ILSI Research Foundation Databases and e-Learning Courses

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Scientific Program Officer
July 21, 2016

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Research Foundation

Open Access Resources

Mission: Improve environmental sustainability and human health by advancing science to address real world problems.

Resources:

- GM Crop Database (USDA supported)
- Crop Composition Database (supported by CropLife International)
- e-Learning courses

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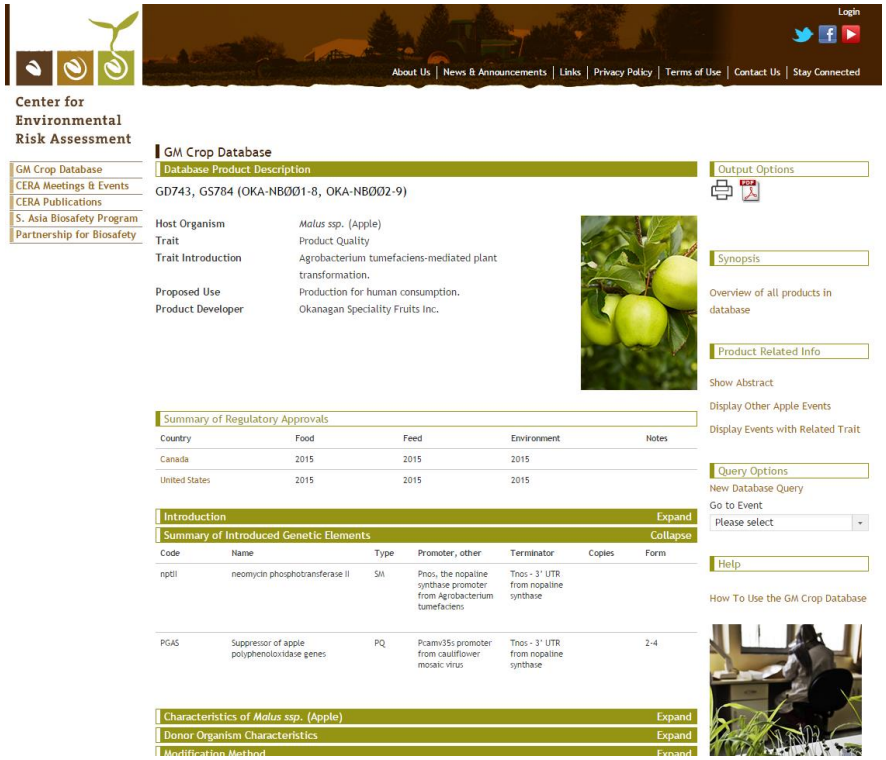
GM Crop Database

www.cera-gmc.org/GMCropDatabase



Contains safety-related information about regulatory evaluations and approvals of GM plants

17 Traits

30 Countries' Regulatory Approvals

192 Events

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Why make a GM Crop Database?

- Started life as the AgBios Database
- Moved to the ILSI Research Foundation in 2009
- The purpose of the database was to provide a single place where you could find data on GM crop approvals
  - Events under field trial are not included in the database

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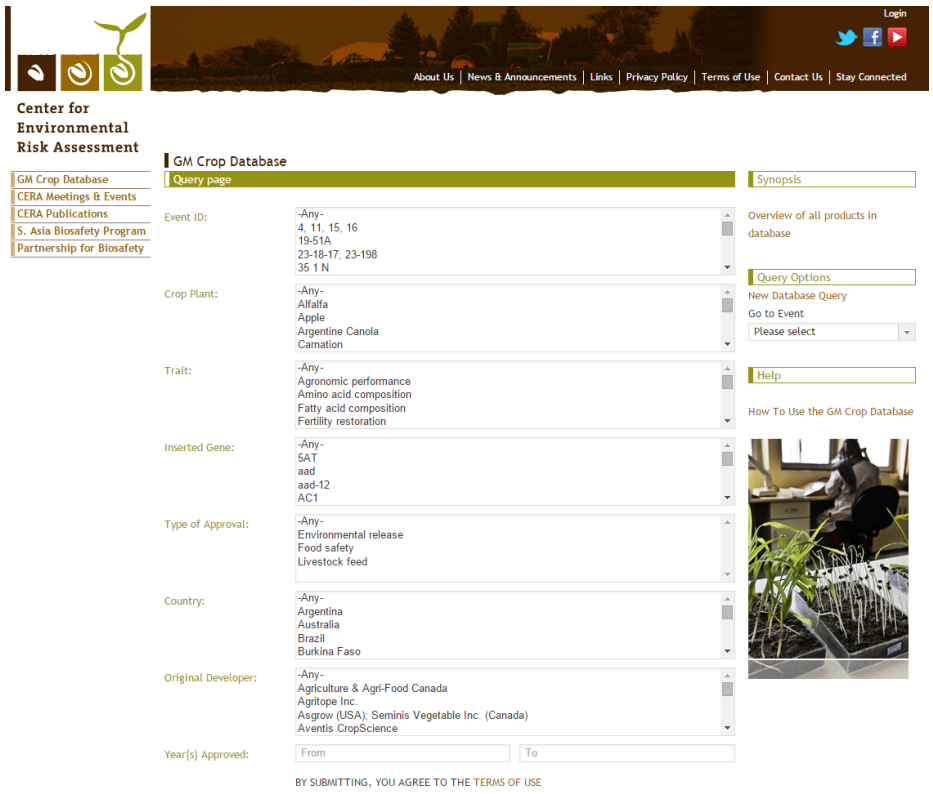
GM Crop Database Search Criteria



- Event names
- Crop plants
- Traits
- Inserted genes
- Type of approval: Environmental release, Food safety, Livestock feed
- Countries
- Original developer
- Year(s) approved

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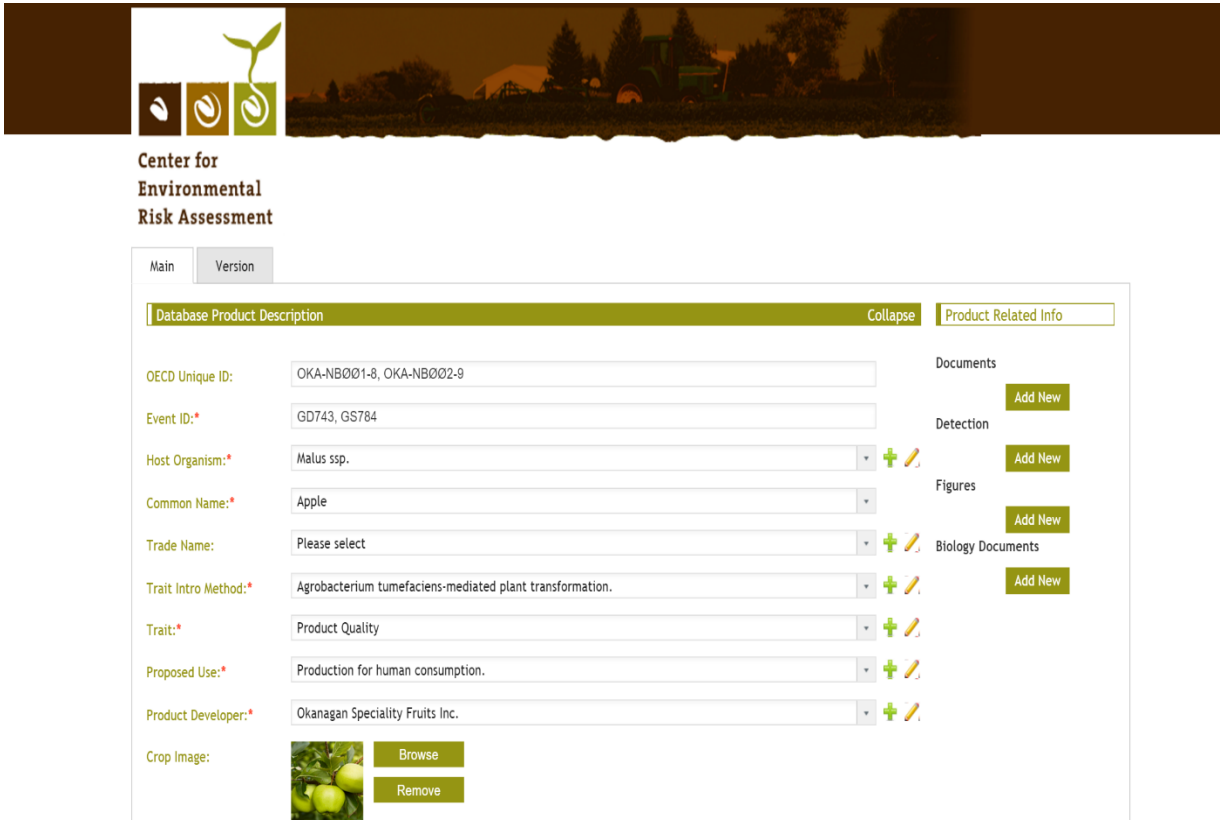
GM Crop Database Categories

- Event ID
- OECD Unique ID
- Host Organism
- Common Name
- Trait Intro Method
- Trait
- Proposed Use
- Product Developer
- Crop Image



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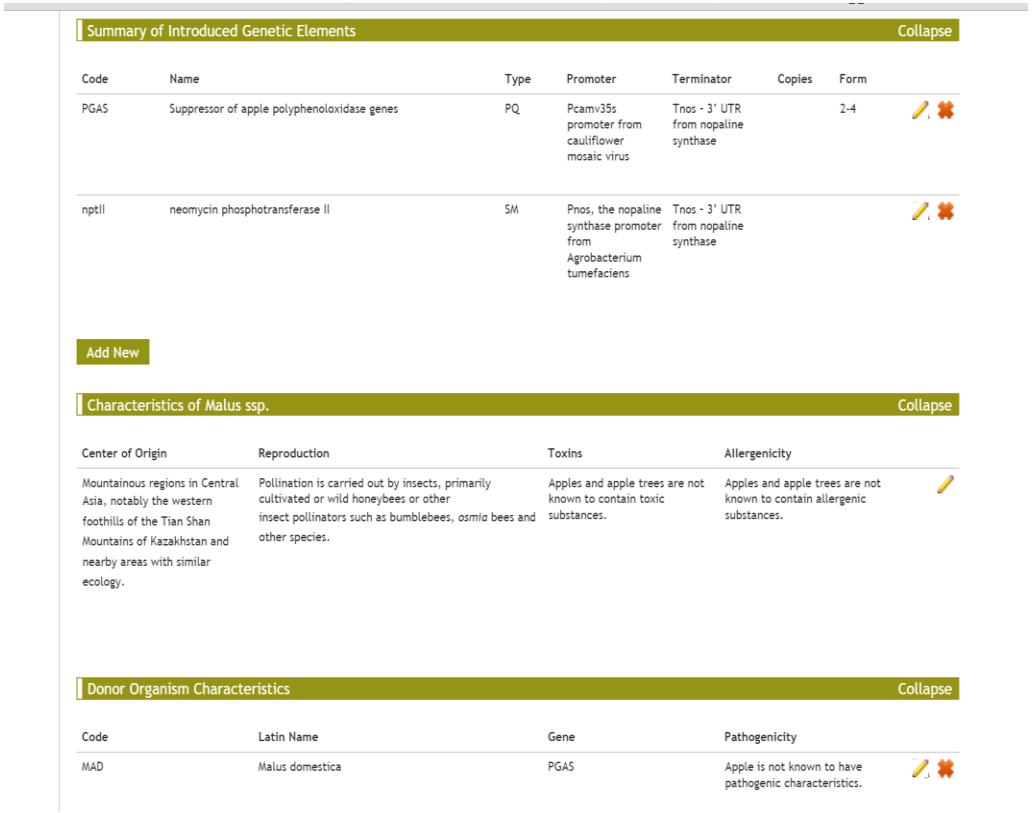
GM Crop Database Categories



Summary of Introduced Genetic Elements — Collapse

Code	Name	Type	Promoter	Terminator	Copies	Form
PGAS	Suppressor of apple polyphenoloxidase genes	PQ	Pcamv35s promoter from cauliflower mosaic virus	Tnos - 3' UTR from nopaline synthase		2-4
nptII	neomycin phosphotransferase II	SM	Pnos, the nopaline synthase promoter from Agrobacterium tumefaciens	Tnos - 3' UTR from nopaline synthase		

Add New

Characteristics of Malus ssp. — Collapse

Center of Origin	Reproduction	Toxins	Allergenicity
Mountainous regions in Central Asia, notably the western foothills of the Tian Shan Mountains of Kazakhstan and nearby areas with similar ecology.	Pollination is carried out by insects, primarily cultivated or wild honeybees or other insect pollinators such as bumblebees, *osmia* bees and other species.	Apples and apple trees are not known to contain toxic substances.	Apples and apple trees are not known to contain allergenic substances.

Donor Organism Characteristics — Collapse

Code	Latin Name	Gene	Pathogenicity
MAD	Malus domestica	PGAS	Apple is not known to have pathogenic characteristics.

- Summary of Regulatory Approvals (Country/Category/Year)
- General Description
- Summary of Introduced Genetic Elements
- Donor Organism Characteristics
- Modification Method
- Characteristics of the Modification
- Environmental Safety Considerations
- Food and/or Feed Safety Considerations
- Links to Further Information

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Potential GM Crop Database Users

- Regulatory agencies
- Academics
- Product developer communities
- Members of the value chain all over the world

128,700

visits in 2015

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GM Crop Database is Expanding

- In 2015, 23 new events for 5 crops and 216 country approvals for existing events were added to the database.

- Looking ahead, we would like to add:
  - New Events
  - Additional Country Approvals

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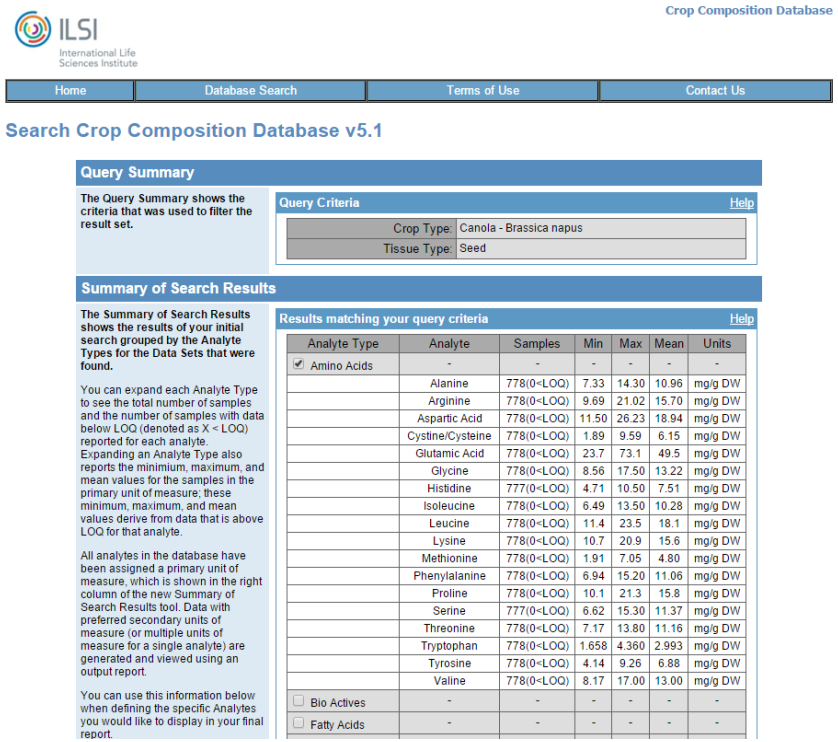
ILSI Crop Composition Database (CCDB)

www.cropcomposition.org



Crop Composition Database

ILSI International Life Sciences Institute

Home | Database Search | Terms of Use | Contact Us

Search Crop Composition Database v5.1

Query Summary

The Query Summary shows the criteria that was used to filter the result set.

Query Criteria Help

Crop Type:	Canola - Brassica napus
Tissue Type:	Seed

Summary of Search Results

The Summary of Search Results shows the results of your initial search grouped by the Analyte Types for the Data Sets that were found.

You can expand each Analyte Type to see the total number of samples and the number of samples with data below LOQ (denoted as X < LOQ) reported for each analyte. Expanding an Analyte Type also reports the minimum, maximum, and mean values for the samples in the primary unit of measure; these minimum, maximum, and mean values derive from data that is above LOQ for that analyte.

All analytes in the database have been assigned a primary unit of measure, which is shown in the right column of the new Summary of Search Results tool. Data with preferred secondary units of measure (or multiple units of measure for a single analyte) are generated and viewed using an output report.

You can use this information below when defining the specific Analytes you would like to display in your final report.

Results matching your query criteria Help

Analyte Type	Analyte	Samples	Min	Max	Mean	Units
☑ Amino Acids	-	-	-	-	-	-
	Alanine	778(0<LOQ)	7.33	14.30	10.96	mg/g DW
	Arginine	778(0<LOQ)	9.69	21.02	15.70	mg/g DW
	Aspartic Acid	778(0<LOQ)	11.50	26.23	18.94	mg/g DW
	Cystine/Cysteine	778(0<LOQ)	1.89	9.59	6.15	mg/g DW
	Glutamic Acid	778(0<LOQ)	23.7	73.1	49.5	mg/g DW
	Glycine	778(0<LOQ)	8.56	17.50	13.22	mg/g DW
	Histidine	777(0<LOQ)	4.71	10.50	7.51	mg/g DW
	Isoleucine	778(0<LOQ)	6.49	13.50	10.28	mg/g DW
	Leucine	778(0<LOQ)	11.4	23.5	18.1	mg/g DW
	Lysine	778(0<LOQ)	10.7	20.9	15.6	mg/g DW
	Methionine	778(0<LOQ)	1.91	7.05	4.80	mg/g DW
	Phenylalanine	778(0<LOQ)	6.94	15.20	11.06	mg/g DW
	Proline	778(0<LOQ)	10.1	21.3	15.8	mg/g DW
	Serine	777(0<LOQ)	6.62	15.30	11.37	mg/g DW
	Threonine	778(0<LOQ)	7.17	13.80	11.16	mg/g DW
	Tryptophan	778(0<LOQ)	1.658	4.360	2.993	mg/g DW
	Tyrosine	778(0<LOQ)	4.14	9.26	6.88	mg/g DW
	Valine	778(0<LOQ)	8.17	17.00	13.00	mg/g DW
☐ Bio Actives	-	-	-	-	-	-
☐ Fatty Acids	-	-	-	-	-	-

Provides information on the natural variability in composition of conventionally-bred crops

6 Crops

3,150 Compositional Components

843,000 Data Points

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Food composition variability in daily life

What makes a single clove garlic (solo garlic)?

What's the sugar content in watermelon?

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Why the Crop Composition Database?

- In 2000, the ILSI International Food Biotechnology Committee (IFBiC) recognized a clear need for an up-to-date and easily accessible source of information.
- Published crop composition data were frequently old and collected under unknown or unrecorded conditions (more or less).
- Without reliable, quality data, it is difficult to assess the relevance of nutritional differences in GE crops.
- Scientist and the general public would benefit from having access to the data.

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The advantages and limitations of a food nutrition table

www.people.com.cn/GB/14739/14745/21522/2907407.html

主要食物营养成分表

（每百克食物所含的成分。五百克为一市斤 ※仅供参考※）

类别	食物名称	蛋白质（克）	脂肪（克）	碳水化合物（克）	热量（千卡）	无机盐类（克）	钙（毫克）	磷（毫克）	铁（毫克）
谷类	大米	7.5	0.5	79	351	0.4	10	100	1.0
	小米	9.7	1.7	77	362	1.4	21	240	4.7
	高粱米	8.2	2.2	78	385	0.4	17	230	5.0
	玉署黍	8.5	4.3	73	365	1.7	22	210	1.6
	大麦仁	10.5	2.2	66	326	2.6	43	400	4.1
	面粉	12.0	0.8	70	339	1.5	22	180	7.6
干豆类	黄豆（大豆）	39.2	17.4	25	413	5.0	320	570	5.9
	青豆	37.3	18.3	30	434	5.0	240	530	5.4
	黑豆	49.8	12.1	19	384	4.0	250	450	10.5
	赤小豆	20.7	0.5	58	318	3.3	67	305	5.2
	绿豆	22.1	0.8	59	332	3.3	34	222	9.7
	花豇豆	22.6	2.1	58	341	2.5	100	456	7.9
	豌豆	24.0	1.0	58	339	2.9	57	225	0.8
	蚕豆	28.2	0.8	49	318	2.7	71	340	7.0
鲜豆类	青扁豆荚（鹊豆）	3.0	0.2	6	38	0.7	132	77	0.9
	白扁豆荚（刀子豆）	3.2	0.3	5	36	0.8	81	68	3.4
	四季豆（芸豆）	1.9	0.8	4	31	0.7	66	49	1.6
	豌豆（准豆、小寒豆）	7.2	0.3	12	80	0.9	13	90	0.8
	蚕豆（胡豆、佛豆）	9.0	0.7	11	86	1.2	15	217	1.7
	菜豆角	2.4	0.2	4	27	0.6	53	63	1.0
豆类	黄豆芽	11.5	2.0	7	92	1.4	68	102	6.4
	豆腐浆	1.6	0.7	1	17	0.2	-	-	-
	北豆腐	9.2	1.2	6	72	0.9	110	110	3.6

History and Database Development

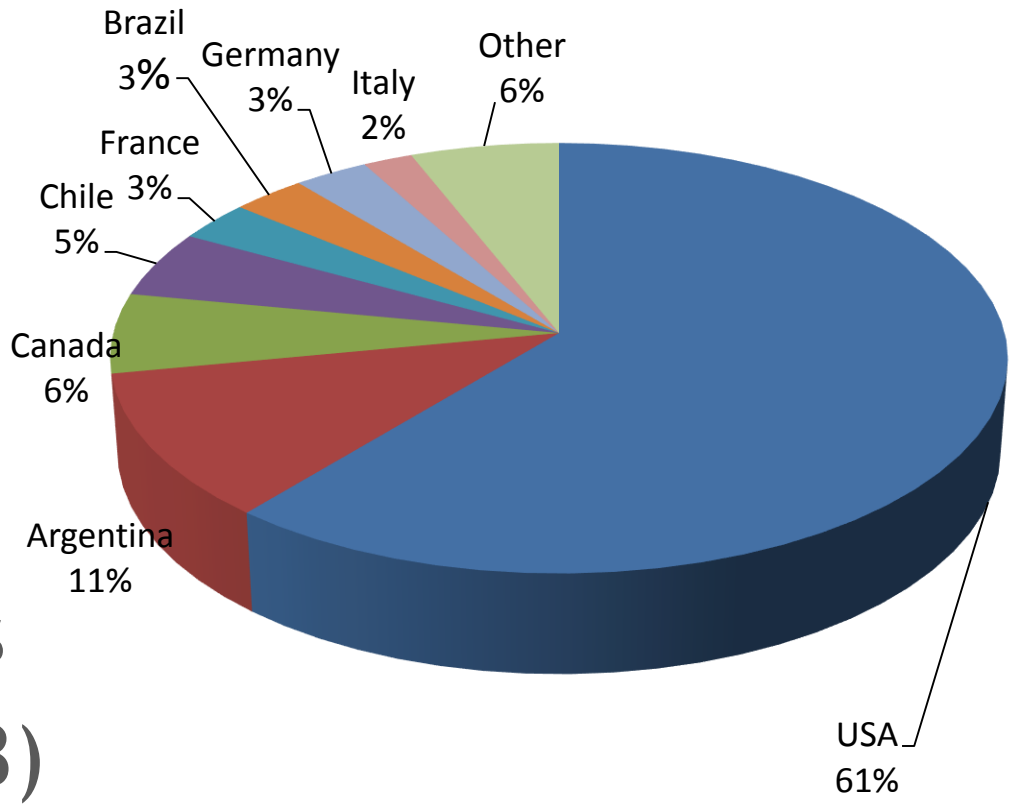
Version	Year of Release	Features
1	2003	Corn, soybean
2	2004	Additional data: corn, soybean New crop: cotton
3	2006	Additional data: corn, soybean, cotton
4	2010	New platform (functionality, speed, efficiency) Multiple units of measure Improved reporting output
5	2014	Additional data: field corn, soybean, cotton New crops: canola, sweet corn, rice

Ridley et al. 2004. Development of the International Life Sciences Institute Crop Composition Database. *Journal of Food Composition and Analysis* 17:423-438

Alba et al. 2010. Improvements to the International Life Sciences Institute Crop Composition Database. *Journal of Food Composition and Analysis* 23:741-748.

Sult et al. 2016. Report: Release of the International Life Sciences Institute Crop Composition Database Version 5. *Journal of Food Composition and Analysis* (in press).

Database Details



- 843,413 data points
- 19 years (1995-2013)

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Data by Crop Tissue

Crop	Tissues	Data points
Canola	Seed	52,961
Cotton	Acid delinted seed Fuzzy seed	50,182 17,671
Field corn	Forage Grain	37,460 384,952
Sweet corn	Kernel	14,349
Rice	Straw Grain	92 835
Soybean	Forage Seed	19,721 265,190
Total		834,413

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Analyte type	Canola	Cotton	Field corn	Sweet corn	Rice	Soybean
Amino acids (18)		●	●	●	●	●
Bio-actives (25)	●	●	●	●	●	●
Carbohydrates (6)			●	●	●	●
Fatty acids (42)	●	●	●	●	●	●
Fiber (6)	●	●	●	●	●	●
Glucosinolates (16)	●					
Minerals (14)	●	●	●	●	●	●
Other metabolites (4)		●	●	●		
Phospholipid (6)						●
Proximates (7)	●	●	●	●	●	●
Vitamins (17)	●	●	●	●	●	●

*Proximates = moisture, protein, fat, ash, carbohydrates, fiber

ILSI CCDB Data Acceptance Criteria (1 of 2)

Stringent unbiased acceptance:

1. Samples used for analysis
   a. From conventional crops.
   b. From controlled field trials.
   c. Each data point is from a composite sample representing a single plot. No averaging.
   d. Information on the samples:

- Location of the plot
- Year of production and sample collection
- Variety grown
- Dates of planting, harvesting, sample collection (not submitted as part of the data)

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ILSI CCDB Data Acceptance Criteria (2 of 2)

2. Analysis of samples
   - Every data point was obtained using a referenced method (certified or historically verified standards).
   - Samples were analyzed in accredited/certified labs or labs experienced with the specific methodology.
   - Therefore, quality control is in place.
   - Records and data retained after submission for at least 5 years; accessible if needed by ILSI.

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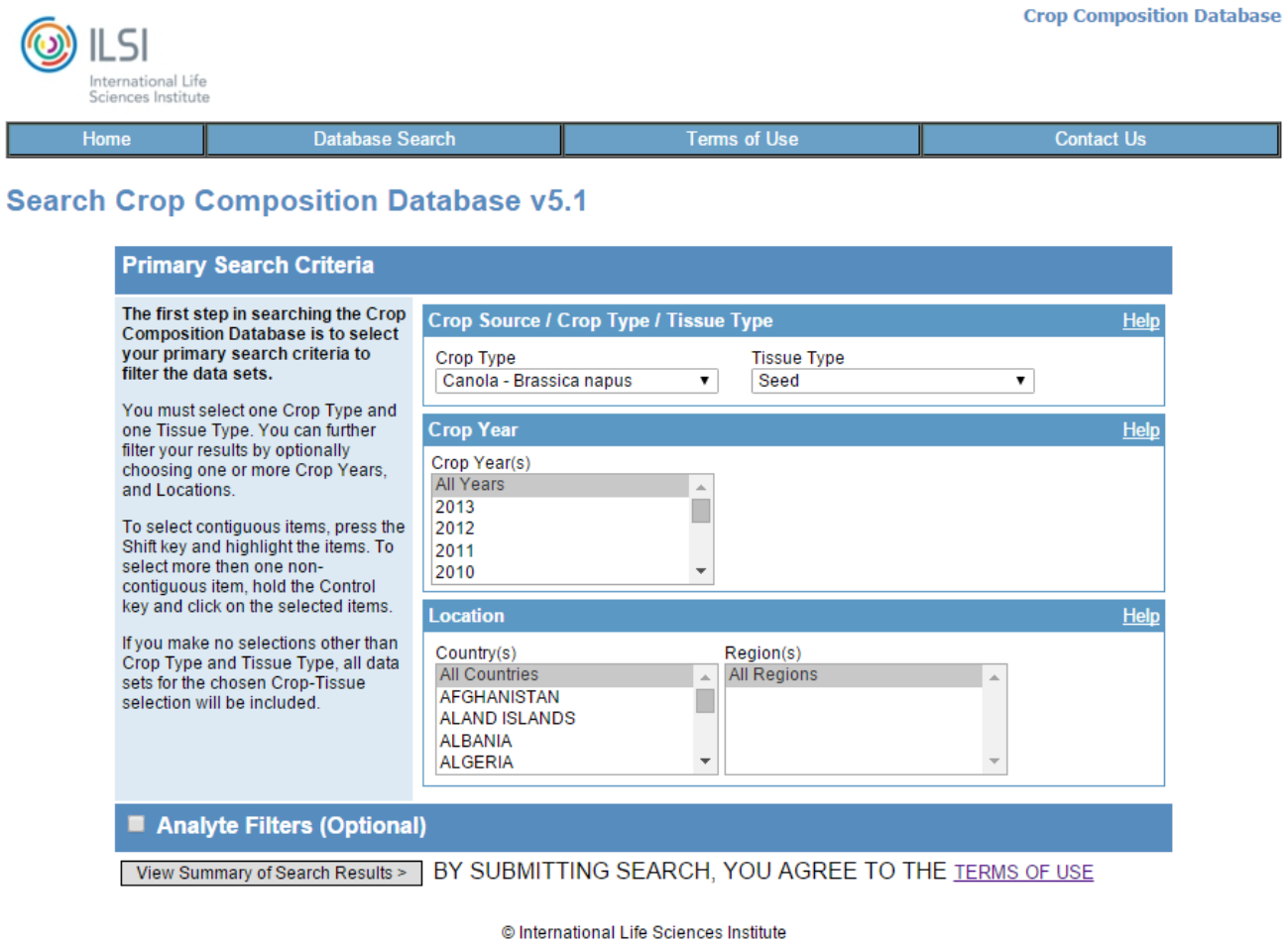
ILSI CCDB Search Criteria

- Crop Type
- Tissue Type
- Crop Year
- Location



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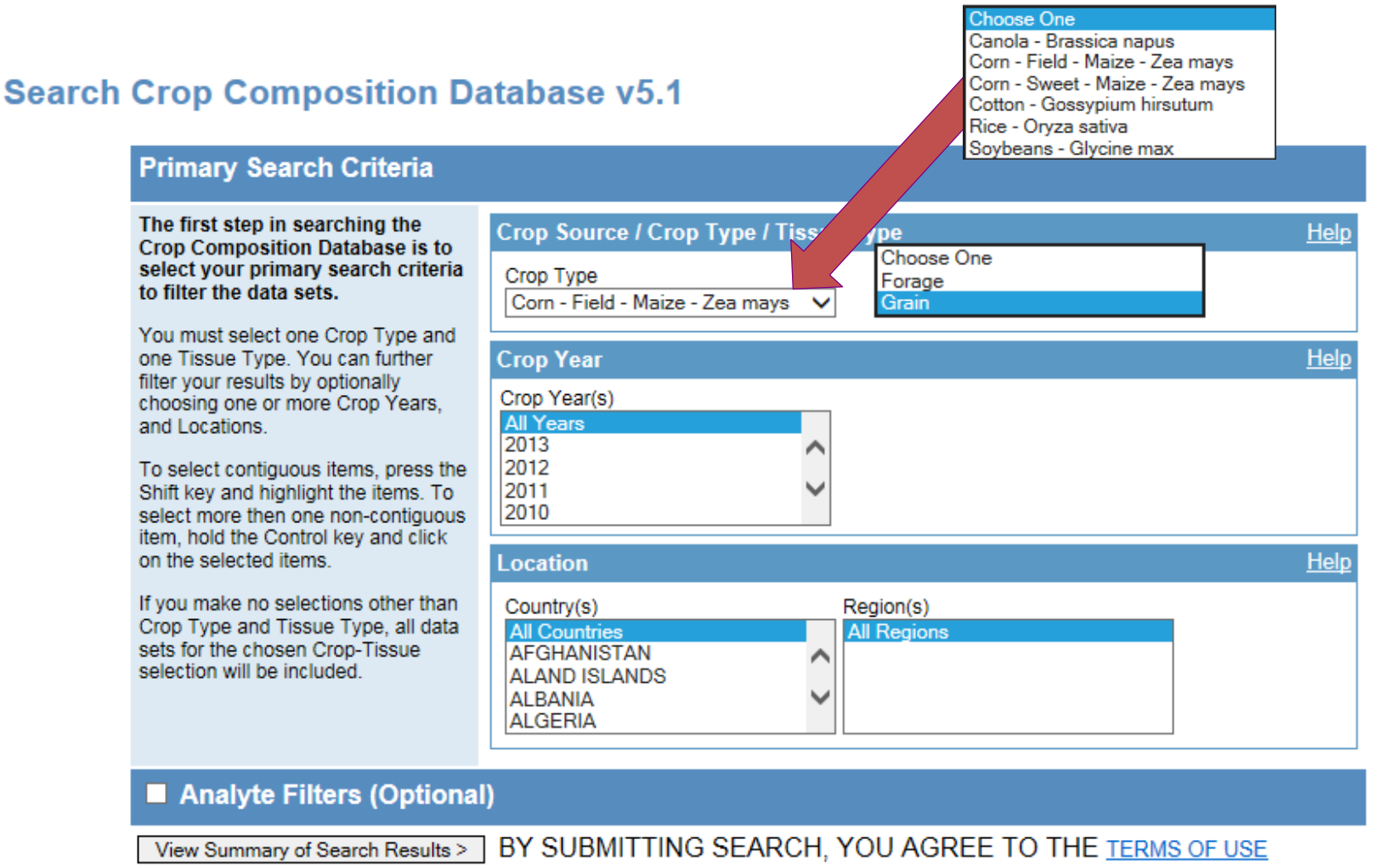
www.cropcomposition.org



www.cropcomposition.org

Search Crop Composition Database v5.1

Query Summary

The Query Summary shows the criteria that was used to filter the result set.

Query Criteria Help

Crop Type:	Corn - Field - Maize - Zea mays
Tissue Type:	Grain

Summary of Search Results

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Results matching your query criteria Help

Analyte Type	Analyte	Samples	Min	Max	Mean	Units
☐ Amino Acids	-	-	-	-	-	-
☐ Bio Actives	-	-	-	-	-	-
☑ Carbohydrates	-	-	-	-	-	-
	Starch	1931(0<LOQ)	26.5	83.7	66.6	% DW
☐ Fatty Acids	-	-	-	-	-	-
☑ Fiber	-	-	-	-	-	-
	Acid Detergent Fiber	5942(0<LOQ)	1.41	11.34	3.72	% DW
	Crude Fiber	1572(0<LOQ)	0.49	3.66	2.54	% DW
	Neutral Detergent Fiber	5941(0<LOQ)	4.28	22.64	10.31	% DW
	Total Dietary Fiber	3763(0<LOQ)	8.73	35.31	13.90	% DW
☐ Minerals	-	-	-	-	-	-
☐ Other Metabolites	-	-	-	-	-	-
☐ Proximates	-	-	-	-	-	-
☐ Vitamins	-	-	-	-	-	-

www.cropcomposition.org

Corn grain fiber and minerals

Query Criteria:
Crop Type is Corn - Field - Maize - Zea mays
Tissue Type is Grain

Analyte Type	Analyte	Minimum Value	Maximum Value	Mean Value	Number of Samples	Samples Below LOQ	Samples Above LOQ	Unit of Measure
Fiber	Acid Detergent Fiber	1.41	11.34	3.72	5,942	0	5,942	% DW
Fiber	Crude Fiber	0.49	3.66	2.54	1,572	0	1,572	% DW
Fiber	Neutral Detergent Fiber	4.28	22.64	10.31	5,941	0	5,941	% DW
Fiber	Total Dietary Fiber	8.73	35.31	13.90	3,763	0	3,763	% DW
Minerals	Cadmium	ND	ND	ND	47	47	0	ppm DW
Minerals	Calcium	11.8	1,010.0	44.2	5,938	6	5,932	ppm DW
Minerals	Chloride	375.6	892.9	599.4	53	0	53	ppm DW
Minerals	Copper	0.55	21.20	1.71	5,808	158	5,650	ppm DW
Minerals	Iron	9.51	191.00	20.56	5,819	0	5,819	ppm DW
Minerals	Magnesium	594.0	1,940.0	1,217.0	5,823	0	5,823	ppm DW
Minerals	Manganese	1.69	14.30	6.45	5,822	0	5,822	ppm DW
Minerals	Phosphorus	1,300.0	5,520.0	3,142.0	5,938	0	5,938	ppm DW
Minerals	Potassium	1,810.0	6,030.0	3,690.6	5,823	0	5,823	ppm DW
Minerals	Selenium	0.03	1.51	0.28	2,492	1,519	973	ppm DW
Minerals	Sodium	0.17	731.54	24.94	5,757	4,647	1,110	ppm DW
Minerals	Sulfur	506.1	1,370.0	847.8	53	0	53	ppm DW
Minerals	Zinc	6.5	42.6	22.8	5,823	0	5,823	ppm DW

www.cropcomposition.org

Query Criteria:
Crop Type is Corn - Field - Maize - Zea mays
Tissue Type is Grain

Analyte Type	Analyte	Value	Units
Fiber	Acid Detergent Fiber	1.41	% DW
Fiber	Acid Detergent Fiber	1.74	% DW
Fiber	Acid Detergent Fiber	1.76	% DW
Fiber	Acid Detergent Fiber	1.80	% DW
Fiber	Acid Detergent Fiber	1.81	% DW
Fiber	Acid Detergent Fiber	1.82	% DW
Fiber	Acid Detergent Fiber	1.82	% DW
Fiber	Acid Detergent Fiber	1.83	% DW
Fiber	Acid Detergent Fiber	1.83	% DW
Fiber	Acid Detergent Fiber	1.84	% DW
Fiber	Acid Detergent Fiber	1.85	% DW
Fiber	Acid Detergent Fiber	1.85	% DW
Fiber	Acid Detergent Fiber	1.86	% DW
Fiber	Acid Detergent Fiber	1.87	% DW
Fiber	Acid Detergent Fiber	1.88	% DW
Fiber	Acid Detergent Fiber	1.89	% DW
Fiber	Acid Detergent Fiber	1.91	% DW
Fiber	Acid Detergent Fiber	1.92	% DW
Fiber	Acid Detergent Fiber	1.93	% DW
Fiber	Acid Detergent Fiber	1.94	% DW
Fiber	Acid Detergent Fiber	1.94	% DW
Fiber	Acid Detergent Fiber	1.95	% DW
Fiber	Acid Detergent Fiber	1.97	% DW
Fiber	Acid Detergent Fiber	1.98	% DW

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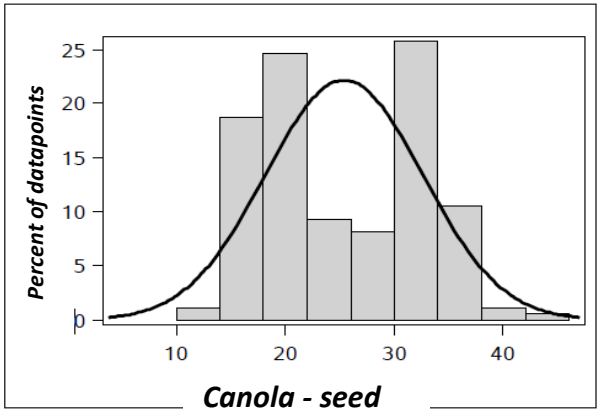
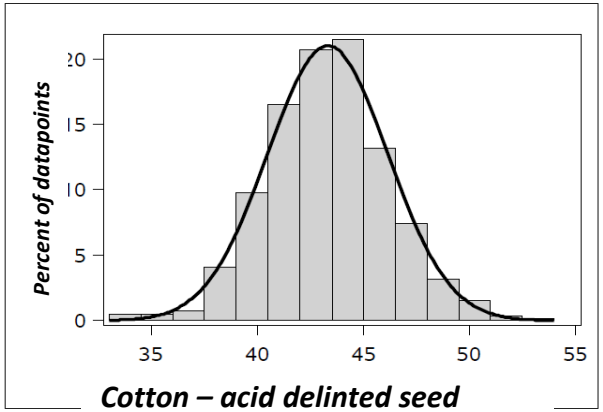


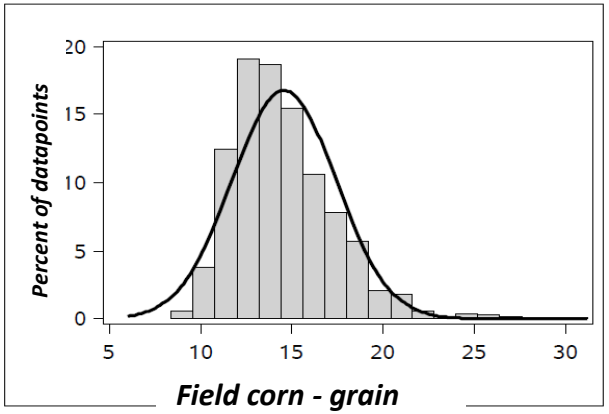
Canola - seed

N = 171



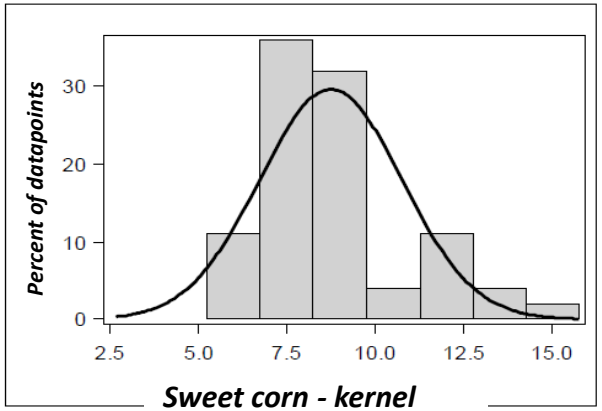
Cotton – acid delinted seed

N = 661



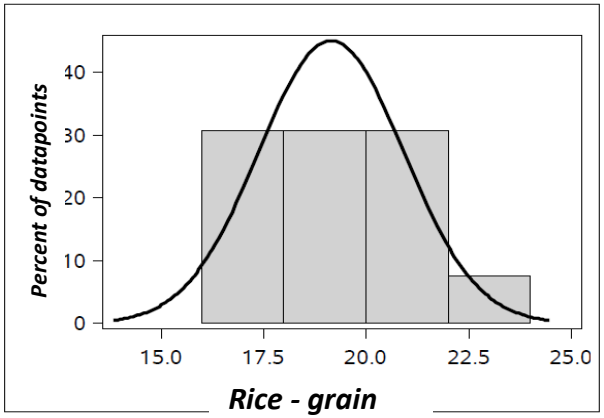
Field corn - grain

N = 1984



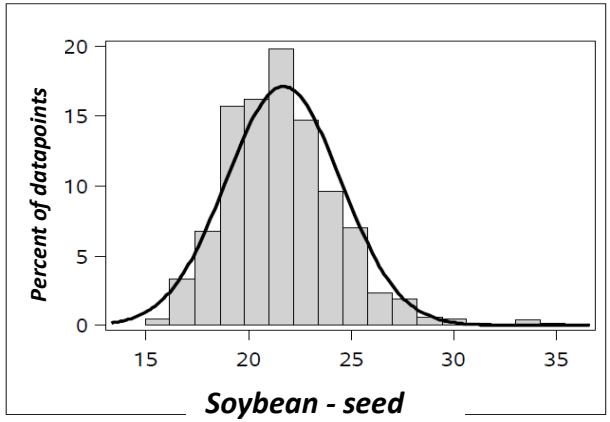
Sweet corn - kernel

N = 100



Rice - grain

N = 13



Soybean - seed

N = 1102

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Total Dietary Fiber (%DW)

Funding and Management

- ILSI Research Foundation
  - Center for Safety Assessment of Food and Feed
- CCDB Working Group

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ILSI CCDB Working Group

- US FDA
- Bayer CropScience
- BASF Plant Science
- Canadian Grain Commission
- Covance, Inc.
- Dow AgroSciences
- Monsanto Company
- DuPont Pioneer
- Syngenta Crop Protection

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ILSI CCDB Users

- Government Agencies
- Scientific/Academic Institutions
- FAO Food and Nutrition Division
- OECD Task Force for the Safety of Novel Foods and Feeds
- ILSI Task Force on Improved Nutrition Crops

81,300

visits to the ILSI CCDB in 2015
representing 127 Countries

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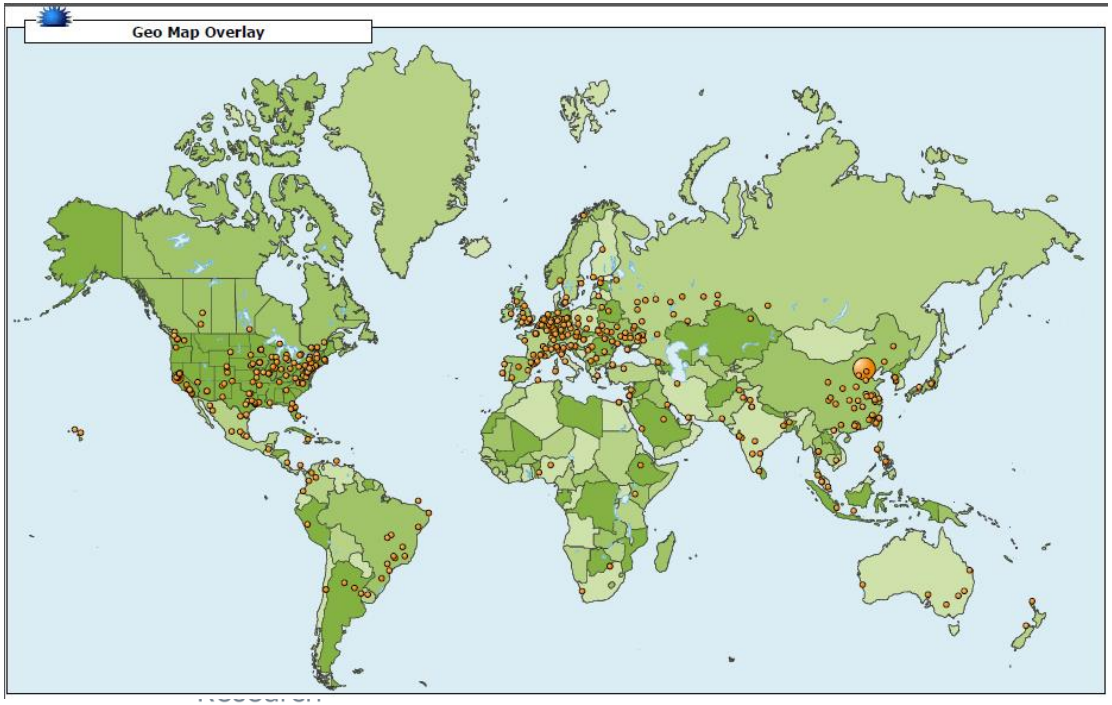
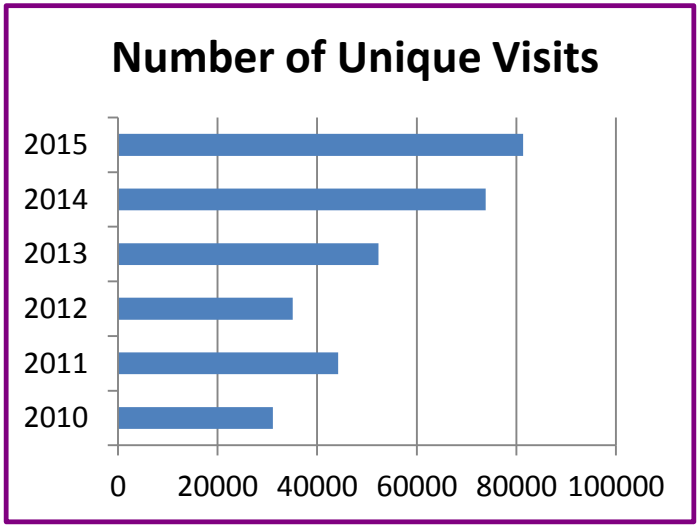
CCDB Uses

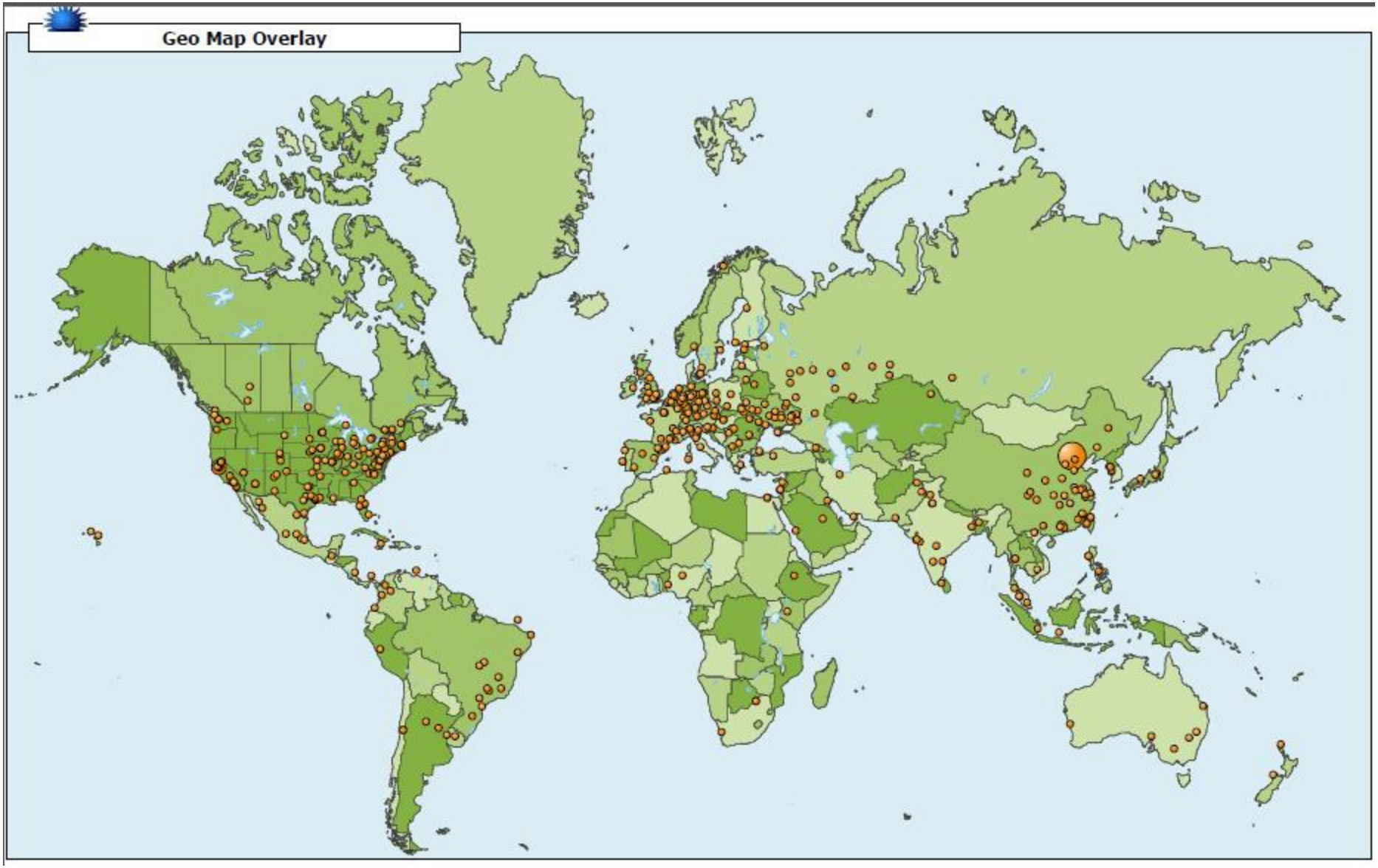
- Assessment of natural variation
- Nutritional studies
- To research components of interest for breeding
- Methodology comparisons





Database usage July 2010 through December 2015

Database Usage (July 2010 – Dec 2015)



ILSI CCDB Future Priorities

- Potential new crops: potato, sorghum, sugarcane
- Additional data on existing crops
- Improvements to search and report functions
- Outreach to potential new data providers



Available e-Learning Courses

Biosafety & Biotech Courses	Food Safety Courses
Understanding Low Level Presence in Agricultural Biotechnology • *Available in English, Chinese, Spanish, Portuguese, Korean, Japanese*, Vietnamese*	Concepts in the Safety Assessment of Novel Food and Feed • *Available in English & Chinese*
Confined Field Trials of Genetically Engineered Plants • *Available in English, Spanish, Portuguese, Vietnamese, French**	Application of Problem Formulation for Food & Feed Safety • *Available in English & Chinese*
Application of Problem Formulation to the Environmental Risk Assessment of Genetically Engineered Crops • *Available in English, Spanish*	

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Why e-Learning courses?

- Provide a resource-efficient means to disseminate environmental risk assessment and food and feed safety information in a online course format
- Participants will improve knowledge and skills for making more consistent and science-based decisions when reviewing safety data.

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General Information

150 DAYS OF ACCESS

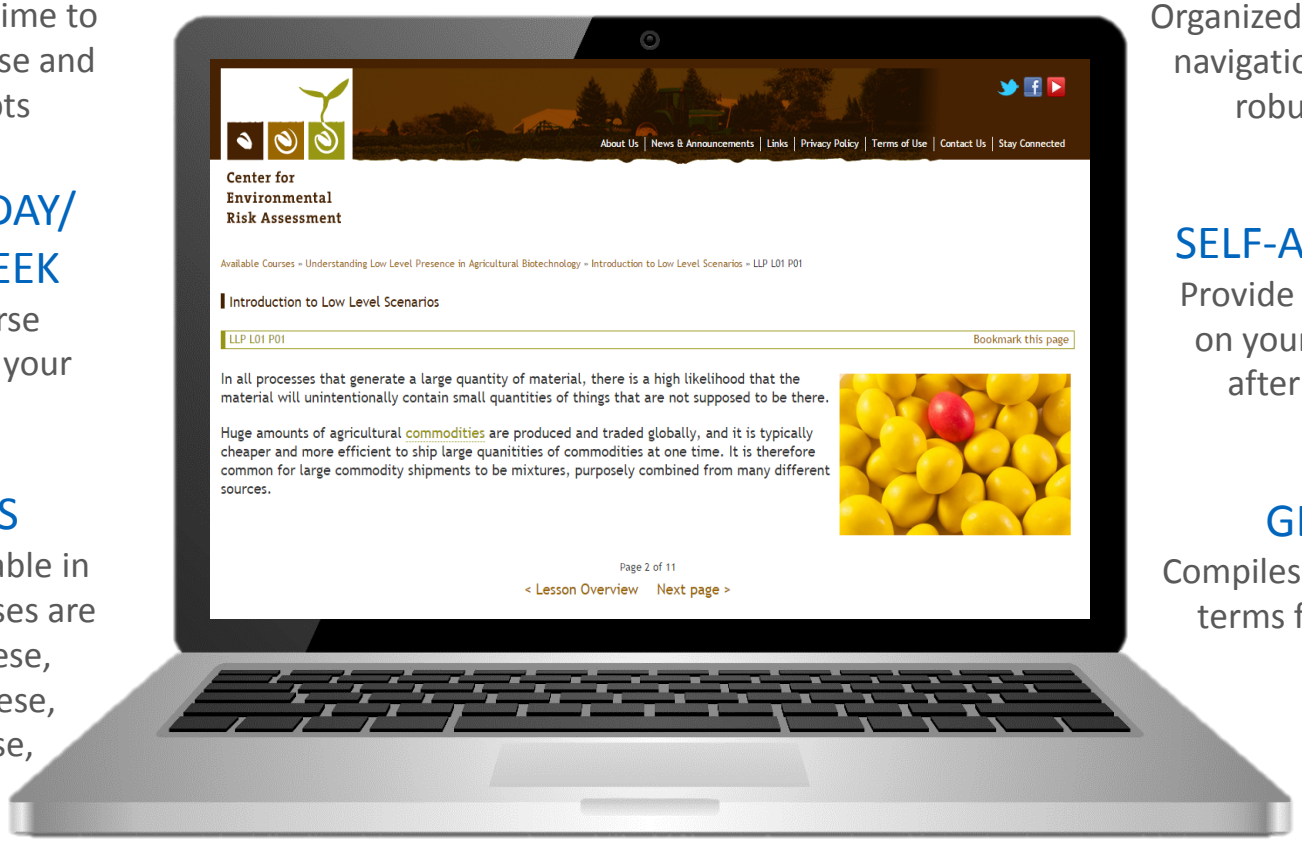
Allows significant time to complete the course and review concepts

24 HOURS A DAY/ 7 DAYS A WEEK

Access the course anytime it meets your schedule

LANGUAGES

All course are available in English. Select courses are available in Chinese, Spanish, Portuguese, Korean, Japanese, Vietnamese, and French



LESSONS

Organized to provide easy navigation through the robust content

SELF-ASSESSMENTS

Provide instant feedback on your understanding after each module

GLOSSARY

Compiles definitions of key terms from the course

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COURSE REGISTRATION

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Questions?

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www.cera-gmc.org/GMCropDatabase

www.cropcomposition.org

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