

Microbial BCAs: What are the Risks?

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Outline

- What do we mean by risk?
- International Context & the Precautionary Principle
- Elements of risk for invertebrates introduced for biological control purposes



Risk: What is it?

- *The probability of an adverse event and the magnitude of the consequences...*



COMPONENTS OF RISK

- Probability (*or likelihood, chance*)
- Consequences (*or impact*)
- Uncertainty
- Ability to manage

There must be a potential 'hazard' for risk to exist



PROCESS OF RISK ANALYSIS

- [Initiation]
- Hazard Identification
- Risk Assessment
 - Probability, consequences, uncertainty
- Risk Management
 - Efficacy, feasibility, impacts
- [Risk communication]



Context

- Regulatory authorities charged with environmental protection
- Increasing public awareness & interest in environmental protection- risk aversion
- Invasive alien species - one of the greatest potential threats to biodiversity



Context

- High level of uncertainty in environmental decision making
 - Ecology - a developing science to understand complex, dynamic systems
 - Limited predictive capacity
 - Data collection difficult & expensive
- Evidence of adverse impacts of invasive alien species- **hazards** identifiable but **likelihood** & magnitude of impact difficult to quantify
 - **Precautionary Principle**



Precautionary Principle

- Full scientific proof of a possible environmental impact is not required before action is taken to prevent that impact
- Applies if there is a risk of damage that is
 - significant
 - widespread
 - irreversible



Biological Control Agents

- Intent for successful reproduction (and establishment?)
- Intent for successful host searching and dispersal
- Intent to achieve reduction in population of target pest species (and local extinction)

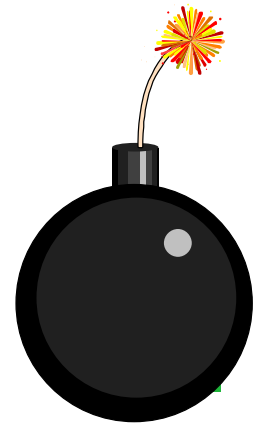


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Regulators Perspective - Exotic BCAs

- Introductions potentially “risky”
- Potential impact on national/regional biodiversity
- Precautionary Approach
 - Incomplete knowledge of species interactions
 - Absence of an agreed framework for evaluating risk



Risks - native species as BCAs

- Native species considered a low risk rating
- Not risk free
 - Introduction to new areas where not ordinarily resident i.e. non-native to release area
 - Poor definition of “native”-origin & identity of stocks, strains
 - High numbers introduced



Data Requirements

- Description of organism & release site
- Origin, culture conditions, QA
- Biology, distribution and natural habitat
- Interactions with other organisms and environment
- Survival/Environmental parameters
- Details of receiving environment
- Information on monitoring and control



Identity, Characterisation, Purity

- Inaccurate characterisation
Organism released differs from that intended!
- Contamination & Poor Quality Control-
 - Introduction of entomopathogens, hyperparasites
 - Co-formulants & Processing e.g. toxins
 - Contaminants e.g. host

Loss of credibility & confidence



Risks - Human Health

- Risk of bites, stings, allergic response
- Toxins, pathogens e.g. fermentation products
- Disease vectors



Propellant Handlers Ensemble Coverall (a Self-Contained Atmospheric Protective Ensemble (SCAPE) designed to protect the propellant handlers from exposure to toxic hypergol propellants)

Risks: Plant Health



- Intentional introduction of BCA for weed control
- Internationally agreed quarantine controls & Pest Risk Analysis protocols
- Host range studies
- Control costs of new pest
- Loss of export markets



A Fairchild-grown *Opuntia corallicola* reaches for the sky in its new home.

Impact

Direct

- Species extinction
- Reduction in non-target population levels
- Reduction in distribution
- Displacement of native species
- Interbreeding with native species
- Economic damage e.g. phytophagous plant pest requiring additional control costs

Indirect

- Reduced effectiveness of existing natural enemies
- Increased control costs
- Reduced pollination
- Reduction in bird population
- Hyperparasitism, disease transmission, vector
- Multi-trophic interactions changes to eco-system structure, diversity and functionality
- Social e.g. tourism, employment

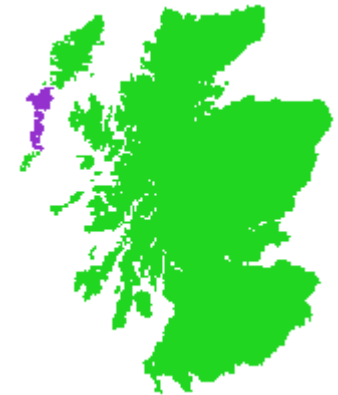


Risks – Release Site

Islands



South Uist, Scotland



Invasive
native species

Risks - Release Site

Islands

- Unique Fauna- susceptible to invasion
- More vulnerable- ecological specialisation
- Isolated islands tend to have more unique fauna e.g. Hawaii
 - Species extinctions



Lespesia archippivora vs armyworms
Loss of *Agrotis crinigera*



Risks - Organism traits

- Host range
- Dispersal potential
- Establishment potential
 - permanent or transient



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Summary

- Risks of exotic BCAs need to be assessed as for other non-native species
- Wider environmental context beyond crop protection
- Internationally agreed framework for evaluating risks provides
 - Reassurance in decision-making
 - Public confidence in industry

