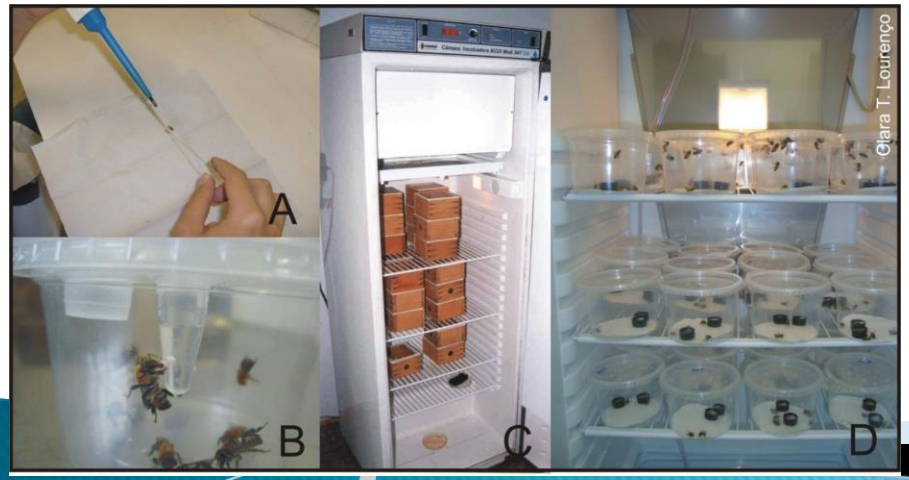
Risk assessment to stingless bees: where we are, where we want to go


FOTO: REPRODUÇÃO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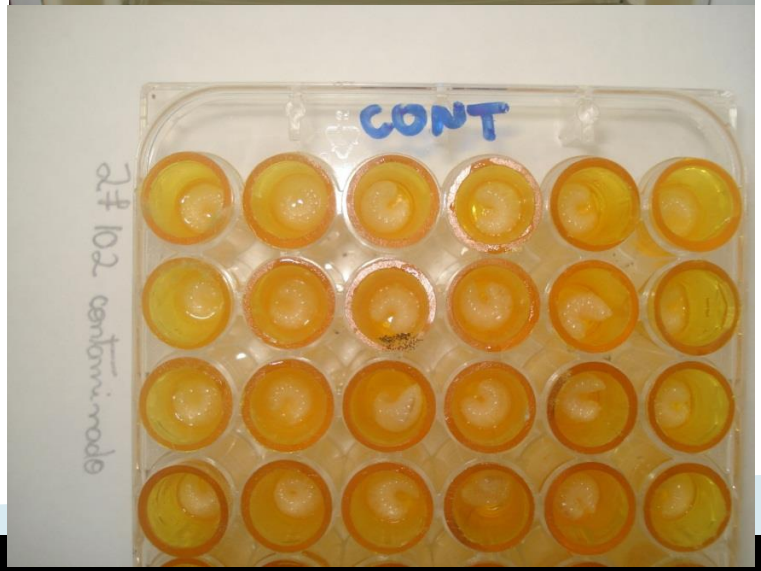
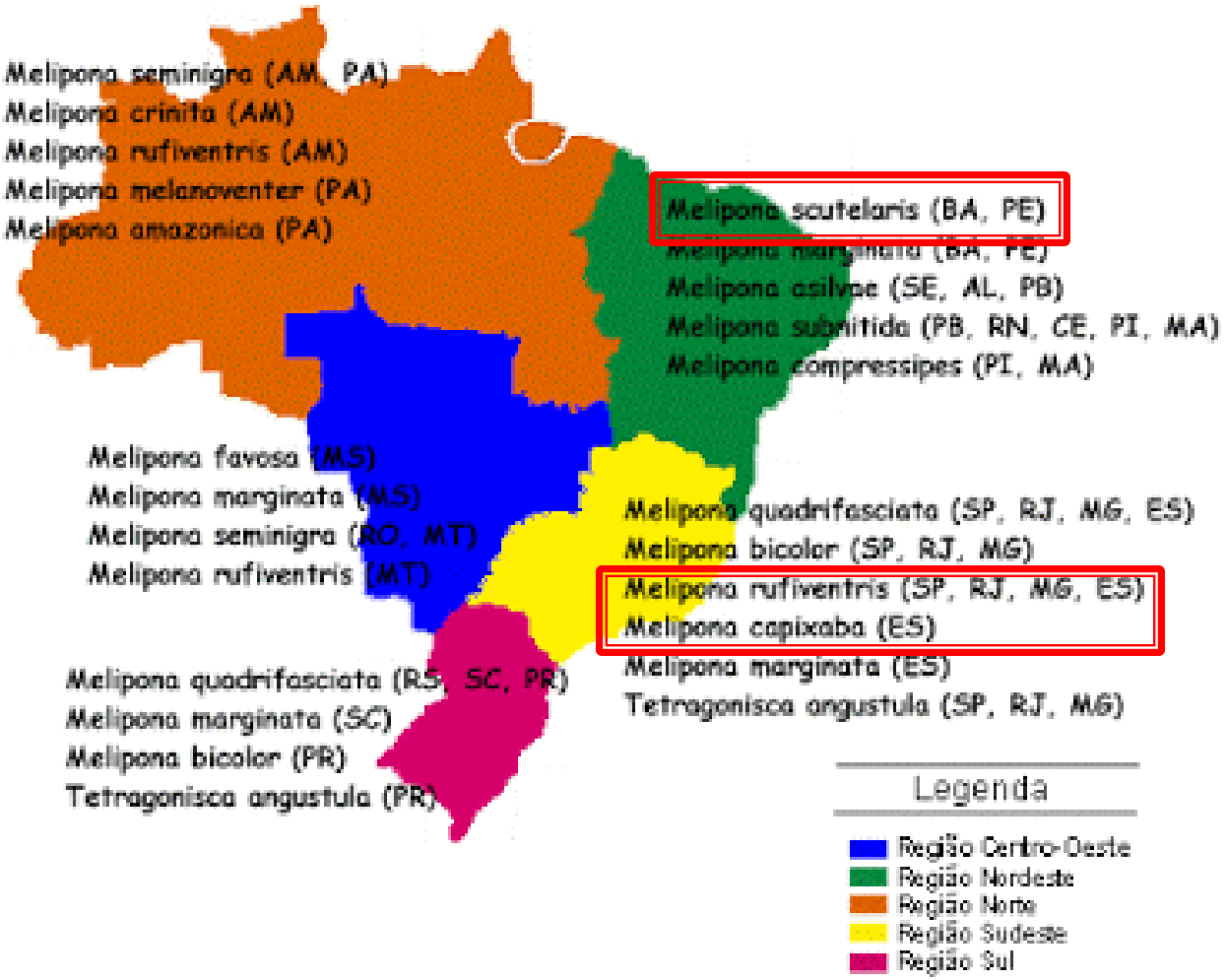
Clara T. Lourenço


CONT
2ª 10² contaminado

ufSCar

Meliponini in Brazil



- >300 species
- 4 threatened of extinction

http://www.abelhasdobrasil.com.br/2012_02_01_archive.html

Pesticide Exposure Assessment Paradigm for non-Apis bees workshop – stingless

Pesticide exposure assessment paradigm for stingless bees

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Environmental Entomology

Life history traits of *Apis mellifera* compared with stingless bees and expected implications for risk assessment

Traits	*Apis mellifera*	Stingless bees	Expected implications for risk assessment
Nesting substrate	Large cavities. Hives.	Highly variable. subterranean cavities, tree trunks, branches of living trees, rock crevices, brick walls, or occasionally in active colonies of other social insects.	Pesticide exposure via soil/mud is not relevant in *A. mellifera* but is an important route of exposure in stingless bees.

Life history traits of *Apis mellifera* compared with stingless bees and expected implications for risk assessment

Traits	*Apis mellifera*	Stingless bees	Expected implications for risk assessment
Nesting material	Wax	Cerumen (wax + resins), batumen (wax + mud + resins), resins, mud, soil, leaves, sticks, etc.	Several environmental matrices may be highly relevant to stingless bees but less so to *A. mellifera*.
Traits	*Apis mellifera*	Stingless bees	Expected implications for risk assessment
Amenability to nest in confined conditions	Low	Lack of data	--

Life history traits of *Apis mellifera* compared with stingless bees and expected implications for risk assessment

Traits	*Apis mellifera*	Stingless bees	Expected implications for risk assessment
Nesting period	All year except winter	All year	May impact duration of exposure to pesticides when there are multiple crop cycles per year.
Pollen transport	On hind legs. Pollen wetted with nectar and glandular secretions.	Most species carry dry pollen on hind legs or abdomen.	Pollen ingestion for foraging stingless bees are highly relevant. Adults of stingless bees ingest freshly-collected pollen, not mixed with nectar.

Life history traits of *Apis mellifera* compared with stingless bees and expected implications for risk assessment

Traits	*Apis mellifera*	Stingless bees	Expected implications for risk assessment
Body size	~128 mg (workers)	Highly variable depending on the species, ranging from from 2 - 100 mg (workers)	A possible extrapolation factor from honey bees to stingless bees should consider in this large body size variability.
Adult food	Nectar plus small amounts of pollen	Nectar plus pollen, some indications that the pollen consumption is much higher than that of *A. mellifera*	The amounts and identity of nectar and pollen consumed may vary widely

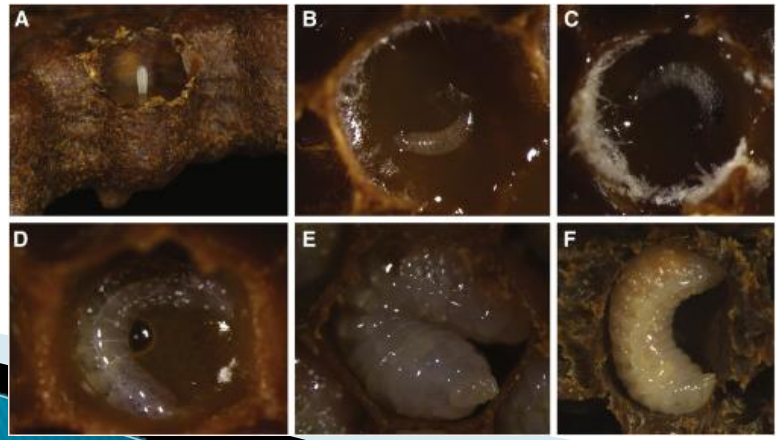
Life history traits of *Apis mellifera* compared with stingless bees and expected implications for risk assessment

Traits	*Apis mellifera*	Stingless bees	Expected implications for risk assessment
Larval food	Royal jelly, bee bread and honey	Pollen unprocessed with nectar and secretions	Larvae of stingless bees consume unprocessed food
Larval food provisioning	Progressive feeding	Mass-provisioning.	The larvae will be exposed to the total amount of food, composed of unprocessed pollen.
Larval feeding period	5 days	12 to 15 days, depending on the species	The exposure to larval food for stingless bees is continuous and longer than that of honey bees.

Larvae – a special case

	Apis mellifera	*Melipona quadrifasciata*	*Melipona scutellaris*	*Trigona angustula*	*Trigona postica*
Egg	3 (14%)	5,5 (18%)	9 (19%)	6 (14%)	2 (4,3%)
Larvae	6 (29%)	12,5 (40%)	16 (33%)	10 (27,8%)	13 (27,6%)
Pupae	12 (57%)	16,7 (42%)	24 (48%)	20 (55,6%)	31-33 (65-70%)
Total	21	31	49	36	46-48

Comparative developmental cycle (in days) until emergence between Apis mellifera and some species of stingless bees. Bsed on: Nates, G., Abejas corbiculadas de Colombia. 2006 (http://datateca.unad.edu.co/contenidos/201518/contLinea/leccin_9_tribu_meliponini.html)



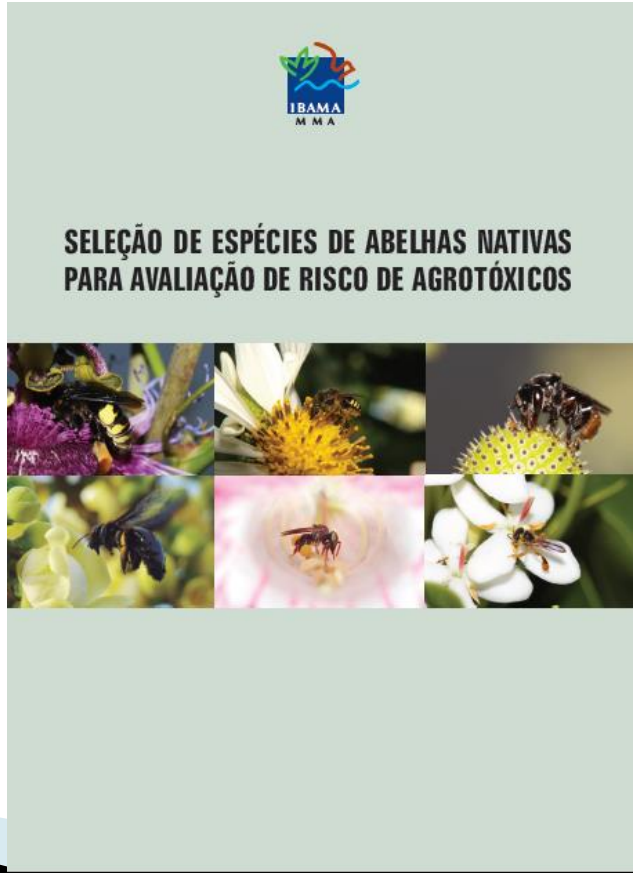
http://www.sciencedirect.com/science/article/pii/S0960982215011082

So, how to choose a specie for studies of risk assessment?

Published now!!!

- Available at:

http://www.ibama.gov.br/agrotoxicos/reavaliacao-ambiental#publicacoes



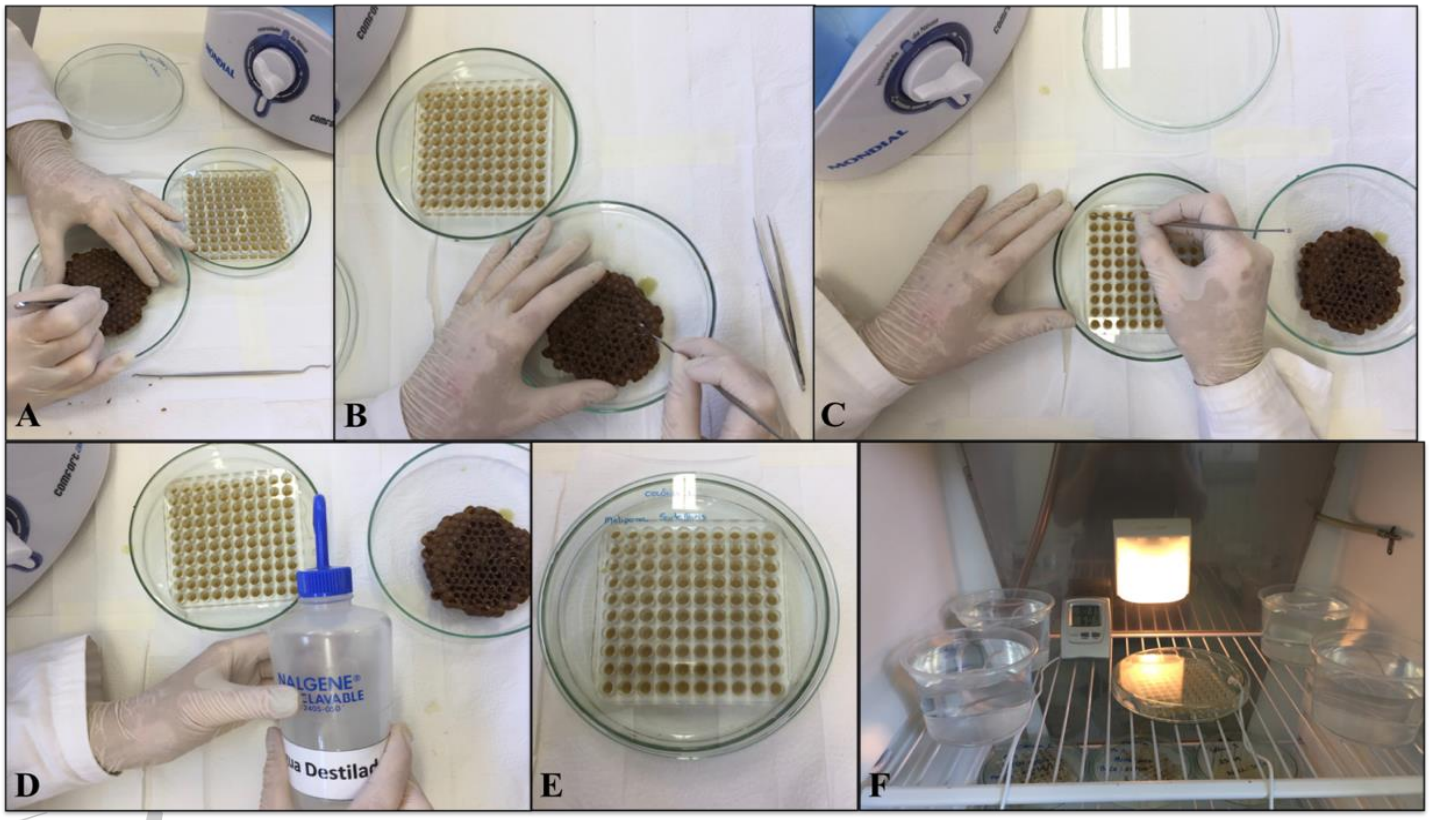
Social bee species

Social bee species	Final score
Trigona spinipes	28
Tetragonisca angustula	24
Nannotrigona testaceicornis	22
Melipona scutellaris	21
Melipona quadrifasciata	20

Non-Apis group ICPPR Subgroup Stingless bee Laboratory

- DL_{50} topic
- DL_{50} oral

Larvae



Where we want to go...

- Gaps of knowledege – Document published by IBAMA in january 2017 (O02001/000857/2017-00).
- Development of commercial colonies to studies of risk assessment and pollination.
- Well-established and standardized protocols for stingless bees.
- Answer the question: Is *Apis mellifera* a good surrogate for stingless bees???
- Solitary bees in the next few years???
- Food production with conservation.

- Thank you for your attention!
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