

**Convention on Biological Diversity
Conservation and Sustainable Use of Agricultural Biological Diversity
U.S. Government Submission to the Secretariat**

Introduction to the Submission on Pollinators:

As a start to CBD efforts to address the issue of pollinators, the U.S. has compiled the attached selected list of bibliographic references. This bibliography is not an exhaustive compilation but rather a tool to aid further research. In addition, the following paragraphs offer a general overview of the available literature and a few basic recommendations for consideration by the Secretariat.

Pollinators: Literature Overview

Of the estimated 240,000 species of flowering plants, 91% require the services of pollinators to set fruit and seed. Roubik's (1995) survey indicated that the world's major crops are pollinated by 44 genera of animals including bees (72.7%), flies (18.8%), bats (6.5%), wasps (5.2%), beetles (5.1%), birds (4.1%), butterflies and moths (4.4%), and thrips (1.3%).

Honeybees are not always the most efficient pollinators, yet they are mistakenly credited for the majority of all insect pollination. The contribution of wild species to the pollination of crops is difficult to evaluate, and documentation is conspicuously lacking worldwide. Despite farmers reliance on managed European honeybees (*Apis mellifera*), of the 73% of crops pollinated by bees, it is estimated that 15% are pollinated by honeybees and 58% rely on other wild bee species (pollen bees).

In the last 50 years, over one-half of the managed honeybee colonies in the U.S. have been lost, with 25% of this loss occurring in the last five years. This dramatic decline is a result of mite infestation and disease, destruction of potential nesting sites, pesticide exposure, and breeding with African honeybees which makes them unmanageable. As a result, it is recognized that wild pollinators will have to play an increasingly important role in pollinating crops that historically have been pollinated by honeybees. According to G. P. Nabhan, one of the founders of the Forgotten Pollinators educational outreach campaign, if wild pollinators are incapable of replacing the services traditionally provided by honeybees, the cost to U.S. consumers will be an estimated \$6 to \$8 billion dollars per year.

Despite these facts, the majority of the available literature focuses on information specific to European honeybees, with limited resources documenting the management and/or utilization of the 20,000 species of pollen bees or other insects. When the more than 1,000 species of unconventional vertebrate pollinators -- from birds and bats to possums, lemurs and even geckos -- are considered, the available literature is scant and composed primarily of descriptive, often anecdotal, accounts of pollination ecology.

Like honeybees, the populations of many pollen bees and these other pollinators are currently threatened or in decline. Declines in wild bee species have been documented in Austria, Britain, Canada, Costa Rica, Germany, Italy, Poland, and the former Soviet Union. In another example, the IUCN estimates that 26% of the bat species worldwide are threatened with extinction. Some of these bat species are important pollinators in ecosystems with depauperate pollinator faunas, including some oceanic islands.

Recommendations for the promotion of best conservation practices, technologies, and educational programs to either maintain or promote the re-establishment of pollinators include the following:

1. Efforts should emphasize the research and development of alternative pollinator species for effective crop pollination. At the same time, plant breeders should seek to develop new varieties that are attractive to native pollinators. Site and crop specific studies are required, as optimal pollinator faunas will vary due to location, climate, plant vectors, and other factors. This may also include studies to identify efficient native pollinators in areas where important crops or their wild relatives are thought to have originated.
2. Additional data should be collected to identify the population density and habitat requirements of native pollinators for efficient fruit and seed set. This involves the need to census and monitor pollinators in habitats adjacent to agricultural areas and would also focus on the need for greenbelts or nectar corridors and the availability of alternative pollinator food resources at the times when crops are not being grown.
3. Further taxonomic research on pollinator species is important. For example, it is estimated that less than 2/3 of the world's bee species have been named and described. Additional taxonomic research may identify species or races of wild pollinators with beneficial characteristics such as greater resistance to parasites or diseases, more efficient pollination habits, and greater domestication potential.
4. Efforts should be made to develop data and encourage practices that would help growers and pest control applicators select chemicals less toxic to pollinators and apply them only when needed or when pollinators are less active, such as when crops are not yet in bloom.
5. Efforts should focus on educating the public on the benefits pollinators provide. In urban settings, the establishment of pollinator gardens and other retreats for birds, bees, and butterflies should be encouraged. In the U.S. alone, close to 62% of all households are engaged in lawn and garden care. Lists of native plants and pollinators should be available for those interested in promoting native pollinator conservation practices.

Pollinators: Selected Bibliography

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