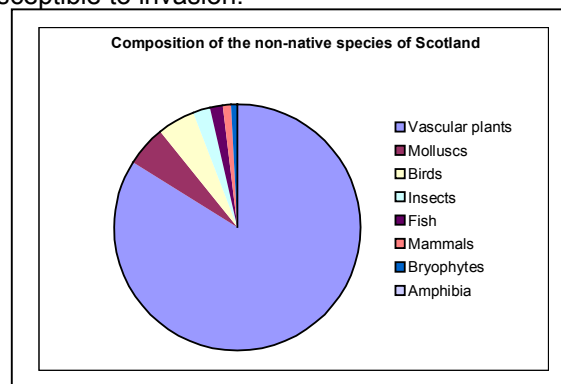


NON-INDIGENOUS SPECIES AND BIOLOGICAL INVASIONS

Problem

Biological invasions by non-native or “alien” species are widely recognised as a significant component of human-caused global environmental change, often resulting in a significant loss in the economic value, biological diversity and function of invaded ecosystems. In the United States, the cost of biological invasions has been estimated to total \$97 billion hitherto for 79 major bioinvasions. Member States of the European Union have a commitment to strictly control the introduction of non-indigenous species and eradicate those alien species which threaten ecosystems, habitats or species. The use of non-native species in farming, forestry, aquaculture and for recreational purposes has increased in Britain during this century. Species may be imported because they grow faster (offering increased economic returns), because they feed on and suppress other species (biological control species), or simply because people like them (pets and many garden plants). In addition to these deliberate introductions, agricultural trade may itself facilitate the spread of aliens directly through accidental introduction of non-native species or indirectly by modifying the natural environment so that it becomes more susceptible to invasion.



Impact

In the UK rhododendron reduces the biodiversity of Atlantic oakwoods while American mink is held partially responsible for the decline in water vole populations. Hybridisation has occurred between non-native sika and native red deer as well as between native and non-native plants. Japanese knotweed undermines flood defences and the impact of bark stripping by grey squirrels reduces forestry production. Alien species can also affect human health e.g. phytophotodermatitis through contact with giant hogweed or leptospirosis spread by the brown rat.

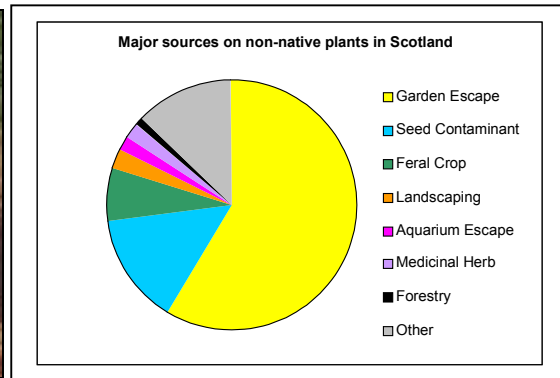
Areas at Risk

While deliberate introductions can be regulated and controlled to some degree, unintentional introductions are harder to prevent even with rigorous inspection and quarantine procedures.

- **Arable and Animal Production** Most of the major crops grown in the UK are non-native but accidental contamination of grain supplies or feedstuffs presents a more diverse route for the introduction of non-native plant species into the United Kingdom. Crops deliberately introduced into the United Kingdom, and most seed contaminants will have only a minor impact outside of a managed agricultural environment. Nevertheless, past trends are not a guarantee that crops introduced in the future will not pose a threat to the environment.
- **Fur farms** Historically an important source of non-native species source of non-native species that will close of January 1 2003 under the Fur Farming Prohibition Act 2000.
- **Horticulture** The majority (58%) of non-native plants naturalised in the UK result from garden escapes and it is increasingly recognised that the composition of the UK non-native flora strongly reflects horticultural trends. Some of the most pernicious and invasive non-native plants are the result of garden escapes. The horticulture trade is an important source of accidental introductions of agricultural pests.
- **Aquaculture** The introduction of non-native fish and plants into UK freshwaters either deliberately or accidentally e.g. common carp have resulted in dramatic habitat changes

by increasing the turbidity of freshwaters, destroying or replacing macrophytes or predated native fish

- **Forestry** To date, conifer plantations represent almost 6% of the land area of the British Isles. Many non-native conifers set seed and regenerate naturally in Britain. Successful invasion of native woodlands by non-native conifers may be restricted to the pine, birch and oak woods on strongly acid soils yet could dramatically alter the species composition and function of these ecosystems.



Global change is, predicted to favour non-native invasive species and agriculture may accelerate invasions through increased eutrophication, disturbance and overgrazing. The growth in international trade and commerce will continue to increase the movement of species between countries and continents, both deliberately and unintentionally. Thus, further non-native species introductions, a number of which will have economic or ecological impacts should be expected in the future. The changing face of British agriculture will also contribute to the success of biological invasions as the market moves towards alternative agricultural production, including extending the commercial exploitation of non-native species.

Practical Actions

There have been relatively few successful control eradication programmes against non-native species. Control measures are generally not implemented until a species becomes a problem, by which stage they are very expensive and require extensive research into the ecological, economic and political aspects of management. Future remedies focus on changes to UK legislation:

- Update existing lists of invasive species for which release into the wild is an offence.
- Prohibit sales of invasive species.
- Establish in legislation a more precautionary approach to the release of non-native species.
- Speed up the review process so responses to newly invading species can be more efficient.
- Manage the control of invasive species at a national scale, possibly through a Lead Agency.
- Include agricultural introductions within legislation.

Linkages

Biodiversity: currently threatened by biological invasions.

Nutrient surpluses: facilitate the spread of invasive species.

Research Gaps

The research approach should prioritise:

- Assessment of the impact of specific non-native species on ecosystem.
- Identification of the relative importance of ecosystem traits that might influence their risk from invasion by alien species.
- Development of models to predict why outbreaks occur and how species spread within ecosystems and across landscapes and test predictions.
- Exploitation of results to develop management guidelines with stakeholders to prevent and/or control invasion where economically or environmentally appropriate.

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