Biological Control in Invasive Species Management: Experiences and Lessons of Using ISPM3

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Biological control - Widest view

**Non-Self Sustaining**
- Inundative biological control
- Sterile male release
- Host resistance
- Biological chemicals

**Self Sustaining**
- Classical biological control
- Augmentation
- Habitat management
Biological control

- IPPC - A pest control strategy making use of living natural enemies, antagonists or competitors and other self replicating biotic entities
Classical biological control

IPPC - Intentional introduction and permanent establishment of an exotic biological control agent for long-term control

Native range of pest

Locality of new infestation

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Growing need and use of biological control

- Spurred by successes
- To deal with the growing number of IAS
- ....and the increased need for IPM and and growth of the organic sector
Successes

- Numerous success since Koebele introduced the vedalia beetle to control the cottony cushion scale over 100 years ago.
Cassava mealybug
Pink hibiscus mealybug
The challenges continue..
Concerns have increased

- Disastrous introduction of vertebrates predators over a century ago continue to hound CBC
- The very permanent nature of CBC has also led to concerns over impact of introduced agents on non-target organisms and local communities
- ….but on the whole over the last 50 years or so CBC has been relatively safe due to greater care
Development of ISPM3

- IIBC now part of CAB International and IOBC approached FAO in 1989 to initiate discussions to determine the need for a code.
- ISPM3 was developed in the ensuing years and was endorsed by FAO member countries in 1995, and formally published in 1996.
Objectives of ISPM3

• To facilitate the safe importation of exotic biological control agents for research and/or release into the environment.

By

• Defining the responsibilities of government authorities and other bodies involved
Beneficiaries

• Some countries already had comparable procedures in place: e.g. Australia, Canada, New Zealand, South Africa, USA

• Less experienced countries the main beneficiaries
Key elements of ISPM3

• Formation of a national body to administer the regulatory process.

• For each new introduction, dossiers should be prepared:
  – On the pest (identification, importance and known n.e)
  – Natural enemy (ident., biology and ecology, host specificity and impact on ntos, n.e or contaminants and procedures for elimination)
  – Potential hazards

• The responsibilities of exporters and importers
How are dossiers developed?

• Dossiers prepared on basis of:
  – Literature and inputs from biosystematists
  – Laboratory and field data on host range, biology/ecology
  – Practical experience from laboratory rearing
Use of Dossiers or Environmental Assessments (1996-2001)

- 104 introductions
- 42 countries
- 28 pest species
- 43 biological control agents
Awareness of the ISPM3

Were you/the country aware of ISPM3 when introductions were made?

- Yes: 82%
- No: 18%
Use of ISPM3

Have you used ISPM3?

50% followed provisions of ISPM3 mostly/completely while the other 50% did so partially

[Graph showing Yes 76% and No 24%]
Reason for not using ISPM3

- Other procedures already in Place: 80%
- No designated Authority: 20%
Awareness among relevant agencies and stakeholders

- Poor: 65%
- Limited: 15%
- Good: 20%
Importers and Exporters of BCA

- Government agencies – 48%
- Regional and international research agencies - 48%
- Private sector – 6%
Impact of ISPM3 on biological control introductions.

Made them...

- More rigorous: 46%
- More lengthy and time consuming: 27%
- Easier: 20%
- Difficult/harder: 7%
National legislative frameworks -1

• Do you have national legislation governing introduction and release of BCA?

71% said yes
National legislative frameworks - 2

• Will ISPM3 provide a basis for development of legislation?
  - Probably Yes: 64%
  - Probably not: 0%
  - Don't know: 9%
  - Yes: 27%
• ....but also, 47% of countries do not have a quarantine facility?
Case histories

- Caribbean
- West Africa
- Kenya
- Yemen
- Colombia
- Brazil
Caribbean - 1

• Prior to 1995, very little experience at implementing biological control
• National mechanisms governing introduction of biological control agents non-existent or outdated
• Little capacity or experience at implementing the ISPM3
Since 1990, the region has faced a number of new exotic pests

- Pink Hibiscus Mealybug
- Citrus Blackfly
- Coconut Blackfly
- Giant African Snail

(CAB International)
Caribbean - 3

• In the case of HMB, dossiers instigated by FAO/CABI
• .......but the problem with HMB created regional awareness
• National programmes are now requesting that dossiers be prepared for new introductions as a matter of practice
West Africa

• *Aleurodicus dispersus* a regional problem
• At the instigation of FAO/CABI, a dossier prepared on *Nephaspis bicolor*
• Decision to introduce deliberated at the regional level
Kenya

• Need for process guiding introduction of biological control agents already addressed before ISPM3 was ratified
• Authority to introduce vested with the Minister of Agriculture and implemented by DoA who was advised by KSTCIE – Chaired by DoA and the MD KEPHIS is Secretary
• Prior to 1996, KSTCIE required written petition and verbal presentation
• ISPM3 validated this arrangement and refined content of dossiers
Yemen

• Prior to arrival of the Brown Peach Aphid (BPA) in 1993, the GDPP had implemented a biological control project against the potato tuber moth.
• No set mechanism for assessing potential introductions was in place
• In 1995 a project was started to implement biological control of BPA funded by FAO
• A dossier was prepared for the selected natural enemy, Pauesia antennata and this provided for the first time a critical look at introductions and established the important role of the national authority (GDPP)
Colombia

• *Hypothenemus hampei* is a major pest of coffee
• Biocontrol efforts commenced in the 1980s resulting in introduction of two parasitoids
• A new project in 1993 funded by DfID commenced, part of which was to introduce *Phymasticus coffeae*
• Laboratory host feeding studies on *Phymasticus* showed that in no choice situations it could attack other small scolytids
• Results were presented to the MoA who gave permission for introduction
• The dossier allowed decision makers to make an informed decision.
• No adverse effects observed in the field.
Brazil

- Since 1991 – introductions overseen by the national quarantine facility, Costa Lima
- Specific procedures agreed among COSAVE member countries used
- Regional standards agreed in 1996
- In developing these, ISPM3 was referenced as well as national legislations and US guidelines
- From 1991-2000, 170 introductions processed
Problems with the dossier approach

- Delay implementation of biological control projects
- Scant resources limit the kinds of studies that can be conducted
- Little information on remedial action after agents are released
- Lack of competent authorities to review dossiers
- Lack of adequate follow-up after release
Conclusions

- Production and dissemination of the ISPM3 was timely and appropriate
- ISPM3 ensures environmental issues are raised
- The ISPM3 provided a mechanism for formalising good practice, within an internationally recognized frame
- Facilitation of regional collaboration
- Urgent need to address constraints – capacity, lack of guidelines and development of national mechanisms for its implementation
- Proposed revision of ISPM3 is timely, taking into account the growing need for biological control
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