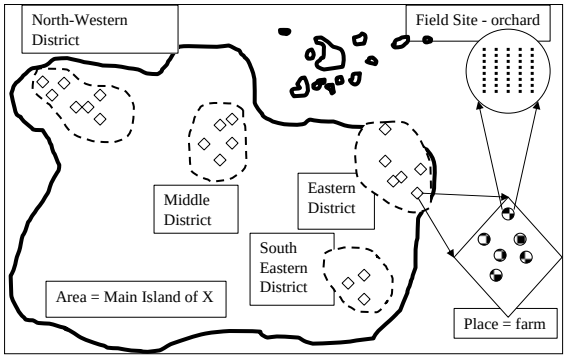
Types of surveillance programs

- **NATIONAL SURVEILLANCE**
- **STATE AND REGIONAL SURVEILLANCE**
- **FARM SURVEILLANCE**

SURVEY SITES

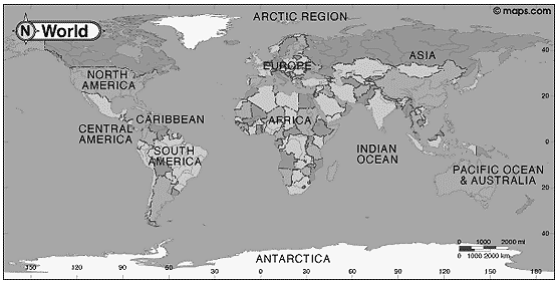
There are 6 levels involved in site selection:

- **Area**
- **District**
- **Places**
- **Field Sites**
- **Survey Sites, and**
- **Sampling Places**



Example map to illustrate the concepts of Area, District, Place and Field Site

AREA: Officially defined country, part of a country, or all or parts of several countries (*ISPM 5*)



Several countries

A country

Part of a country

DISTRICT: Regions of the AREA that fall into rough groups

Figure F1. Distribution map of Oriental Fly *(B. tryoni)* and Medfly (*C. capitata*)

PLACES: farms, forests, communities, villages, ports, markets

Farms

Forests

Markets

Ports

FIELD SITES: fields, plantation lots, market stalls, gardens

Garden

Plantation lot

Stall

SAMPLING SITES: quadrats, individual plants, trees or produce, transects, trees for trap, crop rows

Crop rows

Individual plant

Tree for traps

Information to be recorded from the sampling sites

- Record the Area….details of climate, topography, location coordinates
- Record the District….identify and provide coordinates or define
- Record characteristics of Places, Field Sites and Sampling Sites

Choosing Survey Sites

When the Survey Sites are known

- There is no need to decide which sites to survey
- For example, survey targeted to particular Places, Field Sites or Sampling Sites, i.e.:
  a. delimiting surveys
  b. high risk site surveillance
  c. some market access negotiations

When the Survey Sites are not known

- You need to decide which sites to survey
- Your decision will depend on:
  a. Logistical constraints (Time & Money)
  b. Physical constraints (Geography, weather)
  c. Likely pattern of pest spread/dispersal
- If the information cannot be determined a pilot study made be required before conducting the survey proper

Logistical and physical constraints

- You need to work backwards and identify how many Sample Points and Sampling Sites can be achieved with limitations you have:
  a. Staff numbers
  b. Time and money
  c. Available expertise
  d. geography, weather and other factors

Pattern of spread of the pest

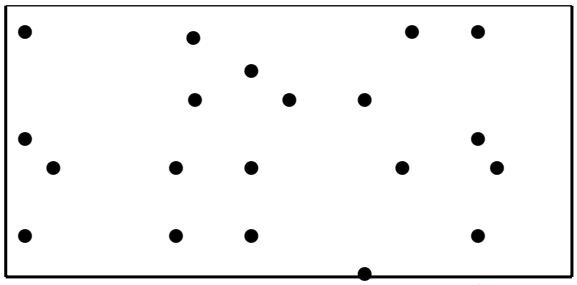
- Understanding how pest spreads across a crop or other sites will affect how specific surveys are planned
- Pests such as flying locusts will spread randomly throughout a crop, while others, e.g. nematodes or weeds, tend to clump in small areas of the field

Selecting Survey Sites

- Rarely possible, or necessary, to survey all sites
- When surveying a selection of sites a number of sampling techniques can be used:
  a. random sampling
  b. systematic sampling
  c. stratified random sampling
  d. targeted site selection

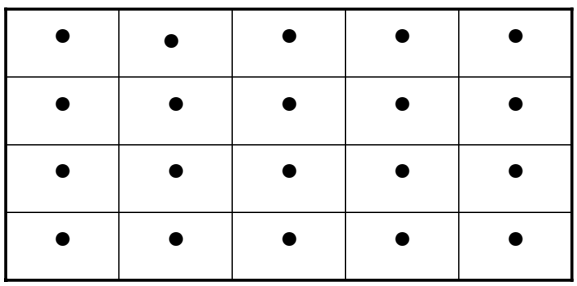
Random Sampling

- Involves assigning all sites a number or symbol and then using a random number generation method, the sites are selected and recorded



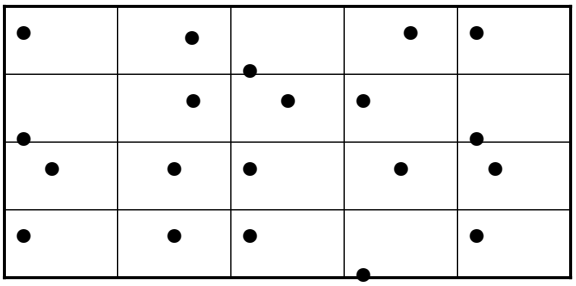
Systematic Sampling

- Involves mapping out a site and surveying at regular intervals: i.e., surveying every 10th row of trees, every 2nd farm, setting insect lures in a grid pattern, 2 apples from every tree



Stratified Random Sampling

- Involves dividing the sites into logical categories and then systematically or randomly choosing sites from within categories



Targeted Site Selection

- Sites are chosen based on where the pest is most likely to be, thereby deliberately biasing the selection process in favour of finding the pest

Other sampling methods

- Convenience sampling
- Haphazard sampling
- Drive/walk through surveys
- Worker observations
- Full sampling
- Remote sensing
- Species accumulation curve

Timing of the survey

Ideally when the pest is most likely to be present and in an identifiable state

……and may be determined by:

- the life cycle of the pest
- the phenology of the pest and its host
- when the pest is most active
- accessibility and availability of vehicle
- time of sowing, seedling emergence, etc.
- time of obvious symptoms

Good surveillance practice

- Personnel involved should be adequately trained in appropriate fields of plant protection and data management
- Personnel involved should be adequately trained and where appropriate audited, in sampling methods, preservation and transportation of samples for ID and record keeping associated with samples
- Appropriate equipment should be available and maintained adequately
- The methodology used should be technically and statistically valid

FOR DISCUSSION

What is the practice in your country??

What are the constraints??

- in terms of personnel (e.g. numbers, capacity and capability, etc.)
- in terms of facilities (e.g. equipment, available information/methodology, manuals, annual budget, etc.)

APEC Workshop on Surveillance Capacity

The Guidelines in Practice in Thailand

Dr Paul Pheloung
Office of the Chief Plant Protection Officer,
Australian Government Department of Agriculture, Fisheries and Forestry

As a collaboration between the Australian Government Department of Agriculture, Fisheries and Forestry and the Thailand Department of Agriculture, a workshop was conducted in Pak Chong Thailand, 6-11 June 2005.

The purpose of the workshop was to discuss the Guidelines for Plant Pest Surveillance and employ some of the methodology in practical sessions. Workshop attendees included senior and technical staff with management, entomology, plant pathology and weed ecology background and skills.

The workshop reviewed the reasons for undertaking plant pest surveillance, in the context of the international trade environment. The workshop combined formal presentations and breakout discussions with practical sessions in the field and laboratory.

The practical sessions involved:

1 A mango pest list survey.
   - A preliminary pest list was prepared based on current knowledge (general survey).
   - Planning the activities included forming teams, assigning tasks, preparing forms for field recording and deciding on the sampling regime including the methodology for developing a pest list. Fruit fly traps (using cue and ME lures) were installed 2 weeks prior to the exercise.
   - A mango orchard was visited by 4 teams of about 8 people where trees were inspected and specimens were collected.
   - The teams returned to a laboratory to examine and identify the specimens and prepare a species accumulation curve.

2 A mango monitoring survey.
   - Two insect and two plant pathogen pests were nominated as targets.
   - Activities were planned as above including planning the sampling regime based on statistical principles.
   - A mango orchard was visited by 4 teams of about 8 people where trees were inspected and specimens were collected.
   - The teams returned to a laboratory to examine and identify the specimens and use statistical principles to estimate pest prevalence.

Random and systematic sampling methods were tried by different teams.

A number of issues became clear during the workshop:

- the need for a clear division of labour within teams;
- the need for illustrated identification guides

- the importance of comfort factors in determining the effectiveness of a survey– eg food, shelter, fatigue, boredom;
- the small scale of the pest list survey resulted in a accumulation curve that did not flatten properly, demonstrating the importance of sample size;
- for the monitoring survey, the target pests were rare, possibility because of confounding effect of a recent chemical treatment;
- the statistical principles and analysis were unfamiliar to the majority of participants;
- terminology was also unfamiliar;
- good record keeping important;
- planning takes time but is worth it.

Australian Government
Department of Agriculture, Fisheries and Forestry

APEC Workshop on Surveillance Capacity
Current market Access Issues for Australia

Dr Paul Pheloung
Office of the Chief Plant Protection Officer,
Australian Government Department of Agriculture, Fisheries and Forestry

DEPARTMENT OF AGRICULTURE, FISHERIES AND FORESTRY

Surveillance and SPS

Surveillance for plant pests in Australia has been necessary to show that a pest of concern is not present in an area in order to justify SPS requirements to a trading partner:

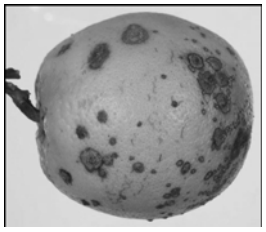
- to provide assurance that commodities exported from that area will not provide a pathway for the introduction of that pest, or
- as a reason for requiring phytosanitary measures on commodities imported into that area, to manage the risk of introduction of that pest.

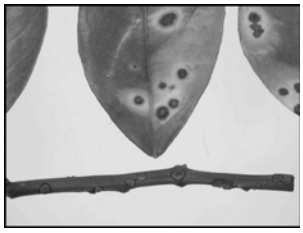
The paper accompanying this talk contains a table of pests that have been the subject of surveillance in Australia for market access purposes.

I will discuss two recent issues, in relation to citrus canker and karnal bunt.

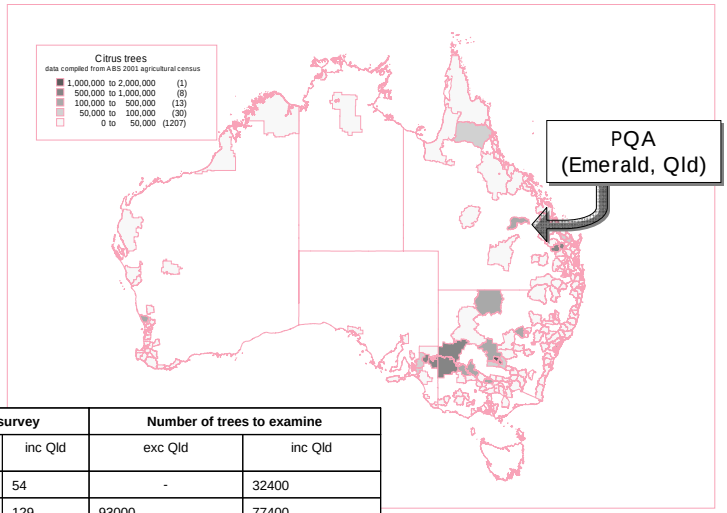
Citrus Canker

- **Following the detection of this pest in a small citrus production area of central Qld in 2004 – a pest quarantine area (PQA) was established and an eradication program commenced.**
- **Comprehensive surveillance delimited the infestation to the PQA and demonstrated freedom from the pest in Australia outside of the PQA.**
- **The pest is a well known threat in Australia:**
  - it is a Northern Australia Quarantine Strategy (NAQS) target and consequently has the subject of ongoing surveillance for many years.
  - it is a categorised pest in the citrus industry biosecurity plan.





Citrus canker surveillance



State	Blocks to survey		Number of trees to examine	
	exc Qld	inc Qld	exc Qld	inc Qld
Qld	-	54	-	32400
NSW	155	129	93000	77400
SA	92	77	55200	46200
Vic	59	49	35400	29400
WA	13	11	7800	6600
NT	1	1	600	600
Total	**320**	**320**	**192,000**	**192,600**

This surveillance plan provided 95% confidence that if 1% or more of the blocks contained infected trees, they would have been detected.

Karnal bunt

Trigger:

Feb 2004 Claim made by trading partner that a wheat shipment was infected by *Tilletia indica*, the fungus responsible for Karnal bunt

Response:

March 2004 Diagnostic tests commenced on shipment samples by independent third parties

Diagnostic tests commenced on port receival samples representing wheat produced throughout Australia

April 2004 Negative results from these tests in combination with a range of activities in Australia that would have revealed the presence of the disease are conveyed to the international community through the IPPC

Outcome:

Trading partners continue to recognise that Karnal bunt is not present in Australia.

A key challenge was to definitively distinguish between spores of *T. indica* and *T. ehrhartae*, a related pathogen of no quarantine concern.

Other recent issues

Banana black sigatoka

Fruit flies

papaya fruit fly, melon fly, Philippine fruit fly

Queensland and mediterranean fruit fly

Grape phylloxera

Siam weed and branched broomrape

Current-lettuce aphid

Conclusion

Australia frequently has to manage ccess to markets for produce and surveillance can play an essential role.

These include both international and interstate (domestic) trade.

MINISTRY OF AGRICULTURE
THE REPUBLIC OF INDONESIA

Market Access Issue:

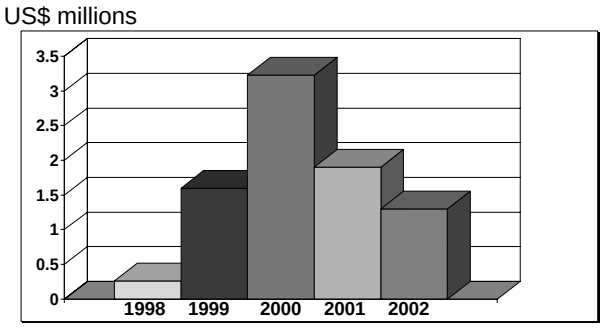
Chinese Taipei Imposed an Import Ban on Horticultural Commodities from Indonesia due to Fruit Fly Infestation

CONTENT:

- **Overview**
- **Actions to Counteract the Ban**
- **Fruit-fly Surveillance**
- **Strategies for Fruit Fly Control**

OVERVIEW (1)

- **Chinese Taipei is a prospective export market for Indonesia**
- **Trend of Indonesian Export Value to Chinese Taipei:**



Ministry of Agriculture ,The Republic of Indonesia

OVERVIEW (2)

- **November 1, 2003, Chinese Taipei BAPHIQ promulgated an import ban on Indonesian horticultural products**
- **13 Indonesian horticultural commodities were suspected to contain several species of fruit flies**
- **Estimated financial losses resulted from the ban: US$ 1.3 millions**

Ministry of Agriculture, The Republic of Indonesia

Actions to Counteract the Ban

1. **Bilateral approach:**
   - **a mission team for negotiation**
   - **notification (no scientific basis)**
2. **Improving surveillance system**
3. **Improving control strategy**

FRUITFLY SURVEILLANCE

- **1920 First detected to attack mango**
- **1938 Reported to attack other commodities (chilly, banana, guava, coffee, etc.)**
- **Now - Found all over the economy**
  - **66 species have been identified**
  - **But only a few species whose host have been identified**
    - ***B. Cucurbitae: cucumber, water melon***
    - ***B. Umbrosa: jackfruit***
    - ***B. Caudata: several plants from family of cucurbitaceae***

Strategies for Fruit Fly Control (1)

Basis:

- **Government regulation No. 6, 1995 about "Plant Protection"**
- **Minister of Agriculture's decree No.887/Kpts/OT.210/9/97 about "Pest Control Guidance"**

Strategies for Fruit Fly Control (2)

Methods of Fruit Fly Control:

- **Prevention of fruit fly infestation (strict quarantine regulation, fruit wrapping, fogging)**
- **Sanitation of production areas**
- **Application of trap and attractant**
- **Biological crop protection**
- **Sterile insects**
- **Pesticides**
- **Eradication**
- **Post harvest treatment**

THANK YOU

FOR

YOUR ATTENTION

Ministry of Agriculture ,The Republic of Indonesia

A Surveillance to Develop the Plant Quarantine Measure

~ A Pest of Low Prevalence on Japanese Apples ~

Takayasu Watanabe
Plant Quarantine Office,
Plant Protection Division, MAFF, JAPAN

Background 1

Major pest for apple fruits :
Peach fruit borer (Carposina sasakii)

Quarantine measures for export:
Methyl bromide fumigation

Background 2

Manchurian fruit moth (*Grapholita inopinata*)

- The infestation on apples had not been reported since 1950's.
- Pest status on apples was regarded extremely low according to scientific papers.

But there is a case that the import economy where this species does not occur designates this species as a quarantine significance to request plant quarantine measures to Japan.

About Manchurian fruit moth

1. Scientific name: *Grapholita inopinata* (Heinrich)
2. Taxonomic position: Lepidoptera – Tortricidae
3. Distribution: CHINA, RUSSIA, JAPAN
4. Host plant: mainly toringo crab apple (Main host, *Malus toringo)*, *Malus prunifolia* etc.
5. Historical Record in Japan:
   - The infestation on *Malus prunifolia* var. ringo was confirmed in Fukushima prefecture in 1952.
   - No infestation on apple fruit was confirmed at production during survey in1957.
   - No infestation on apple fruit has been reported for about 50 years.

The survey to confirm the pest status

1.Method (1/3)

The survey area (prefecture):

- Aomori prefecture and Fukushima prefecture (in 2002 and 2003)
- Miyagi prefecture (in 2003)

The survey site:

- Apple production orchard under conventional pest control (**Controlled orchard**).
- Apple production orchard not conducted pest control (**Non-controlled orchard**).
- The growing sites of wild host plants such as wild toringo crab apple, the growing sites of *Malus prunifolia*, and forest (**Wild host plants area**).

And trap and fruit surveys were conducted in the same survey.

1.Method (2/3)

(1) Trap survey

a. Non-controlled orchard and Wild host plants area

- Term : form June to October (the season of the occurrence of adult of this species)
- Attractant : Z8-12Ac ((Z)-8-dodecenyl acetate)
- Trap type : The Funnel trap

b. Controlled orchard

The terms of survey and the types of trap were in the same way as above.

1.Method (3/3)

(2)Fruit survey

a. Non-controlled orchard and Wild host plants area

- Field : Visual inspection
- Laboratory : Randomly collected fruits were stored for examination.
- Term : The middle to the end of June, August to October

b. Controlled orchard

- The inspection and examination were in the same way as above.
- Targeted on : The immature and mature apple fruits cultivated in Controlled orchard.
- Term : The middle to end of June, the middle of September

2. Results (1/2)

(1) Trap survey

a. Non-controlled orchard and Wild host plants area

Male adults of 54 of this species were trapped.

Specimens of 3 were trapped at Non-controlled orchard.

Specimens of 51 were trapped at Wild host plants area.

b. Controlled orchard

This species was not trapped.

2. Results(2/2)

(2) Fruit survey

a. Non-controlled orchard and Wild host plants area

Fruits of 9,192 were inspected :

Two specimens were totally found.

One was found in fruit of wild *Malus toringo*.

One was found in fruit of *Malus prunifolia*.

Not found in apple fruit of Non-controlled orchard.

b. Controlled orchard

Fruits of 50,275 were inspected :

No infestation by this species was found.

3. Conclusion

(1) Manchurian fruit moth does not occur in Controlled orchard.

(2) It was found that Controlled orchard could be regarded as a pest free production.

Feasible plant quarantine measures to export

Proposed quarantine measures to confirm no infestation on apple fruits by Manchurian fruit moth is as follows:

(1) Designation of the production orchard
(2) Convention pest control at the orchard
(3) Trap survey at production orchard
(4) Fruit survey at production orchard
(5) Sorting and culling fruits and packing fruits in boxes
(6) Export inspection

CURRENT MARKET ACCESS ISSUES

PHILIPPINES

TAIWAN MANGO

- pests of concern are Mango seed weevil (MSW), mango pulp weevil (MPW) and guava fruitfly, *Bactrocera correcta*
- Taiwan requested for the following::

1. Original reference which proves that the Philippines is free from guava fruitfly
2. 3 year continuous survey data on production areas free from MSW and MPW
3. MSW/MPW survey in the Philippines
4. Pest list of Philippine mango
5. Pest monitoring activity in Guimaras

MANGO

- Taiwan required for “pest free are” for MSW and MPW as the only phytosanitary measure to achieve the ALOP
- The Phils offered other measures such as systems approach, quarantine inspection. Appropriate treatment and others to achieve the ALOP
- The following facts were also presented:

1. Japan, Korea and New Zealand accepts mangoes from the whole Phils axcept Palawan (where MPW is present) with VHT
2. Australia and US accepts mangoes from Guimaras Island with VHT

MANGO

- In the next round of negotiation the Philippines will offer sourcing mangoes from Guimaras Island pending the conduct of a nationwide survey

BANANA

- Taiwan required the following information:

1. Last 2 year continuous survey data on production areas free from banana bract mosaic virus and banana streak badnavirus
2. Last 5 year continuous survey data on production areas free from Moko disease race 2 and Panama disease race 2 and 3
3. Quarantine measures used to maintain pest free area including regulatory actions, routine monitoring, intercepted records, etc

BANANA

- the Philippines submitted the infrastructure and cultural methods of managing pests, diseases and weeds of banana plantations practiced by PBGEA
- the Bureau of Plant Industry will resubmit data for crop protection and quarantine measures

COCONUT

- The pest of concern is Cadang-cadang disease
- Taiwan required:

1. Last 2 year continuous survey data on production areas free from Cadang-cadang disease
2. Quarantine measures used to maintain status of pest free areas, including regulatory actions, routine monitoring, interception records, etc

- The Philippines has already submitted survey data for recognition by Taiwan on cadang-cadang pest free area

USA

Mango Export

- Scientific evidence that MSW and MPW do not exist in Guimaras Island
    - survey was conducted
- Certification that the area is free from the pests
- Isolation (imposed quarantine)
- Regular monitoring – monthly survey (representative tree)
- All mango export to the US mainland is sourced only from Guimaras

USA

- In 2003 the Philippines requested US to allow sourcing of mangoes from other places except Palawan going to Guam and Hawaii
- US is now in the process of revising the Federal Rule which will take 18 months
- Proposal for a nationwide survey to determine presence/absence of MPW and MSW in the Philippines
    - the aim is to increase the area (except Palawan) to source mangoes for export to the US

AUSTRALIA

BANANA

- Formal PRA started in June 28, 2000
- June 2002, Draft PRA was released
- Feb. 2004, Revised Draft PRA was released
- June 16, 2004, Addendum to the Revised Draft released
- Aug. 2004, Australia informed that they will release a Further Revised Draft
- Stringent measures for the importation of bananas in relation to Moko, banana bract mosaic virus and mealybugs

AUSTRALIA

BANANA

- In all the Draft IRA releases, the Philippines opposes the findings of Australia and gave its own scientific justifications
- If the Australian recommended mitigating quarantine measures will be followed, at least 2-year survey data is needed and to be sustained on a weekly basis once the PFA/ ALPP (areas of low pest prevalence) is established for Moko, Freckle and banana bract mosaic virus
- Philippines still waiting for the further revised draft

MARKET ACCESS
“THAILAND”

The Document Performing

2002

Orchid (Flower, Plants)
USA, France, Netherlands,
Italy, Germany

2003

Orchids – Japan, Republic of Korea

Longan - China

2004

6 Fruit – USA

4 Fruit – Australia, New Zealand

2 Fruit - Japan

Pest List & Pest Analysis

Manggo
Mangosteen
Rambutan
Pineaple
Lychee
Longan

– Submitted completed Pest List

APHIS

Dr. Ralf Ross (Expertise) + **Entomologist Pathologist Crop Science** + **Herbarium Curator** / Insects \ Disease

Submitted

Completed PRA draft

(3 Correction)

To Meet requirements

- **Information of Crop / Plant**

-Taxonomy -Distribution
-Botanical description -Produce area
-Harvesting season -Fruit standard
-Packaging -etc

- **Information of Pathogens**

-Taxonomy -Hosts ranges
-Distribution -Biology + Ecology
-etc

- Treatment Procedures – registration + auditing by DOA
  - Types of treatments
  - Equipment certification
  - Monitoring procedure
  - Fruit cutting (Prior to treatment)

- Inspection
  - Sampling rate
  - Location inspection
  - GAP
  - Pre harvest – Field
  - Post harvest – Packing areas

Quarantine Pests ?

USA => APHIS => Finalized Quarantine Pests (USA)

Crops	Insect	Pathogen
Mangosteen	7	-
Mango	4	1 (*Phomopsis sp.)*
Longan	5	-
Lychee	8	2
Pineaple	10	1

Australia + New Zealand

Crops	Insect	Pathogen
Pineaple	17/2	1 *Fusarium subglutinans*
Mangosteen	7	-
Longan	5	-
Lychee	28/31 8 ff-VHT	2/1

Japan

Crops	Insect	Pathogen
Mangosteen	4	-
Mango	2	-

PINEAPPLE

2 Species of Fruitfly
4 Species of weevil
1 Species of beetle
6 Species of mealy bugs
1 Species of scale insect
1 fly
1 moth
2 butterfly

INSECTS

Mangosteen, Lychee, Longan, Mango

- *Bactrocera caramborae* – Carambora fruitfly
- *B. dorsalis* - Oriental fruitfly
- *B. papayae* – papaya fruitfly
- *B. cucurbitae* – melon fruitfly
- *B. pyrifoliae*
- *Dolichoderus sp.* (Black ant)
- *Techonomyrmex butteli* (Black ant)
- *Dysmicoccus neobrevipes* (mealy bug)
- *Pseudococcus cryptus* (mealy bug)
- etc

PATHOGEN

- *Phytophthora sp.*
- *Phomopsis sp.*
- *Fusarium subglutinans*

Treatment Required Australia, New Zealand

Vapor heat treatment => Protocol Approved by Oxford Plant Protection Laboratory, USDA- APHIS-PPQ, NC, USA

- 46^0C above 58 min
  (lychee, Longan, mangosteen)
- 47^0C above 20 min
  (mango)

JAPAN
(Mango + Mangosteen)

- **Packing House -**

  Japanese PQI + Thai (5%)
  46^0C above 58 min
  (lychee, Longan, mangosteen)
  47^0C above 20 min
  (mango)

- **Air/ Ship cargo - Inspection**

THANK YOU

CURRENT MARKET ACCESS ISSUES :

MALAYSIA

Why Malaysia Needs To Look For New Markets

- High Import Bills on Food Items – RM 12 Billions / Year
- Government Policy: Balance of Trade (B.O.T.)
- Increased Agricultural Production

TECHNICAL MARKET ACCESS

- New Market Access Submission
- Market Access Maintenance
- Market Access Improvements

TECHNICAL MARKET ACCESS

- New Market Access Submission
- Market Access Maintenance
- Market Access Improvements

Process of opening up markets

- Export country NPPO applies to export
  - Malaysia identifies Commodities/Products for Export Based on Market Potential in the Importing Countries
  - Prioritize Commodities/Products
  - Submit official applications to Importer NPPOs

    1. Bilateral Cooperation – Australia, China, Japan,
    2. Unilateral – Korea, Iran

Bilateral dialogue

- Country to country discussions on import/export conditions
  - Transparency
  - Technical validity
  - Operational capability

→ → Import conditions and TRADE

AUSTRALIA (Bilateral)

Submission of Technical Documents:

Orchids, Chrysanthemum, Anthurium, Durians, Pineapples, Carambola, Papaya, Mangosteen and Aquatic Plants.

Elements of Technical Document

- Crop – species/varieties
- Production areas/volumes/seasons
- Cultivation methods – pest management, surveillance, harvesting
- Pest list/datasheet – taxonomy, common names, hosts, plant part affected, biology, control

Elements of Technical Document

- Packing house – post harvest handling and treatment, storage, packaging
- Export program – destination markets, phytosanitary import conditions
- References and copies of key papers

Importer NPPO

- Importer NPPO undertakes a Pest Risk Analysis
  – Australia spent AUD 60,000 on Orchids and Chrysanthemum and AUD 40,000 on Pineapples
- Importer NPPO identifies pests of concern
  – Australia Proposed Risk Options – Devitalization of Cut Chrysanthemum and Aster flowers, Decrowning & Mandatory Fumigation of Pineapples on Arrival, Frozen Durian
- Both NPPOs agree on risk management procedures
- Trade begins

Our Preparations:

- Preparation of Farms/Packing House
- Setting up of Malaysian Phytosanitary Certification Assurance Scheme (MPCA Scheme)
  - Voluntary Scheme
  - Register growers/packers
  - Provide Training to growers/packers to meet specific International Standards for all components
  - Systems for productions and marketing will be audited by Importer NPPO
  - Individual growers will be identifiable – for product integrity, tracebility and security

OUTCOME

Australia:

- Market access gained

1. Cut Flowers- Orchids and Anthurium
2. Chrysanthemum, Asters,and Foliages (devitalization)
3. Frozen Durian (-18^{0}C for 7 days before Shipment)

- Only certified growers/packers have access
- Systems for productions and marketing will be audited
- Individual growers will be identifiable for traceability, integrity and security

OUTCOME

Australia:

- Pending

1. Pineapples – Biosecurity Australia agreed in principle, however, final approval is in the hand the Prescribed Agency/Stakeholder

(Decrowned and mandatory fumigation)

OUTCOME

Australia:

- Under Review

1. Chilled Durian (2^0-13^0 C) – considered as a review under existing policy

2. Mangosteen – Reviewing import conditions for Thai mangosteen, Malaysian request will be considered as a review under extension of existing policy

OUTCOME

Australia:

- Keep In View
  1. Papaya – concerns with fruit fly and papaya ringspot virus risks
  2. Carambola – Australia has no existing policy for the importation, more over it is used as a garnish and market is not big enough
  3. Aquatic Plants – Australia informed that it has had bad experiences with aquatic plants becoming weeds

JAPAN (Bilateral)

Submission of Technical Documents:

Mangosteen, Rambutan, Papaya, Carambola, Watermelons, Bell Pepper, Mango, Durians and Jackfruit.

However, due to our constraints we decided to prioritize the crops i.e. Papaya, Mango, Mangosteen and Bell Pepper

JAPAN (Bilateral)

We have to propose a plan for each commodity which suits the 13 procedures for lifting the ban on importation

Papaya,Mangosteen and Bell Pepper

Mango – Started 7 years ago, but fulfilled only 6 of the 13 procedures.

Procedures for Lifting the Ban on Importation (JAPAN)

1.Request for lifting the ban of importation from exporting country

2.Submission the plan of research by exporting country

3.Examination the plan by Japanese experts

4. Development of disinfestation method or research for pest free area

5. Submission the data of experiment or research by exporting country

6. Examination the plan by Japanese experts

7. Submission the plan of verification testing or research by exporting country

8. Examination the plan by Japanese experts

9.Conducting the verification testing by Japanese experts

10. Submission the plan of verification by exporting country

11. Examination the data by Japanese experts

(Explanation meetings for domestic producer if necessary)

12. Gathering the public comments and conducting the public hearing

13. Amendment the regulation (lifting the ban of importation)

OUTCOME

- Japan:

• Market access gained

Durian – All Forms, i.e. Frozen, Chilled and Fresh

TECHNICAL MARKET ACCESS

- New Market Access Submission
- Market Access Maintenance
- Market Access Improvements

TECHNICAL MARKET ACCESS

Market Access Maintenance

- Maintain the existing markets

TECHNICAL MARKET ACCESS

- New Market Access Submission
- Market Access Maintenance
- Market Access Improvements

TECHNICAL MARKET ACCESS

- Market Access Improvements
  - Some countries amend/revise their Quarantine Regulations, and therefore import requirements changed

    e.g. China and Singapore

TECHNICAL MARKET ACCESS

- Market Access Improvements

  - China has imposed a new requirement on importation of Papaya, i.e. Papaya fruits must undergo Hot Water Treatment to disinfest Fruit Flies (*Bactrocera papayae*) effective July 1, 2005.

    As a result, we have to hold the export which is about 20 metric tons a day.

    - a very short notice was served, i.e. a one month notice

  - Singapore only allows export of Plants from certified farms/packers (MPCA Scheme) without PCs. Plants from other Farms/Packing Houses must be accompanied by PCs.

Opportunities for Regional Collaboration — A Surveillance Network?

In 2001/02, the Australian Agency for International Development (AusAID) supported an initiative to review and assess the arthropod pest collections and plant disease herbaria in ASEAN countries. The authors of these studies observed that, to a greater or lesser extent, none of the countries of the region could provide an adequate description of the health (pest) status of its agricultural industries. The problem was attributed, in large part, to the small number of specimens held in plant disease herbaria. The arthropod pest collections were generally much better populated than the plant disease herbaria, but all needed additional resources and assistance to bring these up to contemporary international standards. Some arthropod pest collections contained many specimens that were unidentified.

Many collections of arthropod pests and plant diseases are the product of work dating back a century or more. The early curators of those collections sourced specimens from practicing plant health scientists, farmers and from their own collecting trips. While specimens submitted by plant health scientists and farmers are still valuable, the collecting of specimens has become more purposeful than in the past, driven by the need to expand knowledge about biodiversity, concern about the need to recognise alien pests in new environments and a desire to expand trade in agricultural commodities. However, the capacity of individual countries to undertake surveillance for plant pests and diseases in constrained by factors such as:

- Lack of experience in designing and carrying out surveillance programs;
- Lack of understanding of the definitions applying to different types of surveys as set out in various International Standards for Phytosanitary Measures (ISPMs) developed under the aegis of the International Plant Protection Convention (IPPC);
- Little understanding, at least in some agencies / institutions, of the importance of pest collections in the global trading environment;
- Limited in-country capacity to identify pests and pathogens.

Diagnostic capacity is a problem globally as many agencies downgrade the importance of taxonomy and plant health generally. Given the problems listed above, sharing expertise through regional, in-country and international networks seems an obvious approach to overcome the shortage of specialists.

If networks of international collaborators working together to build specimen-based pest lists is to succeed, there needs to be a strong desire to work together. Increasingly much can be done on the internet, including using new diagnostic tools, but providing the resources for such networks will remain a problem for some countries. On the other hand, many developed members of the World Trade Organization and donor agencies are giving a high priority to assisting developing countries to expand trade in agricultural commodities by building capacity to address phytosanitary issues. Accessing the resources provided by developing countries is competitive, but can be made easier when senior managers are aware of the importance of pest collection in trade.
Senior administrators and politicians cannot be expected to know about the importance of

building specimen-based pest lists and they need to be told in terms that they understand – that is trade and national development.

Within the Asia Pacific region there are some examples of surveillance networks. These include the collaborative efforts of Malaysia and Griffith University in Australia under the aegis of the International Center for the Management of Pest Fruit Flies and the forest pathologists in Australia who work with counterparts in Pacific island countries. Funding for collaborative work can be sourced through the Australian Center for International Agricultural Research (ACIAR) and various bilateral and regional programs funded by the Australian Agency for International Development (AusAID). Doubtless other donor agencies would also respond to well-presented applications for support. APEC also has funds to support collaborative efforts that meet the objectives of its members, that is to liberalise and expand trade between its members.

A national plant health surveillance network in Australia

The Australian government, five state governments, two territory governments and industry groups in Australia all undertake various types of surveillance for the presence of plant pests. The purpose of this surveillance includes early detection surveys for the presence of new plant pests, surveys to demonstrate absence of pests that could affect trade, delimiting surveys to determine and then monitor the extent of a pest infestation during an eradication program, and monitoring surveys to determine the prevalence of established pests. Also relevant are awareness raising activities.

Comprehensive knowledge of all of these activities is difficult and time consuming to obtain. We are in the process of developing a network of surveillance coordinators from all jurisdictions and sectors who can report on what surveillance is being done. This information will be stored in a central repository that will include such things as the pest(s) that are targeted, the hosts involved, where, when and why the surveillance is being done and who is involved. This information should help in the rapid generation and analysis of information that may be needed, for example, to demonstrate the absence or distribution limits of a particular pest and the level of confidence that can be attributed to those claims. As a shared resource, the network will provide a forum for collaboratively sharing information in relation to plant pest surveillance.

DRAFT RECOMMENDATIONS:

1. **That the ATCWG and the Plant and Animal Quarantine and Pest Management sub-group take stock of APEC-wide expertise in plant pest diagnostics and taxonomy, and support regional initiatives to harness these resources in a coordinated manner to support pest surveillance and biosecurity preparedness.**

2. **That member economies co-operate to share plant health and biosecurity data through an appropriate communication forum to facilitate easy access to such information needed for biosecurity planning and market access negotiations.**

3. **That the ATCWG brings the attention of the APEC Forum the need to support efforts to identify regional commonalities in pest threats, priorities in pest surveillance, and raise the awareness of member economies of the need to address biosecurity concerns with respect to these threats, on a national and regional basis.**

4. **That the ATCWG recognizes the need for capacity-building activities to be organized on a regular basis to raise skill levels of plant health professionals in developing APEC economies to meet WTO/SPS requirements. It is proposed that hands-on training, using relevant case studies, be conducted to reinforce the knowledge and skills acquired from the current activity.**