

# **Global Agricultural Concept Scheme**

## **GACS and Agrisemantics**

**Tom Baker, Caterina Caracciolo, Anton Doroszenko,  
Lori Finch, Osma Suominen, Sujata Suri**

**DC-2016, Copenhagen  
October 13, 2016**

**<http://agrisemantics.org/gacs/>**

# Who

- Food and Agriculture Organization of the UN
- CAB International (UK)
- National Agricultural Library (US)



# What

## Three overlapping thesauri – *rice, aquaculture, plant pests...*

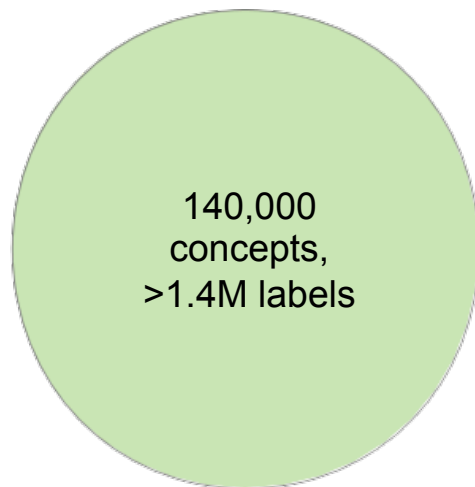
	Bibliographic database	Indexed records	Number of concepts	Coverage	Format
CABI Thesaurus (CABT)	CAB Abstracts	8.3 million	264,500 terms with about 206,400 plant, animal and microorganism names Multilingual in 10 languages	Pure and applied life sciences, technology and social sciences	
NALT	Agricola	5.2 million	> 120,610 terms English and Spanish	In depth coverage of agriculture, biology and related disciplines.	Linked Open Data: XML, RDF-SKOS, PDF, MARC and DOC
AGROVOC	AGRIS	8 million	> 32,000 concepts available in 23 languages	All areas of interest of FAO, including food, nutrition, agriculture, fisheries, forestry, environment etc.	Linked Open Data, SKOS-XL

# What



## AGROVOC

English, Spanish,  
Portuguese, German,  
Czech, Persian, Polish,  
Hindi, French, Italian,  
Russian, Japanese,  
Hungarian, Chinese,  
Slovak, Thai, Lao, Turkish,  
Korean, Arabic, Telugu ...



## CAB Thesaurus

English, Spanish, Portuguese,  
Dutch + others



## NAL Thesaurus

English, Spanish

# Milestones

- **2013-04** G8 - Conference on Open Data in Agriculture & Nutrition
- **2013-10+** GODAN - Global Open Data for Agriculture & Nutrition
- **GACS**
  - 2014-02+** Phase 1: Feasibility Study
  - 2014-06+** Phase 2: Proof of Concept (GACS Alpha)
  - 2015-07+** Phase 3: GACS Beta
  - 2016-05** **GACS Beta 3.1 Soft Launch**

# Why

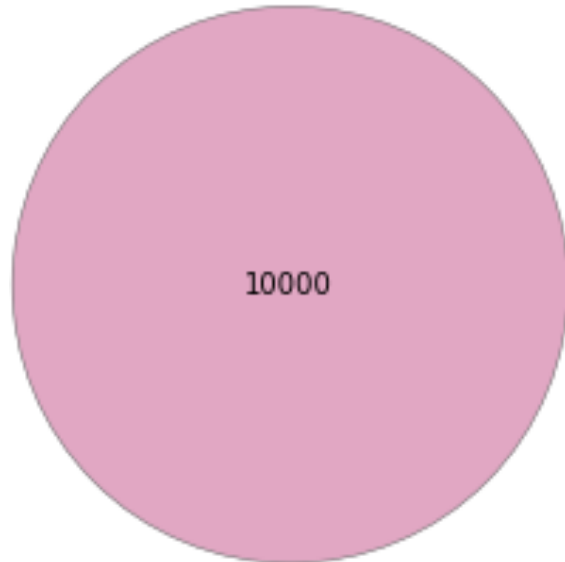
1. To improve the **semantic interoperability** of thesauri maintained by FAO, CABI, and NAL
2. To provide **core concepts** broadly supported across the three thesauri
3. To achieve **efficiencies of scale** by maintaining the core concepts in cooperation
4. “Open data needs common semantics for linking diverse information” (G8)

# How

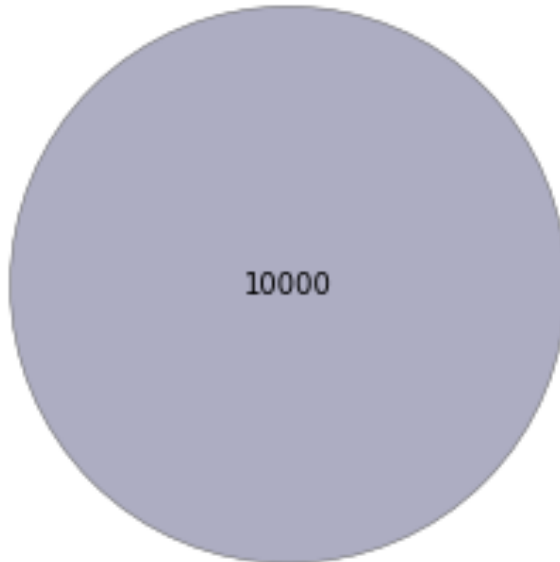
## 1. Take the 10,000 most-used concepts from each

October 2014

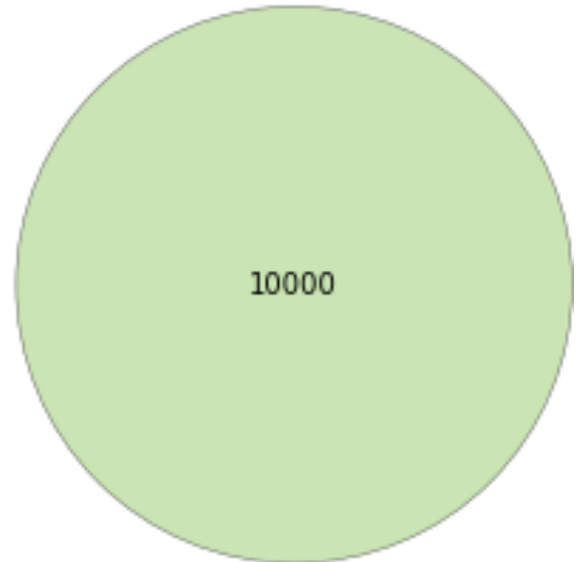
**Before mapping**



AGROVOC (10000)



NALT (10000)

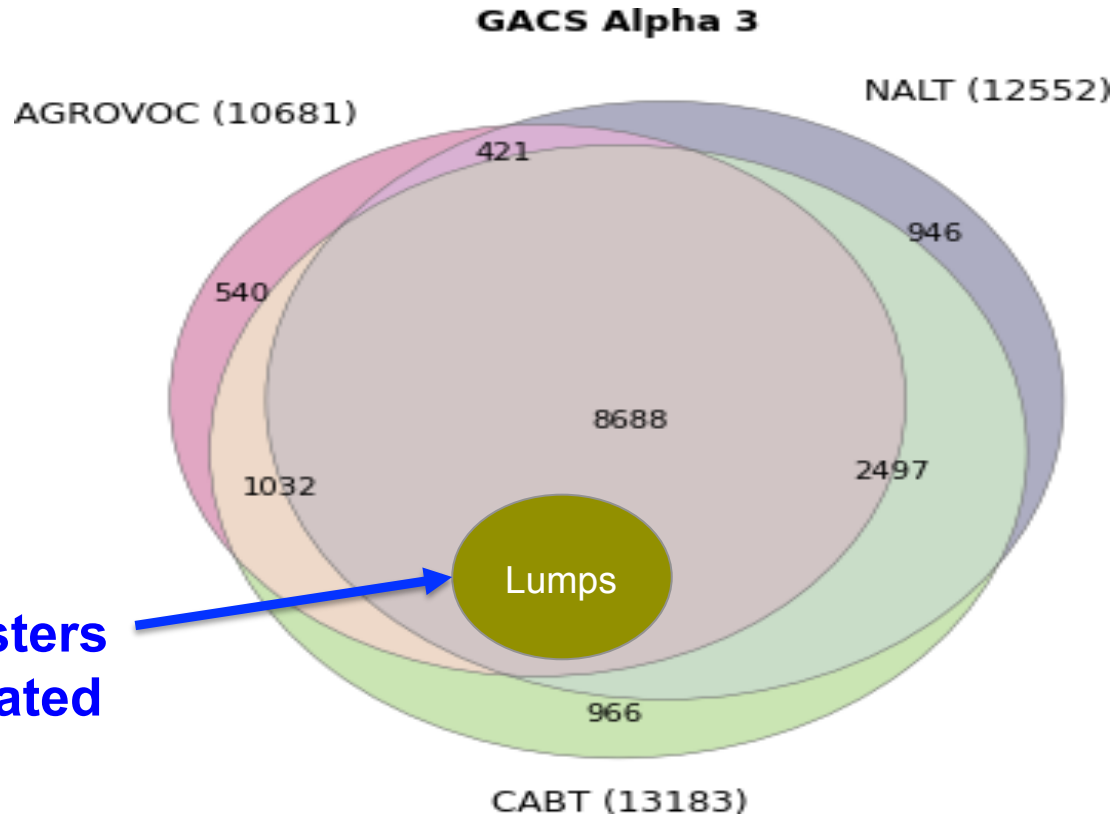


CABT (10000)

# How

## 2. Automatically map them to each other

March 2015



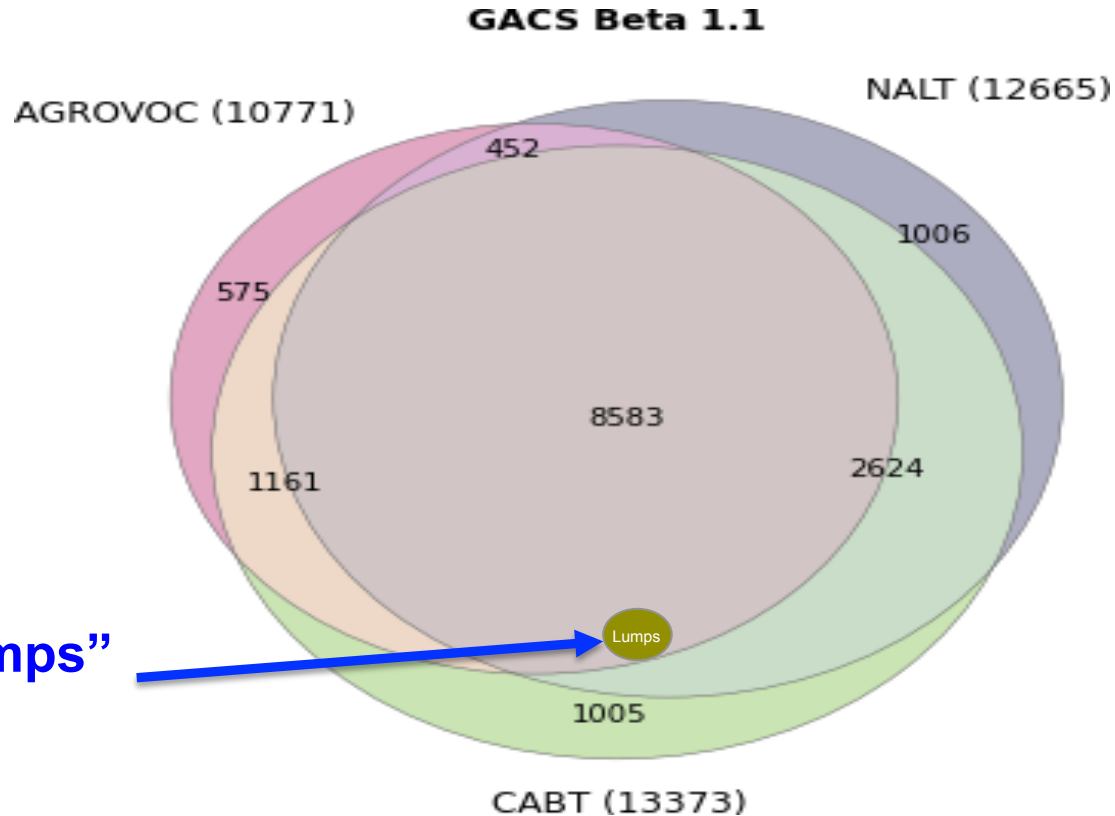
**Awkwardly  
mapped clusters  
were anticipated**



# How

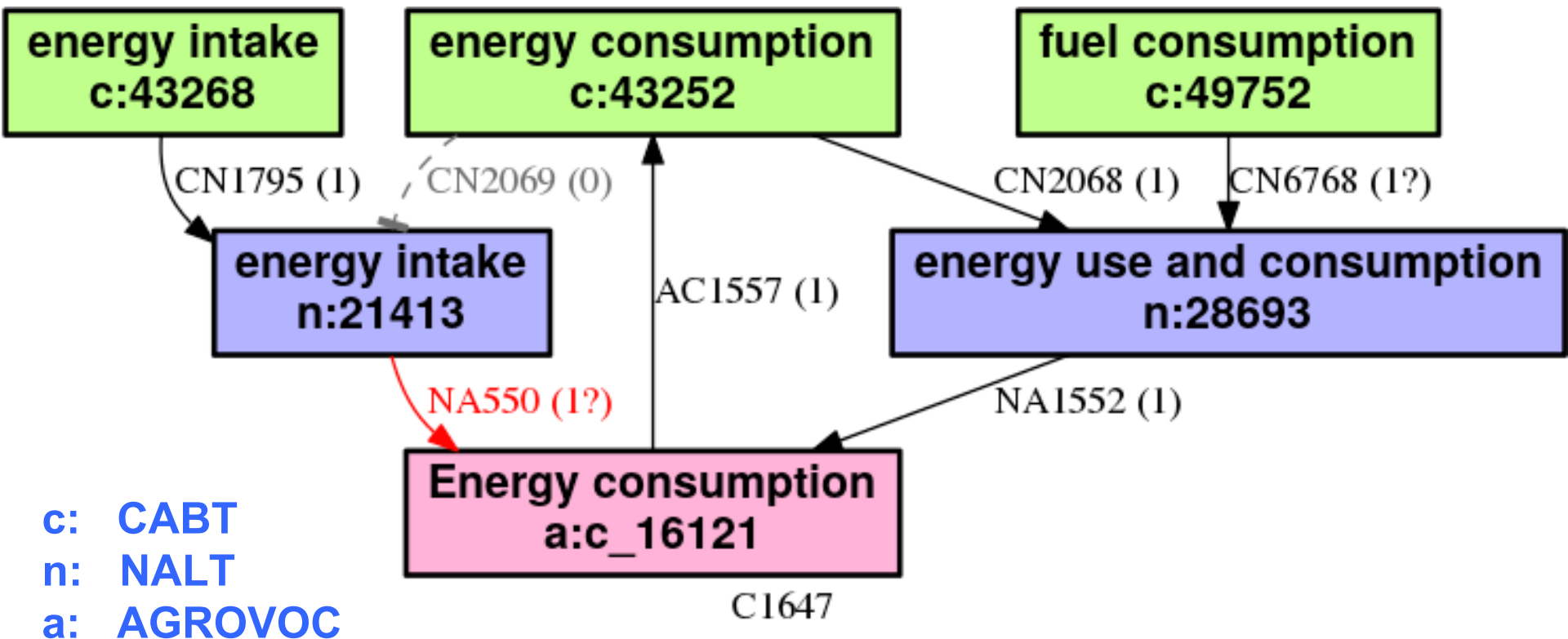
## 3. Verify mappings, one by one

October 2015



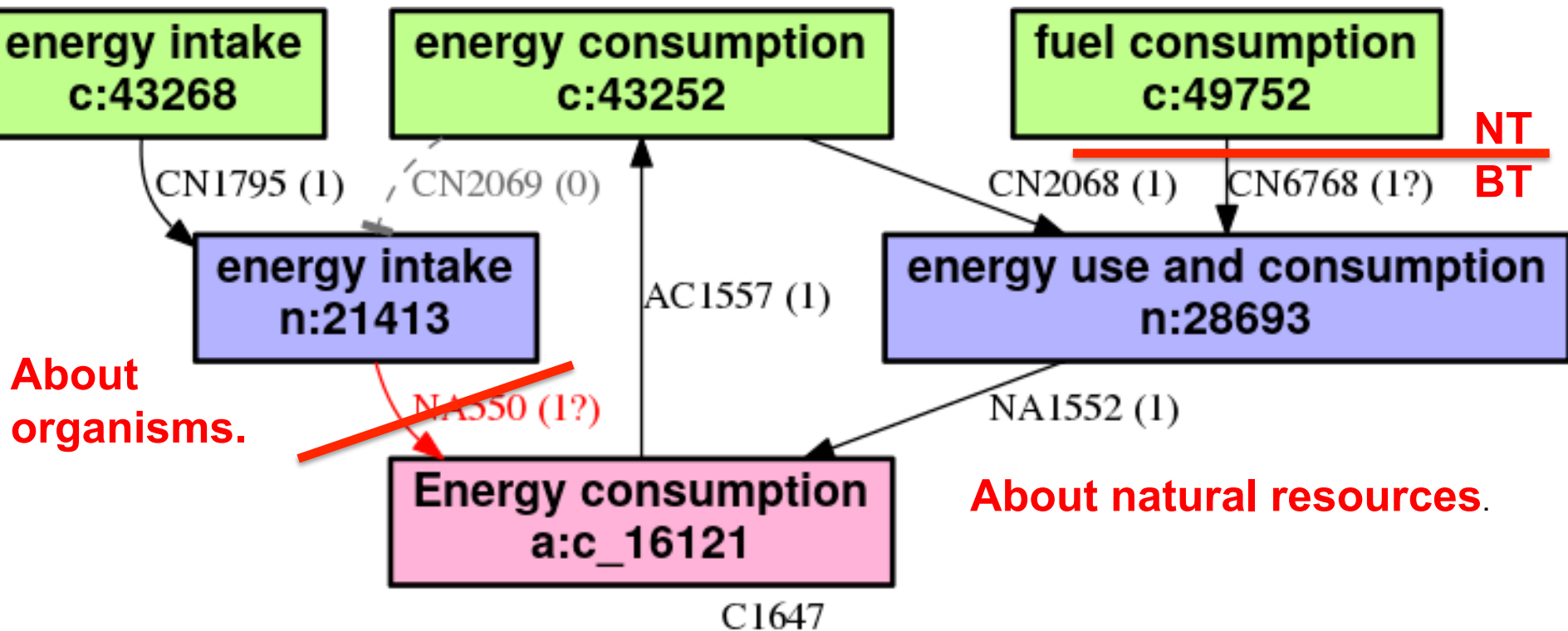
Example Lump

## Six concepts

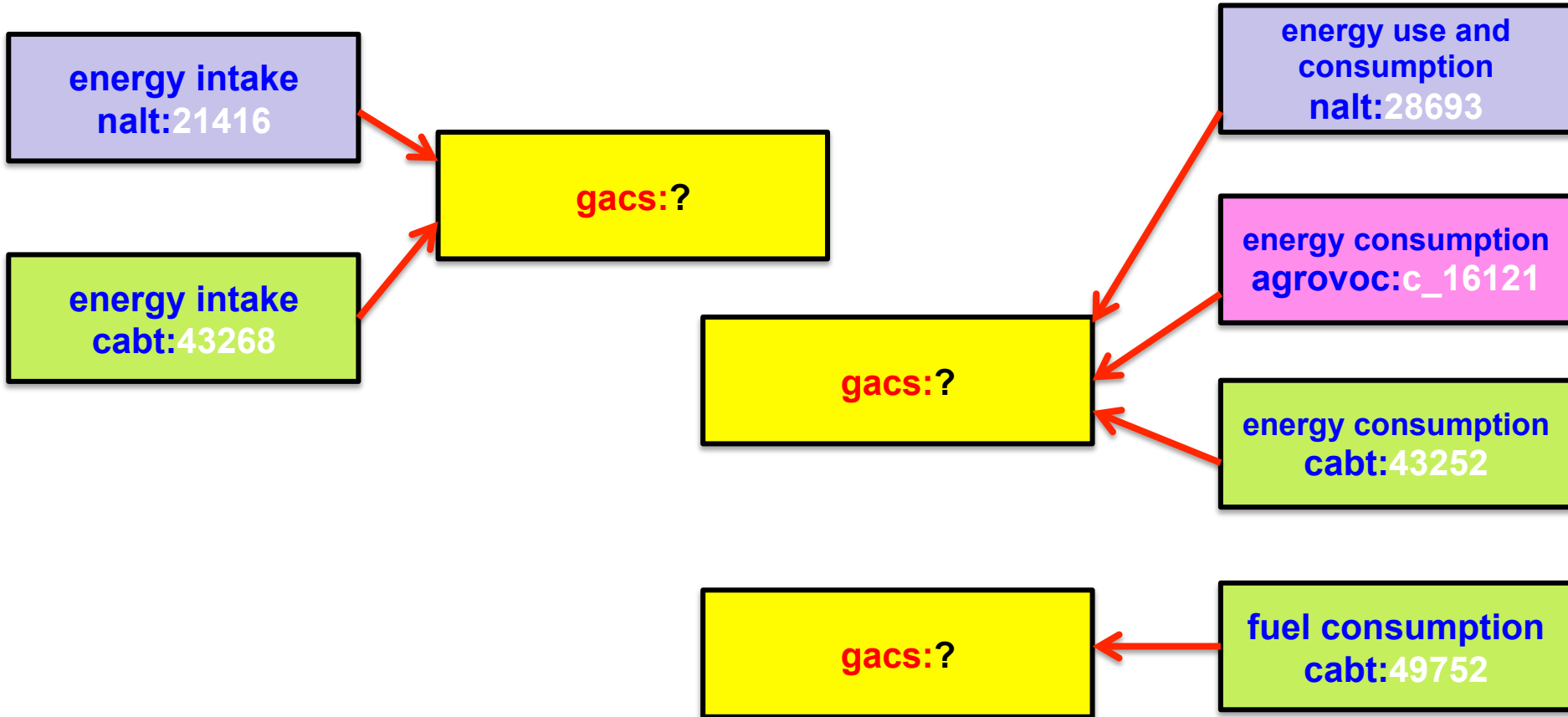


Example Lump

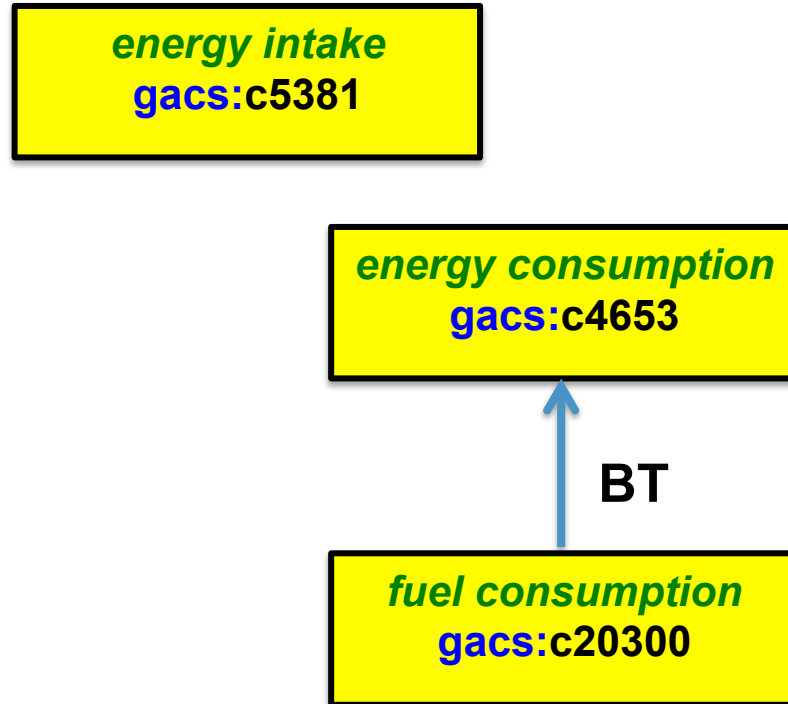
# Mappings fixed



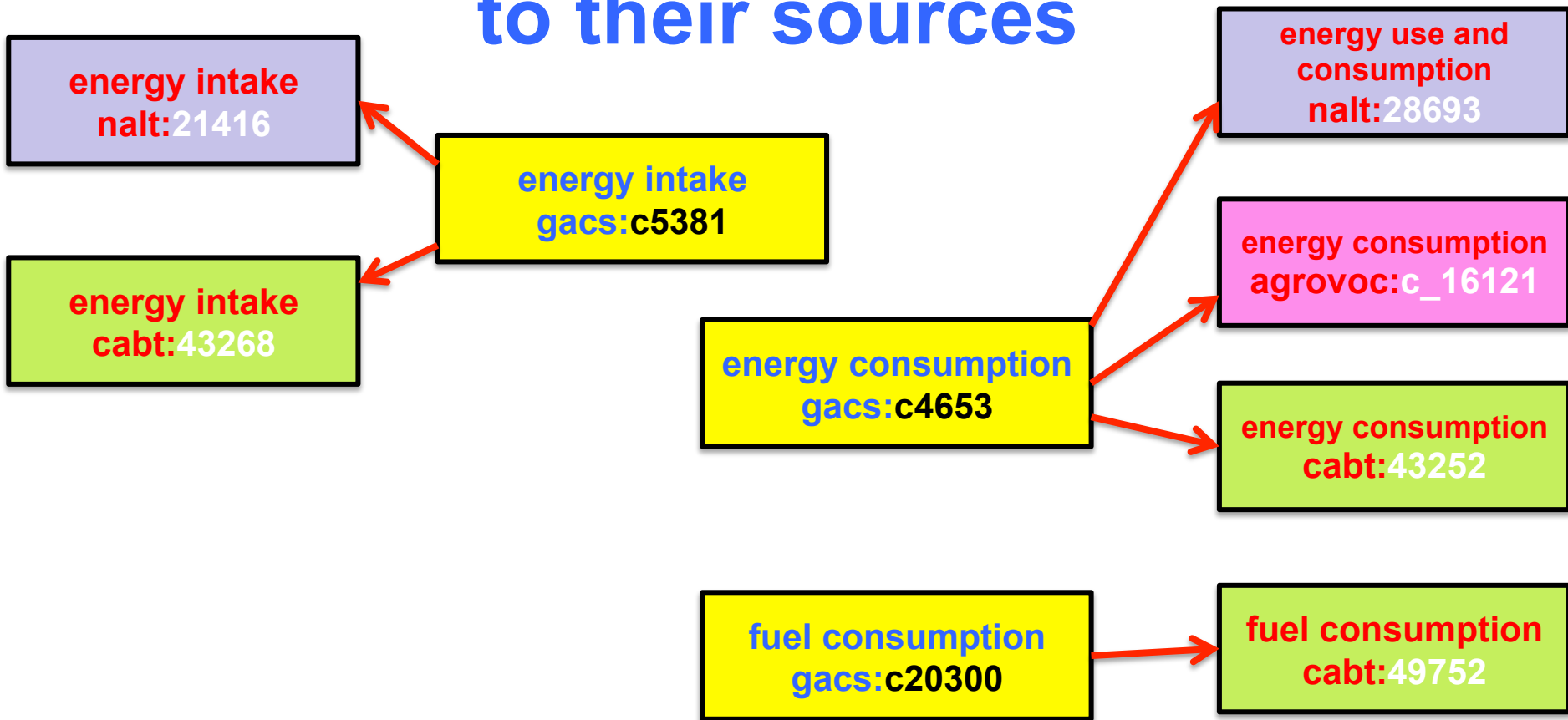
# Used to create



# ...three concepts in GACS Core



...which map back  
to their sources



## GACS concept

Broader, narrower, and related concepts

Alternative labels

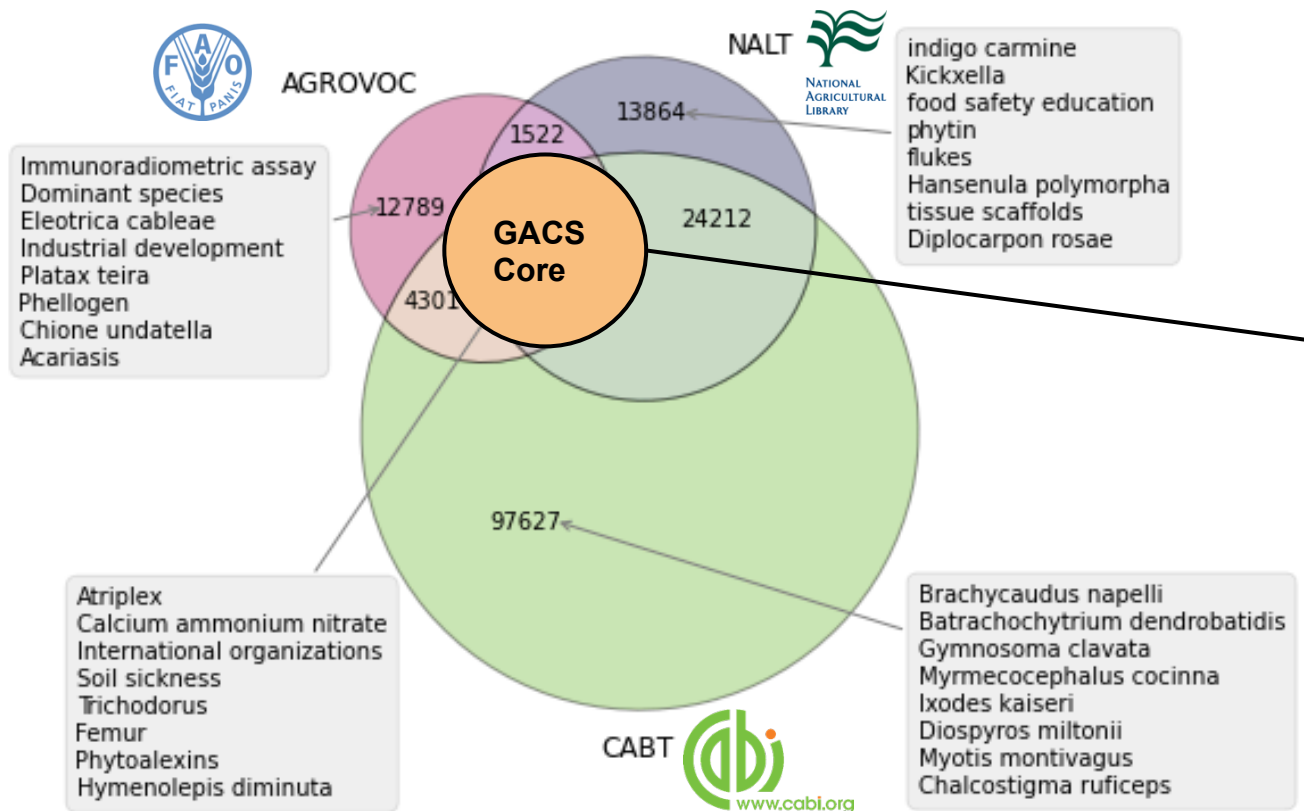
Translated in up to 25 languages

Mapped to source thesauri

biology > organisms > plants (botany) > host plants biology > organisms > hosts > host plants																																																	
PREFERRED TERM	host plants																																																
TYPE	Organism																																																
DEFINITION	<p>Plantas que sirven de albergue, hábitat, sitios de crianza o fuente de alimentos como parte del ciclo vital de otros organismos.</p> <p>Plants which are hosts for symbiont organisms, including those that are trophically associated with them (such as plant pathogens, plant parasites and phytophagous arthropods).</p> <p>Plants which provide shelter, habitat, breeding sites or serve as a food source as part of the life cycle of another organism.</p>																																																
BROADER CONCEPT	hosts plants (botany)																																																
NARROWER CONCEPTS	food plants weed hosts																																																
RELATED CONCEPTS	plant parasites plant pathogens																																																
ALTERNATIVE LABEL	<i>host crops</i> <i>host plant</i> <i>hosts of plant diseases</i> <i>hosts of plant pests</i> <i>plant host</i> <i>plant hosts</i>																																																
BELONGS TO GROUP	organisms, by non-taxonomic groups																																																
IN OTHER LANGUAGES	<table><tr><td>نباتات عائله</td><td>Arabic</td></tr><tr><td>寄主植物</td><td>Chinese</td></tr><tr><td>hostitelské rostliny</td><td>Czech</td></tr><tr><td>waardplanten</td><td>Dutch</td></tr><tr><td>Plante hôte</td><td>French</td></tr><tr><td>Wirtspflanze</td><td>German</td></tr><tr><td>परपोषी पौधे</td><td>Hindi</td></tr><tr><td>gazdanövény</td><td>Hungarian</td></tr><tr><td>Piante ospiti</td><td>Italian</td></tr><tr><td>宿主植物</td><td>Japanese</td></tr><tr><td>기주식물</td><td>Korean</td></tr><tr><td>မိသားစု</td><td>Lao</td></tr><tr><td>گیاهان میزبان</td><td>Persian</td></tr><tr><td>Roślina żywicielska</td><td>Polish</td></tr><tr><td>plantas hospedeiras</td><td>Portuguese</td></tr><tr><td>Planta hospedeira</td><td></td></tr><tr><td>растения-хозяева</td><td>Russian</td></tr><tr><td>hostiteľské rastliny</td><td>Slovak</td></tr><tr><td>plantas huéspedes</td><td>Spanish</td></tr><tr><td>plantas hospedantes</td><td></td></tr><tr><td>అతిథియ మొక్కలు</td><td>Telugu</td></tr><tr><td>พืชอาศัย</td><td>Thai</td></tr><tr><td>konukçu bitki</td><td>Turkish</td></tr><tr><td>рослини-хазяї</td><td>Ukrainian</td></tr></table>	نباتات عائله	Arabic	寄主植物	Chinese	hostitelské rostliny	Czech	waardplanten	Dutch	Plante hôte	French	Wirtspflanze	German	परपोषी पौधे	Hindi	gazdanövény	Hungarian	Piante ospiti	Italian	宿主植物	Japanese	기주식물	Korean	မိသားစု	Lao	گیاهان میزبان	Persian	Roślina żywicielska	Polish	plantas hospedeiras	Portuguese	Planta hospedeira		растения-хозяева	Russian	hostiteľské rastliny	Slovak	plantas huéspedes	Spanish	plantas hospedantes		అతిథియ మొక్కలు	Telugu	พืชอาศัย	Thai	konukçu bitki	Turkish	рослини-хазяї	Ukrainian
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URI	<a href="http://id.agrisemantics.org/gacs/C1029">http://id.agrisemantics.org/gacs/C1029</a>																																																
Download this concept:	RDF/XML Turtle JSON-LD																																																
EXACT MATCH	<table><tr><td>host plants</td><td>AGROVOC</td></tr><tr><td>host plants</td><td>CAB Thesaurus</td></tr><tr><td>host plants</td><td>NAL Thesaurus</td></tr></table>	host plants	AGROVOC	host plants	CAB Thesaurus	host plants	NAL Thesaurus																																										
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# GACS – Global Agricultural Concept Scheme

May 2016



**GACS Core Beta 3.1**

- 15,000+ concepts
- 350,000+ labels in 29 languages



# GACS Core **Beta**

- Concepts considered **reasonably stable**
- **URIs** not *expected* to change, but may
- Some **quality issues** fixed but work remains
- Next: design and **fix a coherent hierarchy**
- **Testing** is encouraged
- **Feedback** welcome!

<http://agrisemantics.org/gacs/>

# GACS objectives

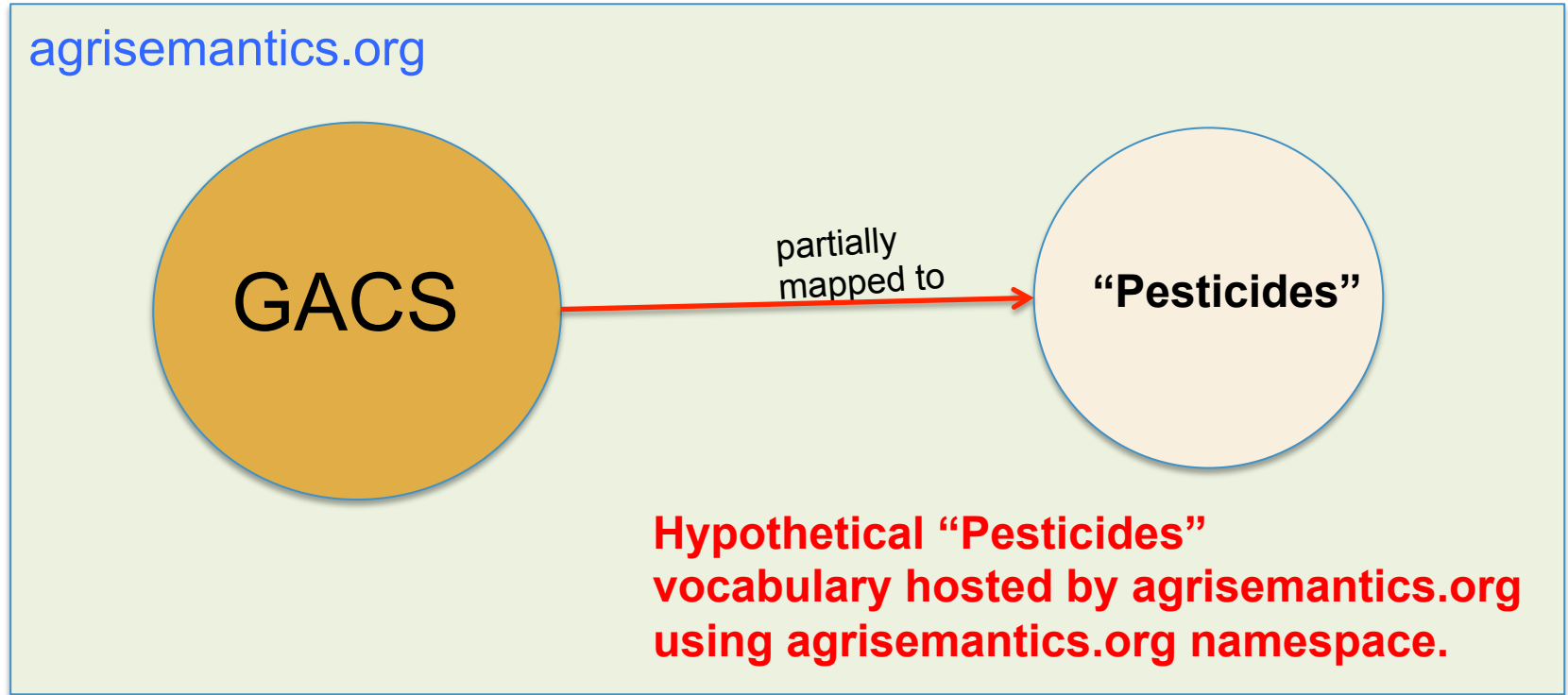
- To **support applications** of subject description, natural language processing, retrieval, automated indexing, spelling and translation
- To **serve as a hub** for mapping and integrating related or specialized vocabularies for semantic interoperability
- To **improve discoverability** of information and data to the benefit of farmers, researchers, and policy makers

# GACS in Agrisemantics

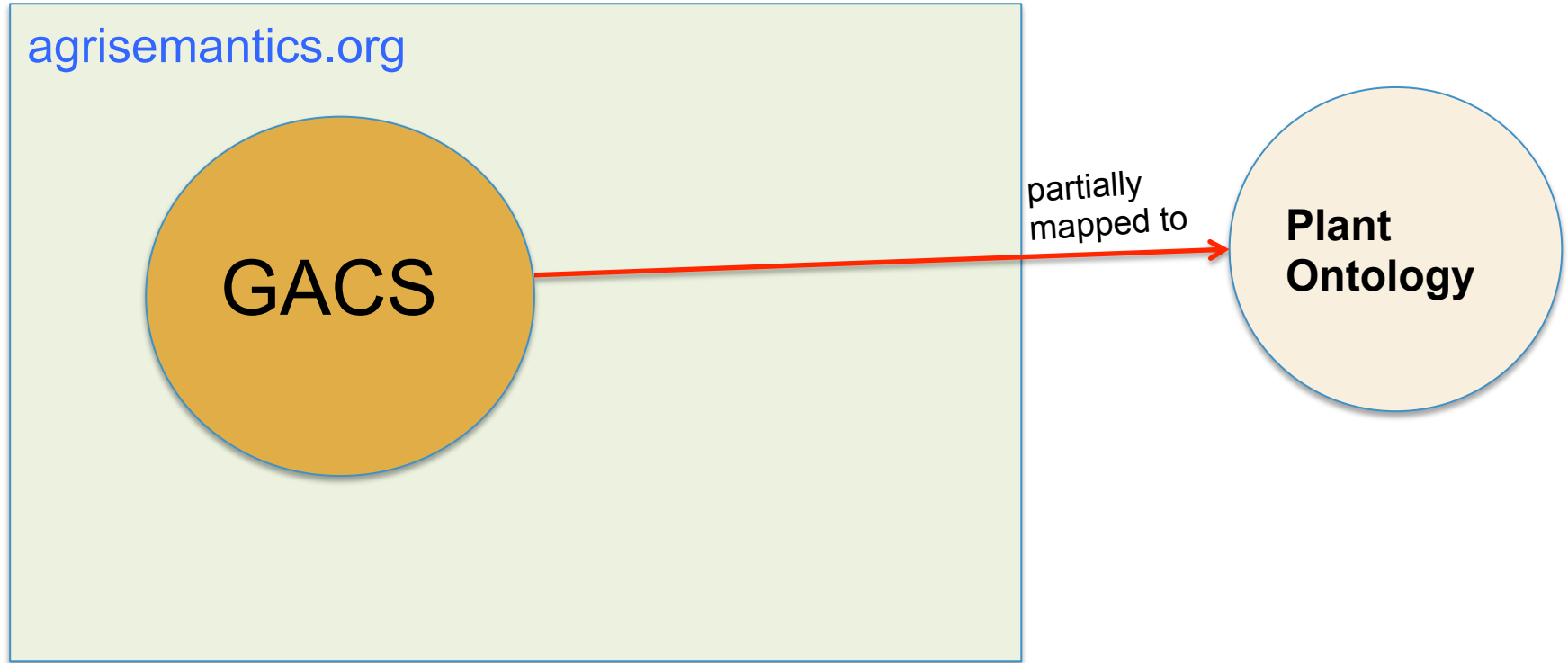
# Agrisemantics vision

- **GACS as a hub** linking user-oriented thesauri with semantically more precise domain ontologies.
- **Domain ontologies link to datasets** about food and agriculture, in order to make that data more interoperable and reusable.
- GACS is seen as the first step towards improving the **coherence and interoperability** of agricultural data.

# Mappings within agrisemantics.org

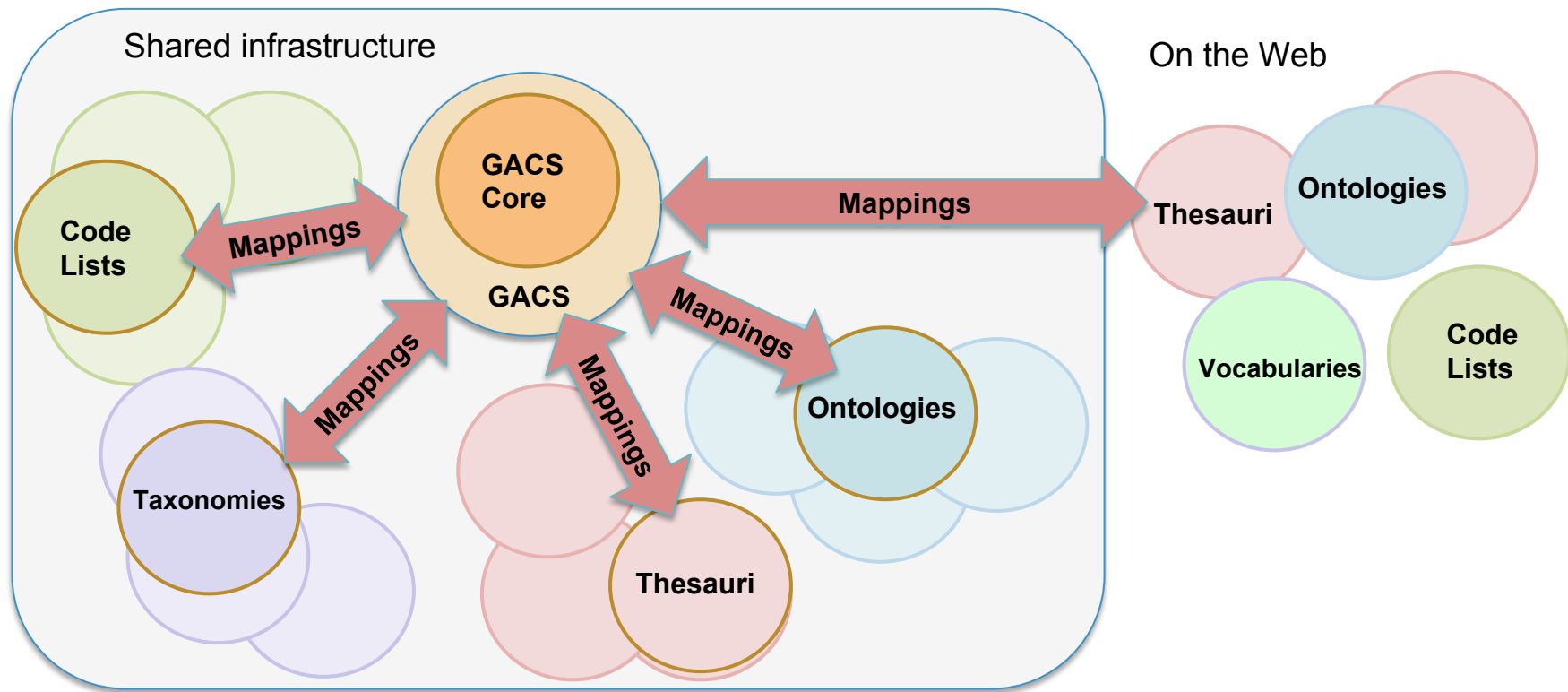


# Mappings to external vocabularies



Plant Ontology Base URI: "<http://purl.obolibrary.org/obo/>"

# Agrisemantics



## 'Grain' in Agrovoc

Mappings support mash-ups

### grain

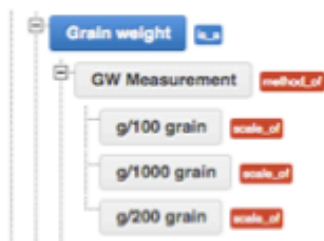
↳ plant products

↳ coarse grains

حب (ar), 谷类 (zh), zmo (cs), Grain (fr), Korn (de), अनाज/दाना (hi), gabonaszem (hu), Granelia (it), 穀物 (ja), 낱알 (ko), မြေထဲကစားဖို (lo), Bijian (ms), غله (fa), Ziarno (pl), Grão (pt), зерно (ru), zrno (sk), Granos (es), เมล็ดธัญพืช (th), taneliler (tr), hububat (tr)

[http://aims.fao.org/aos/agrovoc/c\\_3346](http://aims.fao.org/aos/agrovoc/c_3346)

## 'Grain weight' in Crop Ontology with methods and units of measurement



**Trait description** Grain weight usually expressed as weight of single, one hundred, two hundred or thousand grains.

## 'fruit weight' in Trait Ontology

### ▼ TO:0002746 fruit weight

1 TO:0000590 grain weight

1 TO:0000919 kernel weight

1 CO\_339:0000135 Pod weight




# Agris abstracts indexed using the term 'grain weight'

**AGRIS** SEARCH

## Search Results

[Get Classical View >](#)

Query : grain weight

 copy URL Results 1 - 10 of 356,043



Refine your search

< first < prev next >

Page 1 of 35604



### Correlation and path coefficient analysis in bread wheat under drought stress and normal conditions [jan2000]

Subhani, G.M.

#### Abstract:

This paper describes the association, direct and indirect effects of morphological traits under drought stress and irrigated conditions. Significant mean squares among crosses were obtained for all characters under irrigation as well as drought stress. Positive and significant correlation were observed between grain yield per plant and flag leaf area, specific flag leaf weight, tillers per plant ...



### Genotypic competition among elite wheat breeding lines under irrigated and rainfed conditions [2012]

Khan, A. ; Mohammad, F. ; Hassan, G. ; Khalil, I.H.

#### Abstract:

Development of high yielding cultivars is one of the prime objectives of all wheat breeding programs. An experiment was conducted during 2008-09 at Agriculture Research Farm, Khyber Pukhtunkhwa Agricultural University, Peshawar, Pakistan in which fifteen wheat lines were evaluated for yield and yield contributing traits under irrigated and rainfed field conditions. Lines exhibited significant ...



### Effects of all straw returned to the field on grain number and grain weight at different spikelets and grain positions in winter wheat [may.2011]

Bibliographic  
abstracts

## CIMMYT Research Data Dataverse

   [Create Account](#) [Log In](#)

### 18TH SEMI-ARID WHEAT YIELD TRIAL

hdl:11529/10170


Version: 2-- Released: Mon Sep 14 06:43:43 CDT 2015

#### CATALOGING INFORMATION

[Data & Analysis](#)

[Comments](#)

[Versions](#)

 If you use these data, please add the following citation to your scholarly references. [Why cite?](#)

#### Data Citation

Singh, Ravi; Payne, Thomas, 2010, "18th Semi-Arid Wheat Yield Trial",  
<https://hdl.handle.net/11529/10170> International Maize and Wheat Improvement Center  
[Distributor] V2 [Version]

Citation Format [Print](#) 

#### Publications

18th SAWYT

#### Data Citation Details

Subtitle	18th SAWYT Cycle 2010
Study Global ID	hdl:11529/10170
Authors	Singh, Ravi (CIMMYT); Payne, Thomas (CIMMYT)
Distributor	International Maize and Wheat Improvement Center (CIMMYT)

Research  
data

## Data files

Trial name	Occ	Loc_no	Country	Loc_desc	Cycle	Cid	Sid	Gen_name	Trait	Trait name	Gen_no	Rep	Sub_block	Plot	Value	Unit
18TH SEMI-ARID WHEAT YT	1	61702	SERBIA	RINSKI SANCEVI	2010	61665	1	LOCAL CHECK	147	1000_GRAIN_WEIGHT	1	1	1	1	31.5	g
18TH SEMI-ARID WHEAT YT	1	61702	SERBIA	RINSKI SANCEVI	2010	95758	12	DHARWAR DRY	147	1000_GRAIN_WEIGHT	2	1	1	2	27.1	g
18TH SEMI-ARID WHEAT YT	1	61702	SERBIA	RINSKI SANCEVI	2010	24762	30	CHAM 6	147	1000_GRAIN_WEIGHT	3	1	1	3	24.1	g
18TH SEMI-ARID WHEAT YT	1	61702	SERBIA	RINSKI SANCEVI	2010	462733	42	HSB 1313/2*WBLL1	147	1000_GRAIN_WEIGHT	21	1	3	21	26.5	g
18TH SEMI-ARID WHEAT YT	1	61702	SERBIA	RINSKI SANCEVI	2010	479309	345	SOKOLL/EXCALIBUR	147	1000_GRAIN_WEIGHT	23	1	3	23	31.8	g
18TH SEMI-ARID WHEAT YT	1	61702	SERBIA	RINSKI SANCEVI	2010	485682	62	PI 610750/LANG	147	1000_GRAIN_WEIGHT	25	1	3	25	25.5	g
18TH SEMI-ARID WHEAT YT	1	61702	SERBIA	RINSKI SANCEVI	2010	485792	55	ALTAR 84/AE.SQUARROSA (219)	147	1000_GRAIN_WEIGHT	26	1	3	26	24.5	g
18TH SEMI-ARID WHEAT YT	1	61702	SERBIA	RINSKI SANCEVI	2010	485792	56	ALTAR 84/AE.SQUARROSA (219)	147	1000_GRAIN_WEIGHT	27	1	3	27	27.4	g
18TH SEMI-ARID WHEAT YT	1	61702	SERBIA	RINSKI SANCEVI	2010	485834	26	SOKOLL//SUNCO/2*PASTOR	147	1000_GRAIN_WEIGHT	28	1	3	28	28.5	g

# RDA Agrisemantics WG



- Agrisemantics Working Group of the Research Data Alliance
- A forum for knowledge and practices related to semantic interoperability in agriculture
- Convenes stakeholders to design the Agrisemantics platform



<https://rd-alliance.org/groups/agrisemantics-wg.html>

# Agrisemantics objectives

- **Open-access** semantics are easy to re-use.
- They make agricultural **data easier to re-use**.
- Mapping the semantics **promotes cooperation** and **reduces duplication**.
- Coherent semantics benefit **research, innovation systems, and value chains**.

**<http://agrisemantics.org/gacs/>**