



Using knowledge management to better identify research gaps and priorities on pesticide plants in West and Central Africa

Silvie P., Martin P., Marnotte P., Yarou Boni B., Zida P.E., Foko Dadji G., Ilboudo Z., Tofel H.K., Tendonkeng F., Sow G., Adda C.

Nature is a market place in Africa



@Pascal Marnotte

Khaya senegalensis (Desv.) A.Juss. (Meliaceae)



Needs for a better look at the landscape level...

And...

...to conserve the traditional knowledge (on plant uses)

...to better use the academic knowledge

1st STEP: to establish a network

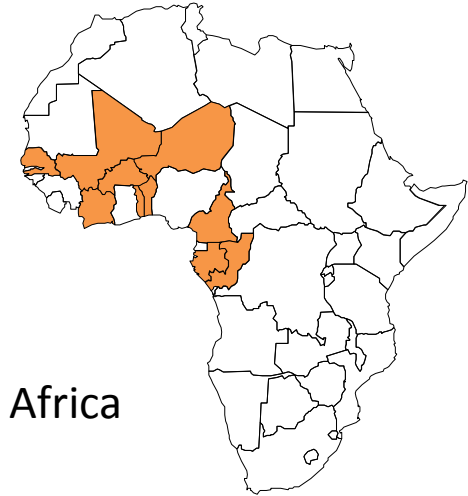
2nd STEP: to organize a knowledge base

3rd STEP: to define research gaps and priorities



1. Building a West and Central Africa Network

10 sub-Saharan **countries**: Benin, Burkina Faso, Cameroon, Gabon, Ivory Coast, Mali, Niger, Democratic Republic of Congo, Senegal, Togo.



55 African **members**

Affiliations: Universities, National research organizations in Africa

15 ‘Correspondents’ located outside the African continent, mostly in France.

Complement to the *African Network of Research on Storage Insects*
(founded in 2008, arising from the African Network on Bruchids – Glitho, 2002).

2. The current Knowledge Base

Census of **pesticide plants** which were studied in these countries .

Knowledge on the use of these plants:

- * Plants are employed in different forms (extracts, essential oils, etc.)
- * Their interactions with harmful organisms, have been compiled in a knowledge base.



Structure of the Knowledge Base

N8		grains stockés															N° article															Titre article de l'article															Volume (Nombre)															Page														
A		B		C		D		E		F		G		H		I		J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z		AA		AB		AC		AD		AE		AF		AG		AH		AI		AJ		AK				
1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20		21		22		23		24		25		26		27		28		29		30		31		32		33		34		35								
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35 columns = 35 types of information

Structure of the Knowledge Base

Interactions_Analyse(21-06-2016).xlsx - Microsoft Excel

A2		Pays d'Afrique subsaharienne francophones où l'expérimentation a été faite, ou d'où sont originaires les plantes éprouvées en laboratoire.									
		N.R. = Non Renseigné									
		Plante			Informations plante (caractéristiques, localité)						
N° espèce botanique		Nom latin plante	Nom (vernaculaire, français, autre)	Famille botanique	Partie de la plante utilisée (écorce, feuille, fleur, graine, fruit, parties vertes, rhizome, tige, tubercule, jus, coque)	Méthode d'extraction des principes actifs	Forme d'utilisation (poudre, huile = huile essentielle)	Technique d'identification chimique (GC=CPG, CPG/MS = GC/MS, HPLC/MS, autre technique) ou composants non identifiés (NI)	Principe actif (si éprouvé seul)		
ID											
95	7	<i>Balanites aegyptiaca</i>	Dattier du désert	Zygophyllaceae	écorce	Macération					
96	7	<i>Balanites aegyptiaca</i>	Dattier du désert	Zygophyllaceae	écorce	Macération					
97	7	<i>Balanites aegyptiaca</i>	Dattier du désert	Zygophyllaceae	écorce	Macération					

Taskbar: Prêt | Tri plante et pays | English_doc | Dictionnaire | 125% | 10:59 09/08/2016

Structure of the Knowledge Base

Copie de Interactions_Analyse(18-09-2016).xls [Mode de compatibilité] - Microsoft Excel

M53		Gossypium hirsutum													
	A	B	C	K	L	M	N	O	P	Q	R	S	T		
1			Pays d'Afrique subsaharienne												
2			B	J	K	L	M	N	O	P	Q	R	S		
3			Plante				Domaine d'application (hors pharmacologie)	Pests, diseases or auxiliaries			Mode c				
4	ID	N° espèce botanique	Nom latin plante	Pays où la plante est prélevée (pour l'expérimentation)	Entités géographiques (départements, régions,...) du pays où	Organisme à protéger (espèce de plante, animal)	(semences, protection au champ, grains sur épi, grains stockés, animaux d'élevage, vecteurs/santé	Organisme cible (Insecte, Acarien, maladie de la plante due à Champignon, Champignon du	Nom latin	Extrait c	employ	associé	compos	Fractor	éprouvé
5	1	1	<i>Acacia gourmaensis</i>	Burkina Faso		Sorgho	Semences	Champignon	<i>Phoma sorghina (= Epicoccum sorgh</i>						
6	2	1	<i>Acacia gourmaensis</i>	Burkina Faso		Mil	Semences	Champignon	<i>Phoma sorghina (= Epicoccum sorgh</i>						
7	3	2	<i>Adenium sp.</i>	Mali		<i>Sorghum bicolor</i>		Champignon	<i>Sporisorium sorghi</i>						associé
8	4		<i>Ageratum conyzoides</i>	Bénin	Bantè	<i>Arachide</i>	grains stockés	Champignon	<i>Aspergillus flavus</i>						
9	5		<i>Ageratum conyzoides</i>	Bénin	Bantè	<i>Arachide</i>	grains stockés	Champignon	<i>Aspergillus parasiticus</i>						
10	6		<i>Ageratum conyzoides</i>	Bénin	Bantè	<i>Arachide</i>	grains stockés	Champignon	<i>Aspergillus ochraceus</i>						
11	7		<i>Ageratum conyzoides</i>	Bénin	Bantè	<i>Arachide</i>	grains stockés	Champignon	<i>Fusarium oxysporum</i>						
12	8		<i>Ageratum conyzoides</i>	Bénin	Bantè	<i>Arachide</i>	grains stockés	Champignon	<i>Aspergillus flavus</i>						
13	9		<i>Ageratum conyzoides</i>	Bénin	Bantè	<i>Arachide</i>	grains stockés	Champignon	<i>Aspergillus parasiticus</i>						
14	10		<i>Ageratum conyzoides</i>	Bénin	Bantè	<i>Arachide</i>	grains stockés	Champignon	<i>Aspergillus ochraceus</i>						
15	11		<i>Ageratum conyzoides</i>	Bénin	Bantè	<i>Arachide</i>	grains stockés	Champignon	<i>Fusarium oxysporum</i>						
16	12		<i>Ageratum conyzoides</i>	Bénin	Bantè	<i>Arachide</i>	grains stockés	Champignon	<i>Aspergillus flavus</i>						
17	13		<i>Ageratum conyzoides</i>	Bénin	Bantè	<i>Arachide</i>	grains stockés	Champignon	<i>Aspergillus parasiticus</i>						
18	14		<i>Ageratum conyzoides</i>	Bénin	Bantè	<i>Arachide</i>	grains stockés	Champignon	<i>Aspergillus ochraceus</i>						
19	15		<i>Ageratum conyzoides</i>	Bénin	Bantè	<i>Arachide</i>	grains stockés	Champignon	<i>Fusarium oxysporum</i>						
20	16		<i>Ageratum conyzoides</i>	Bénin	Bantè	<i>Arachide</i>	grains stockés	Champignon	<i>Aspergillus flavus</i>						
21	17		<i>Ageratum conyzoides</i>	Bénin	Bantè	<i>Arachide</i>	grains stockés	Champignon	<i>Aspergillus parasiticus</i>						
22	18		<i>Ageratum conyzoides</i>	Bénin	Bantè	<i>Arachide</i>	grains stockés	Champignon	<i>Aspergillus ochraceus</i>						

Structure of the Knowledge Base

Copie de Interactions_Analyse(18-09-2016).xls [Mode de compatibilité] - Microsoft Excel

Fichier Accueil Insertion Mise en page Formules Données Révision Affichage Compléments


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Insérer Supprimer Format Trier et Rechercher et filtrer sélectionner Édition

W16

Pays d'Afrique subsaharienne			R		S		T		U		V		W		X		Y		Z			
Plante			extrait dans les essais biologiques (LABO)		Modalités d'application (CHAMP)																	
N° espèce botanique			Nom latin plante		Modalité d'application vis à vis de l'organismecible (Imbibition, Contact, Ingestion, application foliaire, Inhalation, disques)		Dose appliquée: (µl/ml; µl/cm²; ml/ml; ppm)		extrait employé seul ou/et associé à d'autres composants		Solide (Poudre, Liquide (bouillie, mélange,...), Emulsion		Type de bouillie employée (extemporané, formulation prête à		Volume de mélange (bouillie) appliquée		Surface traitée (m²)		Dose appliquée: bouillie (L/ha), substance sur graines (kg/L (ou animal), µl/ml		Dose de matière active (quand unique)/ha	
ID																						
5	1	1	Acacia gourmaensis	Imbibition																		
6	2	1	Acacia gourmaensis	Imbibition																		
7	3	2	Adenium sp.																			
8	4		Ageratum conyzoides	milieu gélósé	µl/ml, ml/ml																	
9	5		Ageratum conyzoides	milieu gélósé	µl/ml, ml/ml																	
10	6		Ageratum conyzoides	milieu gélósé	µl/ml, ml/ml																	
11	7		Ageratum conyzoides	milieu gélósé	µl/ml, ml/ml																	
12	8		Ageratum conyzoides	milieu gélósé	µl/ml, ml/ml																	
13	9		Ageratum conyzoides	milieu gélósé	µl/ml, ml/ml																	
14	10		Ageratum conyzoides	milieu gélósé	µl/ml, ml/ml																	
15	11		Ageratum conyzoides	milieu gélósé	µl/ml, ml/ml																	
16	12		Ageratum conyzoides	milieu gélósé	µl/ml, ml/ml																	
17	13		Ageratum conyzoides	milieu gélósé	µl/ml, ml/ml																	
18	14		Ageratum conyzoides	milieu gélósé	µl/ml, ml/ml																	
19	15		Ageratum conyzoides	milieu gélósé	µl/ml, ml/ml																	
20	16		Ageratum conyzoides	milieu gélósé	µl/ml, ml/ml																	
21	17		Ageratum conyzoides	milieu gélósé	µl/ml, ml/ml																	
22	18		Ageratum conyzoides	milieu gélósé	µl/ml, ml/ml																	
23	19		Ageratum conyzoides	milieu gélósé	µl/ml, ml/ml																	
24	20	3	Annona muricata																			
25	21	3	Annona muricata																			
26	22	4	Annona senegalensis																			
27	23	4	Annona senegalensis																			
28	24	4	Annona senegalensis																			
29	25	4	Annona senegalensis																			



@Matar Dione (Sénégal)

PPAF English_doc Dictionnaire Catégories Perpignan Feuill4 Feil

Prêt 70 % 11:32 19/09/2016

Structure of the Knowledge Base

Interactions_Analyse(21-06-2016).xlsx - Microsoft Excel

	A	B	C	AB	AC	AD	AE	AF	AG	AH	AI
1			Pays d'Afrique subsaharienne	surlignés en jaune, les pays non francophones				en orange: à vérifier ou compléter			
2											
3			Plante	Interactions Plante-Organisme			Qualité attribuée à l'information	Source de l'information			
4	ID	N° espèce botanique	Nom latin plante	Mécanismes étudiés (appétence/antiappétence; attraction/répulsion, toxicité,...)	Paramètres mesurés	Effet global observé ou relation produit-organisme	Valable (fiable), douteuse, non confirmée scientifiquement	Auteur(s)	Année	Titre article ou du document	Revue
104		8	<i>Blumea aurita</i>	Toxicité	Nombre d'œufs pondus.24h ⁻¹ ; Nb		Fiable	Boeke et al.	2004	Toxicity and repeller	Journal c
105		8	<i>Blumea aurita</i>	Répulsion/att	Nombre d'œufs pondus sur témoi		Fiable	Boeke et al.	2004	Toxicity and repeller	Journal c
106		8	<i>Blumea aurita</i>		pas ou peu d'effet		Fiable	Sereme et al.	2013	The first international confer	

Structure of the Knowledge Base

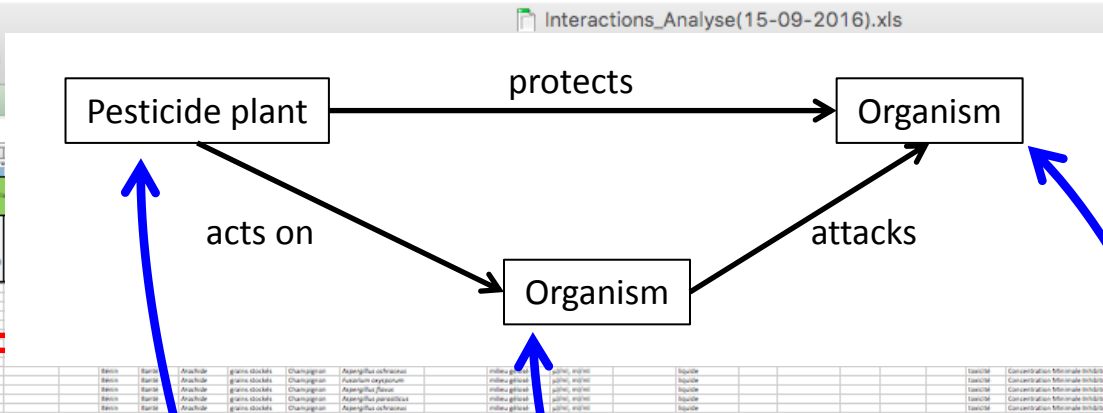
Copie de Interactions_Analyse(18-09-2016).xls [Mode de compatibilité] - Microsoft Excel

	A	B	C	AD	AE	AF	AG	AH	AI	AJ	
1			Pays d'Afrique subsaharienne		en orange: à vérifier ou compléter						
2			B	AC	AD	AE	AF	AG	AH	AI	
3			Plante	Qualité attribuée à l'information	Source de l'information						
		N° espèce botanique	Nom latin plante	Valable (fiable), douteuse, non confirmée scientifiquement	Auteur(s)	Année	Titre article ou du document	Revue	Volume (Numéro)	Pagination	
4	ID										
5	1	1	<i>Acacia gourmaensis</i>		Zida et al.	2008	Effect of aqueous ex Asian J. Plant		2(1)	40-47	
6	2	1	<i>Acacia gourmaensis</i>		Zida et al.	2008	Effect of aqueous ex Asian J. Plant		2(1)	40-47	
7	3	2	<i>Adenium sp.</i>		Dagno et al.	2015	Séminaire Divecosys, Dakar		pas de volume		
8	4		<i>Ageratum conyzoides</i>	Variable	Adjou et Soun	2013	Efficacité des extrait Journal of Ap		70	5555-5566	
9	5		<i>Ageratum conyzoides</i>	Variable	Adjou et Soun	2013	Efficacité des extrait Journal of Ap		70	5555-5566	
10	6		<i>Ageratum conyzoides</i>	Variable	Adjou et Soun	2013	Efficacité des extrait Journal of Ap		70	5555-5566	
11	7		<i>Ageratum conyzoides</i>	Variable	Adjou et Soun	2013	Efficacité des extrait Journal of Ap		70	5555-5566	
12	8		<i>Ageratum conyzoides</i>	Variable	Adjou et Soun	2013	Efficacité des extrait Journal of Ap		70	5555-5566	
13	9		<i>Ageratum conyzoides</i>	Variable	Adjou et Soun	2013	Efficacité des extrait Journal of Ap		70	5555-5566	
14	10		<i>Ageratum conyzoides</i>	Variable	Adjou et Soun	2013	Efficacité des extrait Journal of Ap		70	5555-5566	
15	11		<i>Ageratum conyzoides</i>	Variable	Adjou et Soun	2013	Efficacité des extrait Journal of Ap		70	5555-5566	
16	12		<i>Ageratum conyzoides</i>	Variable	Adjou et Soun	2013	Efficacité des extrait Journal of Ap		70	5555-5566	
17	13		<i>Ageratum conyzoides</i>	Variable	Adjou et Soun	2013	Efficacité des extrait Journal of Ap		70	5555-5566	
18	14		<i>Ageratum conyzoides</i>	Variable	Adjou et Soun	2013	Efficacité des extrait Journal of Ap		70	5555-5566	
19	15		<i>Ageratum conyzoides</i>	Variable	Adjou et Soun	2013	Efficacité des extrait Journal of Ap		70	5555-5566	
20	16		<i>Ageratum conyzoides</i>	Variable	Adjou et Soun	2013	Efficacité des extrait Journal of Ap		70	5555-5566	
21	17		<i>Ageratum conyzoides</i>	Variable	Adjou et Soun	2013	Efficacité des extrait Journal of Ap		70	5555-5566	
22	18		<i>Ageratum conyzoides</i>	Variable	Adjou et Soun	2013	Efficacité des extrait Journal of Ap		70	5555-5566	

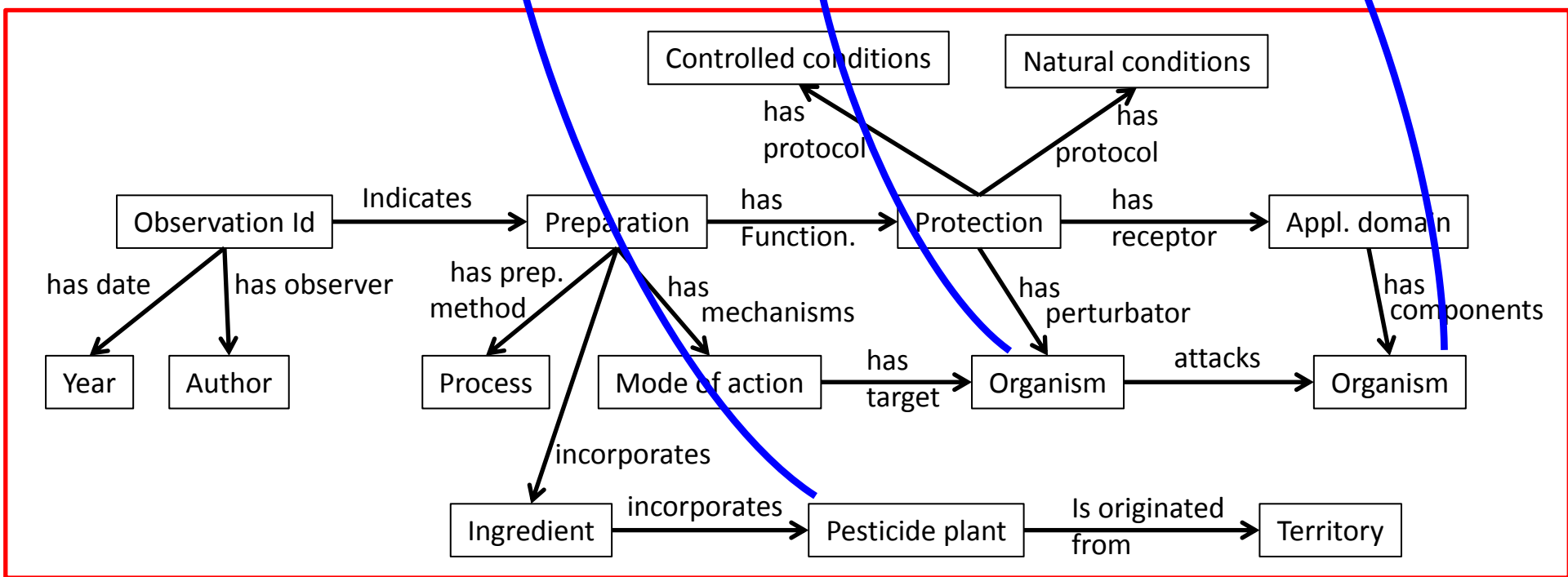
Part of the knowledge presented today

AR22

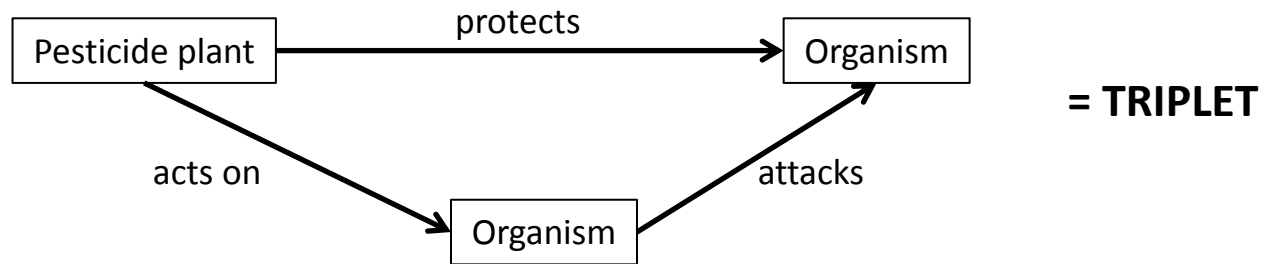
Plante		Informations plante (paracatégorique)				
N° espèce botanique	Nom latin plante	Nom vernaculaire, français, usuel	Famille botanique	Partie de la plante utilisée (racine, feuille, fleur, fruit, graine)	Méthode d'extraction des principes actifs	Nature et utilisation (huile essentielle)
1	Acacia gommifère		Fabaceae	Racine	Maceration	
2	Acacia gommifère		Fabaceae	Acacia	Maceration	
3	Adiantum sp.	Adiantum	Polypodiaceae			
4	Agaricium carneum		Agaricaceae	Spore	Hydrodistillation	Huile essentielle
5	Agaricium carneum		Agaricaceae	Spore	Hydrodistillation	Huile essentielle
6	Agaricium carneum		Agaricaceae	Spore	Hydrodistillation	Huile essentielle



Source de l'information						
Auteur(s)	Année	Titre de l'article ou du document	Revue	Volume (Number)	Page(s)	
Zhou et al.	2008	Effect of aqueous extract of Acacia gommifère	Journal of Agricultural Science	141	123-127	10.1017/S0021859608001234
Zhou et al.	2008	Effect of aqueous extract of Acacia gommifère	Journal of Agricultural Science	141	123-127	10.1017/S0021859608001234
Chagnac et al.	2013	Antimicrobial activity of Acacia gommifère	Journal of Agricultural Science	144	123-127	10.1017/S0021859613001234
Adjou et al.	2013	Effacité des extraits journaliers de Acacia gommifère	Journal of Agricultural Science	144	123-127	10.1017/S0021859613001234
Adjou et al.	2013	Effacité des extraits journaliers de Acacia gommifère	Journal of Agricultural Science	144	123-127	10.1017/S0021859613001234



640 knowledge identified in the literature

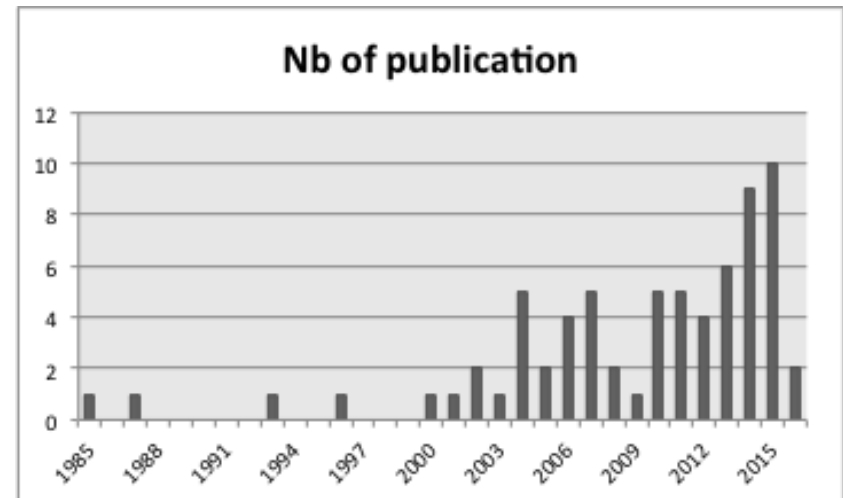


69 articles:

- Sources: Journal of insect science, Alexandria Journal of Veterinary Sciences, J. Rec. Adv. Agri, Journal of Applied Biosciences, Int. J. Biol. Chem. Sci., Comptes Rendus Chimie, Journal of Stored Products Research, African Journal of Agricultural Research, Journal of Entomology, Report (Annex Report SYPROBIO Project (EU), ...)
- From 1985 to 2016

But 140 incomplete knowledge

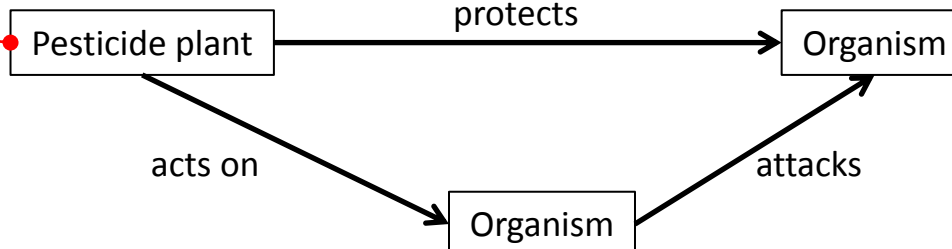
219 duplicates (Pest. plant, orga., orga.)
=> diversity (extract, essential oil)...



Content of the knowledge base (2016.09.19)

21 Orders
29 Families
62 Genus

72 species



Order	Family	Genus
Asparagales	Asparagaceae	Dracaena
Asterales	Asteraceae	Ageratum, Aspilia, Blumea, Chromolaena, Eclipta, Erigeron, Tagetes
Capparales	Capparaceae	Boscia, Crateva
	Moringaceae	Moringa
Caryophyllales	Amaranthaceae	Dysphania
Cyperales	Poaceae	Cymbopogon
Fabales	Fabaceae	Acacia, Canavalia, Chamaecrista, Parkia, Senna, Tephrosia
Gentianales	Apocynaceae	Adenium, Calotropis, Pergularia, Tabernanthe
Lamiales	Boraginaceae	Heliotropium
	Lamiaceae	Hyptis, Mentha, Ocimum, Plectranthus, Thymus
	Verbenaceae	Lantana, Lippia
Laurales	Lauraceae	Cinnamomum
Liliales	Dioscoreaceae	Dioscorea
Magnoliales	Annonaceae	Annona, Monodora, Xylopia
Myrtales	Combretaceae	Combretum
	Myrtaceae	Callistemon, Corymbia, Eucalyptus, Melaleuca, Syzgium
Piperales	Piperaceae	Piper
Polygalales	Polygalaceae	Securidaca
Santalales	Opiliaceae	Opilia
Sapindales	Meliaceae	Azadirachta, Carapa, Khaya, Melia
	Rutaceae	Clausena
	Zygophyllaceae	Balanites
Scrophulariales	Orobanchaceae	Striga
Solanales	Solanaceae	Capsicum, Nicotiana
Urticales	Moraceae	Ficus
Violales	Caricaceae	Carica
	Cucurbitaceae	Momordica
Zingiberales	Musaceae	Musa
	Zingiberaceae	Zingiber



Taxonomy and nomenclature

Family: Verbenaceae
 Vernacular/local names:
 (English): Fever leaf, Lemon Bush
 (Akhikang) Koozibosseti, emoebosise
 (Swati): muswane, umSutane
 (Xhosa): in Zinzinba
 (Zulu): um Suzwane, umSwazi
 (Tswana): musukudu, bokhukhwane

Distribution and habitat

Lippia javanica is a woody shrub found throughout eastern and southern Africa, usually on forest fringe, grasslands on hillsides and banks of streams. In Tanzania, it can be found in Musoma district, Serengeti, Seronera – Solt Ayai, Arusha district, Ititi Mene, Mt. Kilimanjaro, Ngurdoto area, Arusha National Park, Momela, Lushoto district, Kawi Valley. In Kenya, it can be found in Cherangani Hills, Kiambu district, Masai district and on the Nairobi-Nairobi road. In southern Africa, *Lippia javanica* is found from Eastern Cape through to Botswana, Swaziland, Mozambique and Malawi. The species is drought resistant and can grow in a variety of soil types.

to treat malaria. Skin disorders, such as heat rash and other rashes, as well as scratches, stings and bites and parasites such as lice and scabies can be treated with the *Lippia javanica* leaves mixed in hot water tea that is usually cooled and then applied like a lotion. Leaves, twigs and sometimes roots can be used.

Cosmetics – Masai people use its red pigment to decorate their bodies. Gardeners use it in pot-pouri and some people use it to make perfume.



Botanical description

Lippia javanica is a 1 to 2m high woody shrub that stands erect and is multi-stemmed. The stems are heavily branched and appear square when observed in a cross section. The leaves are elliptical, 3-4 cm in length with sunken veins, when crushed they give off a lemon like odour. The leaf margins are dentate, lightly toothed and hairy on both sides. The flowers are creamy white, clustered together in a dense round spike at the apex of the stem. Flowers are creamy white, densely clustered together, in round spikes. Flowers are inflorescence 1.3 per axis, globose to hemispherical or oblong to ovoid, 0.5-2 cm. Bracts 3 x 2 mm, broadly ovate, calyx 2-lobed, 2mm long, tube 3-4mm long, puberulous and glandular above corolla tube 4 mm long.

Uses

Pesticidal – The volatile oil produced by *Lippia javanica* is used to repel and control insects such as bark beetles. It is also used in pre and post-harvest pest management and ecto parasite control in livestock. Plant extracts from leaf powder at 12.5% w/v using 0.1% v/v soap can be used against rape aphids and tomato spider mites. The oil chemistry varies between populations and seasons and can impact efficacy. There is potential for commercial use.

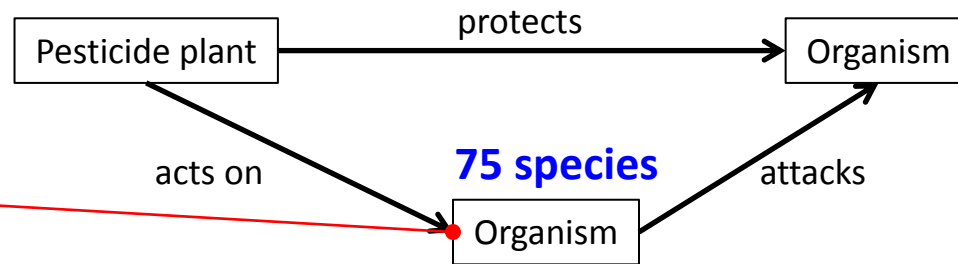
Medicinal – Leaves are medicinal and used as a herbal tea to treat coughs, aching muscles and sometimes

Authors: P. Anjarwalla, S. Belmain, G. Koech, R. Jamnadas and P. C. Stevenson.

September 2015

Content of the knowledge base

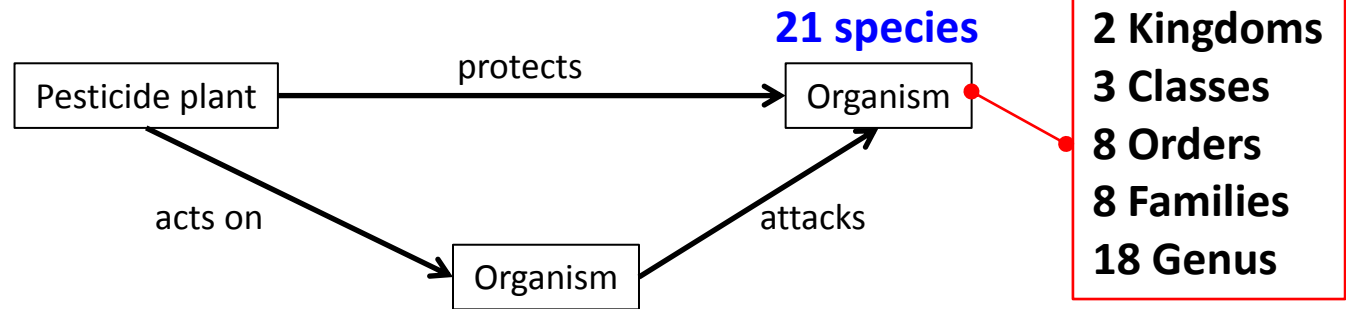
14 Classes
25 Orders
42 Families
67 Genus



@Zakaria Ilboudo
(Burkina Faso)

Class	Order	Family
Agaricomycetes	Atheliales	Atheliaceae
Arachnida	Ixodida	Ixodidae
Bacilli	Bacillales	Staphylococcaceae
	Lactobacillales	Enterococcaceae
Dothideomycetes	Capnodiales	Mycosphaerellaceae
	Pleosporales	Pleosporaceae
Eurotiomycetes	Eurotiales	Trichocomaceae
Gammaproteobacteria	Enterobacteriales	Enterobacteriaceae
	Pseudomonadales	Moraxellaceae, Pseudomonadaceae
Insecta	Coleoptera	Bostrichidae, Chrysomelidae, Coccinellidae, Dryophthoridae, Tenebrionidae
	Diptera	Culicidae
	Hemiptera	Aleyrodidae, Aphididae, Aphrophoridae, Cicadellidae, Pentatomidae, Pyrrhocoridae
	Hymenoptera	Braconidae, Formicidae, Pteromalidae
	Isoptera	Termitidae
	Lepidoptera	Crambidae, Gelechiidae, Gelechiidae, Nolidae, Plutellidae, Tortricidae
	Orthoptera	Pyrgomorphidae
Not assigned	Actinomycetales	Corynebacteriaceae
	Peronosporales	Peronosporaceae
Saccharomycetes	Saccharomycetales	Saccharomycetaceae, Not assigned
Secernentea	Tylenchida	Heteroderidae
Sordariomycetes	Hypocreales	Nectriaceae, Not assigned
	Not assigned	Glomerellaceae
Tremellomycetes	Trichosporonales	Trichosporonaceae
Ustilaginomycetes	Ustilaginales	Ustilaginaceae

Content of the knowledge base



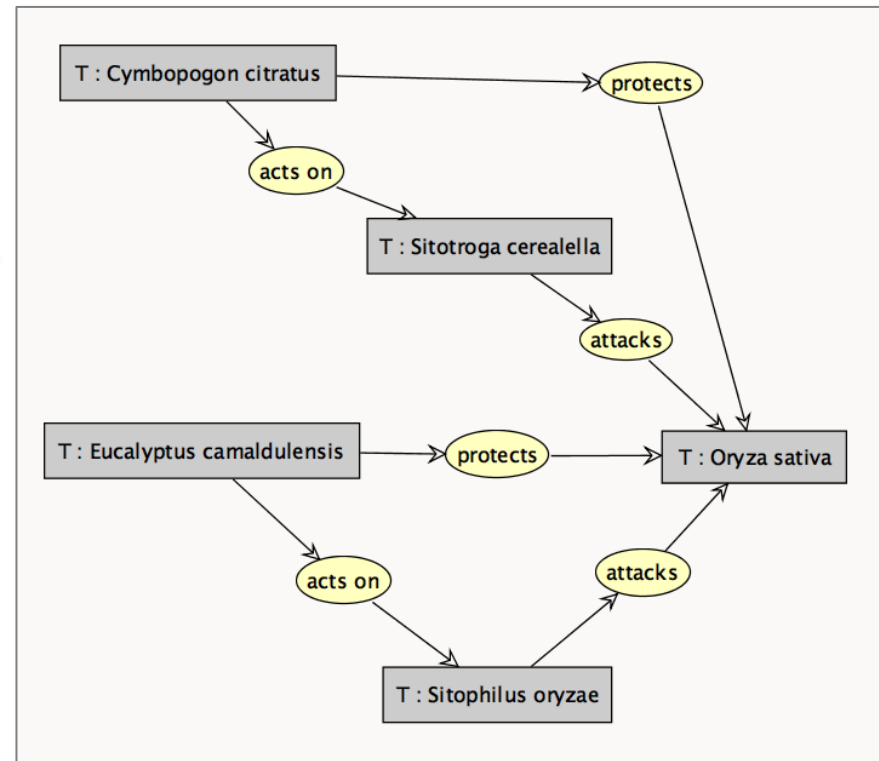
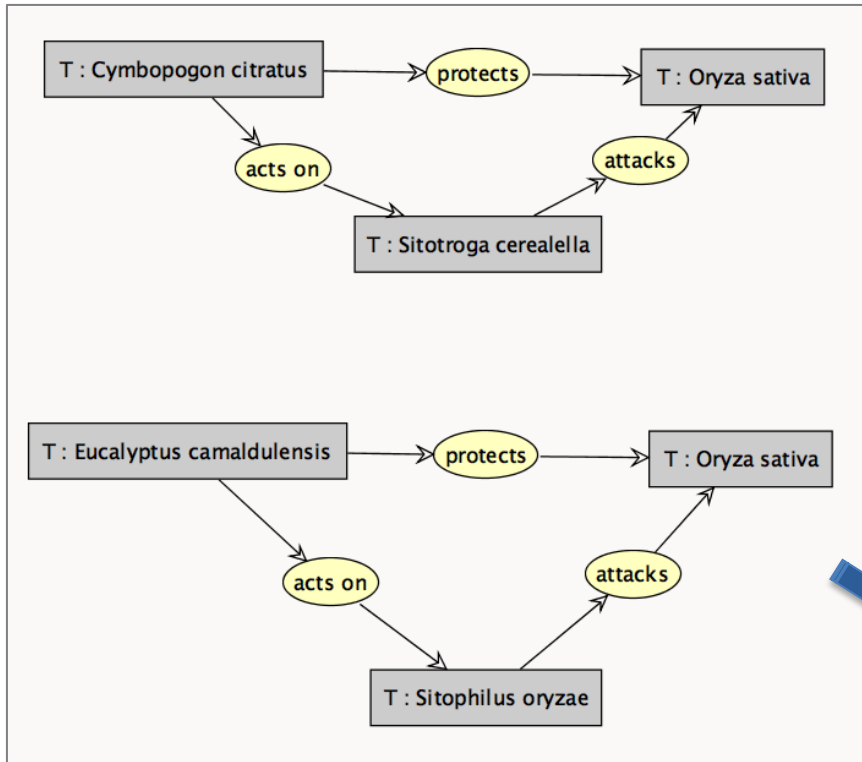
2 Kingdoms
3 Classes
8 Orders
8 Families
18 Genus

Kingdom	Family	Species
Animalia	Bovidae	<i>Bos taurus, Capra aegagrus</i>
	Hominidae	<i>Homo sapiens</i>
	Not specified	Not specified
Plantae	Brassicaceae	<i>Brassica oleracea</i>
	Fabaceae	<i>Arachis hypogaea, Cicer arietinum, Phaseolus vulgaris</i>
		<i>Pisum sativum, Vigna mungo, Vigna subterranea</i>
		<i>Vigna unguiculata</i>
	Malvaceae	<i>Abelmoschus esculentus, Gossypium hirsutum</i>
	Musaceae	<i>Musa spp.</i>
	Poaceae	<i>Oryza sativa, Pennisetum glaucum, Sorghum bicolor</i>
<i>Triticum sp., Zea mays</i>		
Solanaceae	<i>Solanum lycopersicum, Solanum tuberosum</i>	

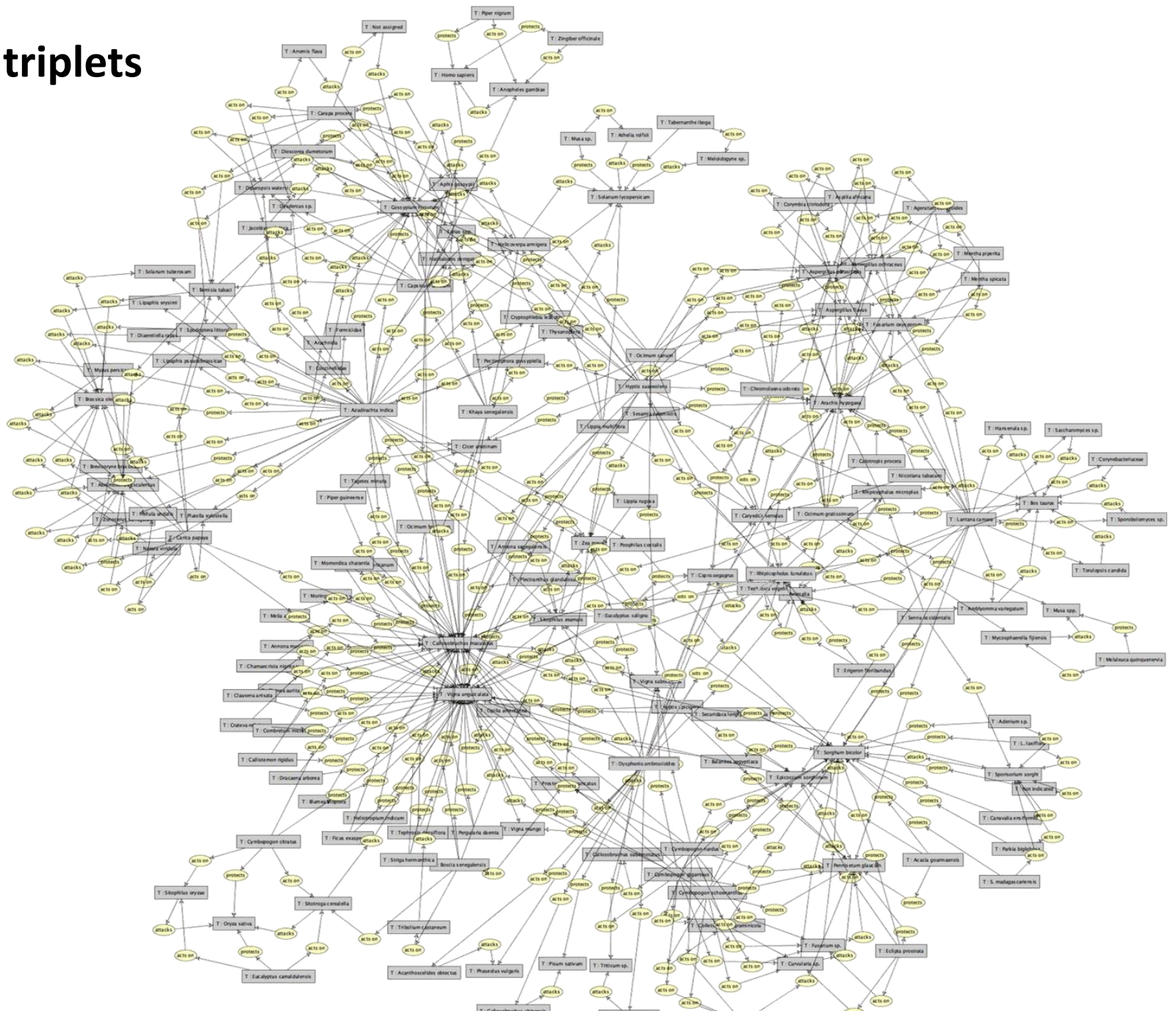


@Pierre Silvie

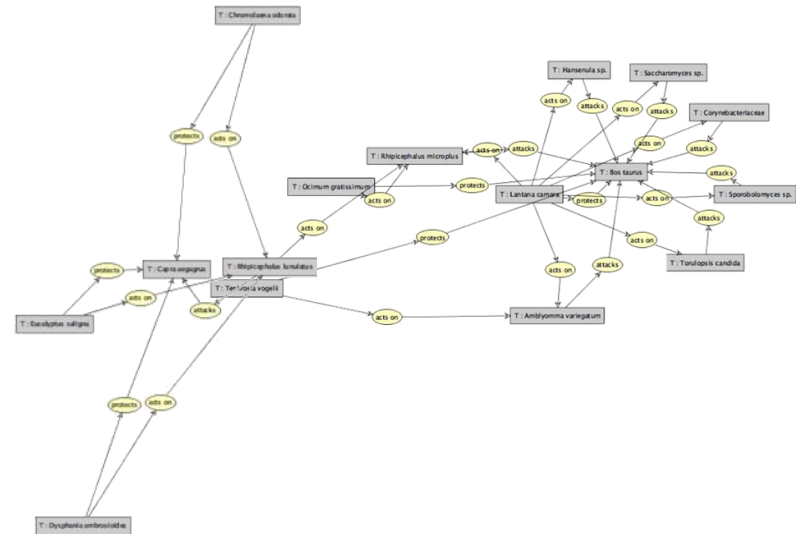
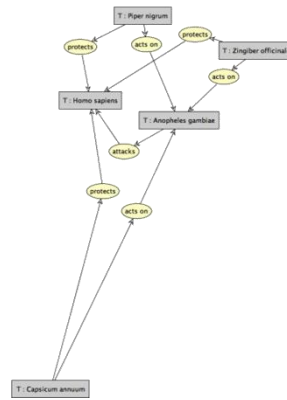
Representing the triplets for analysis



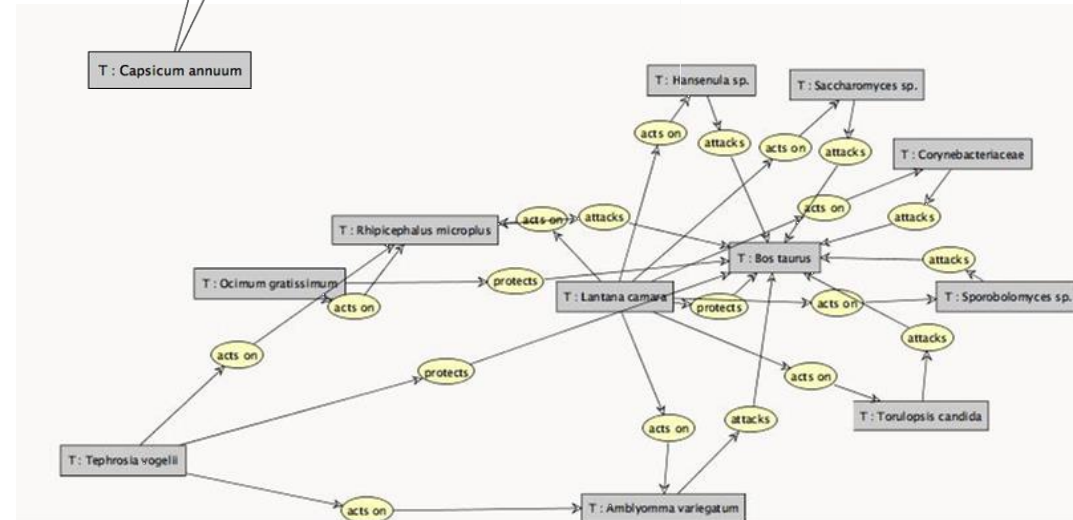
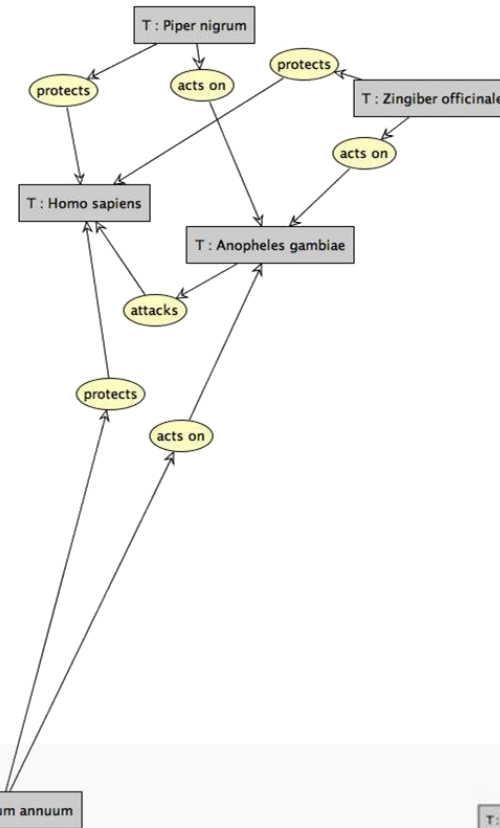
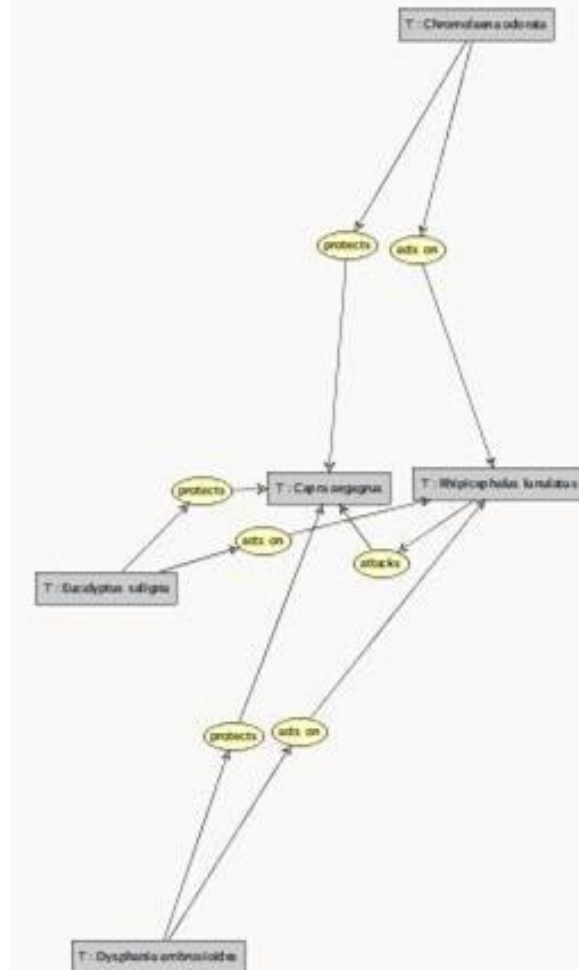
All triplets



Exple 1: Animalia

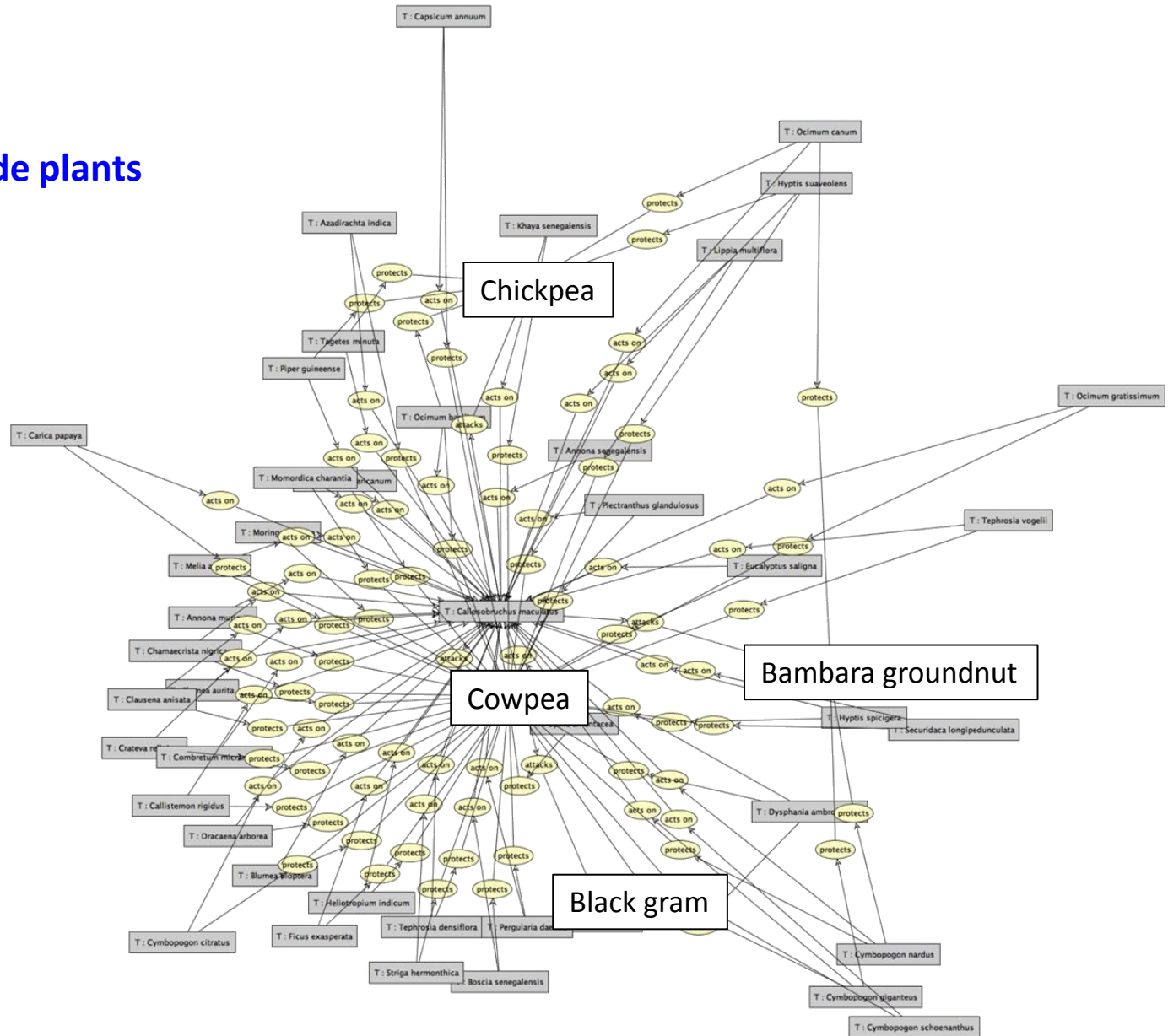


Exple 1: Animalia



Exple 2: *Callosobruchus maculatus*

35 pesticide plants



3. Identifying knowledge gaps

The **knowledge base** reveals the diversity of the studies

Literature => 640 knowledge

“Low” targets:

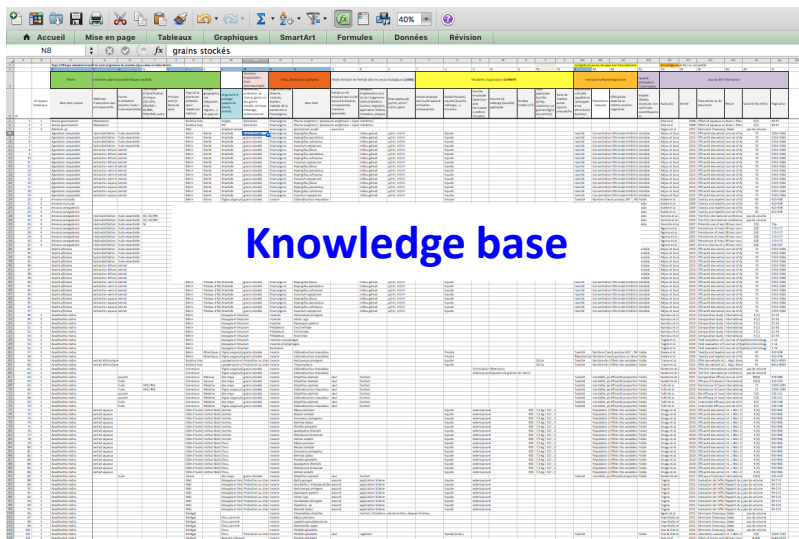
Insect vector: 1 species (*Anopheles gambiae*)

Natural enemies targets:

Parasitoid: 2 species

Predator: 3 families / orders

Next step: State of art vs. current infestations:



The image shows a screenshot of a Microsoft Excel spreadsheet. The spreadsheet has a complex layout with multiple columns and rows of data. A large white rectangular box with the text "Knowledge base" in blue font is overlaid on the center of the spreadsheet. The spreadsheet's interface includes a ribbon at the top with tabs for "Accueil", "Mise en page", "Tableaux", "Graphiques", "SmartArt", "Formules", "Données", and "Révision". The title bar of the window reads "grains stockés".

Vs.



IITA *Research to nourish Africa*
International Institute for
Tropical Agriculture


Regional scientific workshop on bioagressors,
Climate change and crop production
Cotonou (Benin), May 2014

Perspectives

1. Research priorities

- Main Pests
- Adverse effects on NTO (Non-target organisms)

Regional scientific workshop on bioagressors,
Climate change and crop production
Cotonou (Benin), May 2014



2. Research needs

- infrastructures (facilities)
- Links with northern public institutions (universities)
- links to private sector

3. Other needs

- Capacity building
- Training

Perspectives

1. Research priorities

- Main Pests
- Adverse effects on NTO (Non-target organisms)

2. Research needs

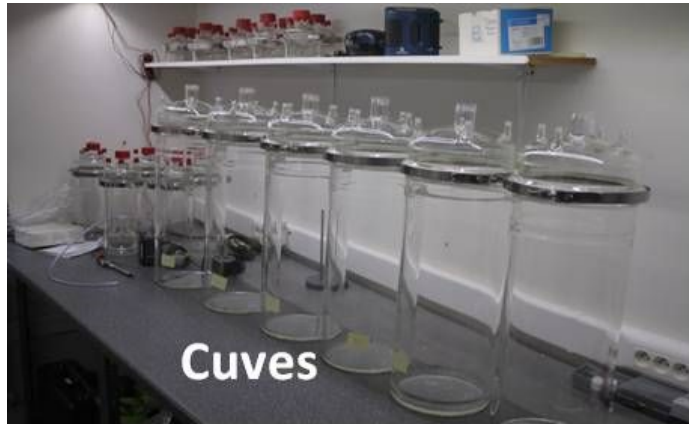
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3. Other needs

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- Training

Facilities

Belgium



Matériels de prélèvement d'odeur



Source: Mr. Yarou Boni

Facilities

Burkina Faso



Source: Mrs Elisabeth Zida

Facilities

Burkina Faso



Source: Mrs Elisabeth Zida

Perspectives

1. Research priorities

- Main Pests
- Adverse effects on NTO (Non-target organisms)

2. Research needs

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Discussion



@Pierre Silvie