ESA Position Statement on Insects and Biodiversity

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The Entomological Society of America (ESA) advocates the following positions on the study, preservation, and use of biodiversity in ecosystems:

**Key Points**

- Earth’s long-term well being may depend on a solid understanding of how biodiversity functions.
- Insects are one of the few key groups of organisms that define the complex nature of biodiversity, and their condition is indicative of ecosystem health.
- Natural ecosystems are dynamic resources for economically valuable plant and animal gene products that should be discovered, studied, and used.
- National agencies that deal with issues of biodiversity must have oversight authority to manage biodiversity and regulate biological exploration.
- Identifying the species that inhabit an ecosystem is fundamental to understanding that ecosystem’s biodiversity. Therefore, research on insect systematics and taxonomy is encouraged as part of biodiversity assessment.
- The capture and shipment of endangered species for individual gain must be thwarted, whereas the use of insects for scientific study must be encouraged.
- ESA encourages the virtual extermination of specific, highly damaging pest and vector species even though this may result in a temporary reduction of biodiversity.
- Entomologists and other scientists, lawyers, policy makers, and citizens are encouraged to work cooperatively to prevent the introduction of damaging exotic species into the United States.

**The Meaning of Biodiversity**

The term “biodiversity” characterizes the dynamic state of an ecosystem’s health. Human survival depends on the health of the ecosystems in which we live. At its simplest level, biodiversity measures the numbers and variety of species in an ecosystem. At a deeper level, it denotes genetic diversity that contributes to the population dynamics of species and provides a measure of their richness and interdependence. Biodiversity influences processes, such as carbon and nutrient cycling, that drive ecosystem dynamics and atmospheric and energy exchanges.

Biodiversity issues -- including the greenhouse effect, global warming, ozone depletion, desertification, land use and apportionment, surface and underground water contamination, and food safety -- are rapidly approaching crisis status. Although
many environmental processes are beyond human control, our planet’s long-term well
being may depend on a solid understanding of how biodiversity functions to maintain
a healthy planet. Only if we understand the biodiversity of an area can we hope to
wisely manage human influences on it.

Insects as Biodiversity Indicators
Over half of all multi-cellular animal species are insects. Therefore, they play
dominant, vital roles in the functioning of ecosystems. They are one of the few
organism classifications that define the complex nature of biodiversity. How sensitive
insects are to an ecosystem and its degradation provides a persuasive argument for
using appropriate insect taxa as indicators of biodiversity. Monitoring key insect
groups can define ecosystem stability and signal actual or potential shifts in
productivity, desertification, nutrient cycling, and other changes.

Genetic Resources and Commercial Products
Natural ecosystems are dynamic resources of economically valuable plants and
animals that should be discovered, inventoried, conserved, studied, and used.
Organisms containing gene products are valuable natural resources. Vital
medications, for example, are based on novel chemical substances derived from
arthropod venom. Therefore, industry frequently provides resources for the
exploration of biologically diverse ecosystems, especially in developing countries.

Intellectual Property Rights and Species Preservation
National government agencies must have oversight authority for preserving
biodiversity within their borders and for helping to regulate ownership rights
associated with biological exploration. They are encouraged to recognize intellectual
property rights (IPRs) to stimulate industry support for long-term maintenance of
biodiversity. Biological exploration is costly, and IPRs can help industry recover its
investment and remain profitable. Because future technologies and breakthroughs will
stimulate more intensive exploration, preservation of biota -- an area’s flora and fauna
-- is of high priority to industry.

Conservation of Arthropod Diversity
The species that inhabit an ecosystem must be defined before biodiversity can be
understood. Given this, U.S. systematic and ecological resources are being focused on
identifying our biota in the context of its biodiversity. Many taxa, or organism
classifications, previously unknown to science are being systematically described and
characterized by the U.S. Geological Survey’s Biological Research Division. They
are including insects that have a vital role in ecosystem functioning, and this is
strongly supported by ESA. Also, to this end, the National Science Foundation’s
Partnerships for Enhancing Expertise in Taxonomy is to be commended for fostering
training in taxonomy and systematics of poorly known groups of organisms, and is
encouraged to place more emphasis on classical taxonomy.

International Regulation of Arthropod Collection and Shipment
Some arthropod species are rare and their existence may be threatened if they are
captured in large numbers and sold for individual gain. This practice must be
thwarted, whereas the judicious use of insects for scientific study must be encouraged. For example, exchange of dead arthropods for taxonomic studies is vital and shipment of live natural enemies is necessary for the biological control of pests. It seems to be a challenge for policy makers to prevent the collection and sale of endangered species while providing for unencumbered movement of arthropods that are beneficial to society. The conservation and restoration of ecosystem biodiversity are laudable and desirable national and international goals that necessitate increased collaboration among the biological disciplines.

**Intentional Species Extermination**

Pesticides are often used cyclically to control pests that repeatedly re-infest crops, a practice that introduces undesirable chemicals into the environment. If a key pest can be eradicated from a wide area, biodiversity may be enhanced by its absence due to reduced amounts of chemical pesticides. A few noteworthy cases exist in which insects are systematically eliminated from entire regions, such as the screwworm fly, cotton boll weevil, codling moth, and certain tropical fruit flies. This pest management approach could lead to purposeful species extinction. ESA encourages the extermination of specific, highly damaging pest and vector species from an area with minimal reduction of the native biodiversity.

**Exotic Species Introductions**

The importance of invasive, non-indigenous, plants and animals is great in agriculture, forestry, and urban and natural habitats. As part of well-considered, integrated pest management (IPM) systems, the introduction of predators, parasites, and pathogens of exotic insect pests can help to minimize the use of pesticides. However, it is possible that introduced organisms may play unexpected roles in non-native habitats and, if not well understood, they can destroy native species. Consequently, thorough testing of specific hosts of an organism is required before that organism is released. Also, such organisms must be monitored periodically thereafter.

We must limit non-target impacts of introduced biological control agents. Entomologists and other scientists, lawyers, policy makers, and citizens are encouraged to work cooperatively to improve our pest risk assessment capabilities and to minimize non-target impacts of all pest control interventions, including intentionally introduced biological control agents. ESA recognizes that limiting the use of all pesticides and selecting the ecologically least disruptive pesticides for specific control situations are important to preserve biodiversity. Therefore, ESA endorses ecologically based IPM as a standard for pest control.

The Entomological Society of America is the largest organization in the world serving the professional and scientific needs of entomologists and people in related disciplines. Founded in 1889, ESA today has more than 7,000 members worldwide affiliated with educational institutions, health agencies, private industry, and government. Members, many of whom utilize collections directly or indirectly but all of whom understand their importance, include researchers, teachers, extension educators, administrators, marketing representatives, research technicians,
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