

São Paulo Declaration on Pollinators plus 5 Forum

**Survey methods for bee as
pollinators in Brazil: assessing
the status and suggesting best
practices**

Workshop Report

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Sao Paulo
2004

Foreword

Workshop preparation

In October 1998, Sao Paulo workshop on sustainable use of pollinators for agricultural use was held, and as a result from this meeting the S. Paulo Declaration on Pollinators was constructed. In COP5 from CBD the International Pollinators Initiative was approved as a new program related to sustainable agriculture. FAO was invited to be a facilitator of this process. In COP6, The Hagen 2002, a plan of action for IPI was approved for guiding the actions of regional pollinator initiatives, proposing goals to be attained in 10 years.

Meanwhile, regional efforts related to IPI developed. In Brazil, several activities were performed, coordinated by a committee informally established by the focal point in Ministry of Agriculture, in 2002, during the main Brazilian meeting on bees (V Encontro sobre Abelhas, em Ribeirao Preto). Among these activities was the FAO proposal of a workshop related to standard methodologies and assessment of best practices in agriculture to promote biodiversity in agro ecosystems. The title SP Declaration on Pollinators +5 was suggested by M. Ruggiero, and promptly accepted.

The preparation of this workshop focused the awareness in the issue to the potential participants of the Brazilian Pollinator Initiative program, in this initial phase: scientific community in consolidate and emergent groups, including here the Agricultural staff from Embrapa and other agronomic schools that could be engaged in this Initiative. For discussing common routes, the issues related to the International Pollinator Initiative, we also invited the leaders of other established Pollinator Initiatives: North American, European, African, ICIMOD, and FAO, the IPI facilitator. In Brazil, EMBRAPA and bee researchers from all country (15 research centers, from 15 states) were invited. We had 77 attendants to this workshop. Several countries (11) participated in this SP Declaration on Pollinators plus 5. ITIS, INESP and FAO were also present. Federal government ministries from Science and Technology and Environment also gave their support for this workshop, a counterpart to FAO support.

International Pollinators Initiatives

In order to show a general panorama of the International Pollinator Initiative (IPI), we invited for this workshop the worldwide pollinators initiatives (North American Pollinator Initiative; European Pollinator Initiative; African Pollinator Initiative; ICIMOD and FAO, as facilitator of the IPI), who presented their program of activities and recent achievements.

North American Pollinator Initiative comprises an established net of institutions, associations and researchers involved in the pollinators' issue, as well as in the ecological services provided by them. It is a public-private partnership of pollinators' conservation programs. Among the milestones of pollinators programs are The Forgotten Pollinators Campaign (1996), the Sao Paulo Declaration on Pollinators Conservation and sustainable use (1998), the North American Pollinator Protection Campaign (NAPPC) in 1999, the International Pollinator Initiative (IPI) in CBD (2000; 2002), among others. This is a science-based program, "a portfolio of programs, projects and activities

from the public and private sector, connected by a spirit of cooperation” (Ruggiero et al., 2004).

European Pollinator Initiative (EPI) has adopted the same framework of the IPI, the four key components being: assessment, adaptive management, capacity building and mainstreaming. To assess the pollinator loss it was developed ALARM (**A**ssessing of **L**arge-scale **E**nvironmental **R**isks with tested **M**ethods) project, combining the expertise of 54 partners from 26 countries. This program started on February 1st 2004, and it is planned for 5 years initially. In particular, risks arising from pollinators’ loss in the context of current and future land use in Europe will be assessed. SUPER (**S**ustainable **U**se of **P**ollinators as an **E**uropean **R**esource) will build directly upon ALARM to address identified declines in European Pollinators resources in socially and economic viable way (Potts, 2004).

The African Pollinator Initiative was established in 1999, as the African network of the IPI. “It strives to improve communication channels between all people and organizations interested in pollinators and pollination biology, including biodiversity conservation, agriculture and general awareness, and facilitate collective achievements (Eardley et al. 2004)”. In 2002 its first Secretariat was formed, and published the Plan of Action of African Pollinator Initiative. At this moment API comprises Ghana, Kenya and South Africa, but it is opened for other participants. A major need that exists in Africa is to know what the pollinators are. Rapid assessments, taxonomic efforts and capacity building are among the main needs.

ICIMOD (International Centre for Integrated Mountain Development) initiated its pollinator/pollination program in 1991, to address applied research, development and related issues of pollinators and pollination. The overall goal of ICIMOD is to improve livelihoods of mountain people by enhancing agricultural productivity and biodiversity conservation through conservation of indigenous pollinators’ species in order to ensure sustainable pollination of crops and other indigenous plant species of the Hindu Kush-Himalayan region. Several activities are being undertaken concerning pollinators (Partap, 2004).

Brazilian Pollinators Initiative (BPI) was constructed based on the Sao Paulo Declaration on Pollinators, who raised international interest and provided strategic direction for pollinator conservation planning (Dias et al., 1998; Kevan and Imperatriz-Fonseca, 2002; Imperatriz-Fonseca & Dias, 2004; Imperatriz-Fonseca et al., 2004).

API, BPI and ICIMOD are together in a GEF project recently approved, (http://www.webbee.org.br/bpi/pdfs/gef_proposal.pdf) entitled *Conservation and management of pollinators for sustainable agriculture through an ecosystem approach*, having FAO as facilitator. In this global scenario, with pollinators in mainstreaming in developed countries and almost unknown in undeveloped countries, a partnership among scientists and stakeholders will improve capacity building and sustainable use of pollinators. As the general framework of IPI is adopted by all Initiatives, including here standardized methodologies for assessments, to join leaderships to discuss goals, needs and opportunities was considered essential. For global comparisons, assessment methods must be standardized.

Methodological discussions

The talks were organized in order to give support for the discussion on which standard methodologies should be used in the development of Brazilian Pollinator Initiative. In oral presentations several aspects of the methodologies applied until now in pollination research and pollinators assessment were presented by the specialists, showing how some important issues should be considered in our further actions. Subjects as the influence of individual collector performance in assessment, methods to be applied in assessment research, long term and short term evaluations, introduction and restoration of pollinators, performance evaluation in solitary pollinators, meta analysis of data related on plant-pollinators relationships, priorities for pollinators programs, were presented. Gene flow, bee's species visiting flowers of important crops and pollinators breeding possibilities in Brazil were also part of oral presentations and specific group discussions.

The group discussions followed a protocol previously scheduled by group coordinators. We did an attempt to bring also as specialist Dr. Puja Batra, a specialist in Rapid Assessment Protocols from Conservation International that also had experience with bees in her degree, in India. Unfortunately, at the last moment she was not able to come to join us in the discussions.

Protocols and discussions

The sessions' coordinators established a protocol to be discussed during the workshop. The groups should discuss the methods to be standardized, and suggest themes for the PDF B phase of the GEF project. We must consider the enormous task for some themes, which obviously could not be concluded after a 5 days workshop. Some general comments will follow.

The first group discussed assessment methods for pollinators' status. Although they advanced in the analysis of different methods, the task is not concluded. The main methods to be applied were pointed, but only indications for the Manual of Standard Methods were done. Coordinators could answer the proposed questions, an orientation for case studies and next steps in PDF B phase from GEF project.

The gene flow group presented a conclusive report. They also pointed the chosen methods to be used for different purposes, without describing them. Gene flow studies must be included in the full project, and a selection of subjects was suggested by the group for next steps.

Management of bees that could be used as crop pollinators was the next subject, divided in 3 parts: for honeybees; for stingless bees; for bumblebees and solitary bees.

In Brazil, as well as in other countries, honeybees are used as generalist pollinators because they are abundant, easy to breed and to manage in crops. Honeybees were focused for crop pollination in the important McGregor book, still very used and updated on line. Nevertheless, Brazil has the Africanized honeybee, who requires special management practices, and knowledge related to their performance as pollinators. In fact, they are quite effective in pollination, as Roubik (2002) pointed out for coffee production in Panama, and as Couto (2002) discussed for several crops. The honeybees study group presented a well comprehensive report, with valuable suggestions and guidelines for further applications of bees as pollinators. It is important to remark that, if funding is not

available to develop bee biology projects and to improve the local knowledge and capacity building with the other bee species, honeybees will be the only available pollinators in high quantity for Agricultural use in our country, although introduced in America, generalists and in most cases less effective for biodiversity conservancy.

Stingless bees are native in Brazil, with more than 300 species in all territory. Their breeding is known for some species. Brazilian government has just fixed norms for the stingless bees' beekeeping, through the CONAMA (CONAMA 346; <http://www.mma.gov.br/port/conama/index.cfm>). In Brazil, animals and plants belong, by law, to the government. The use of natural resources is very restricting now, a contrast between the high level of deforestation and habitat destruction by fire and other "sustainable use" in all over the country. Nevertheless, basic research in stingless bees is still needed. A meta analysis of available data in Brazil is important mainly to define the relationships among bees genus and plants visited by them, a first approach for their use in pollination; stingless bees fossils are around 85 millions years old and coevolution with local flora should occur in the very biodiverse habitat they live, with floral preferences (see Ramalho et al., 1992; Biesmeijer et al. submitted), although their generalist use of floral resources. This academic research has to be done and its result turned to lists of plants indicated for stingless bees breeding and habitat restoration. A big problem for stingless bees breeding and capacity building programs is that relevant literature for this program is in English or in unpublished thesis, as well as there is a lack of knowledge on basic need for survival for most species. A priority is to make available, in Portuguese, synthesis of the present knowledge, written for different stakeholders. The WebBee (Saraiva et al., 2004) was constructed in order to be our infoway in this task.

Considering the high biodiversity of stingless bees, and the new meliponiculture regulation for research and for beekeeping, it is necessary to develop breeding techniques for all activities, including research. Nest area allowed to be obtained by trapnests in nature; a nest census and a bait-trap survey in natural and agricultural areas for stingless bees is a also a priority for investigation. A recent research developed in Sarawak, Asia, showed the effects of human disturbance on a stingless bee community in a tropical rainforest, as a result of changes in resources availability (Eltz et al., 2002a e b; Samejima et al. in press). Such changes in the bee community may affect the reproductive success of plants and ultimately forest composition. Nests sites are considered as essential resources, and have some requirements, as specialization in use of logs of some plant species as well as diameters at breast height >50 cm. This has implications for reforestation programs as well for the sustainable use of the forest.

Brazil has only 7 species of bumblebees (*Bombus*); nevertheless they are abundant all over the country. They are generally very aggressive, and are not reared for pollination purposes in Brazil. The carpenter bee, *Xylocopa*, can be reared and is a good pollinator for passion-fruit, for instance. There are 49 species of Carpenter bees in Brazil (Silveira et al., 2002), potentially important in Agriculture. The solitary bees management group did a very comprehensive report, presented the main plants that should benefit for their use as pollinators

and the needs for breeding them in large quantities. An effort for a workshop focusing only these bees as pollinators was indicated as a need.

Workshop results are on line in <http://www.webbee.org.br>, as well as the oral presentations.

Sao Paulo, August 29th 2004

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São Paulo Declaration on Pollinators plus 5 Forum

Survey methods for bee as pollinators in Brazil: assessing the status and suggesting best practices

Invitation

In October 1998 the Brazilian Ministry of Environment held an international workshop of experts - the "Workshop on the Conservation and Sustainable use of Pollinators in Agriculture, with Emphasis on Bees", to propose a framework for an International Initiative on Pollinators as a key element in this program. It was attended by 61 scientists from 15 countries and 5 International organizations.

As a consequence of this meeting a document was created in Brasilia entitled "The Sao Paulo Declaration on Pollinators", that was endorsed in May 2000 by the fifth Conference of Parties of Convention of Biological Diversity, held in Nairobi (section II of the decision v/5, that reviewed the implementation of decisions III/11 and IV/6 on the program of work on agro biodiversity). COP5 established an International Initiative for the Conservation and Sustainable Use of Pollinators, hereafter referred to as the International Pollinator Initiative.

A Plan of Action was then prepared by FAO and the CBD Secretariat, endorsed by SBSTTA 7, and recommended for adoption by CBD COP 6. The Plan of Action of the IPI was accepted by member countries and adopted at COP 6 (decision VI/5).

Since then, most regions of the world have established or are in process of establishing wide-ranging pollinator's initiatives. The core objectives of IPI are also kept by the regional Initiatives. They are:

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

To follow this agenda, the Brazilian Pollinator Initiative, under the support of FAO and other Agencies, invites you to participate in its next meeting, to be held in S. Paulo, October 27th - 30th 2003. Under this title S. Paulo Declaration on Pollinators plus 5 we hope to join the regional Initiatives, to discuss common

routes and some essential points: standardized methodologies, pollinators declining and management practices.

Acronyms

API	African Pollinators Initiative
BPI	Brazilian Pollinators Initiative
CBD	Convention on Biological Diversity
CI	Conservation International
COP	Conference of Parties
EMBRAPA	Brazilian Agricultural Research Corporation
EPI	European Pollinators Initiative
FAO	Food and Agriculture Organization of the United Nations
FUSP	Sao Paulo University Foundation
GEF	Global Environmental Facility
ICIMOD	International Centre for Integrated Mountain Development
INPA	National Institute for Amazonian Research
INESP	Network for Expertise in Sustainable Pollination
IPI	International Pollinator Initiative
ITIS	International Taxonomy Information Service
MMA	Ministry of Environment
NAPI	North American Pollinators Initiative
OREADES	NGO
PDF B	Project Development Facility phase B
SBSTTA	Subsidiary Body on Scientific, Technical and Technological Advice
USDA	United States Department of Agriculture
ARS	Agricultural Research Service
USP	Sao Paulo University

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Agenda

- Oral presentation sessions: (2 days, common sessions)
- Discussion groups on target issues (1,5 days, participants divided in three groups)
- Achievements from the discussion groups and recommendations for further activities: last day.

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São Paulo Declaration on Pollinators plus 5 Forum

Workshop objectives

BPI received from FAO a support through a Letter of Agreement with FUSP in order to prepare a Standard Methodology Workshop for assessing pollinator's status and to identify the best management practices to counter its global declining trend.

Two points were considered as essentials:

- the establishment of standard methodologies for assessing the bees' status on crops and in natural habitats;
- the establishment of methodologies for assessing management practices for large scale breeding and use of pollinators in crops and in environment restoration.

Workshop Program

SURVEY METHODS FOR BEE AS POLLINATORS IN BRAZIL: ASSESSING THE STATUS AND SUGGESTING BEST PRACTICES	
	October 27th
9:00	Opening ceremony
9:30	International Pollinators Initiative and Brazilian Pollinators Initiative. Braulio F. S. Dias.
10:00	North American Pollinators Initiative. Michael Ruggiero.
10:30	European Pollinators Initiative. Simon Potts.
11:00	Coffee break
11:30	African Pollinators Initiative. Connal Eardley.
12:00	The Southeast Asian Pollinators program. Uma Partap.
12:30	Conservation and Management of Pollinators for sustainable Agriculture through an Ecosystem Approach. Linda Collette.

13:00	Lunch
SESSION 1: ASSESSMENT OF POLLINATORS' STATUS	
14:15	Pollinator populations and declines: new insights. David Roubik .
15:00	Progress and challenges in bee diversity assessments. Terry Griswold
15:45	Resampling to detect change in local bee assemblages: limitations and some insights gained from regional abundance patterns. James Cane .
16:30	Coffee break
16:45	Native Bees in Natural Areas: Free Pollinators for Crops? Cynthia Pinheiro Machado
17:30	The impact of diseases, pests and pesticides on pollinators in Brazil. David de Jong .
	October 28th
SESSION 2. BEES IN AGRO ECOSYSTEMS	
9:00	Cotton Pollination in Brazil. Francisco de Souza Ramalho .
9:30	Molecular markers in gene flow studies. Rogério Gribel Soares .
10:00	Coffee break
10:30	A quantitative approach to assess specialized plant-pollinator systems. Clemens Schlindwein ; Celso Feitosa Martins; Dieter Wittmann & André Hamm.
11:00	Identifying crop pollinators: plant pollination requirement vs pollinators effectiveness. Breno M. Freitas .
11:30	Challenges to the use and conservation of pollinators in Kenya, Jordan and Germany. D. Wittmann, M. Schndler, A. Al-Ghzawi, S.T. A. Al-Razaq Zaitoun, D. Klein, V. Sieg, S. Streuff & S. Tarazandepour .
12:00	Social bees and flowers in Brazil: a metanalysis. Jacobus C. Biesmeijer .
12:30	Lunch

SESSION 3. BEE MANAGEMENT FOR POLLINATION PURPOSES	
14:00	Costs and benefits of managing pollinators: lessons learned. Peter Kevan & Blandina Felipe Viana.
14:45	Solitary bees for crop pollination in Brazil. Isabel Alves dos Santos.
15:30	Coffee break
15:45	Stingless bees rearing and use as important pollinators. Giorgio C. Venturieri.
16:30	Honeybees as crop pollinators in Brazil. Lionel S. Gonçalves
SESSION 4.	
17:15	Study groups' instructions.
	October 29th
	<p>Workshop breakout sessions on practical issues and solutions to problems perceived.</p> <p>Study groups</p> <p>1) suggested structure for the working group a) Experimental Outline for Agriculture and Natural Areas.</p> <p>2) suggested structure for the working group b) Mediated Gene Flow.</p> <p>3) suggested structure for the working group c) Bee management for pollination purposes.</p> <p>3.1) Solitary bees.</p> <p>3.2) Honey bees.</p> <p>3.3) Stingless bees.</p>
	October 30th
14:00	<p>Working group presentations.</p> <p>Fernando Amaral da Silveira - Experimental outlines for pollinators in Agriculture</p> <p>Cynthia Pinheiro-Machado - Experimental outlines for pollinators in natural areas</p> <p>Claudia Maria Jacobi - Gene flow and pollinators</p> <p>Marina Siqueira de Castro, Breno M. Freitas and David de Jong – Bees' management for pollination purposes</p>

16:00	Recommendations for further studies in Brazil
16:30	Closing ceremony