

Genetic diversity and CGN

with some extra PGR documentation issues

Theo van Hintum, CGN





- content of the presentation
 - genetic diversity
 - definition
 - history
 - value of genetic resources
 - conservation strategies
 - CGN
 - reason to exist
 - collections
 - activities
 - extra focus on documentation

Genetic diversity and CGN



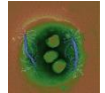
- definition of genetic resources in Convention on Biological Diversity
 - material of plant, animal, microbial or other origin containing functional units of heredity that is of actual or potential value
 - for food, fiber, shelter, timber, herbal medicines and draught animals

Genetic diversity and CGN



■ timeline

- big bang 13,700,000,000 year ago
- earth 4,570,000,000 year ago
- life 3,700,000,000 year ago
- plants 425,000,000 year ago
- flowering plants 220,000,000 year ago
- agriculture 10,000 year ago
- scientific plantbreeding 150 year ago
- genebanks 50 year ago



Genetic diversity and CGN



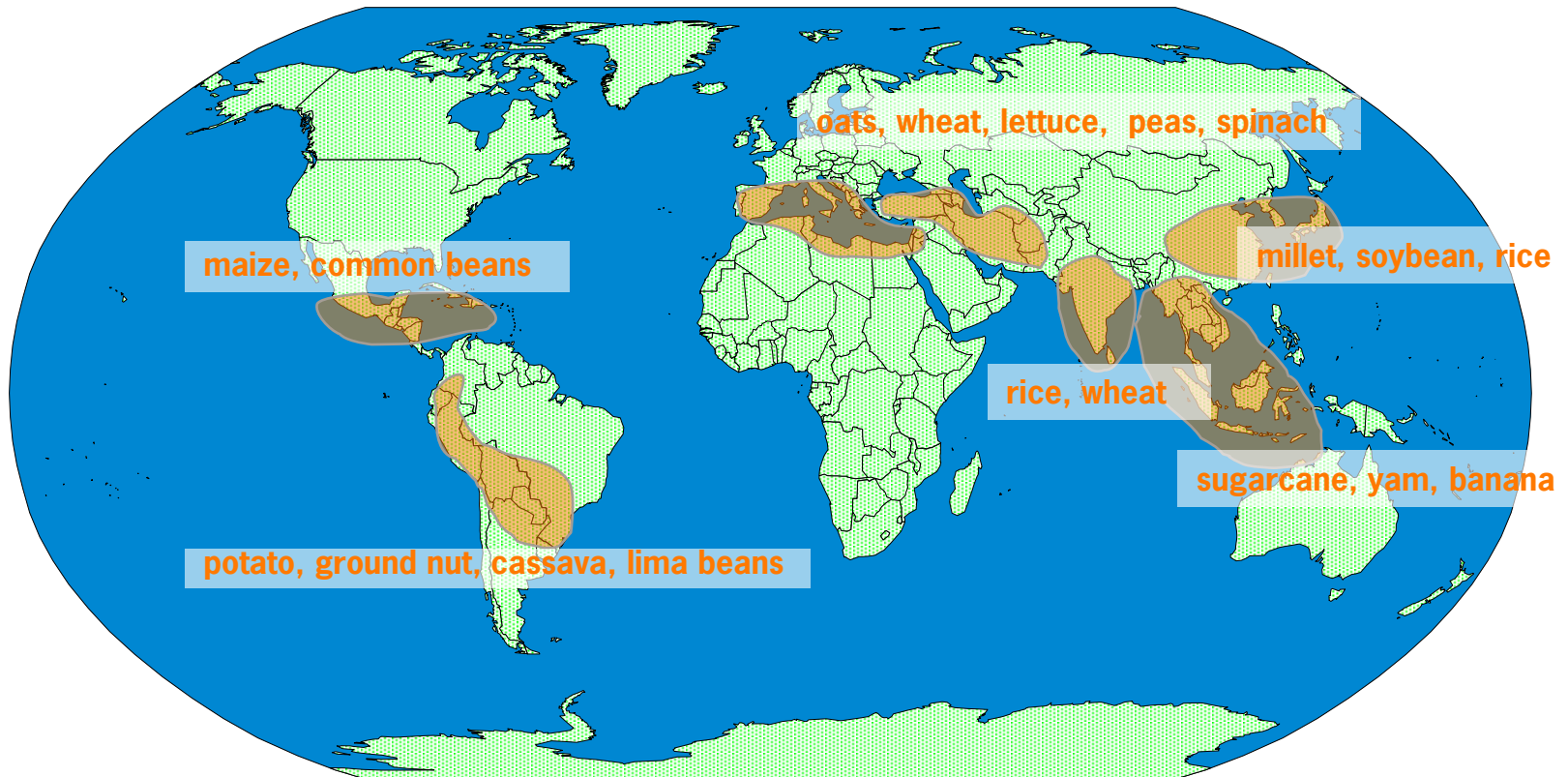
- crop plant genetic diversity in historical context
 - farmers have been domesticating crops since c. 10,000 years
 - selection adapted phenotypes from wild populations
 - in 'centers of origin'
 - result: landraces



Genetic diversity and CGN



- *Vavilov's centres of origin*



Genetic diversity and CGN



- crop plant genetic diversity in historical context
 - since c. 1850 crop genetic diversity disappears due to monocultures and habitat destruction
 - scientific plant breeding based on Mendel and de Vries
 - urbanization, desertification, climate change
 - result: genetic erosion



Genetic diversity and CGN

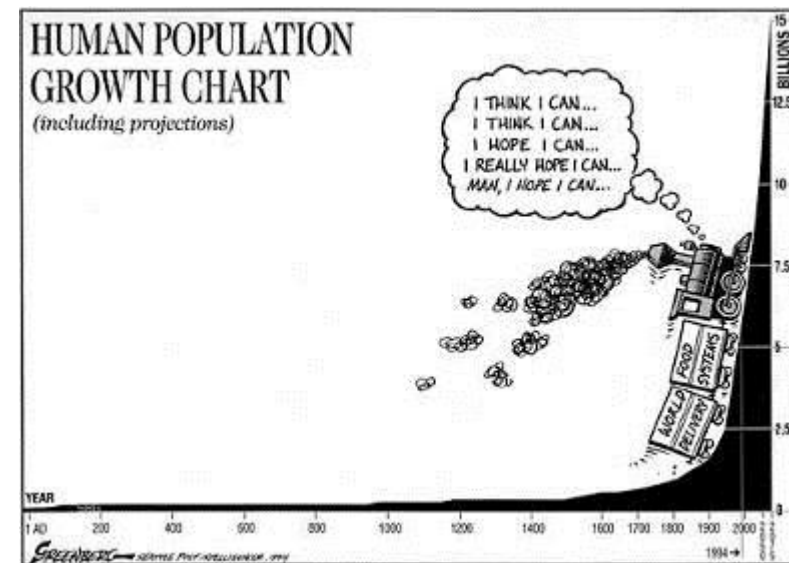


- food crop diversity narrowing
 - species diversity
 - 7000 species ever used as food - 1200 species important on a national scale - 150 entered into world commerce
 - nowadays three cereal species responsible for 55% of food energy supply
 - rice, wheat, maize
 - loss of genetic diversity
 - between species, within species, at ecosystem level
 - genes, gene complexes, traits, varieties
 - indigenous knowledge and bio-cultural heritage

Genetic diversity and CGN



- the importance of genetic diversity is increasing dramatically
 - increased farmers and consumers demands
 - global population growth
 - climate change



Genetic diversity and CGN



- genetic diversity needs to be conserved and made available
 - *ex situ* – in genebanks
 - *in situ* – in nature reserves
 - *on-farm* – in 'traditional' farming systems



Genetic diversity and CGN



- Centre for Genetic Resources, The Netherlands (CGN)
 - crop GR programme established in 1985
 - reasons
 - strategic: guaranteed access to resources
 - contribution to international networks
 - legal: NL signatory to international agreements
 - CBD and IT-PGRFA
 - ethical: NL industry net user of diversity
 - biological: germplasm adapted to NL
 - technical: control over quality
 - since 1999/2002 also mandate for animal/forestry GR



■ collections

- 28 crops
 - depends on definition
- 22519 accessions
 - varieties, landraces and wild populations
 - focus on vegetable crops and potato
 - new collections of neglected species added
 - lamb's lettuce, chives, carrot, asparagus, *Scorzonera*, parsnip
 - focus on small numbers of high quality

Genetic diversity and CGN



■ collection sizes

(15 November 2012)

● lettuce	2363	● wheat	4911
● potato	1438	● barley	2665
● tomato	1309	● flax	952
● onion	417	● peas	1002
● spinach	387		
● pepper	1010	● <i>other crops</i>	3158
● cucumber	937		
● brassicas	1970	● TOTAL	22519

Genetic diversity and CGN



- quality management
 - entire genebank is ISO9001:2000 certified
 - now: ISO9001:2008
- all material is always available
 - only with Standard Material Transfer Agreement of International Treaty (SMTA)
 - yearly 5000-8000 distributed samples



Genetic diversity and CGN



■ seed storage

- storage conditions:
 - -20 °C
 - 3-7% moisture content
- minimum germination requirements for seed storage:
 - cvs and landraces: 80%
 - wild species: 60%
- monitoring germination



Genetic diversity and CGN



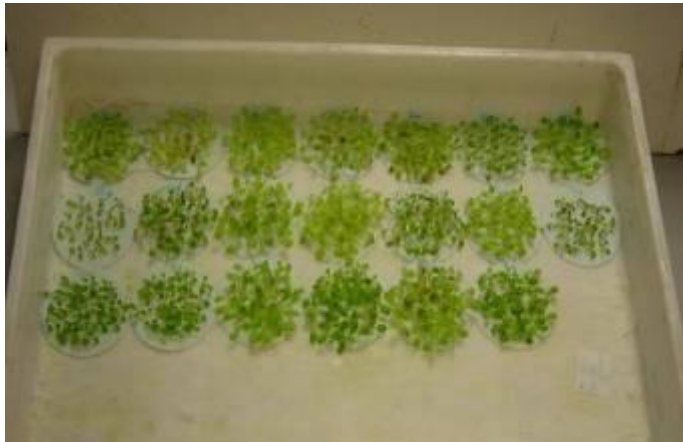
- regeneration
 - in collaboration with breeding companies



self-fertilizing crop: barley



cross-fertilizing crops: potato, clover



■ characterisation and evaluation

- characterization
 - taxonomical
 - easy to describe
 - independent of environment
- evaluation
 - resistance for diseases & pests
 - biochemical, molecular, physiological measurements
- C&E in cooperation with breeding companies and in the context of national or international (EU) programmes

Genetic diversity and CGN



- documentation
 - Oracle DBMS
 - all information is on-line accessible
 - material can be requested on-line
 - SMTA via click-wrap
 - www.cgn.wur.nl

Wageningen UR - Wageningen UR - Centrum voor Genetische Bronnen Nederland - Windows Internet Explorer

http://www.cgn.wur.nl/

WAGENINGEN UR
For quality of life

Log in Zoek Links

Deze Site Zoek Uitbreid zoeken

Onderwijs Onderzoek Publicaties Nieuws & Agenda Over Wageningen UR Werken bij Contact

wageningen ur /home > centrum voor genetische bronnen nederland

Centrum voor Genetische Bronnen Nederland

- Nieuws & Agenda
- CGN Algemene informatie
- CGN Dierlijke Genetische Bronnen
- CGN Genetische Bronnen Bomen
- CGN Plantaardige Genetische Bronnen
- Feedback

Het Centrum voor Genetische Bronnen, Nederland (CGN) voert namens de Nederlandse overheid wettelijke onderzoekstaken (WOT) uit die verband houden met de genetische diversiteit en identiteit van soorten die van belang zijn voor de landbouw en bosbouw. Het CGN is een onafhankelijke onderzoekseenheid binnen de Stichting DLO die de overheid ondersteunt bij de uitvoering van wet- en regelgeving.

» meer Algemene informatie

CGN Algemene informatie

Het CGN heeft samen met de Bibliotheek van WUR een Kennisbank Zeldzame Landbouwhuisdieren ontwikkeld. Op verschillende niveaus is hier informatie (artikelen, boeken, presentaties, websites) te vinden over het gebruik en de conservering van zeldzame rassen van landbouwhuisdieren. De informatie kan gebruikt worden door docenten, onderzoekers, studenten en leerlingen in het Groene Onderwijs.

- KENNISBANK

» meer CGN Algemene informatie

CGN Plantaardige Genetische Bronnen

In juni 2004 is het Internationaal Verdrag inzake Plantaardige Genetische Bronnen van kracht geworden. Nederland heeft dit verdrag geratificeerd. Een Multilateraal Systeem dat toegang tot uitgangsmateriaal en het delen van de opbrengsten regelt, vormt het hart van dit verdrag. In juni 2006 heeft de Governing Body van het Verdrag tot een Standard Material Transfer Agreement (SMTA) besloten. Deze SMTA wordt getekend door de twee partijen die bij een transactie van genetisch uitgangsmateriaal zijn betrokken. In overleg met LNV heeft het Centrum voor Genetische Bronnen Nederland deze SMTA per 5 maart 2007 ingevoerd en tevens elektronische ondertekening van deze SMTA door gebruikers mogelijk gemaakt. De eerste elektronische contracten zijn inmiddels gesloten.

- DIRECT NAAR ZOEKEN EN BESTELLEN VAN GENETISCH MATERIAAL (ENGELS)

» meer CGN Plantaardige Genetische Bronnen

Nieuws

- 16 dec 2008
Samenvattingen en presentaties themadag 'Fokkerij en inteeltbeheersing bij schapen en geiten'
- 9 dec 2008
Presentations international symposium 'New opportunities for conservation genetics with genome wide information'

» meer Nieuws

Agenda

Geen actuele activiteiten

» meer Agenda

Contact

Post adres
Centrum voor Genetische Bronnen, Nederland (CGN)
Postbus 16
6700 AA Wageningen

Bezoek adres
Centrum voor Genetische Bronnen, Nederland (CGN)
Plant Research International, locatie Born-Zuid (gebouw 122)
Bornsesteeg 65, 6708 PD Wageningen

tel: 0317 480884, fax: 0317 423110
cgn@wur.nl
www.cgn.wur.nl

Core Selector

- if one selects material from the CGN collection and finds too many accessions that meet the query
 - say 49

CGn Genis - Online search and order germplasm - Microsoft Internet Explorer

File Edit View Favorites Tools Help


Address <http://www.cgn.wur.nl/applications/cgngenis/default.aspx?page=zoekgewas&Cropnumber=06#Leaf> Go Links

Crop-specific search form

Other searchpages: All crops

Crop:	lettuce
Number of accessions:	2571

Searches can be made based on passport data and characterization / evaluation data or both. Only a selection of traits is on-line searchable, however all data are [downloadable](#). Furthermore it is possible to create core selections to limit the number of selected accessions.



Search specific passport fields

Search for text in the genus, species, subtaxon, accession name, collection site, ancestor and remarks field.
This field accepts only one keyword, which can consist of multiple terms (i.e. 'long red').

Search specific passport fields

Genus: All

Species: All

Sub-taxa: All

Sub-crop type: L. sativa group butterhead lettuce

(Part of) the accession name:

(Part of) the accession number:

Country of origin: All

Sample status: All

Core selection

Enter the maximum number of accessions to be selected.

Sorting

Local intranet

Core Selector

- if one selects material from the CGN collection and finds too many accessions that meet the query
 - say 49

The screenshot shows the CGN Genis online search interface in Microsoft Internet Explorer. The address bar displays the URL: <http://www.cgn.wur.nl/applications/cgngenis/default.aspx?page=zoekgewas&Cropnumber=06#Leaf?>. The interface features several filter sections, each with a 'Description:' row and a 'Nr. of accessions' row. A red arrow points to the 'yellow' option in the 'Leaf color' section.

Leaf color	yellow	green	gray	blue	red	Unknown
Description:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nr. of accessions	140	1043	75	1	90	1222

Leaf color intensity	light	medium	dark	Unknown
Description:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nr. of accessions	28	791	360	1232

Leaf thickness	low	medium	high	Unknown
Description:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nr. of accessions	4	4	26	2509

Leaf blistering	low	medium	high	Unknown
Description:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nr. of accessions	38	799	259	1231

Leaf division	low	medium	high	Unknown
Description:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nr. of accessions	1367	59	173	750

Leaf venation	not flabellate	flabellate	mixed	Unknown
Description:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Core Selector

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 - say 49

CGN Genis - Online search and order germplasm - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://www.cgn.wur.nl/applications/cgngenis/default.aspx?page=lijst>

CGN Passport data search results

Other searchpages: All crops

This is the list of accessions that correspond to the query as formulated in the searchform. The CGN number links to a page with all known data of the selected accession. The SMTA column indicates whether SMTA (Standard Material Transfer Agreement) rules apply to the accession or not. If the accession has pictures available a camera icon will be displayed, which links directly to the images section of the detail page of that accession. If you want to order one or more accession(s) check the checkboxes and click the Update or the Order button. The Order button takes you directly to the shopping cart management and checkout page.

Search criteria

Crop: lettuce
Subcrop: L.sativa group butterhead lettuce
Morphological characteristics / Leaf color : yellow

Results

Number of results 49 accessions

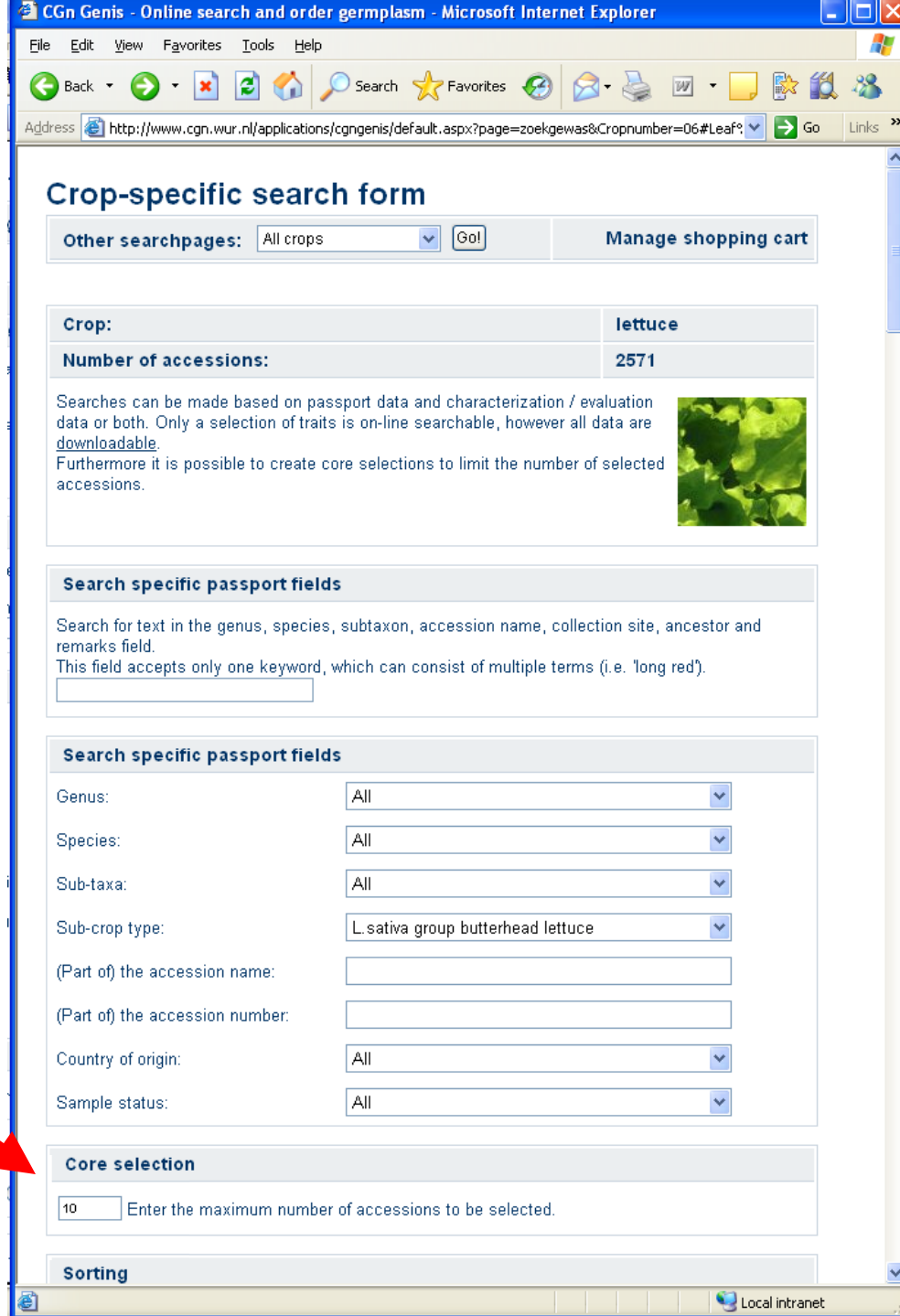
The shoppingcart contains 0 items.

<input type="checkbox"/>	CGN Number	Taxonomic group	Accession name	Origin country	SMTA	Pictures
<input type="checkbox"/>	CGN04886	Lactuca sativa group Butterhead Lettuce			yes	
<input type="checkbox"/>	CGN04793	Lactuca sativa group Butterhead Lettuce			yes	
<input type="checkbox"/>	CGN05871	Lactuca sativa group Butterhead Lettuce			yes	
<input type="checkbox"/>	CGN09369	Lactuca sativa group Butterhead Lettuce			yes	
<input type="checkbox"/>	CGN11430	Lactuca sativa group Butterhead Lettuce			yes	
<input type="checkbox"/>	CGN11412	Lactuca sativa group Butterhead Lettuce			yes	

Done Local intranet

Core Selector

- if one selects material from the CGN collection and finds too many accessions that meet the query
 - say 49
- we allow the user to enter a 'maximum number of accessions to be retrieved'
 - say 10




The screenshot shows the CGN Genis web application in Microsoft Internet Explorer. The browser address bar displays the URL: <http://www.cgn.wur.nl/applications/cgngenis/default.aspx?page=zoekgewas&Cropnumber=06#Leaf?>

Crop-specific search form

Other searchpages: All crops

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Search specific passport fields

Genus:	All
Species:	All
Sub-taxa:	All
Sub-crop type:	L. sativa group butterhead lettuce
(Part of) the accession name:	<input type="text"/>
(Part of) the accession number:	<input type="text"/>
Country of origin:	All
Sample status:	All

Core selection

Enter the maximum number of accessions to be selected.

Sorting

Local intranet

Core Selector

- if one selects material from the CGN collection and finds too many accessions that meet the query
 - say 49
- we allow the user to enter a 'maximum number of accessions to be retrieved
 - say 10
- resulting in a core selection
 - in this case 10 very diverse accessions of yellow butterhead lettuce with good data

CGN Passport data search results

Other searchpages: All crops [Go] Manage shopping cart

This is the list of accessions that correspond to the query as formulated in the searchform. The CGN number links to a page with all known data of the selected accession. The SMTA column indicates whether SMTA (Standard Material Transfer Agreement) rules apply to the accession or not. If the accession has pictures available a camera icon will be displayed, which links directly to the images section of the detail page of that accession. If you want to order one or more accession(s) check the checkboxes and click the Update or the Order button. The Order button takes you directly to the shopping cart management and checkout page.

Search criteria

Crop: lettuce
Subcrop: L. sativa group butterhead lettuce
A core selection of 10 was requested.
Morphological characteristics / Leaf color : yellow

Results

Number of results Core selection of 10 accessions (of 49 accessions total)

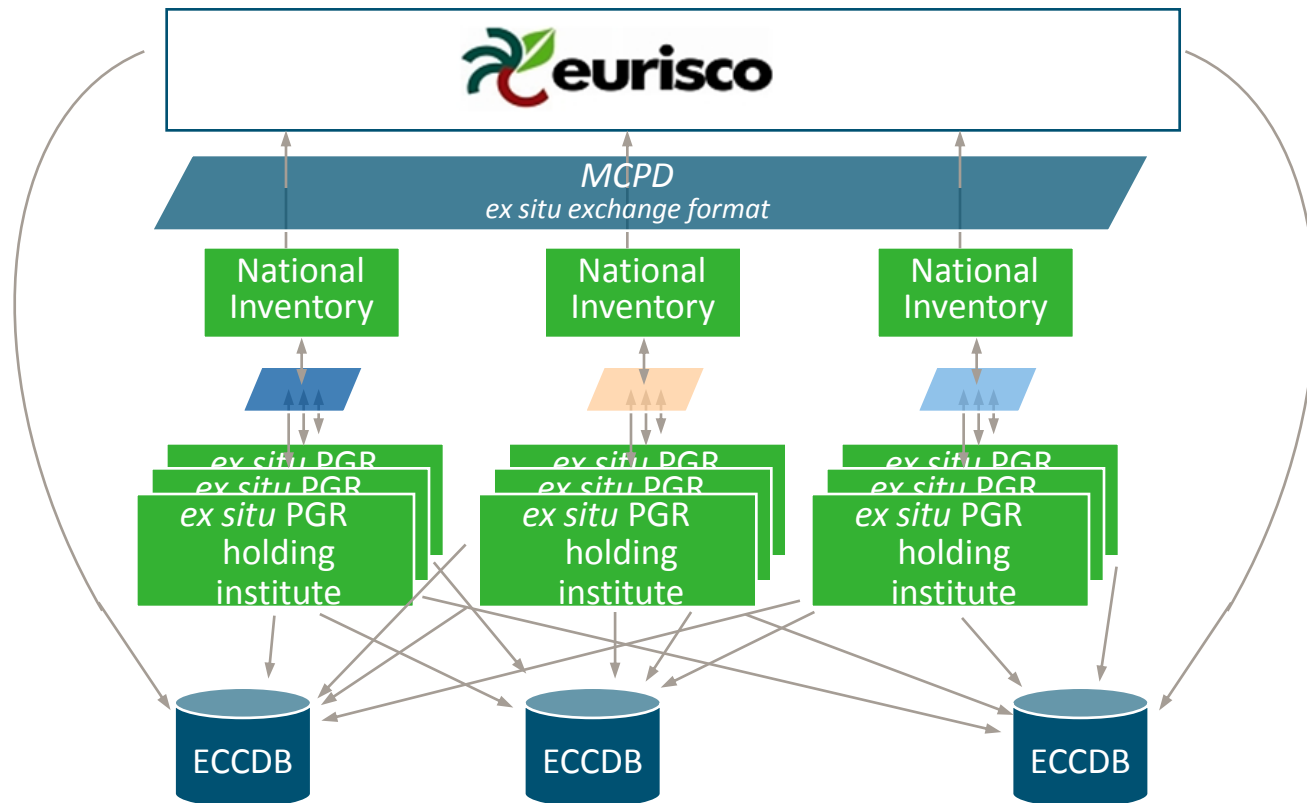
Help **Reset** **Shopping Cart** **Order** **Update**

The shoppingcart contains 0 items.

	CGN Number	Taxonomic group	Accession name	Origin country	SMTA	Pictures
<input type="checkbox"/>	CGN04612	Lactuca sativa group Butterhead Lettuce	Herkules	Austria	yes	
<input type="checkbox"/>	CGN05246	Lactuca sativa group Butterhead Lettuce	Stenhoved	Denmark	yes	
<input type="checkbox"/>	CGN04605	Lactuca sativa group Butterhead Lettuce	Grosse Blonde d'Hiver Bourguignonne	France	yes	
<input type="checkbox"/>	CGN11433	Lactuca sativa group Butterhead Lettuce	Bourguignonne 9B; Grosse Blonde d'Hiver	France	yes	
<input type="checkbox"/>	CGN05972	Lactuca sativa group Butterhead Lettuce	Rudolfs Liebling	Germany	yes	
<input type="checkbox"/>	CGN04529	Lactuca sativa group Butterhead Lettuce	Blondine; Victoria	Netherlands	yes	

Genetic diversity and CGN

- European PGR documentation landscape



Genetic diversity and CGN



- CGN's role in PGR documentation
 - state of the art CGN documentation system
 - Oracle DBMS
 - bar-coding
 - innovative CGN web site
 - searchable & downloadable passport and C&E data
 - core selector
 - click-wrap paper-free SMTA handling
 - prominent role in international initiatives
 - ECPGR documentation & information network
 - EURISCO
 - GeneSys

Thank you for your attention !

