



Dynamiques des connaissances scientifiques et des innovations sur les légumineuses à graines (soya & pulses) : Comment les sciences contribuent-elles au verrouillage ou déverrouillage ?

Marie-Benoît Magrini, Guillaume Cabanac, Tristan Salord

► To cite this version:

Marie-Benoît Magrini, Guillaume Cabanac, Tristan Salord. Dynamiques des connaissances scientifiques et des innovations sur les légumineuses à graines (soya & pulses) : Comment les sciences contribuent-elles au verrouillage ou déverrouillage?. Séminaire du LISSST 2019: Savoirs, Réseaux, Médiations (SRM), Oct 2019, Toulouse, France. 27p. hal-03251505

HAL Id: hal-03251505

<https://hal.inrae.fr/hal-03251505>

Submitted on 7 Jun 2021

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Dynamiques des connaissances scientifiques et des innovations sur les légumineuses à graines (soya & pulses) : Comment les sciences contribuent-elles au verrouillage ou déverrouillage ?

Marie-Benoit MAGRINI, Economiste INRA, UMR AGIR & LEREPS

Responsable Du Groupe Filière LEGUMINEUSES,

Marie-Benoit.Magrini@inra.fr

Guillaume CABANAC, Informaticien, UMR IRIT

Guillaume.Cabanac@univ-tlse3.fr

Tristan SALORD, Sociologue “Geek”, INRA, UMR AGIR

Tristan.Salord@inra.fr



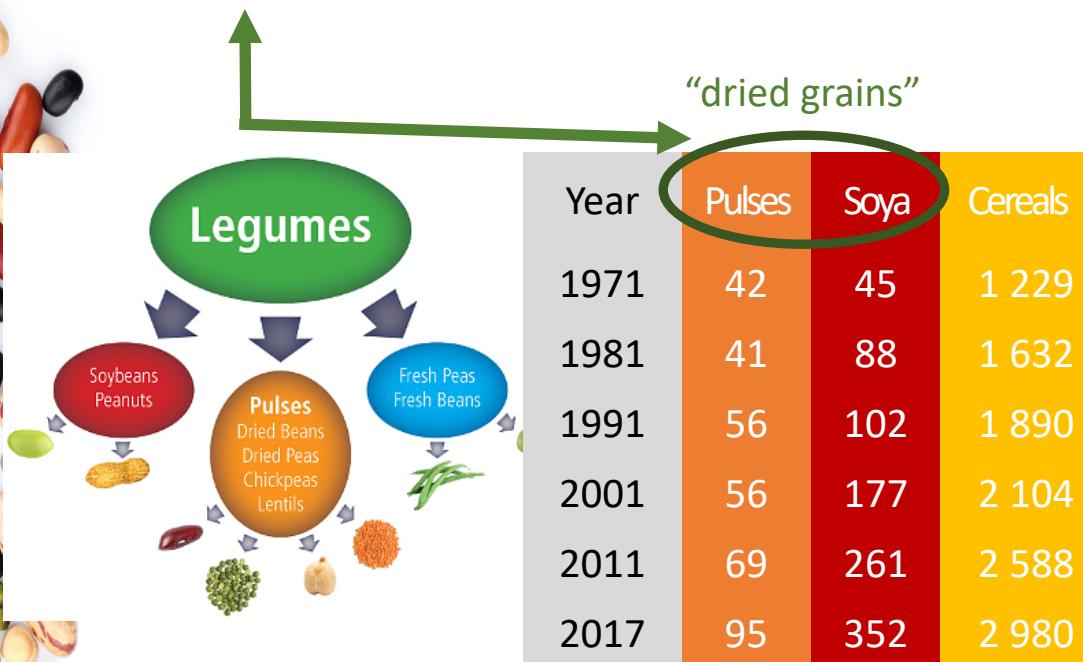
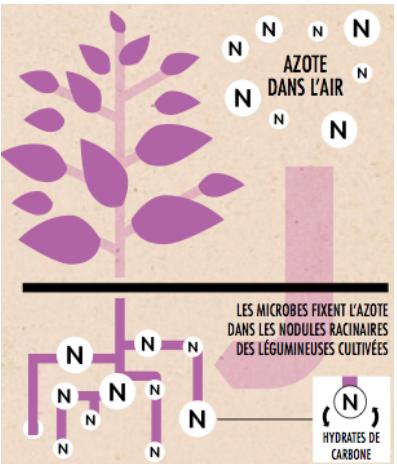
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°727672



Institut de Recherche
en Informatique de Toulouse
CNRS - INP - UT3 - UT1 - UT2J

1. CONTEXTE ET ENJEUX DE RECHERCHE

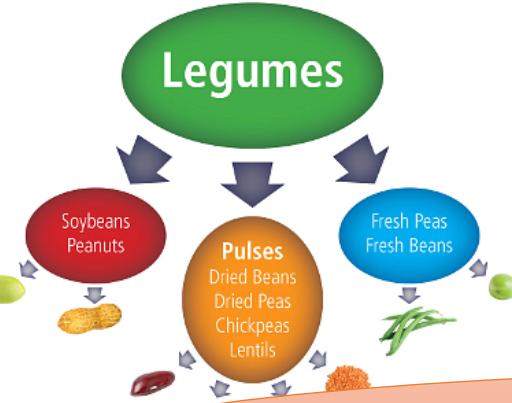
Contexte : le verrouillage des « pulses »



- **LEGUMES = Soya + Pulses.** Des espèces d'une même famille botanique aux trajectoires de développement contrastées.
- **Enjeux accrus de biodiversité cultivée avec des légumineuses** pour la durabilité environnementale (GES, fertilité des sols, phytos...) et la santé humaine (équilibre protéines, maladies cardiovasculaires....)



Contexte : une volonté politique de déverrouillage



- Des espèces appartenant d'une même famille botanique aux trajectoires de développement contrastées.
- Des enjeux accrus de biodiversité cultivée avec des légumineuses pour la durabilité ...

BUT LOCK-IN : unsustainable situation very difficult to change



<http://www.fao.org/pulses-2016/about/en/>

- Nouvelles recommandations nutritionnelles
- Plans protéinés en cours....
- Et les sciences : quelles nouvelles connaissances ?

Nouveaux repères nutritionnels pour les adultes
PNNS 2017-2021 : Révision

Au moins 5 fruits et légumes
(1 portion de fruit = 80-100g)
Pas plus d'1 verre de jus de fruit/jour

poignée de fruits à coque sans sel ajouté

Au moins 2 fois par semaine des légumineuses
x : lentilles, pois chiches, haricots...
Les légumineuses peuvent être considérées comme des substituts aux volailles

Produits céréaliers complets ou peu raffinés tous les jours

2 produits laitiers par jour
1 portion = 150mL de lait, 125g de yaourt, 30g de fromage

Eau à volonté !

Enjeux de recherche : mieux comprendre le verrouillage des pulses

Ecological Economics 126 (2016) 152–162

Contents lists available at ScienceDirect
Ecological Economics
journal homepage: www.elsevier.com/locate/ecolecon

Why are grain-legumes rarely present in cropping systems despite their environmental and nutritional benefits? Analyzing lock-in in the French agrifood system

Marie-Benoit Magrini^{a,*}, Marc Anton^b, Célia Cholez^{a,c}, Guenaelle Corre-Hellou^d, Gérard Duc^e, Marie-Hélène Jeuffroy^f, Jean-Marc Meynard^g, Elise Pelzer^f, Anne-Sophie Voisin^e, Stéphane Walrand

Magrini et al., 2016; 2017; 2018; 2019

THE DEVELOPMENT OF PLANT PROTEINS IN THE EUROPEAN UNION
OPPORTUNITIES AND CHALLENGES
22 & 23 NOVEMBER 2018 - VIENNA
Panel "Supply Chains and Market Segments"
Report from Marie-Benoit Magrini,
French National Institute for Agricultural Research, INRA

ORIGINAL RESEARCH ARTICLE
Front. Sustain. Food Syst., 24 October 2018 | <https://doi.org/10.3389/fsufs.2018.00064>

Pulses for Sustainability: Breaking Agriculture and Food Sectors Out of Lock-In

Marie-Benoit Magrini^a, Marc Anton^b, Jean-Michel Chardigny^b, Gérard Duc^c, Michel Duru^c, Marie-Hélène Jeuffroy^d, Jean-Marc Meynard^d, Valérie Micard^d and Stéphane Walrand^e

^aAGIR, Université de Toulouse, INRA, Castanet-Tolosan, France
^bBIA, INRA, Nantes, France
^cALMH, INRA, Dijon, France
^dAgroécologie, INRA, Dijon, France
^eAgronomie, INRA, Grignon, France
^fSADAPT, INRA, Paris, France
^gIATE, INRA, Montpellier SupAgro, Université Montpellier, CIRAD, Montpellier, France
^hUH, Université de Clermont Auvergne, INRA, CRNH, Clermont-Ferrand, France

Crop diversification can improve the sustainability of Western agriculture. In particular, pulses are crops that can help both agriculture and the food industry become more ecological, as they reduce greenhouse gas emissions and help reduce animal-based consumption. Today, however, the development of these crops in Europe has been hindered due to lock-in, since major crops have been co-developed to a greater extent in farming and food systems. After briefly reviewing the major mechanisms that lead to this lock-in,

AGRO-ECOSYSTEM DIVERSITY
RECONCILING CONTEMPORARY AGRICULTURE AND ENVIRONMENTAL QUALITY

INDUSTRY NETWORK

POLICIES/INSTITUTIONS

CULTURE

INFRASTRUCTURES

MARKETS/USERS PREFERENCES

SCIENTIFIC KNOWLEDGE

Technology

**Current Socio-technical regime Locked-in.
“How to un-lock is the puzzle question” (Geels, 2011)**

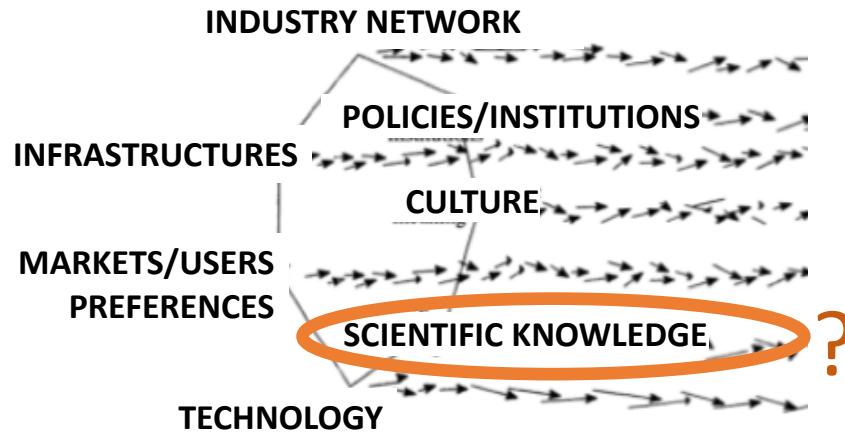
e 2 0 1 8 u s t

Federal Ministry
Republic of Austria
Sustainability and Tourism

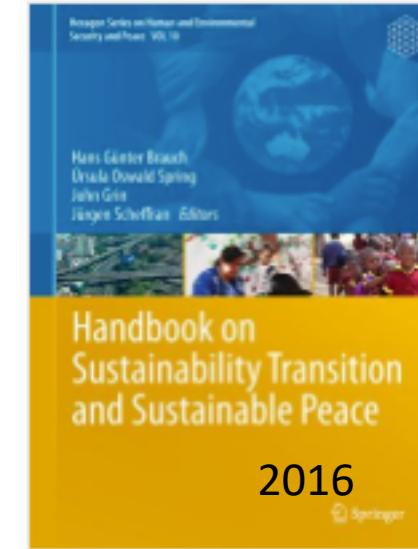
European Commission



...analyse du verrouillage/déverrouillage/transition : des fronts de recherche en sciences humaines et sociales



Geels - Transition Studies, voir aussi le SPRU



...à coupler aux
approches
scientométriques



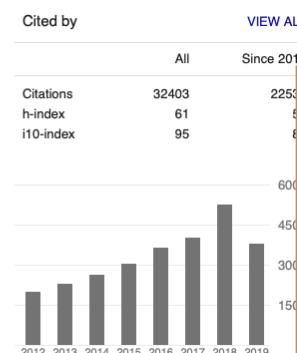
Current Socio-technical regime Locked-in.
“How to un-lock is the puzzle question”
(Geels, 2011)

Frank Geels

Professor of System Innovation and Sustainability, University of Manchester
Verified email at manchester.ac.uk - [Homepage](#)

Sustainability transitions Multi-Level Perspective disruptive innovation socio-technical systems

FOLLOW



I will use the term ‘sociotechnical regimes’ to refer to the semi-coherent set of rules carried by different social groups. By providing orientation and co-ordination to the activities of relevant actor groups, ST-regimes account for the stability of ST-configurations. This stability is of a dynamic kind, meaning that innovation still occurs but is of an incremental nature. In evolutionary terms, ST-regimes thus function as selection and retention mechanism (deep structure). (Geels, 2002:1260)

TITLE

Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study

FW Geels
Research policy 31 (8-9), 1257-1274

Typology of sociotechnical transition pathways
FW Geels, J Schot
Research policy 36 (3), 399-417

CITED BY

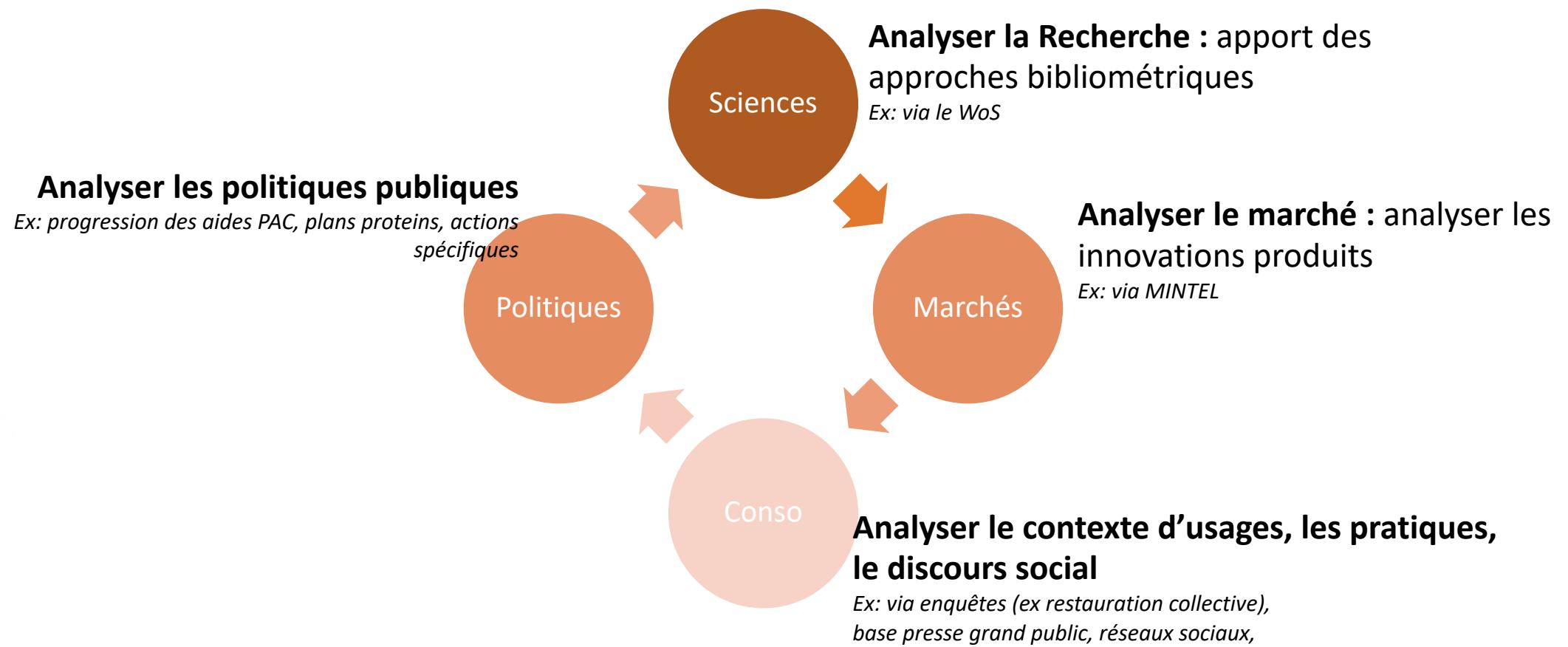
4542 2002

3520

2007

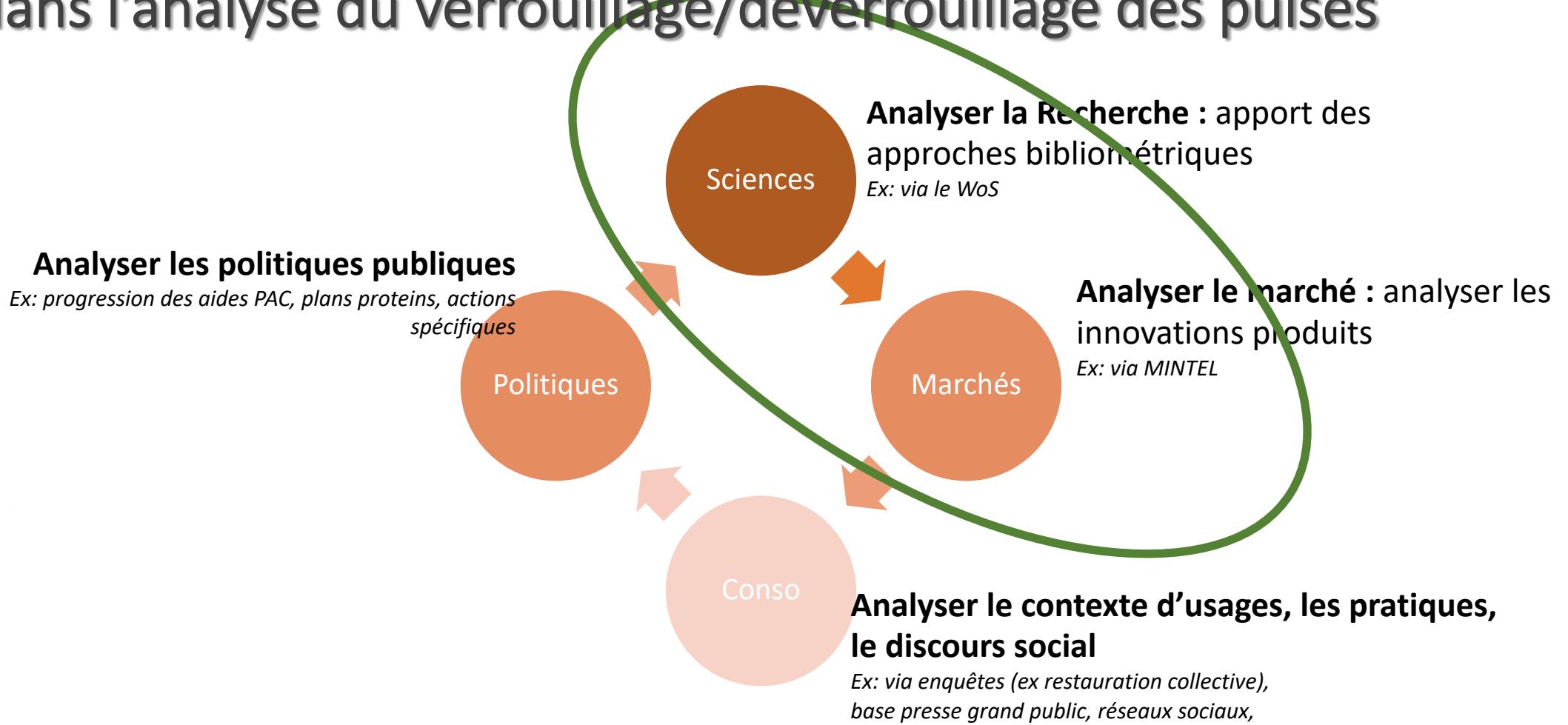


Vers la construction d'un programme de recherche de long terme sur les dépendances « sciences-marchés-politiques-consommateurs » dans l'analyse du verrouillage/déverrouillage des pulses





Vers la construction d'un programme de recherche de long terme sur les dépendances « sciences-marchés-politiques-consommateurs » dans l'analyse du verrouillage/déverrouillage des pulses



2. Analyser l'état des connaissances scientifiques: les sciences contribuent-elles au verrouillage socio-technique ?

Construire un corpus de la littérature scientifique et l'analyser

- **Construction du corpus et statistique exploratoire** : analyse longitudinale du poids des espèces, des thèmes/domaines disciplinaires, positionnement des pays...
→ *ARTICLE SOUMIS avec la proposition d'une approche méthodologique originale, la création d'une plateforme favorisant les interactions entre experts et scientomètres*
 - **Chronologie des champs de recherche**, poids des « topics »
→ *EN COURS via l'analyse des segments de mots*
 - Analyse des réseaux épistémiques et des effets « translationnels » entre espèces ?
→ *ENVISAGÉ via l'analyse des citations*
 - Quelle géographie de ces sciences et lien aux évolutions des marchés ?
→ *ENVISAGÉ*
- ...



Construction du corpus BILAG et premières analyses

Worldwide Scientific Knowledge on Grain-legumes: to what extent does science contribute to agricultural diversity? A bibliometric method and analysis (1980-2018)

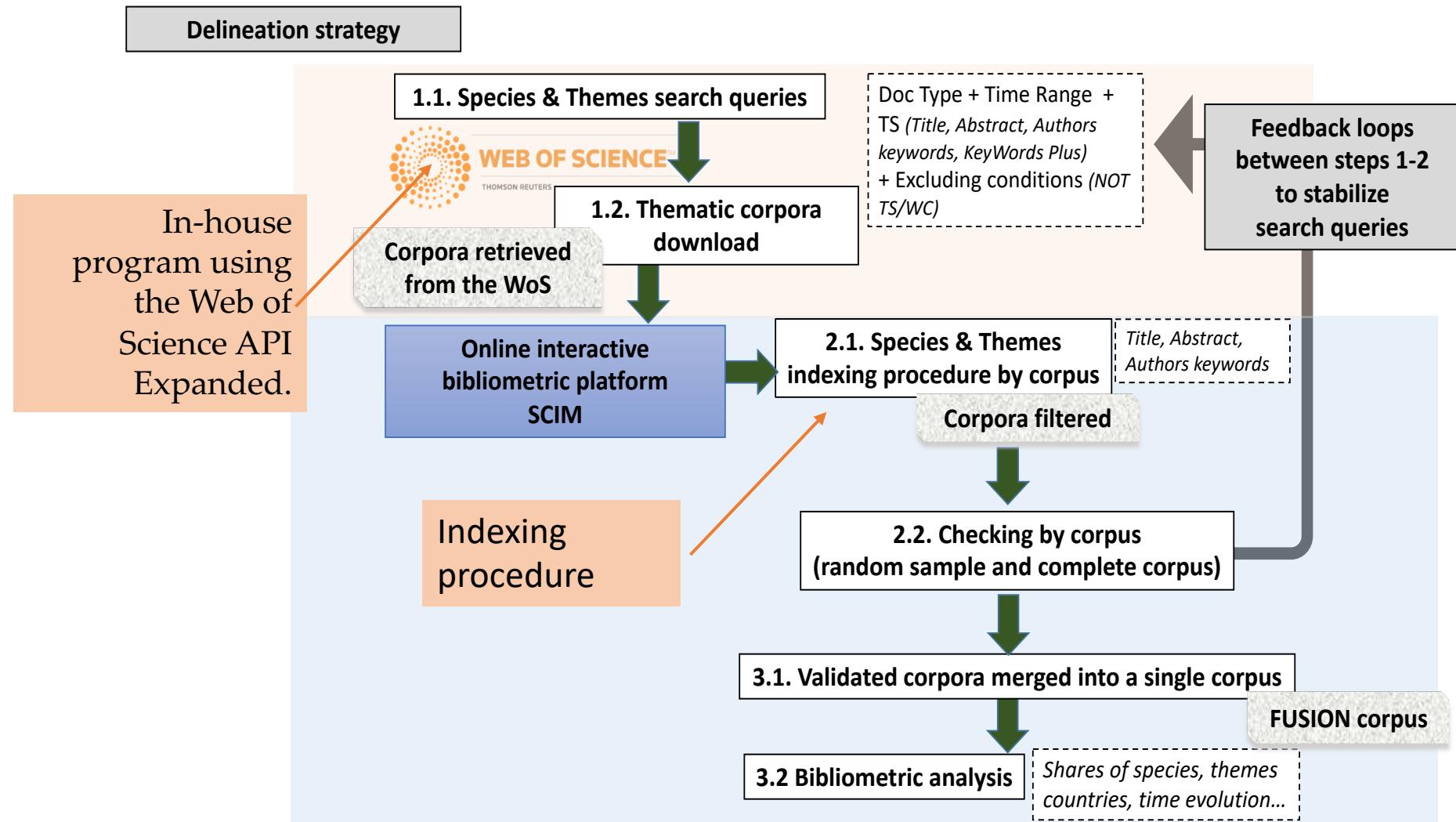
Soumis Sustainability journal

Marie-Benoît Magrini, Guillaume Cabanac, Matteo Lascialfari, Gael Plumecocq, Marie-Josephe Amiot-Carlin, Marc Anton, Gaëlle Arvisenet, Alain Baranger, Laurent Bedoussac, Jean-Michel Chardigny, Gérard Duc, Marie-Hélène Jeuffroy, Etienne-Pascal Journet, Hervé Juin, Colette Larré, Hugues Leiser, Valérie Micard, Dominique Millot, Marie-Laure Pilet-Nayel, Christophe Nguyen-Thé, Tristan Salord, Anne-Sophie Voisin, Stéphane Walrand, and Jacques Wery



Choix méthodologiques : un travail associant experts du champ investi et scientomètres

- Managed by Clarivate Analytics, the WoS provides access to article records from more than 30,000 journals and books in various fields of science. The WoS 'Core Collection' includes about 70 million records
- BILAG-corpus (FUSION):
dataset of 107,823 scientific publications between 1980 and 2018...
- ...from 10 thematic subcorpus merged
- search queries addressing the *title, abstract, and authors' keywords* + indexing step to filter "keyword plus"



Un bruit résiduel restant de l'ordre de 20% (confirmé par analyse dendrogramme)

Thematic corpora investigated by experts.

Theme and underlying corpus name	Description of the theme	Number of scientific experts involved
SPECIES	Names used to designate the various main grain-legume species and varieties cultivated in temperate climates	2
GENETICS	Varieties, genes, breeding methods and objectives	2
AGRONOMY	Ways to grow legume crops and provided services	2
ECOPHYSIOLOGY	Plant physiology in relation to its abiotic environment	2
BIOAGGRESSORS	Weeds, diseases and pests life traits and control in crops	2
FEEDING	Feeding practices, animal nutrition	2
PROCESSING	Transformation and main types of food products excluding non-food uses	4
NUTRITION	Nutrition subjects for humans including health	4
ALLERGY	Concerns on allergy linked to the use of legumes in food	2
ACCEPTABILITY	Sensorial and organoleptic analysis for consumer acceptance	2
SOCIOECONOMICS	Any subject of interest using socio-economic approaches	2

Species identifier and species expressions used in the species search query

Species identifier (Genus or common name)	All species or common name terms included in the search query
Adzuki	phaseolus angularis, vigna angularis, red mung\$, red bean\$, red mungbean\$, adzuki\$, azuki\$
Bambara Bean	vigna subterranea*, bambara bean\$
Bean	phaseolus coccineus, phaseolus vulgaris, phaseolus lunatus, phaseolus spp, common bean\$, common field bean\$, common fieldbean\$, runner bean\$, runnerbean\$, lima bean\$, common bean\$, kidney bean\$, pinto bean\$, vigna aconitifolia, moth bean\$, vigna umbellata, rice bean\$
Chickpea	cicer arietinum, chickpea\$, chick pea\$
Cowpea	vigna unguiculata, cowpea\$, cow pea, cow peas, blackeyed pea, blackeyed peas, black-eye pea, black-eye peas, blackeyed bean\$, catjan\$, long bean\$
Faba bean	vicia faba, fava bean\$, faba bean\$, broadbean\$, broad bean\$, horse bean\$, horsebean\$, fababean\$, field bean\$, fieldbean\$
Fenugreek	trigonella foenum grecum, trigonella foenum graecum, fenugreek\$, fenugrec\$, fenu grec\$
Lathyrus	lathyrus sativus, lathyrus sativa, lathyrus ochrus, lathyrus cicera, grass pea\$, red pea\$, cyprus vetch\$, vetchling\$, gesse\$
Gram bean	vigna mungo, gram bean\$, black bean\$, black lentil\$, black gram, blackgram\$
Groundnut	arachis hypogaea, arachis hypogaea, groundnut\$, peanut\$
Lablab	lablab purpureus, hyacinth bean\$, lablab bean\$, lablab\$
Lentil	lens culinaris, lentils\$
Lupin	lupinus albus, lupinus angustifolius, lupinus luteus, lupinus mutabilis, lupin\$
Mungbean	vigna radiata, vigna mungo, mungbean\$, mung bean\$, moong bean\$, mungo bean\$, green gram\$, golden gram\$, maash\$, moong sanskrit\$
Pea	pisum sativum, pea, peas
Pigeon Pea	cajanus cajan, pigeon pea, pigeon peas, pigeonpea\$
Soya	glycine max, soja, soya\$, soy\$, sojabean\$, soybean\$, soyabean\$
Vicia	vetch\$, vetche\$, vicia sativa, vicia villosa, vicia ervilia, ervil\$, vicia narbonensis, narbon bean\$
Winged bean	psophocarpus tetragonolobus, winged bean\$, asparagus pea\$, goabean\$, goa bean\$
Generic	leguminous, *legume, *legumes, pulse, pulses

INRA\DATA\VERSE: publication des requêtes

Auteurs:
Les experts, le documentaliste IST, G.
Cabanac
Correspondant : 1er auteur

Renvoie à l'article pour la méthode
car l'application *telle quelle* de la
requête ne permet pas le filtrage
des key-words plus

Fichiers associés:
- Requête du WoS format txt
- Les clés UT des records (après
filtrage)

The screenshot shows the INRA DataVERSE interface. At the top, there's a navigation bar with links for 'Recherche', 'À propos', 'Guide d'utilisation [en]', 'Support', 'Français', and 'Marie-Benoit Magrini'. The main header features the INRA logo with the tagline 'SCIENCE & IMPACT'. Below the header, the dataset title 'Socioeconomics and Grain-Legumes WoS DataSet' is displayed, along with status indicators like '0 téléchargement' and buttons for 'Contact', 'Partager', 'Publier', and 'Modifier'.

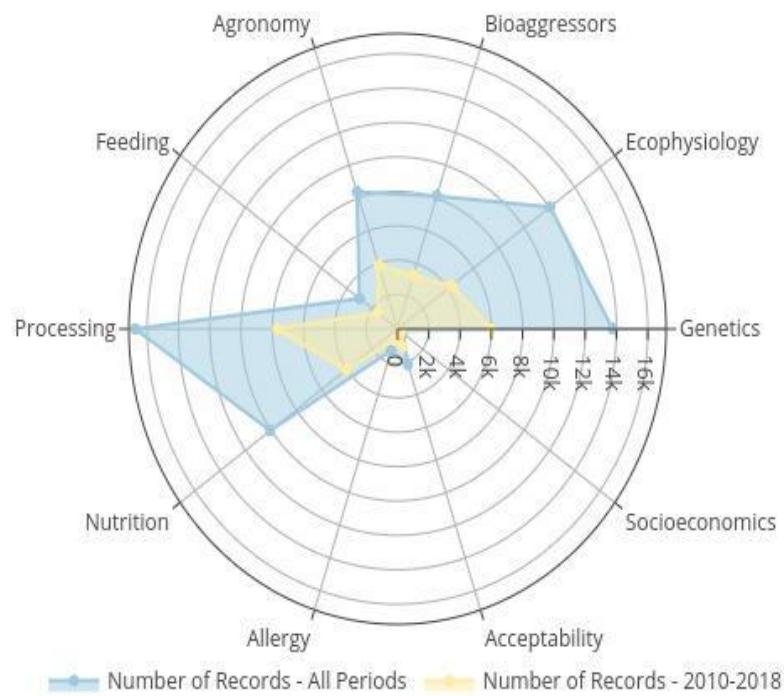
The dataset description area includes a thumbnail icon, the title 'Socioeconomics and Grain-Legumes WoS DataSet', and status buttons 'Version provisoire' and 'Non publiée'. It also contains a detailed description of the dataset, mentioning authors (Magrini, Marie-Benoit; Plumecocq, Gael; Leiser, Hugues; Cabanac, Guillaume), the year (2019), and a URL (<https://doi.org/10.70112/ZIEZEK>). A note indicates that the dataset is a 'VERSION PROVISOIRE' (Draft) and provides a link to 'Data Citation Standards [en]'. A 'Citer le dataset' button is also present.

Below the description, there are sections for 'Description', 'Subject', and 'Related Publication'. The 'Description' section contains a detailed text about the search query and its application on the WoS. The 'Subject' section lists 'Economics'. The 'Related Publication' section links to an article by Magrini et al. titled 'Worldwide Scientific Knowledge on Grain-legumes: to what extent does science contribute to agricultural diversity? A bibliometric method and analysis (1980-2018)' from the journal 'Sustainability'.

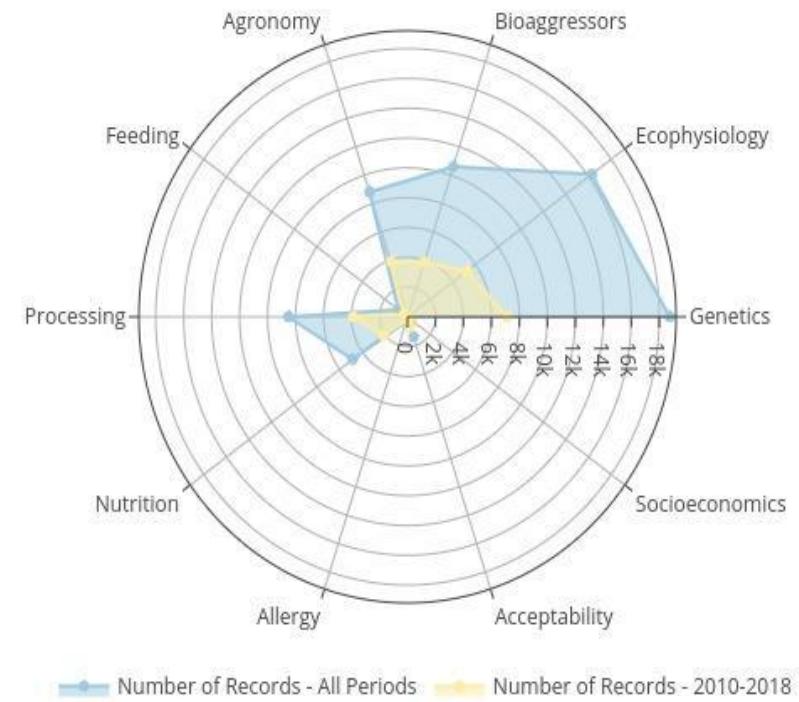
At the bottom, there are tabs for 'Fichiers', 'Métadonnées', 'Conditions', and 'Versions'. A search bar allows users to search within the dataset. The 'Fichiers' tab is active, showing two files: 'DataSet_UT_SocioEconomics.tab' (a tabular file) and 'Socioeconomics_and_GrainLegumes_WoS_Query.txt' (a plain text file). Each file has download, edit, and explore buttons.

SOME RESULTS

Shares of themes within records indexed with Soya comparison to 2010-2018



Shares of themes within records indexed with Pulses comparison to 2010-2018

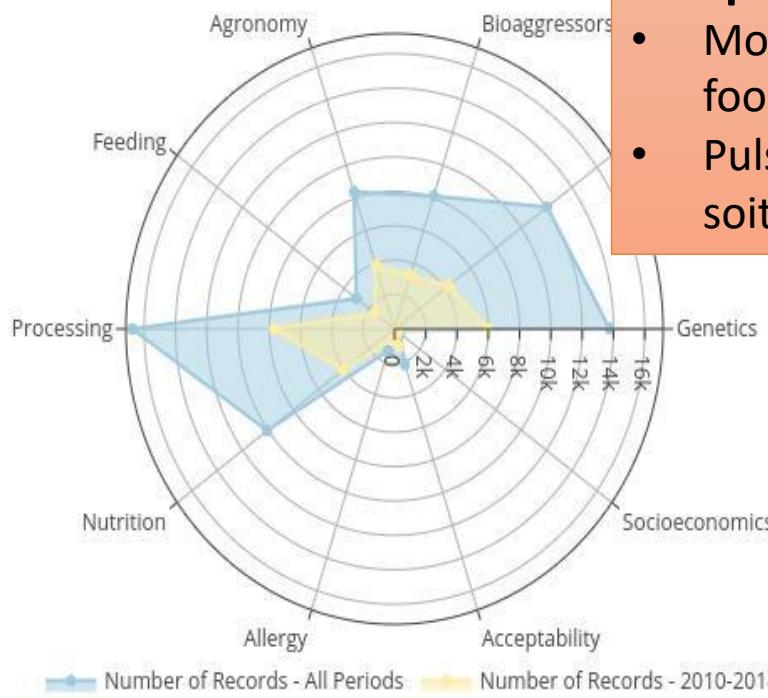


Thematic distribution for each legumes

40% du corpus FUSION est sur la période 2010-2018

SOME RESULTS

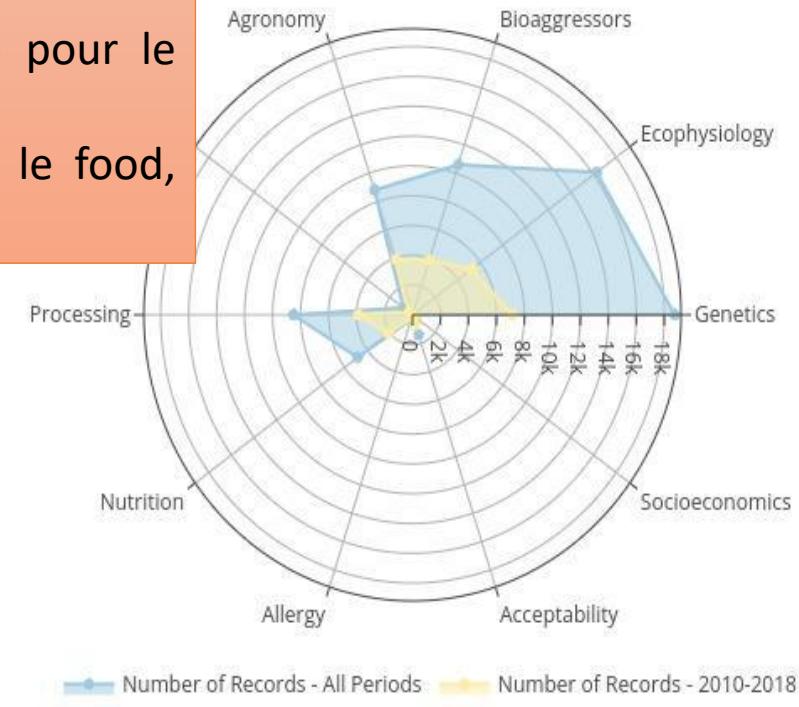
Shares of themes within records indexed with Soya comparison to 2010-2018



Poids déséquilibré des espèces soya/pulses en food sciences comparativement au marché

- Moins de 10% volume soja pour le food, soit 40 MT
- Pulses: au moins 60% pour le food, soit +50 MT

Shares of themes within records indexed with Pulses comparison to 2010-2018

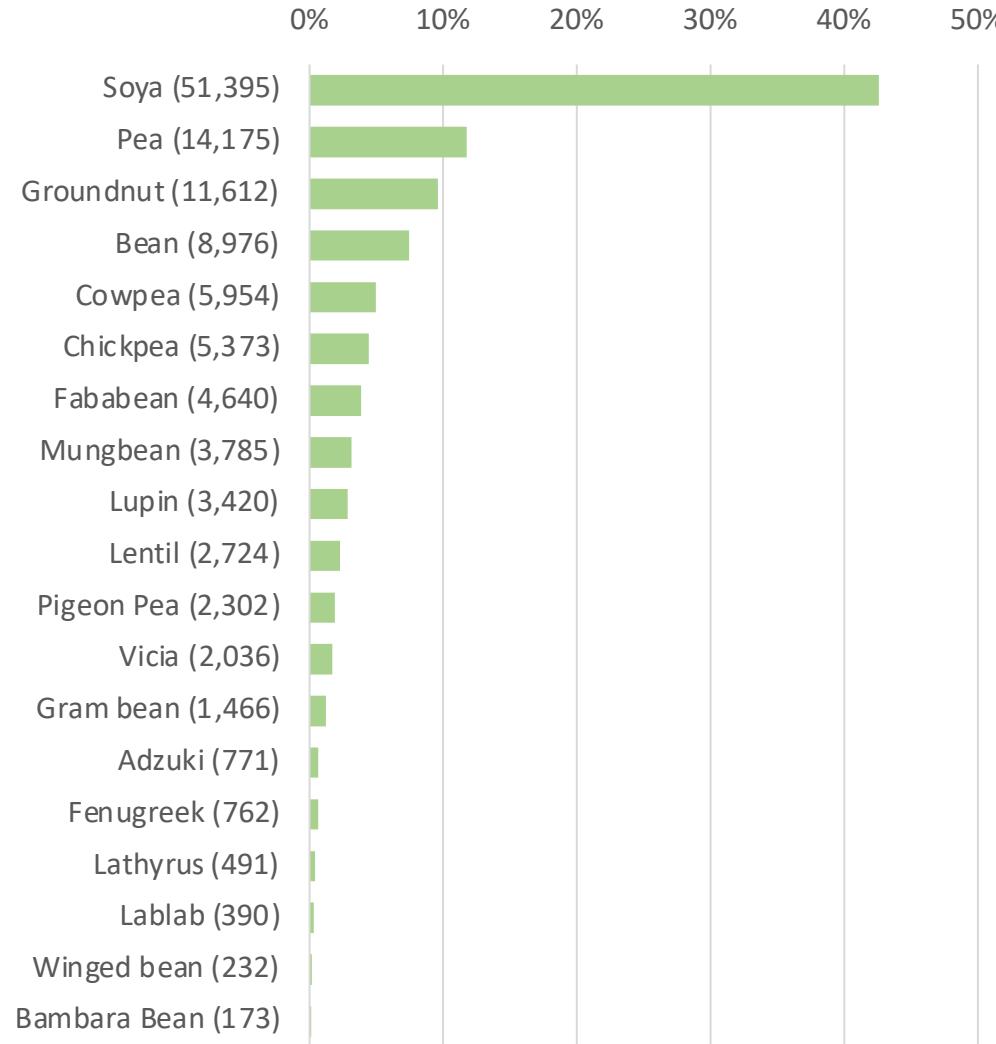


Thematic distribution for each legumes

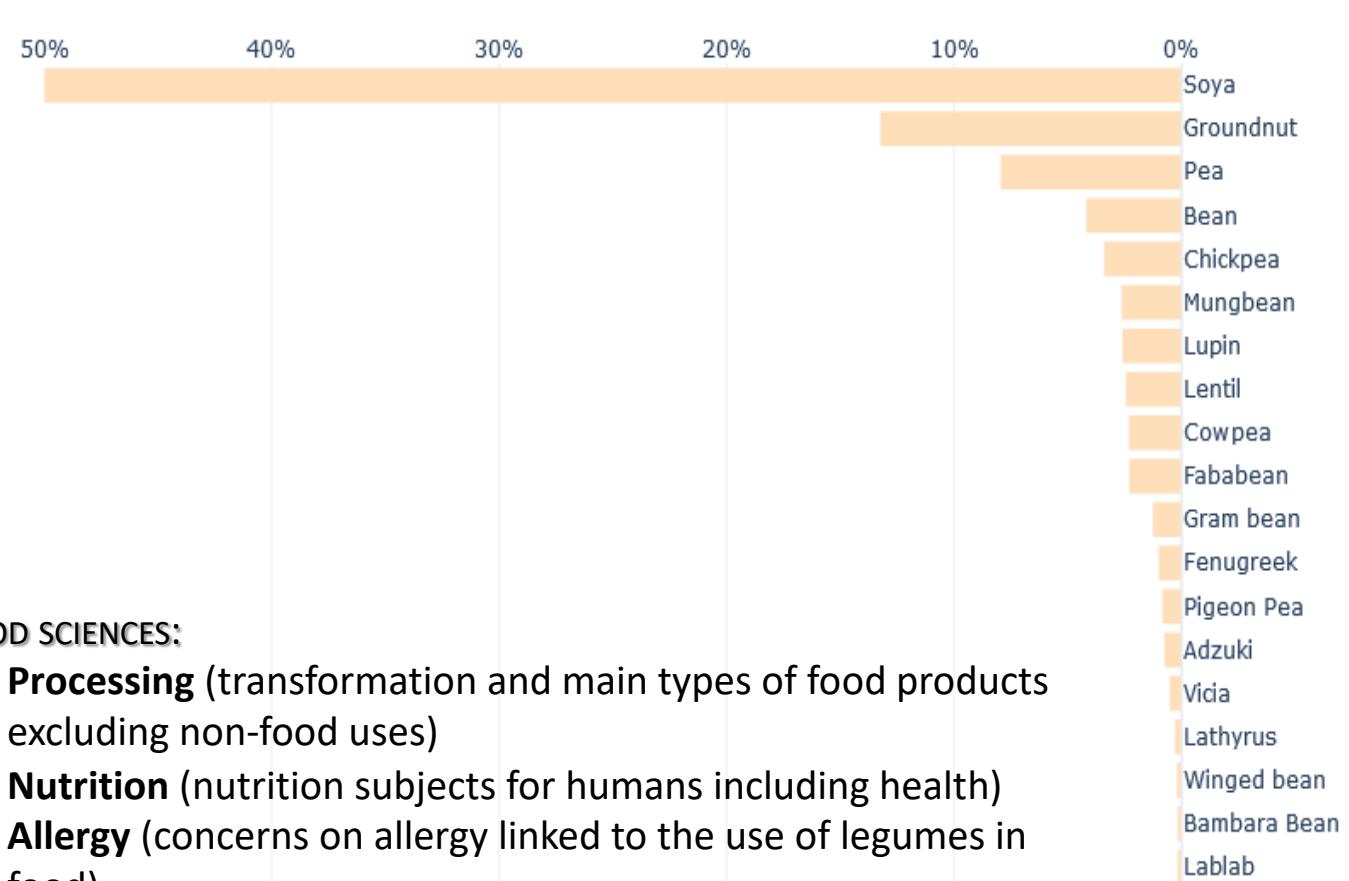
40% du corpus FUSION est sur la période 2010-2018

POIDS DES ESPECES CITEES

ALL CORPUS FUSION



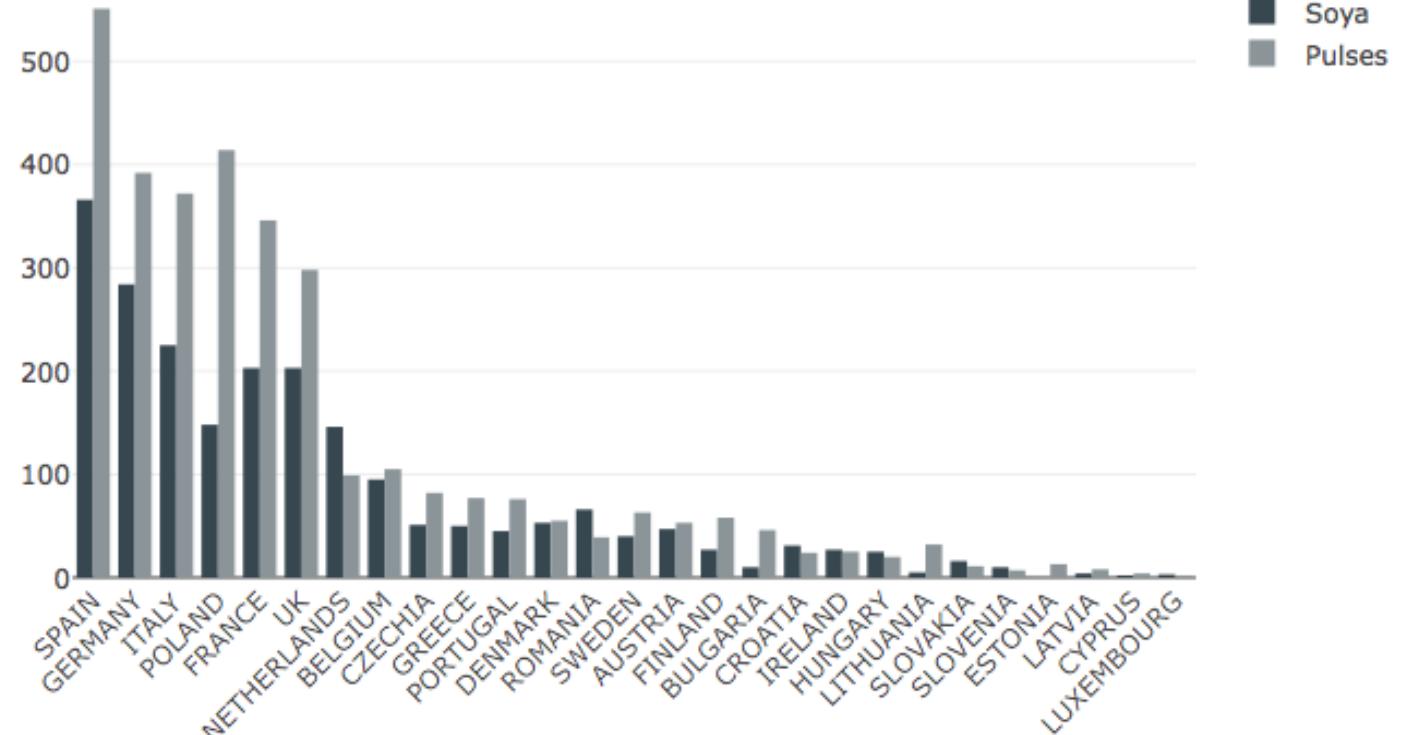
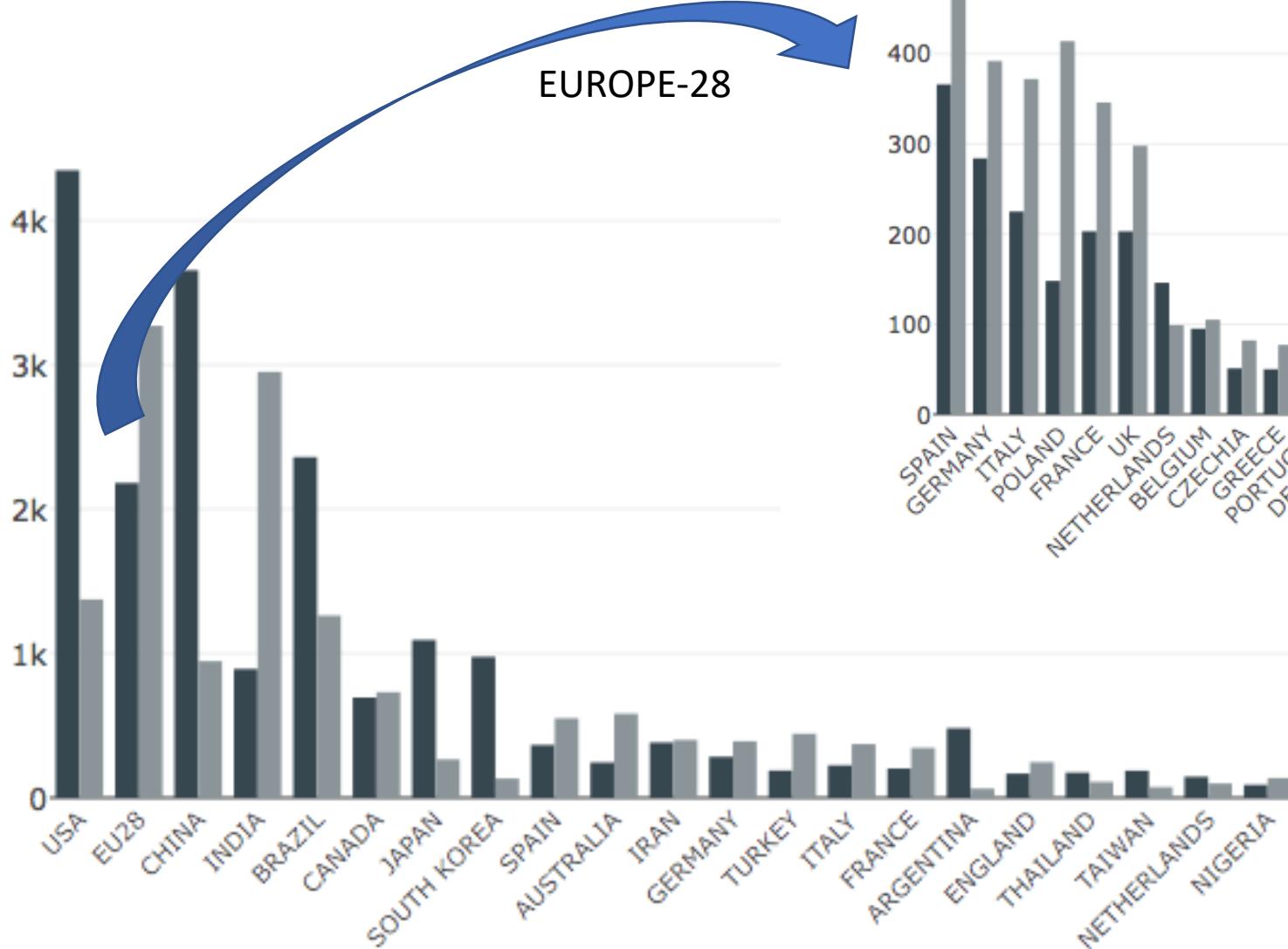
CORPUS FOOD SCIENCES



FOOD SCIENCES:

- **Processing** (transformation and main types of food products excluding non-food uses)
- **Nutrition** (nutrition subjects for humans including health)
- **Allergy** (concerns on allergy linked to the use of legumes in food)
- **Acceptability** (sensorial and organoleptic analysis for consumer acceptance)

2010-2018



The 20 highest frequencies are based on total records by country, a group count done for the EU28. Proportional count for international collaboration records is applied. The country ranking is based on the total records number by country.

Poursuite des analyses sémantiques dans le corpus BILAG

- Usage centre sur Iramuteq
- Construction des graphes de co-occurrences ou similitudes des termes les plus fréquents, pointant des **clusters thématiques de recherche**
- **Un travail de co-expertise** : enrichissement des stop words, detection des synonymes...
 - Ex Harmonisation du corpus selon le dictionnaire de règles (≈ 340 règles de substitution)

- **46 837** 'records'
- **116 819** formes/termes distincts
- **41 057** Hapax (formes d'occurrence 1) – 35% des formes

- **Analyse longitudinale** (chronodendrogramme) des thèmes/sujets de recherche : détecter une évolution différenciée entre soya et pulses
- Positionnement des pays...

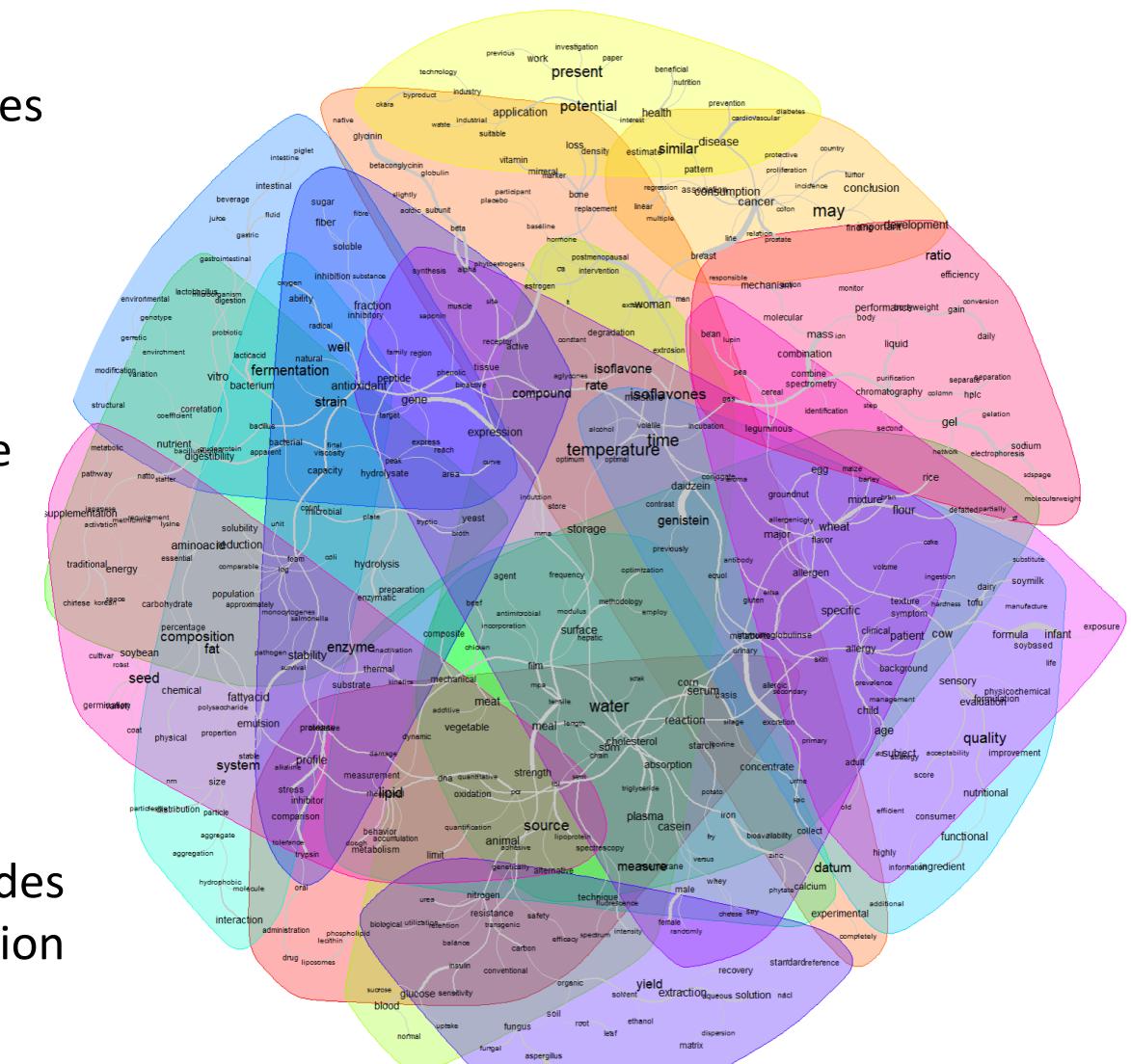
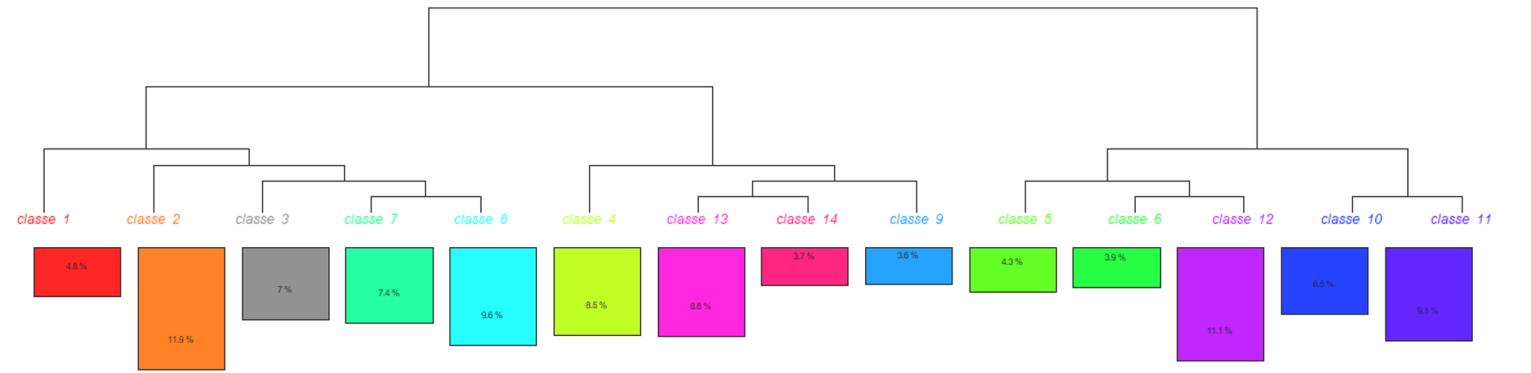


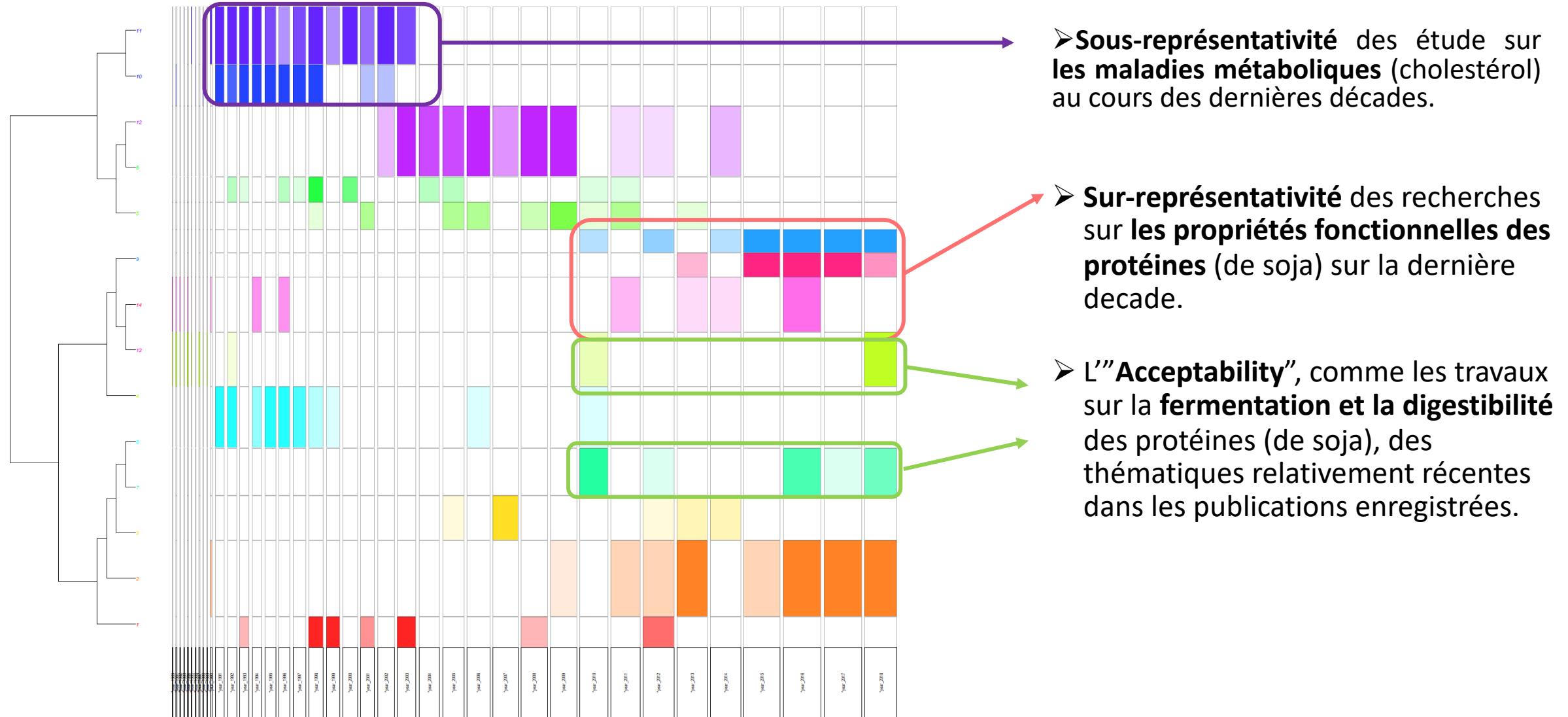
ILLUSTRATION - SOUS-CORPUS SoJA – 1980-2018



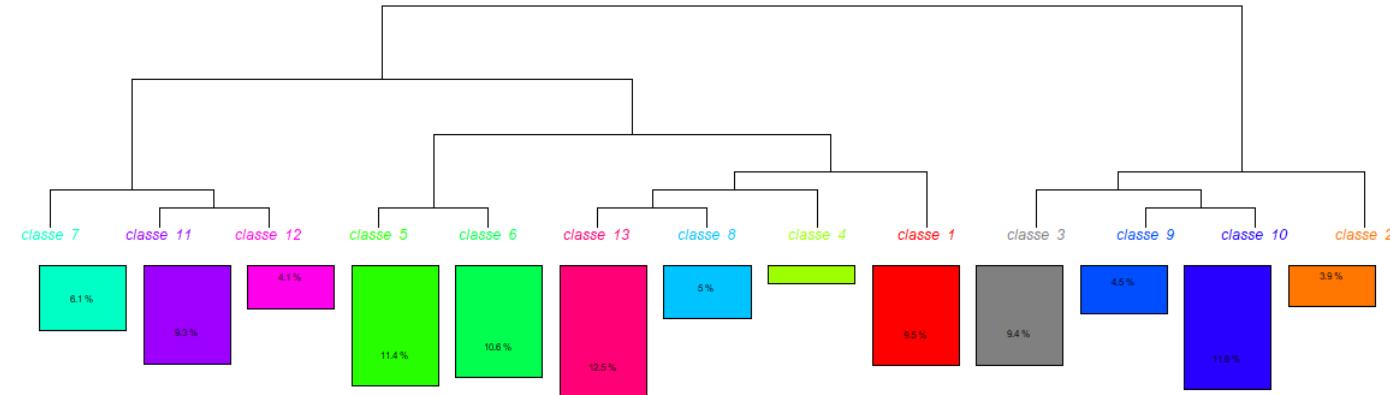
monocyt	plant	method	ferment	activity	sensory	emulsio	liposom	film	cell	allergy	woman	diet	choleste
salmone	soil	spectron	ferment	antioxidar	flour	gel	encapsula	tensile	tumor	immunogl	risk	feed	diet
h7	crop	chromatog	aspergillus	inhibitor	texture	emulsify	drug	mechanic	genistein	child	cancer	sbm	casein
log	gene	extraction	koji	trypsin	bread	protein	delivery	strength	expression	patient	intake	cow	feed
o157	seed	hplc	oryzae	radical	quality	solubility	microenca	adhesive	apoptosis	allergic	health	meal	group
tryptic	sequence	mass	bacillus	enzyme	acceptabili	property	encapsulat	composite	receptor	allergen	postmenop	pig	digestibility
coli	root	column	solidstate	scavenge	cook	stability	dry	resin	proliferatio	atopic	disease	silage	plasma
tsb	fungus	standard	produce	peptide	dough	gelation	air	infrared	mammary	sensitizatio	consumptio	holstein	serum
listeriamo	leaf	liquid	traditional	phenolic	extrusion	11s	release	elongation	cancer	challenge	dietary	milk	live
cfu	dna	sample	bacillus	substrate	dpph	moisture	foam	biodegradat	inhibit	food	association	fee	hepati
agar	pcr	quantificativ	culture	purify	hardness	aggregate	bed	fourier	estrogen	prick	breast	crudeprotei	triglyceride
broth	germination	analytical	strain	protease	color	structure	vesicle	property	pathway	symptom	cardiovascu	blood	insulin
inoculate	transgenic	calibration	starter	aminoacid	product	7s	temperatur	vapor	macrophage	dermatitis	isoflavones	ruminal	male
strain	encode	ionization	waste	hydrolysis	textural	droplet	microcapsu	diffraction	activation	asthma	man	gain	lipoprotein
count	cultivar	recovery	betaglucosid	inhibitory	screw	heat	model	fir	mcf7	diagnosis	intervention	performance	lipid
bacterium	genetically	elisa	korean	acid	colour	denaturatio	carrier	xray	er	groundnut	equol	calf	hdl
region	region	cultivation	rhizopus	lipoxygenas	extrude	glycinin	diffusion	wood	differentiat	skin	trial	hay	ldl
plate	genome	precision	raffinose	hydrolysate	blend	aggregatio	equation	plywood	daidzein	hypersensit	questionnai	ration	dietary
lactobacillu	genetic	separation	couple	subtilis	flavor	hydrophob	flow	plastic	signal	reaction	participant	corn	glucose
growth	drought	chromatogr	natto	enzymatic	formulation	stabilize	velocity	spectroscop	human	igemediated	healthy	broiler	level
escherichia	clone	m	optimization	extract	property	rheological	inlet	plasticizer	apoptotic	anaphylaxis	consume	lactation	bodyweight
survival	stage	limit	yeast	free	wheat	interfacial	fit	transform	kinase	ages	age	oxv	control
typhimuriur	stress	spike	aglycones	ic50	patty	network	particulsize	glycerol	epithelial	clinical	randomize	latin	postprandial
pathogen	functi	tandem	ssf	serine	fry	surface	zeta	sem	e2	egg	may	rumen	fecal
trypticase	shoot	deviation	enzyme	compound	extruder	disulfide	nanoparticle	cast	tfalpha	sensitize	phytoestroge	alfalfa	dairy
biofilm	gm	solidphase	protease	abts	extrudates	interface	dryer	reinforce	nkappa	history	prevention	carcass	control
staphyloco	nodule	simple	xylanase	inhibition	bake	ionic	entrapment	poly	colon	cow	evidence	lactate	body
aureus	wild	quantification	proteinase	flask	starch	fraction	particle	polymer	necrosis	spt	isoflavone	compare	compar
listeria	mycorrhizal	accuracy	stachyose	inhibit	acceptance	emulsificatio	constant	cellulose	cytokines	diagnostic	ifeal	spragueawl	spragueawl
tryptone	pod	linearity	sufru	oxidation	batter	interaction	flux	permeability	suppress	elimination	menopausal	replace	hdlc
streptococc	community	electrospray	nitrogen	alcalase	consumer	interaction	hydrophobic	water	beta	induction	bone	forage	muscle
				chymotrypsin	ditlenfree	hydrophobic	wall	lipid	nitric	milk	review	multiparous	obese
										oral	urinary	ndf	female

- **21 860** ‘records’
 - **118 646** segments de textes
 - **88 134** formes/termes distincts
 - **14** clusters thématiques obtenus
(96.5 % de l’ensemble des segments du sous-corpus analyses)

FOOD SCIENCES – SOYA : « TRENDING SUBJECTS »



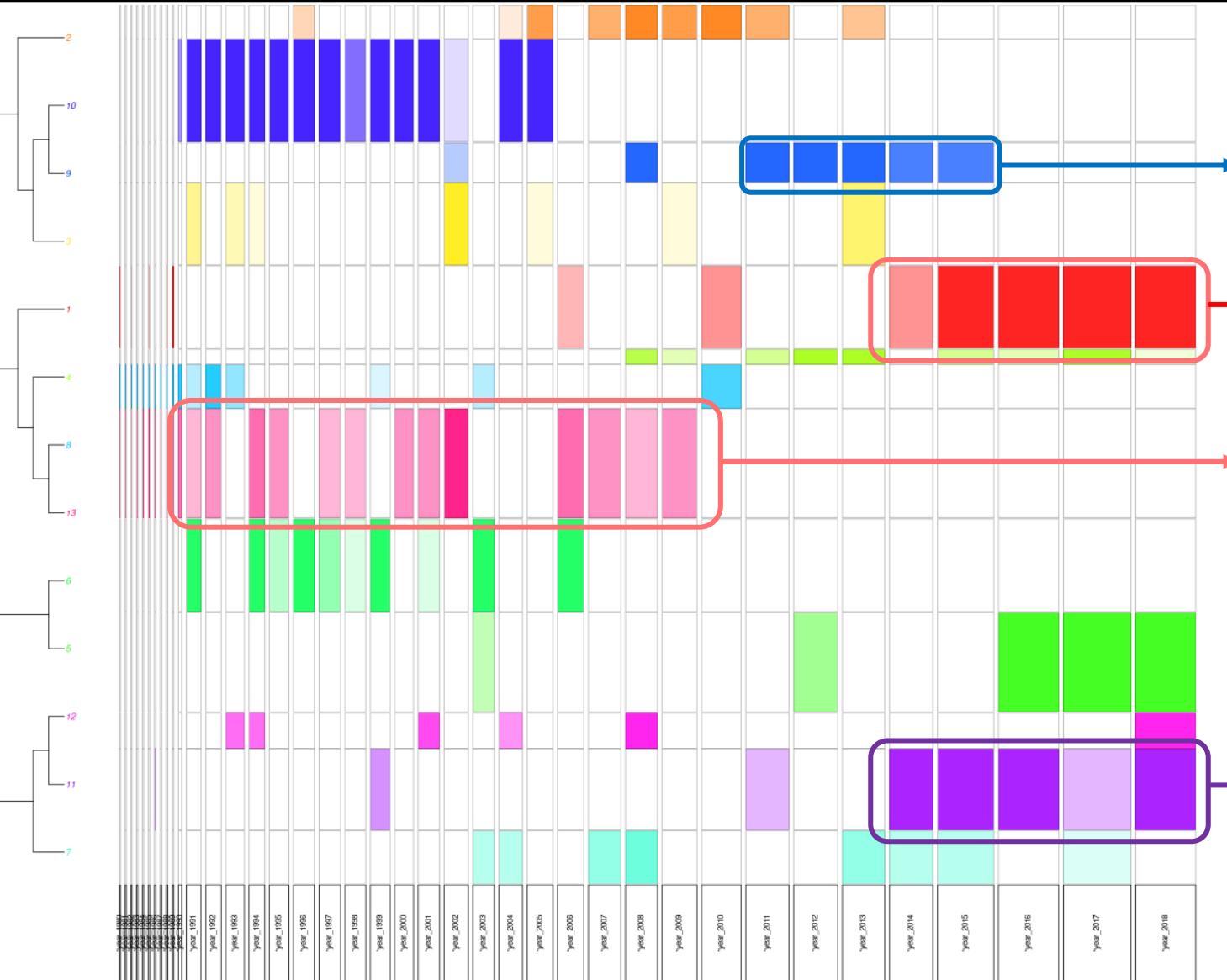
Sous-Corpus PULSES – toutes périodes



temper	emulsic	starch	food	diet	cook	genotyp	radical	flour	fungus	cell	sequen	patient
model	stability	amylose	crop	feed	content	variety	scaveng	bread	root	receptor	gene	allergy
moisture	foam	granule	vegetable	intake	soak	cultivar	dpph	sensory	plant	expressio	purify	immuno
equation	film	gelatinizati	health	meal	germinati	bean	antioxiда	wheat	growth	cancer	enzyme	allergen
speed	emulsify	swell	fruit	pig	tannin	seed	abts	quality	strain	pea15	chromato	allergic
screw	property	paste	yield	group	iron	composit	phenolic	fermentati	soil	apoptosis	encode	crossread
air	ppi	viscosity	consumer	blood	acidphyti	kabuli	teac	acceptabil	pathogen	proliferatio	cdna	sensitizat
bed	solubility	amylopecti	soil	cholesterol	raw	accession	frap	product	mycorrhiza	mRNA	mass	sera
dry	droplet	peak	fertilizer	glucose	digestibil	desi	tpc	ferment	rhizospher	macrophag	electroph	groundnu
constant	strength	enthalpy	consumpti	cow	zinc	unguiculat	trolox	pasta	inoculator	tumor	dna	anaphylax
rpm	protein	hydrophob	crystallinity	casein	process	phaseolus	gallic	snack	bacterium	hepg2	molecular	skin
fit	interfacial	xray	rotation	plasma	seed	vulgaris	orac	nutritional	rhizobium	ped	affinity	clinical
coefficient	denaturatic	setback	practice	gain	antinutritio	activity	texture	blend	specie	live	subunit	prick
kinetics	gelation	smooth	cost	bodyweight	vitro	hydrolysate	fungal	hydrolysat	hepati	hepatic	peptide	symptom
equilibrium	legumin	dsc	benefit	control	bioavailab	coat	infection	acceptable	pathway	ips	purification	spt
diffusivity	wrinkle	wrinkle	country	dietary	phytate	location	fusarium	glutenfree	oxidative	lps	spectromet	asthma
kinetic	gel	native	child	male	fababeen	proximate	shoot	dough	glutathione	nterminat	sensitizat	challenge
dryer	rheological	scan	market	insulin	fababeen	walp	host	formulator	antiinflamm	clone	polypeptid	allergenic
mathematic	surface	anneal	farmer	sbm	tia	variability	inoculate	flavor	tnfalpha	lectin	reaction	reaction
peleg	oil	retrogradati	farmer	ileal	bean	chemical	nodule	score	inflammator	chloroplast	igebinding	binding
experiment	mechanica	calorimetry	recommend	postprandia	mineral	convicine	bacillus	cookie	sod	administrativ	fragment	pollen
time	modulus	crystalline	winter	weight	calcium	vicine	arbuscular	biscuit	salmonella	sperm	bind	anaphylac
diffusion	capacity	ctype	season	fee	sprout	breed	lactobacillus	lactobacillus	amf	filtration	expression	history
arrhenius	thermal	potato	economic	milk	germinate	content	pseudomon	rice	ht29	recombinat	recombinat	elisa
fluidized	charge	gelatinize	nutrition	trial	leguminou	navy	salmonella	lacticacid	il6	inhibitor	inhibit	birch
rate	aggregation	granular	farm	supplement	lentil	trait	epicatachin	evaluation	inhibit	homology	homolog	immunobl
predict	gum	waxy	need	libitum	polyphenol	cotyledon	free	bake	pathogen	catalyze	catalyze	hypersens
density	tension	temperature	sustainable	meat	dehulling	ash	flavan3	chelate	semolina	injury	membrane	birch
phase	aggregate	breakdown	world	carcass	phenolic	100seed	superoxide	aroma	nodulation	epithelial	membrane	immunobl
extrudates	oilin	sem	person	appetite	legume	landraces	dot	durum	resistance	colon	colon	rhinitis
die	polymer	rva	intercroppin	ad	boil	bambara	protocatech	colour	solani	bacterial	gel	child
expansion	stabilize	oval	irrigation	serum	isovitexin	ba	isovitexin	millet	glomus	brain	ion	

- **19 054** ‘records’
 - **100 880** segments de textes
 - **63 229** formes/termes distincts
 - **13 clusters thématiques** obtenus (95 % de l’ensemble des segments du sous-corpus analysés)

Food Sciences – Pulses : « trendings subjects »



- Effet des pulses sur le métabolisme
 - Propriétés d'usage & nouveaux produits alimentaires
 - Digestibilité/préparation des pulses
- L'engouement du marché pour les extractions protéiques plutôt que des usages whole-grains
- Propriétés fonctionnelles des pulses – extraction de protéines

3. Analyser les innovations produits sur le marché :

Les axes de recherche des food sciences se concrétisent-ils au travers des innovations produits ?

La progression des sciences sur les pulses contribue-t-elle au déverrouillage socio-technique ?

MINTEL – GNPD

Support the functional
From prebiotics to probiotics, microorganisms are essential to our microbiota.

Read more

OCTOBER 2019

I'm looking for... Category Region

INSIGHTS Expert Analysis PRODUITS Mintel GNPD PLUS Mintel Products

Bienvenue, Salord Tristan Français

Chercher dans GNPD [Recherche avancée >>](#)

Recherche Ingrédients Tableau de bord
 Recherche avancée Zone Ingrédients C'est tendance!
 Historique de recherche Rechercher des ingrédients Entreprises
 Rechercher dans les archives Nouveaux Ingrédients

Mes recherches sauvegardées [tout afficher](#) Hoppers enregistrés [tout afficher](#)
[Charger une recherche enregistrée](#) [Charger un hoppers enregistré](#)

REPORT



[Gluten-Free Oriental-Style Vegetables & Soy](#)
 Entreprise: Groupe Ekibio
 Marque: Ma Vie Sans Gluten
 Ma Vie Sans Gluten Gluten-Free Oriental-Style Vegetables & Soy is rich in fibres and proteins. This vegan product cooks in three minutes and retails in a 250g recyclable pack featuring heating instructions, the EU Green Leaf and AB logos and V-label seal from the European Vegetarian Union. (ID: 6225129)
 Espagne Déc 2018 Plats préparés & plats principaux Plats préparés/cuisinés

[Wholegrain Pasta with Chickpea Cream and Broccoli Filling](#)
 Entreprise: Pastificio Rana
 Marque: Giovanni Rana Bio Integral
 Giovanni Rana Bio Integral Massa Fresca Integral com Ovos e Recheio à Base de Bróculos e Grão-de-Bico (Wholegrain Pasta with Chickpea Cream and Broccoli Filling) cooks in three minutes and is a source of fibre, proteins, vitamins and minerals. The organic product is made with ingredients that respect natural soil fertilisation, biodiversity, local ecological balance, as well as animal well-being and natural feeding. It retails in a 250g pack featuring the FSC Mix, EU Green Leaf, Instagram, Facebook and CCPB logos, as well as cooking instructions. (ID: 6227413)
 Portugal Déc 2018 Mets d'accompagnement Pâtes

[Aromatic Moroccan Lemon & Herb Cooking Sauce](#)
 Entreprise: Symington's
 Marque: Chicken Tonight
 Chicken Tonight Aromatic Moroccan Lemon & Herb Cooking Sauce is now available. The product is an aromatic blend of herbs, spices and lemon with chickpeas and natural ingredients that is said to help create exciting, quick and easy meals. It is free from gluten and added sugar, and retails in a 250g pack that serves two portions and features Facebook and Twitter logos. (ID: 6232793)
 Royaume-Uni Déc 2018 Sauces & assaisonnements Sauces de cuisine

Merci pour votre attention

