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Global Efforts in Pollinator Conservation

Agricultural Outlook Forum

26 February 2009



Michael Ruggiero, Ph.D.
Smithsonian Institution
National Museum of Natural History

About Pollinators

- **> 80%** of flowering plants are pollinated by animals.
- **$\geq 1/3$** of the world's *major* food crops.
- **\$200 Billion** annually in value for global agriculture.
- There is growing evidence that **pollinators are declining**.
- **19,500** bee species globally and thousands of others



Kinds of Pollinators

INSECTS

- **Bees**
- Beetles
- Butterflies
- Crickets
- Flies
- Midges
- Mosquitoes
- **Moths**
- Wasps



REPTILES

- Geckos
- Skinks
- Anoles
- Whiptails



BIRDS

- Hummingbirds
- Sunbirds
- Honeyeaters
- Sugarbirds
- Flowerpeckers
- **White-winged Doves**



MAMMALS

- **Bats**
- Opossums and Marsupials
- Monkeys and Lemurs
- Rodents



Ami Pate/NPS

Chocolate Needs Pollinators



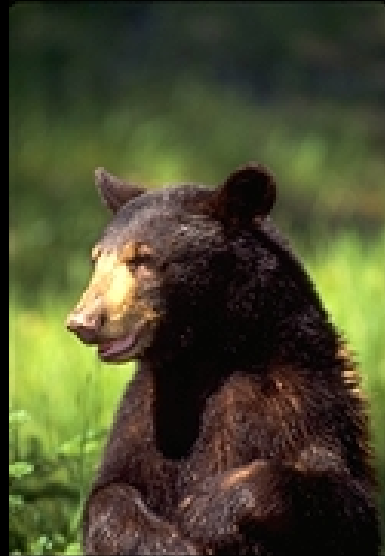
Vanilla and Bees



MISSOURI BOTANICAL GARDEN © 1996



Ecosystem Services

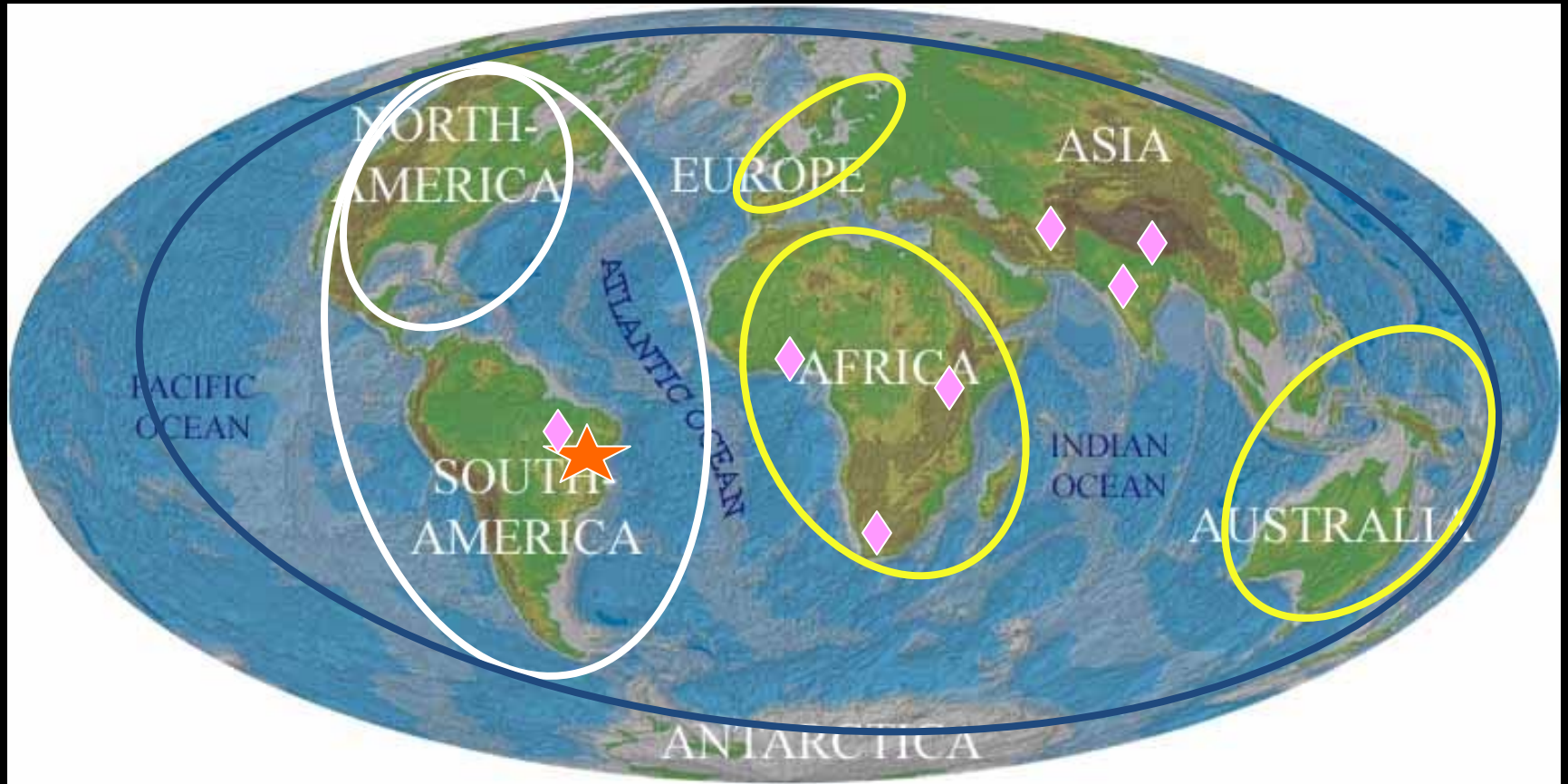


Convention on Biological Diversity International Pollinator Initiative

- Monitor pollinator decline, its causes and its impact on pollination services
- Address the lack of taxonomic information on pollinators
- Assess the economic value of pollination
- Promote the conservation, restoration and sustainable use of pollinator diversity



International Pollinator Activities



Pollinator Initiatives

- **North American Pollinator Protection Campaign (NAPPC)**



- **IABIN Inter-American Pollinator Thematic Network (PTN)**



- **GBIF Global Pollinator Species Campaign**



World Checklist of Bees



ITIS

Integrated Taxonomic Information System

What's New
About ITIS
Data Access
Submit Data
Tools
TRED
Links
Comments

World Bee Checklist

Together with specialists around the world, ITIS has completed a check list of the bee species of the world. The entire checklist (with some synonyms and subspecies) is fully integrated into the ITIS database. Options to access bee data in ITIS include:

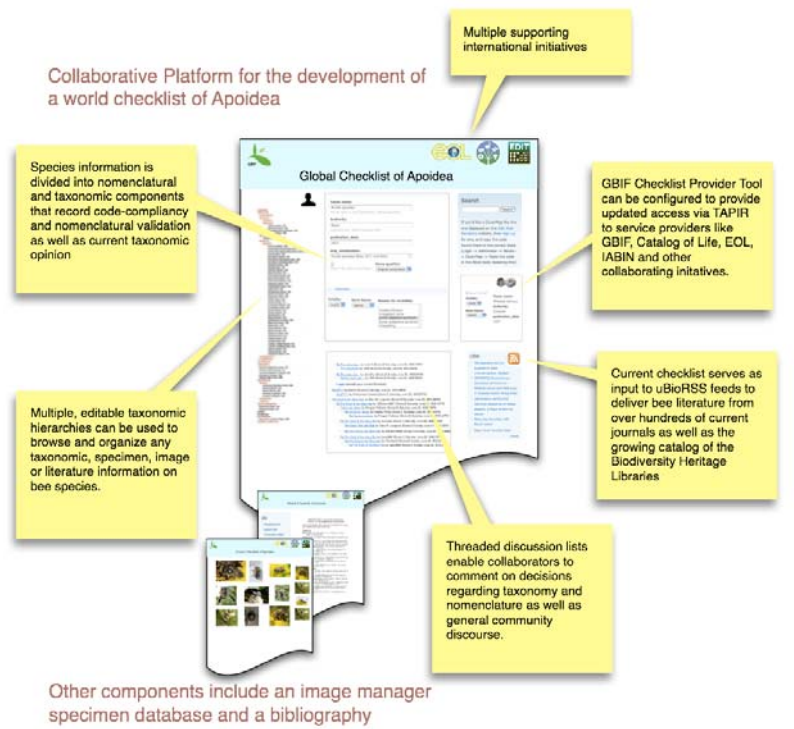
- Search by name from the [ITIS home page](#).
- Download the [full ITIS data base](#).
- Download an [ITIS Taxonomic Workbench file](#) (includes only extant bee families).
- Download a simplified list of just the valid bee species in a Microsoft Excel [file](#).

Bees are a subset of the superfamily Apoidea. The bee checklist includes all members of the following extant families in the superfamily Apoidea:

- Andrenidae -- andrenid bees, andrenids

www.itis.gov

Collaborative Platform for the development of a world checklist of Apoidea



Museum Collections



Bee Specimen and Observation Records

Location of Collections/Databases	Specimens Databased	Specimens Not Databased	Total Specimens
Australia	44,400	163,000	207,400
Africa	40,000	50,000	90,000
Asia	100,000	145,000	245,000
Europe	714,500	414,000	1,128,500
North America	838,000	1,140,000	1,968,000
South America	120,000	726,600	846,000
Global Total	1,706,640	2,778,260	4,484,900

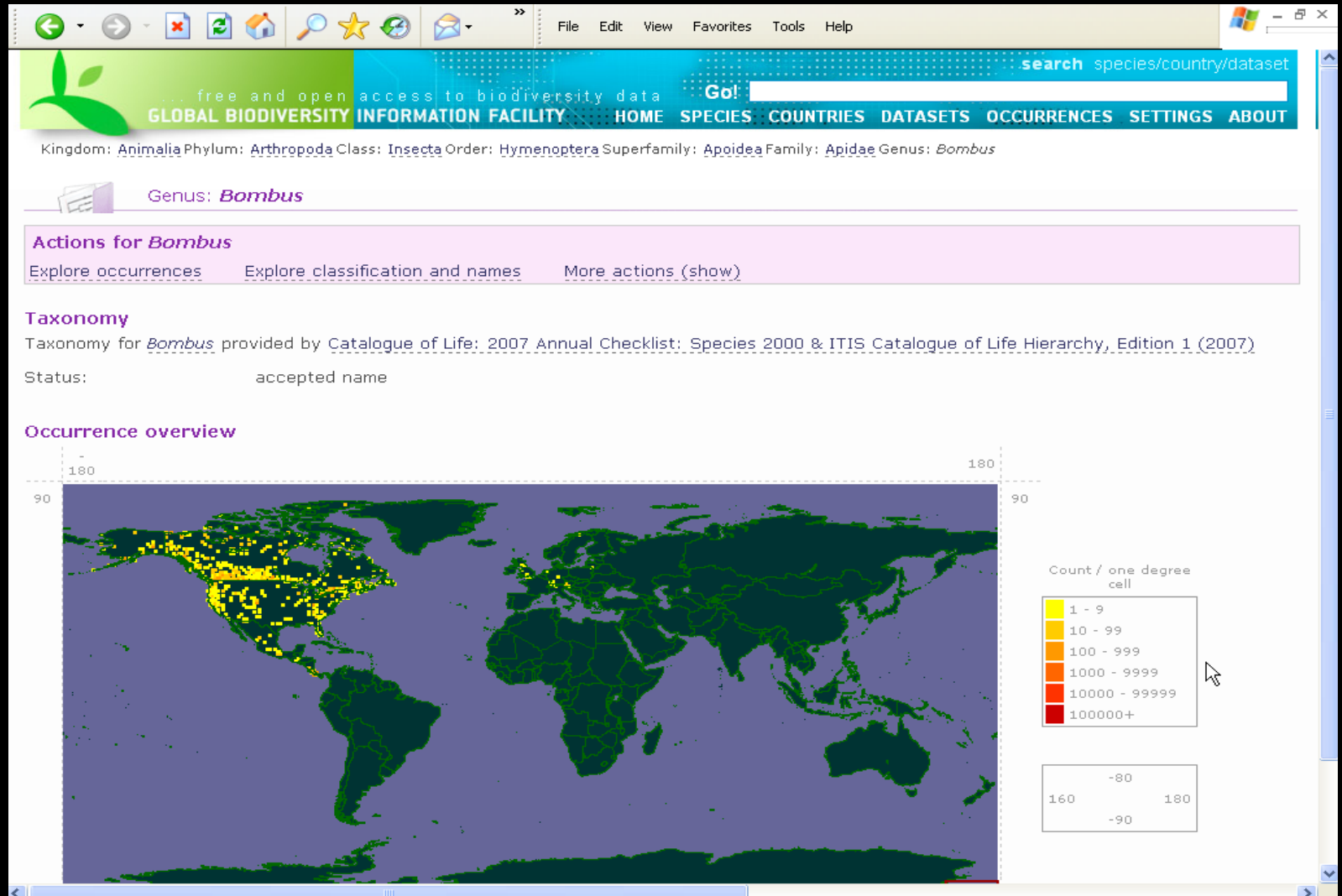
Growth in Digitized Pollinator Data during 2008

From
90,000
to
840,000
Records

www.pollinators.iabin.net

The screenshot displays the iabin website interface for data entry. The header includes the iabin logo (Inter-American Biodiversity Information Network) and the PTN (Pollinators Thematic Network) logo. Navigation links for 'home' and 'iabin-ptn' are visible, along with language options for 'pt', 'br', 'es', and 'fr'. The main content area is titled 'Registry of specimens/observations and plant-pollinator relationship data' and includes a brief description of the tool. Below this, there are three radio buttons for 'Save observation data', 'Save specimen relationship data' (which is selected), and 'View saved records'. The interface is divided into several sections: 'Observed specimens' and 'Related specimens', each with a 'Global Unique Identifier' field and a 'Select...' dropdown menu. The 'Interaction data' section contains an 'Interaction type' dropdown menu, an 'Other' checkbox, and a 'Required' checkbox, with an 'Insert' button. The 'Pollination elements' section features a table with five rows: 'Pollination evidence', 'Pollen removal', 'Nectar removal', 'Oil removal', and 'Flower predation', each with a checked checkbox and a 'Null' label, and an 'Insert' button. The 'Measure environment elements' section includes a 'Temperature' field with a checked checkbox and a 'Null' label, and an 'Insert' button.

GBIF Mapping



Digital Publications



Carl F. W. Muesebeck

This catalog is dedicated to our cherished colleague with affectionate regard for his kindness and with admiration for his distinguished scholarly contributions to our knowledge of North American Hymenoptera for more than half a century.

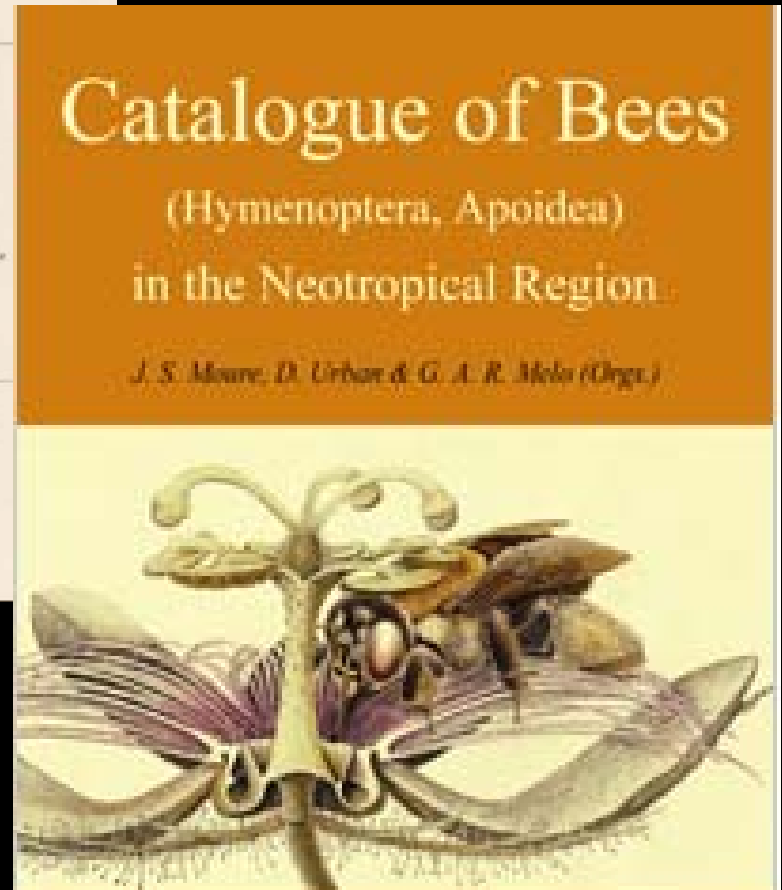
Catalog of Hymenoptera in America North of Mexico

Prepared cooperatively by
specialists on the various groups of Hymenoptera
under the direction of
Karl V. Krombein and Paul D. Hurd, Jr.
Smithsonian Institution
and
David R. Smith and B. D. Burks
Systematic Entomology Laboratory,
Insect Identification and Beneficial Insect Introduction Institute
Science and Education Administration,
United States Department of Agriculture

VOLUME 2

Apocrita (Aculeata)

SMITHSONIAN INSTITUTION PRESS
Washington, D.C.
1979



www.biodiversitylibrary.org

<http://moure.cria.org.br>

DNA Barcoding

Bombus {genus}

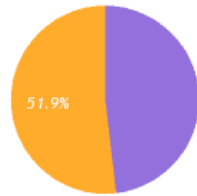
Species (123)

- *Bombus affinis* [1]
- *Bombus alboanalis* [4]
- *Bombus anachoreta* [1]
- *Bombus appositus* [3]
- *Bombus ardens* [50]
- *Bombus argillaceus* [1]
- *Bombus ashtoni* [3]
- *Bombus balteatus* [4]
- *Bombus barbutellus* [2]
- *Bombus beaticola* [6]
- *Bombus bicoloratus* [1]
- *Bombus bifarius nearcticus* [1]
- *Bombus bimaculatus* [17]
- *Bombus bohemicus* [4]
- *Bombus borealis* [8]
- *Bombus caliginosus* [2]
- *Bombus campestris* [2]
- *Bombus centralis* [4]
- *Bombus cingulatus* [5]
- *Bombus citrinus* [9]
- *Bombus confusus* [1]
- *Bombus consobrinus* [7]
- *Bombus cryptarum* [9]
- *Bombus dahlbomi* [1]
- *Bombus dahlbomii* [1]
- *Bombus defector* [1]
- *Bombus deuteronymus* [7]
- *Bombus diversus* [5]
- *Bombus edwardsii* [2]

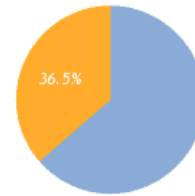
Lineage : Arthropoda; Insecta; Hymenoptera; Apidae;
 Specimen Records : 566
 Specimens with Barcodes : 399
 Public Sequences : 276 (Download)



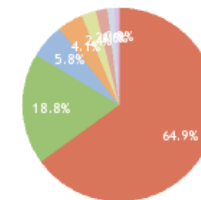
Barcodes :



Species :



Deposited in :



- GenBank - NCBI [534]
- York University [155]
- Biodiversity Institute of Ontario [48]
- Genomic Diversity Lab, University of Guelph [34]
- unspecified [20]
- J.B. Wallis Museum of Entomology, University of M [1]
- Research collection of Cory Sheffield [8]
- Logan Bee Lab, Utah State University [7]

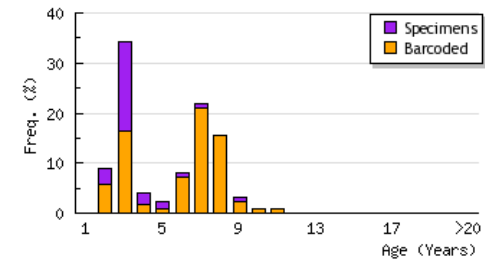
*Reference barcodes are a validated subset of the full database containing only those species represented by three or more individuals showing less than 2% sequence divergence.



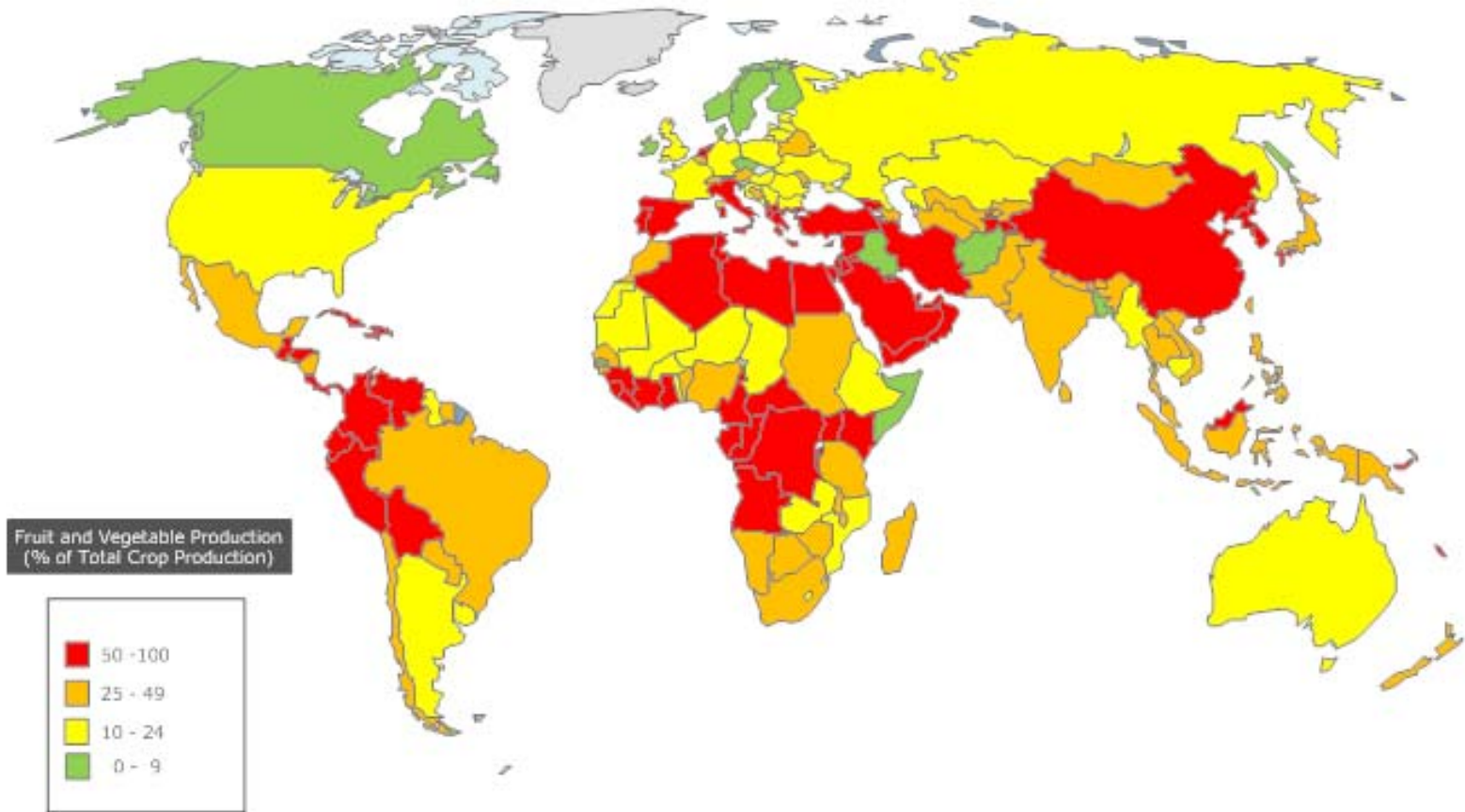
Collected in the following 4 countries :

- Belgium [1]
- Canada [121]
- United States [21]
- unspecified [680]

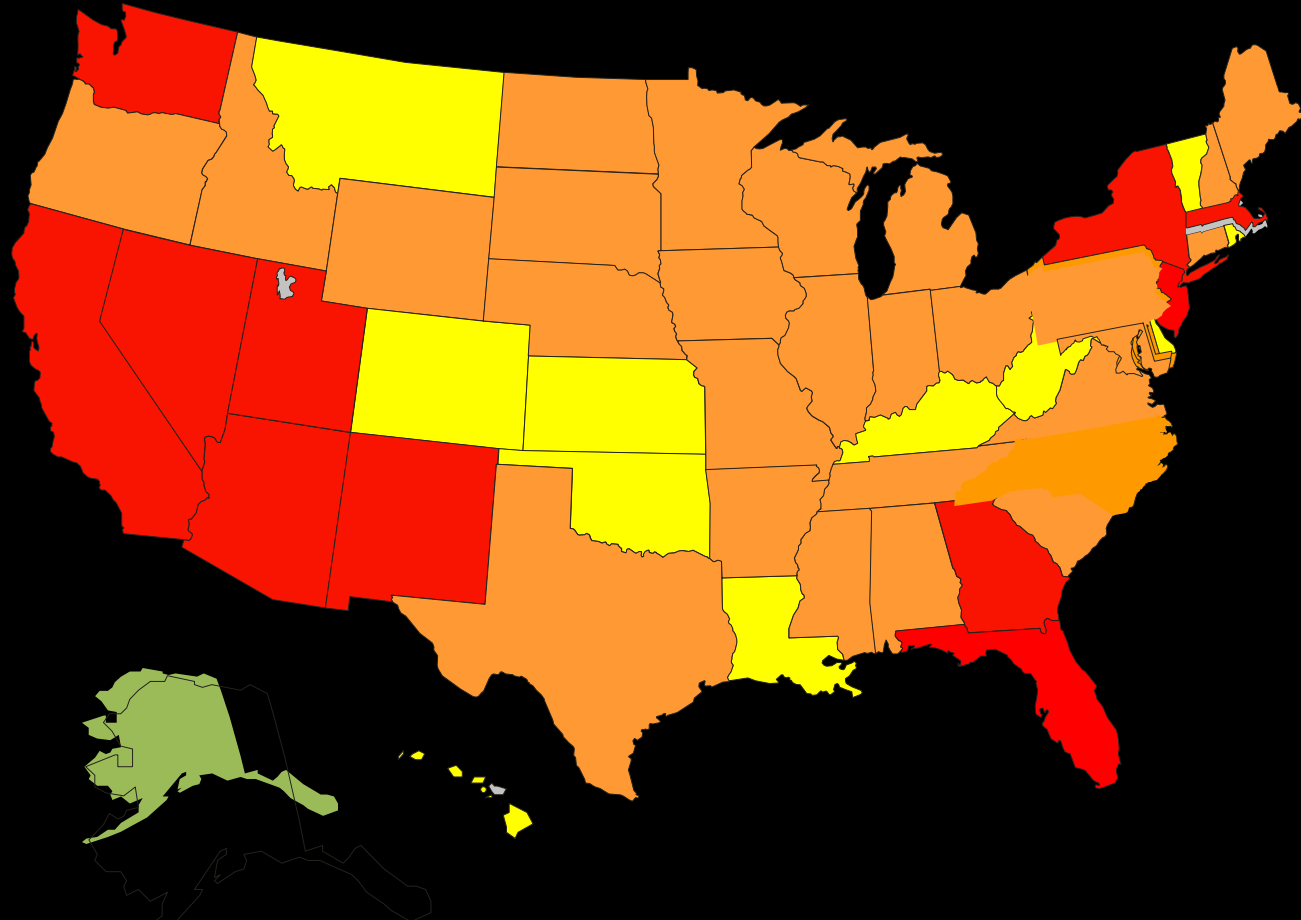
Specimen Age Distribution



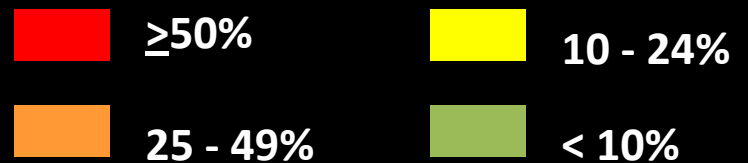
Dependence of Crops on Pollinators



IMPORTANCE OF POLLINATORS TO U.S. AGRICULTURAL CROPS



U.S. Pollinated Principal Crops =
\$71 Billion



Source: 2007 USDA NASS

Global Pollinator Summit



2008 - Durban, South Africa

Summit Recommendations

- Prepare a **Global Pollinator Assessment**
- Create a “**Bee Portal**” as a one-stop-shop
- Create a “Strategy and Action Plan” for **data acquisition**
- Hold a **donor conference**
- Develop better strategies and **marketing** tools to provide support to collections
- Create a significant **outreach** component for the campaign
- Support **capacity-building** for pollinator information and technology in developing countries (collections, training, identification keys, conservation, **beekeeping**)

Stingless Bee Management (Brazil)



Bee Collections



Working with the Community on Meliponiculture (Kenya)





Training

THANK YOU!



ruggierm@si.edu