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# The long and challenging road to capitalize on knowledge of plant-based extracts



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## Introduction

Europe has planned to halve pesticide use by 2030 as part of the Farm to Fork strategy to achieve the European Green Deal. Global warming combined with all year-round availability of host plant for a majority of pests is likely to favour the installation of invasive alien species (IAS) in Europe. The reduction of the range of authorized chemical molecules, initially intended for the control of native species, challenges research to propose sustainable solutions to manage IAS. Plant-based products are an alternative to synthetic products, already adopted in organic agriculture, such as *Tanacetum cinerariifolium* (natural pyrethrum), formulated as aqueous, organic extracts, or essential oils.

## Aim of this work

The knowledge base system Knomana collects description, from the literature, of plant-based extracts (experimented or in laboratory) used in any country to control pests for plant, animal, and human health.

More information on Knomana

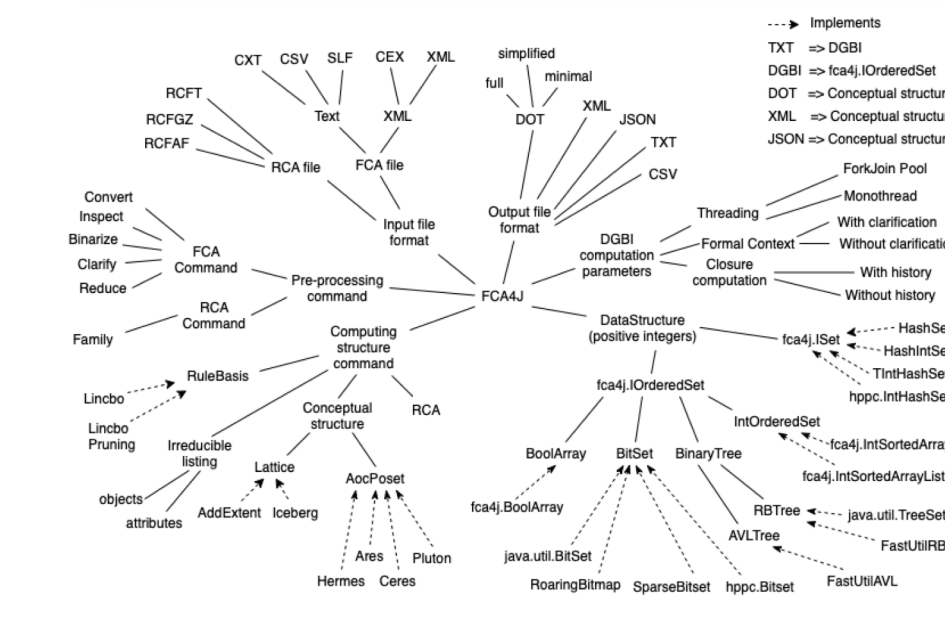
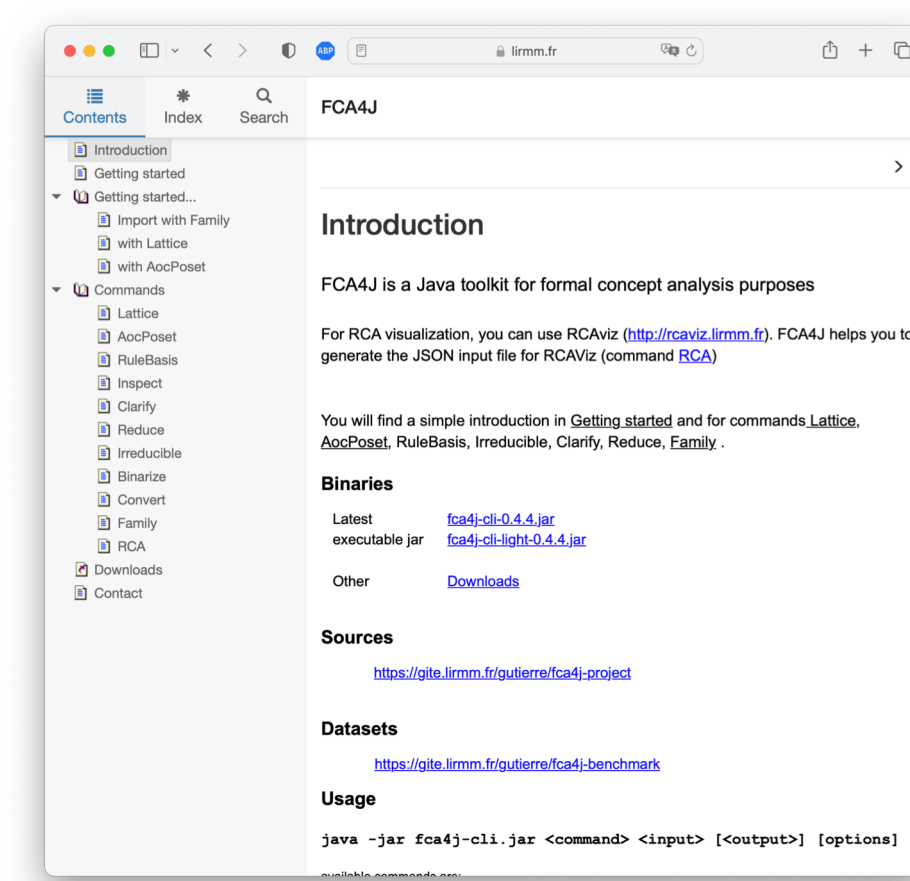
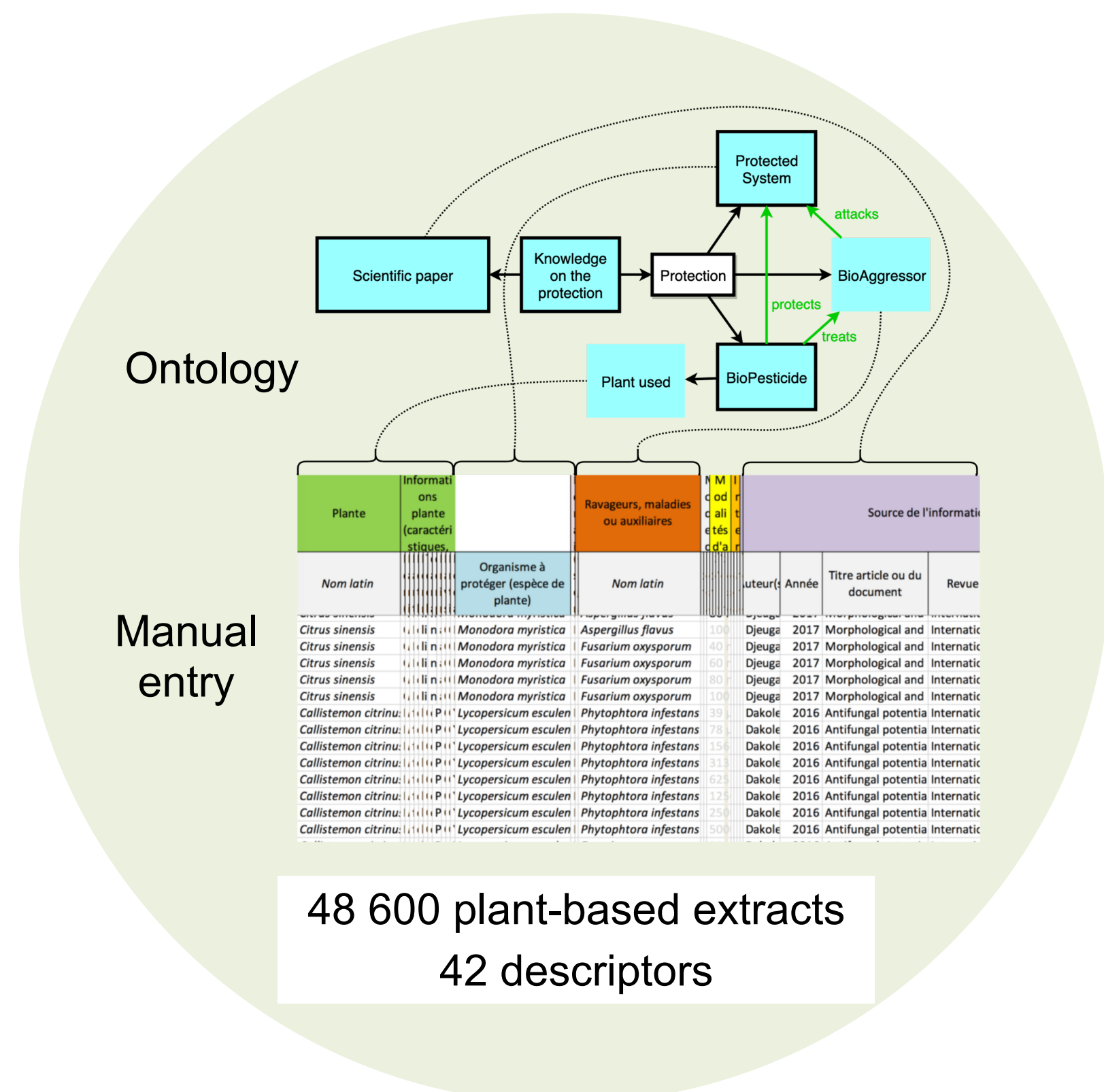


## The knowledge base system (KBS) Knomana

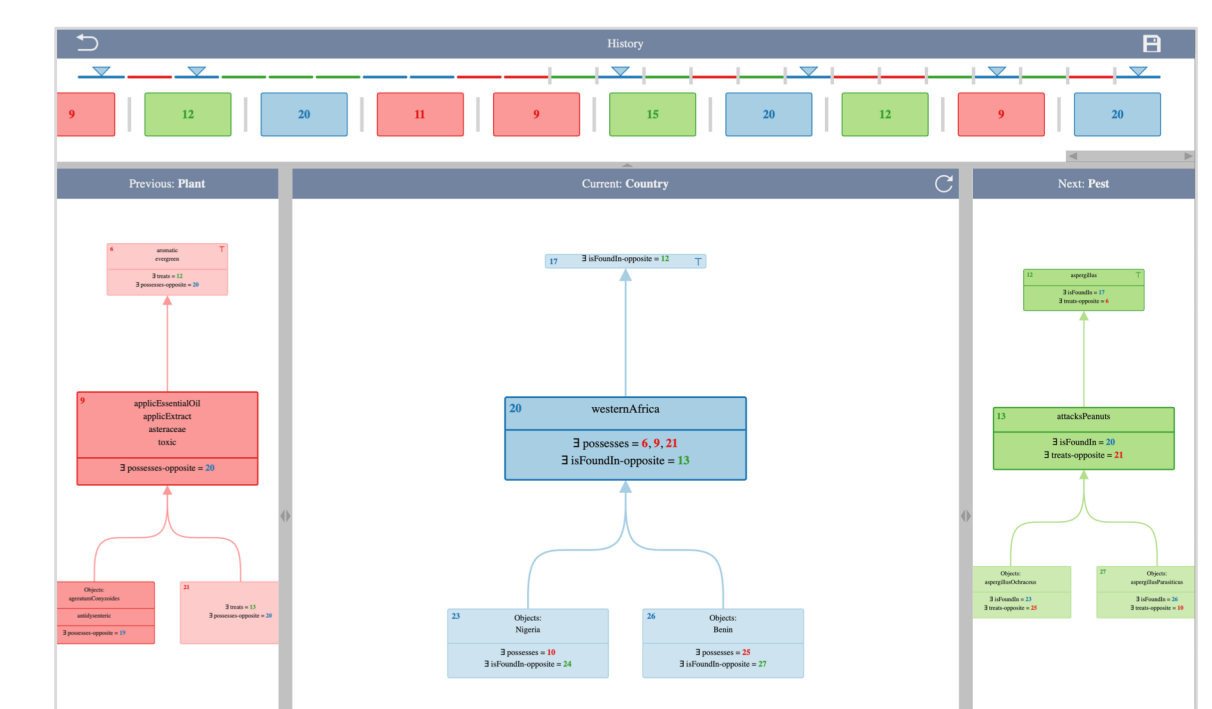
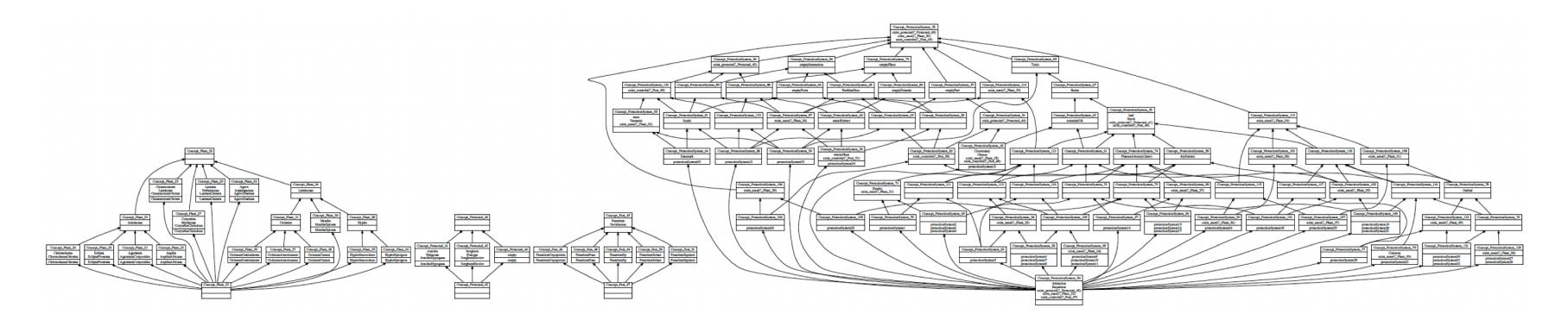
Capitalizing knowledge from literature into a knowledge base

Computing knowledge using Artificial Intelligence methods

Navigating knowledge to identify plant-based product (aqueous extracts or essential oils)



<https://www.lirmm.fr/fcaaj>



<https://rcaviz.lirmm.fr>

## Controlling an IAS using a plant species present in Europe or plant extracts to be imported

As some IAS are coming from another continent, using Knomana can allow European researchers to identify interesting plant species present in Europe, or plant extracts to be imported, to control IAS once their official approval is obtained. The following illustrations inform on the plant species per botanical family tested to control *Helicoverpa armigera*, *Spodoptera littoralis*, and *Spodoptera frugiperda* (Lepidoptera: Noctuidae).



# of pesticidal plants species per family tested to control *S. frugiperda* (total: 207 species from 48 families)

Family	# species	Family	# species
Amaranthaceae	1	Lamiaceae	11
Anacardiaceae	3	Limnathaceae	1
Annonaceae	19	Malvaceae	2
Apiaceae	1	Meliaceae	32
Apocynaceae	1	Monimiaceae	1
Arecaceae	1	Moringaceae	1
Asparagaceae	1	Myrtaceae	9
Asphodelaceae	1	Onocleaceae	1
Aspleniaceae	1	Phyllanthaceae	1
Asteraceae	29	Phytolaccaceae	2
Athyriaceae	1	Picramniaceae	2
Bignoniaceae	2	Piperaceae	6
Burseraceae	2	Poaceae	6
Cactaceae	1	Polygonaceae	2
Calceolariaceae	1	Potamogetonaceae	1
Caricaceae	1	Rhamnaceae	2
Celastraceae	4	Rubiaceae	5
Convolvulaceae	2	Rutaceae	8
Cucurbitaceae	1	Sapindaceae	3
Cupressaceae	1	Simarubaceae	4
Dioscoreaceae	1	Siparunaceae	1
Ditricaceae	1	Solanaceae	2
Euphorbiaceae	9	Verbenaceae	3
Fabaceae	13	Zingiberaceae	3

Tested pesticidal plants species for *H. armigera* (total: 28 species from 13 families)



# of pesticidal plants species per family tested to control *S. littoralis* (total: 284 species from 65 families)

Family	# species	Family	# species
Acanthaceae	1	Lamiaceae	71
Acoraceae	1	Lauraceae	1
Adoxaceae	1	Lythraceae	2
Amaranthaceae	2	Malvaceae	2
Apiaceae	24	Meliaceae	3
Apocynaceae	9	Myrtaceae	3
Araceae	1	Nitriaceae	1
Araliaceae	1	Oleaceae	1
Aristolochiaceae	1	Pinaceae	4
Asparagaceae	2	Plantaginaceae	2
Asteraceae	44	Poaceae	1
Boraginaceae	4	Polemoniaceae	1
Campanulaceae	3	Polygalaceae	1
Cannabaceae	1	Polygonaceae	3
Capparidaceae	1	Ranunculaceae	2
Caprifoliaceae	1	Resedaceae	1
Caricaceae	1	Rubiaceae	8
Caryophyllaceae	2	Rutaceae	3
Celastraceae	1	Rutaceae	7
Cistaceae	2	Salicaceae	1
Cleomaceae	1	Sapindaceae	3
Convolvulaceae	1	Schisandraceae	1
Crassulaceae	1	Scrophulariaceae	3
Cucurbitaceae	2	Simarubaceae	1
Cupressaceae	3	Solanaceae	4
Cynomoriaceae	1	Theaceae	1
Cyperaceae	1	Thymelaeaceae	1
Dioscoreaceae	1	Tropaeolaceae	1
Euphorbiaceae	2	Verbenaceae	4
Fabaceae	21	Vitaceae	1
Geraniaceae	3	Zingiberaceae	1
Hernandiaceae	1	Zygophyllaceae	1
Hypericaceae	2		

Tested pesticidal plants species common to both *S. frugiperda* and *S. littoralis* (total: 16 species from 12 families)  
Species in a white area were also tested on *H. armigera*

## Acknowledgements

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