

ECPGR Activity Grant Scheme – First Call, 2014 Activity Report

Identification and updating of C&E data in EBDB of AEGIS *Hordeum*

(HordEva)

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INTRODUCTION

The aim of this Activity was to promote the establishment by interested members of the Barley WG of a list of accessions from their respective countries of origin and of other evidently unique accessions. Based on these lists, the Chair of the Barley WG and the Activity Coordinator would prepare a list of potential AEGIS accessions to be flagged in EURISCO. To help in the validation of this list, the characterization and evaluation (C&E) data would be updated for relevant descriptors to be defined by the Activity partners. During a meeting in late autumn, partners would validate the list of accessions, check for evident inconsistencies or mistakes, and discuss the management of these accessions in accordance with the principles of AEGIS. Finally, all partners would seek approval of this list of AEGIS accessions from their respective National Coordinator, in order to formally introduce these accessions in the European Collection and flag them in the EURISCO database as part of AEGIS.

ECPGR outcomes, outputs, activities to which this Activity contributed:

- 1. AEGIS is operational
- List of AEGIS accessions with precise passport data and characterization and evaluation (C&E) data ready to include into EURISCO. All chosen accessions will be available for the community under Standard Material Transfer Agreement (SMTA)
- 2. Quality of data in EURISCO has been increased
- 3. All National Focal Points (NFPs) update national inventories and EURISCO
- 2. Easy access (SMTA, EURISCO) to barley accessions and information
- 4. Relations with users of germplasm are strengthened

The Activity proposal, including list of partners, is available from the HordEva webpage.

MATERIALS AND METHODS

A first meeting to discuss the workplan for the project took place on 21 April 2015 in Berlin. Participants: Jan Svensson (Coordinator), Audrey Didier and Stephan Weise. Following the meeting the Coordinator prepared guidelines for the members of the Activity as follows:

1) Selection of AEGIS candidates

Participating members should identify AEGIS candidates following the *Revised simplified procedure* for the selection and flagging of accessions for the European Collection (final version 30.12.2013). In this round of selection the WG should focus on landraces and cultivars. Only material that is safety-duplicated should be included as AEGIS candidates.

Background documents: The AEGIS Safety duplication Policy and A Strategic Framework for the Implementation of a European Genebank Integrated System (AEGIS) – A Policy Guide.

In the European Barley Database (EBDB), 3000 accessions contain evaluation data (13 descriptors for spring types and 18 descriptors for winter types) from an EU GENRES project (1999-2003), and about 80 000 accessions contain characterization data (growth habit, row number, kernel cover). These accessions are potentially very valuable candidates to include as AEGIS barley accessions.

2) Improve passport data of AEGIS candidates

For selected candidates the current passport data should be checked and if needed updated, using the FAO/Bioversity *Multi-Crop Passport Descriptors V.2*, to ensure that the AEGIS barley collection

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only includes accessions with high quality passport data. After steps 1 and 2 have been completed, the list should be sent to the Activity Coordinator.

3) Inventory of characterization and evaluation data

The original aim of the activity was to upload C&E data to the EBDB. However, the EBDB has not been updated since 2001. Instead, it was decided to use EURISCO as the repository for C&E data from this Activity. Therefore, there is only a need for an inventory of C&E data at this stage. Participants who have C&E data should make an inventory of these data. A summary for each trial should include a short abstract (aims) and the descriptors measured/recorded. If possible the descriptors should be translated to follow the guidelines in the *Descriptors for barley* (IPGRI 1994).

4) Meeting 18-20 November 2015 at NordGen, Alnarp, Sweden

Each activity member should present a summary in a standard format of their AEGIS candidates and the results of their inventory of C&E data.

The agenda and list of participants are available from the HordEva webpage.

5) Flagging of AEGIS accessions

After the meeting in November, the selected AEGIS candidates should be approved by the respective National Coordinator and flagged or uploaded to EURISCO by the National Inventory Focal Point (Revised simplified procedure for the selection and flagging of accessions for the European Collection).

RESULTS

Overview

An overview of the results obtained by HordEva is given in Table 1.

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Table 1. Overview of barley accessions selected for AEGIS resulting from the HordEva Activity

Country	Total barley holdings	No. of selected AEGIS accessions	AEGIS flagging status of selected accessions at the end of the Activity
Bulgaria	3236	113	In progress
France	6724	570	Not signed MoU
Germany	23527	12820	In progress
Latvia	529	12	Completed
Lithuania	1831	36	For approval by NC
Nordic countries (*)	16880	576	Completed
Poland	643	149	Completed
Romania	531	65	September 2016
Slovakia	1755	43	June 2016
Switzerland	-	773	In progress
Total		15157	

^{*} One partner, NordGen (SWE054) representing five countries: Denmark, Finland, Iceland, Norway and Sweden.

Selection criteria and outcomes for participating countries

Bulgaria

AEGIS candidates were selected based on accessions with Bulgarian origin already included in EURISCO. Further criteria were accessions which have high quality passport and evaluation data. In total, 113 accessions were selected (Table 1, Annex 1). All accessions have information on row type, growth class and kernel cover. In addition, 15% have been evaluated for resistance to net blotch.

France

The 570 AEGIS candidates all are of French origin (Table 1, Annex 2). These accessions cover French breeding history, have a patrimonial interest and are free of rights. All accessions have information on row type, growth class and kernel cover. The AEGIS collection will be evaluated in the project COLNATOR (Amélioration de la gestion de la COLlection NATionale Orge) led by INRA in five locations during two years for phenotypical descriptors and genotyped for a thousand of SNP markers.

Germany

The Leibniz Institute of Plant Genetics and Crop Plant Research (IPK) selected 12 820 AEGIS Hordeum accessions based on several criteria (Table 1, Annex 3), including 1485 accessions originating from Germany and 3511 accessions that are unique material from collection trips in which IPK participated as collector. At present, evaluation data recorded during routine multiplication of barley accessions (scoring) are being prepared for inclusion in IPK's Genebank Information System (GBIS) and EURISCO, thus a large number of C&E data will become available also for AEGIS accessions within 2016. Within a project that started in 2015, all Hordeum vulgare accessions of the genebank (including the AEGIS accessions) are being genotyped by "Genotyping by Sequencing" (GBS).

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Latvia

The AEGIS collection from Latvia constitutes 12 accessions of Latvian origin (Table 1, Annex 4). All accessions have been evaluated for one to three years and descriptor data have been recorded (based on the IPGRI/UPOV descriptors).

Lithuania

The Lithuanian genebank selected 36 AEGIS accessions (Table 1, Annex 5). The selection criteria used were Lithuanian origin, availability in EURISCO and status of Lithuanian National Genetic Resources (status of Lithuanian National Genetic Resources is certified with signature of the Minister of Environment as important for country germplasm). The Lithuanian collection contains 19 varieties and 17 are breeding lines with actual or potential importance for Lithuania.

Nordic countries

The Nordic Genetic Resource Center (NordGen) selected 576 accessions of Nordic origin (Table 1, Annex 6). These accessions represent the Nordic barley diversity and fulfil the criteria for AEGIS. Several of the AEGIS accessions have previously been evaluated in the Nordic countries and data will be made available. For example, the *Nordic Barley Catalogue* published by the Nordic Genebank (NGB) in 1989 contains C&E data on accessions now included in the AEGIS collection, and data from old C&E experiments are available, for example an analysis of starch granule size distribution in a malting quality experiment (Figure 1).

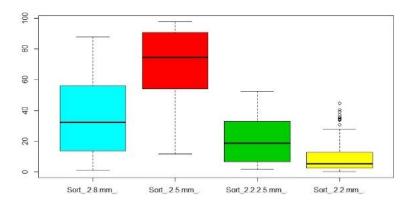


Figure 1. Diversity in starch granule size distribution in the Nordic AEGIS barley collection.

Poland

Accessions with Polish origin were selected (Table 1, Annex 7). The 149 AEGIS candidates were selected based on literature studies for cultivars, whereas landraces were selected based on information in the Polish genebank database. Characterization and evaluation has been done extensively; descriptors scored on 50-70% of the collection are listed here: lodging resistance (70%) (Figure 2), powdery mildew resistance (69%), plant height (cm) (68%), sowing date (65%), full maturity date (64%), 1000 kernel weight (62%), net blotch resistance (61%), emergence date (58%), growth class (100%), crown rust resistance (56%), full heading date (54%), leaf rust resistance (53%), leaf strip resistance (50%), full emergence date (50%) and start of heading date (50%).

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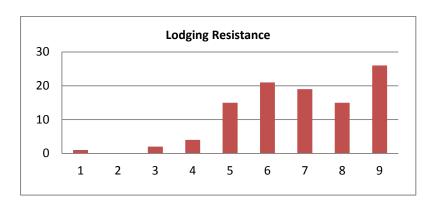


Figure 2. Lodging resistance in the Polish AEGIS collection.

Romania

The 65 Barley AEGIS candidates are local landraces and obsolete cultivars all originating from Romania (Figure 3) (Table 1, Annex 8). Evaluation for disease resistance was done on 63% of the accessions in the framework of the EU GENRES project. Scoring was done for net blotch, scald, mildew, leaf blotch, leaf rust, leaf stripe, spot blotch and covered smut.

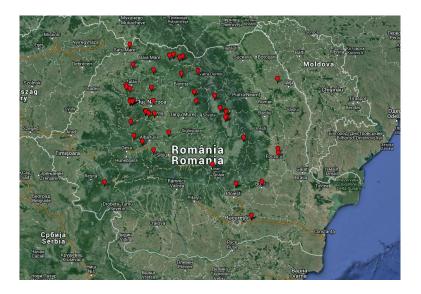


Figure 3. Collecting information on the Romanian AEGIS barley landraces.

Slovakia

(Table 1, Annex 9)

The Slovakian collection constitutes material which has been produced in Slovakia from 1938 to 2009. The selected barley collection is a source of valuable genes for further use and represents the cultural heritage of Slovakia. Historical genotypes can be a suitable source to obtain higher content of β -glucan and protein (Figure 4) in the grain and may be used in the food industry. The selected AEGIS barley collection consists of several different barley malting qualities: elite (13), standard quality (12), non-malting quality (13) and unspecified malting quality (5).

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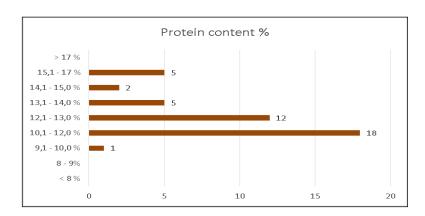


Figure 4. Diversity in protein content of Slovakian AEGIS barley accessions.

Switzerland

Switzerland, although not a funded member in the Activity, selected 773 AEGIS candidates for inclusion in the HordEva activity. All accessions selected were local Swiss varieties (Table 1, Annex 10).

SUMMARY

In total 14 countries(*) selected barley AEGIS candidates in the HordEva project. The barley AEGIS candidates were presented at the HordEva meeting in November 2015 and a total of 15 157 candidates were presented.

Maintenance of the collection was discussed and it was deemed that the participants currently have the capacity to maintain their AEGIS collections. Safety duplication was discussed and NordGen, Lithuania, Poland and Slovakia were open for black-box arrangement if needed.

One objective of HordEva was not reached: updating of C&E data in the European Barley database (EBDB). This was not done since the EBDB is currently not funded and no updates have been done since 2001. However, EURISCO is suitable as C&E data repository, and will be used for this purpose. An inventory of C&E data was done by the participants and C&E data are available once there is a suitable repository for barley data.

(*) One partner, NordGen, representing five countries (see Table 1).

REFERENCES

Alercia A, Diulgheroff S, Mackay M. 2012. <u>FAO/Bioversity Multi-Crop Passport Descriptors V.2</u>. Food and Agriculture Organization of the United Nations (FAO), Rome (Italy); Bioversity International, Rome (Italy).

AEGIS. Revised simplified procedure for the selection and flagging of accessions for the European Collection (Final version, 30 December 2013).

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- ECPGR. 2009. A Strategic Framework for the Implementation of a European Genebank Integrated System (AEGIS) A Policy Guide. European Cooperative Programme for Plant Genetic Resources (ECPGR). Bioversity International, Rome, Italy.
- IPGRI. 1994. <u>Descriptors for Barley (*Hordeum vulgare* L.)</u>. International Plant Genetic Resources Institute, Rome, Italy.
- UPOV. 1994. Guidelines for the conduct of tests for distinctness, uniformity and stability / Principes directeurs pour la conduite de l'examen des caractères distinctifs, de l'homogénéité et de la stabilité / Richtlinien fuer die Durchfuehrung der Pruefung auf Unterscheidbarkeit, Homogenitaet und Bestaendigkeit. Barley / Orge / Gerste (Hordeum vulgare L. sensu lato). TG/19/10. International union for the protection of new varieties of plants (UPOV), Geneva, Switzerland.

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ANNEXES. SUMMARY OF PASSPORT DATA FOR AEGIS CANDIDATES IDENTIFIED IN HORDEVA (MCPD v2)

(The full data will be available online from the HordEva webpage).

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Annex 1. Bulgaria

Country	Number of AEGIS accessions	INSTCODE	ACCENUMB	COLLNUMB
Bulgaria	113	100%	100%	100%
COLLCODE	GENUS	SPECIES	SPAUTHOR	SUBTAXA
100%	100%	100%	100%	100%
SUBTAUTHOR	CROPNAME	ACCENAME	ACQDATE	ORIGCTY
100%	100%	100%	100%	100%
COLLSITE	LATITUDE	LONGITUDE	ELEVATION	COLLDATE
100%	0%	0%	0%	0%
BREDCODE	SAMPSTAT	ANCEST	COLLSRC	DONORCODE
100%	100%	0%	0%	0%
DONORNUMB	OTHERNUMB	DUPLSITE	STORAGE	MLSSTAT
0%	100%	100%	100%	100%
REMARKS	GR_CLASS	PLOIDY	REG_YEAR	SYNONYM_
100%	0%	0%	0%	0%
EXP_CODE	SITE_DES	HERBAR_	PRINC_ATTR	ENTRY_DATE
0%	0%	0%	0%	0%
MAN_CENTER	AVAILAB	AEGISSTAT		
0%	100%	100%		

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Annex 2. France

Country	Number of AEGIS accessions	INSTCODE	ACCENUMB	COLLNUMB
FRA	570	100%	100%	1,7%
COLLCODE	GENUS	SPECIES	SPAUTHOR	SUBTAXA
3,7%	100%	100%	0%	0%
SUBTAUTHOR	CROPNAME	ACCENAME	ACQDATE	ORIGCTY
0%	100%	100%	100%	100%
COLLSITE	LATITUDE	LONGITUDE	ELEVATION	COLLDATE
0,2%	0%	0%	0%	1,4%
BREDCODE	SAMPSTAT	ANCEST	COLLSRC	DONORCODE
92%	100%	72,6%	0%	95%
DONORNUMB	OTHERNUMB	DUPLSITE	STORAGE	MLSSTAT
82%	25,6%	100%	100%	100%
REMARKS	GR_CLASS	PLOIDY	REG_YEAR	SYNONYM_
0%	98,1%	100%	54,9%	2%
EXP_CODE	SITE_DES	HERBAR_	PRINC_ATTR	ENTRY_DATE
0%	0%	100%	0%	0%
MAN_CENTER	AVAILAB	AEGISSTAT		
0%	100%	0%		

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Annex 3. Germany

Country	Number of AEGIS accessions	INSTCODE	ACCENUMB	COLLNUMB
DEU	12820	100%	100%	25%
COLLCODE	GENUS	SPECIES	SPAUTHOR	SUBTAXA
25%	100%	100%	59% (100%)	54%
SUBTAUTHOR	CROPNAME	ACCENAME	ACQDATE	ORIGCTY
53%	0%	46%	100%	94%
COLLSITE	LATITUDE	LONGITUDE	ELEVATION	COLLDATE
36%	14%	14%	9%	10%
BREDCODE	SAMPSTAT	ANCEST	COLLSRC	DONORCODE
0%	100%	2%	99%	67%
DONORNUMB	OTHERNUMB	DUPLSITE	STORAGE	MLSSTAT
63%	67%	15%	100%	100%
REMARKS	GR_CLASS	PLOIDY	REG_YEAR	SYNONYM_
0%	0%	0%	0%	0%
EXP_CODE	SITE_DES	HERBAR_	PRINC_ATTR	ENTRY_DATE
0%	0%	0%	0%	0%
MAN_CENTER	AVAILAB	AEGISSTAT		
0%	100%	100%		

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Annex 4. Latvia

Country	Number of AEGIS accessions	INSTCODE	ACCENUMB	COLLNUMB
LVA	12	100%	100%	0%
COLLCODE	GENUS	SPECIES	SPAUTHOR	SUBTAXA
0%	100%	100%	100%	0%
SUBTAUTHOR	CROPNAME	ACCENAME	ACQDATE	ORIGCTY
	100%	100%	92%	100%
COLLSITE	LATITUDE	LONGITUDE	ELEVATION	COLLDATE
0%	0%	0%	0%	0%
BREDCODE	SAMPSTAT	ANCEST	COLLSRC	DONORCODE
92%	100%	83%	100%	100%
DONORNUMB	OTHERNUMB	DUPLSITE	STORAGE	MLSSTAT
0%	0%	100%	100%	0%
REMARKS	GR_CLASS	PLOIDY	REG_YEAR	SYNONYM_
0%	100%	100%	92%	0%
EXP_CODE	SITE_DES	HERBAR_	PRINC_ATTR	ENTRY_DATE
0%	0%	0%	0%	0%
MAN_CENTER	AVAILAB	AEGISSTAT		
0%	100%	100%		

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Annex 5. Lithuania

Country	Number of AEGIS accessions	INSTCODE	ACCENUMB	COLLNUMB
LTU	36	100%	100%	28%
COLLCODE	GENUS	SPECIES	SPAUTHOR	SUBTAXA
100%	100%	100%	100%	100%
SUBTAUTHOR	CROPNAME	ACCENAME	ACQDATE	ORIGCTY
28%	100%	100%	100%	100%
COLLSITE	LATITUDE	LONGITUDE	ELEVATION	COLLDATE
0%	0%	0%	0%	100%
BREDCODE	SAMPSTAT	ANCEST	COLLSRC	DONORCODE
100%	100%	83%	28%	100%
DONORNUMB	OTHERNUMB	DUPLSITE	STORAGE	MLSSTAT
100%	0%	0%	100%	0%
REMARKS	GR_CLASS	PLOIDY	REG_YEAR	SYNONYM_
0%	100%	0%	0%	19%
EXP_CODE	SITE_DES	HERBAR_	PRINC_ATTR	ENTRY_DATE
0%	0%	0%	92%	0%
MAN_CENTER	AVAILAB	AEGISSTAT		
0%	100%	0%		

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Annex 6. Nordic countries

Country	Number of AEGIS accessions	INSTCODE	ACCENUMB	COLLNUMB
SWE	576	100%	100%	11%
COLLCODE	GENUS	SPECIES	SPAUTHOR	SUBTAXA
0,50%	100%	100%	100%	100%
SUBTAUTHOR	CROPNAME	ACCENAME	ACQDATE	ORIGCTY
100%	100%	100%	99%	98%
COLLSITE	LATITUDE	LONGITUDE	ELEVATION	COLLDATE
12%	7%	7%	2%	12%
BREDCODE	SAMPSTAT	ANCEST	COLLSRC	DONORCODE
15%	100%	47%	2%	47%
DONORNUMB	OTHERNUMB	DUPLSITE	STORAGE	MLSSTAT
92%	16%	98%	100%	100%
REMARKS	GR_CLASS	PLOIDY	REG_YEAR	SYNONYM_
0%	100%	0%	0%	0%
EXP_CODE	SITE_DES	HERBAR_	PRINC_ATTR	ENTRY_DATE
0%	0%	0%	0%	0%
MAN_CENTER	AVAILAB	AEGISSTAT		
0%	100%	0%		

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Annex 7. Poland

Country	Number of AEGIS accessions	INSTCODE	ACCENUMB	COLLNUMB
POL	149	100	100	44
COLLCODE	GENUS	SPECIES	SPAUTHOR	SUBTAXA
0	100	100	100	70
SUBTAUTHOR	CROPNAME	ACCENAME	ACQDATE	ORIGCTY
70	100	100	92	100
COLLSITE	LATITUDE	LONGITUDE	ELEVATION	COLLDATE
35	37	37	37	0
BREDCODE	SAMPSTAT	ANCEST	COLLSRC	DONORCODE
37	100	11	0	37
DONORNUMB	OTHERNUMB	DUPLSITE	STORAGE	MLSSTAT
0	8	0	100	100
REMARKS	GR_CLASS	PLOIDY	REG_YEAR	SYNONYM_
72	100	0	56	0
EXP_CODE	SITE_DES	HERBAR_	PRINC_ATTR	ENTRY_DATE
0	0	0	0	0
MAN_CENTER	AVAILAB	AEGISSTAT		
0	100	100		

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Annex 8. Romania

	Number of AEGIS		1	
Country	accessions	INSTCODE	ACCENUMB	COLLNUMB
ROM	65	100%	100%	43.07%
COLLCODE	GENUS	SPECIES	SPAUTHOR	SUBTAXA
83.07%	100%	100%	100%	9.23%
SUBTAUTHOR	CROPNAME	ACCENAME	ACQDATE	ORIGCTY
0%	100%	100%	16.92%	100%
COLLSITE	LATITUDE	LONGITUDE	ELEVATION	COLLDATE
93.84%	93.84%	93.84%	93.84%	83.07%
BREDCODE	SAMPSTAT	ANCEST	COLLSRC	DONORCODE
0%	100%	7.69%	100%	16.92%
DONORNUMB	OTHERNUMB	DUPLSITE	STORAGE	MLSSTAT
32.30%	0%	0%	100%	94%
REMARKS	GR_CLASS	PLOIDY	REG_YEAR	SYNONYM_
4.6%	100%	100%	58.46%	15.38%
EXP_CODE	SITE_DES	HERBAR_	PRINC_ATTR	ENTRY_DATE
0%	0%	0%	9.23%	100%
MAN_CENTER	AVAILAB	AEGISSTAT		
0%	100%	100%		

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Annex 9. Slovakia

Country	Number of AEGIS accessions	INSTCODE	ACCENUMB	COLLNUMB
SVK	43	100.00%	100.00%	100.00%
COLLCODE	GENUS	SPECIES	SPAUTHOR	SUBTAXA
100.00%	100.00%	100.00%	100.00%	100.00%
SUBTAUTHOR	CROPNAME	ACCENAME	ACQDATE	ORIGCTY
100.00%	100.00%	100.00%	100.00%	100.00%
COLLSITE	LATITUDE	LONGITUDE	ELEVATION	COLLDATE
0.00%	0.00%	0.00%	0.00%	0.00%
BREDCODE	SAMPSTAT	ANCEST	COLLSRC	DONORCODE
97.67%	100.00%	97.67%	100.00%	100.00%
DONORNUMB	OTHERNUMB	DUPLSITE	STORAGE	MLSSTAT
76,74%	86,05%	72,09%	100%	100,00%
REMARKS	GR_CLASS	PLOIDY	REG_YEAR	SYNONYM_
0%	100,00%	100,00%	100,00%	0%
EXP_CODE	SITE_DES	HERBAR_	PRINC_ATTR	ENTRY_DATE
0%	0%	69,77%	0%	0%
MAN_CENTER	AVAILAB	AEGISSTAT		
0%	100%	100,00%		

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Annex 10. Switzerland

Country	Number of AEGIS accessions	INSTCODE	ACCENUMB	COLLNUMB
CHE	773	100%	100%	0%
COLLCODE	GENUS	SPECIES	SPAUTHOR	SUBTAXA
99%	100%	100%	100%	95%
SUBTAUTHOR	CROPNAME	ACCENAME	ACQDATE	ORIGCTY
0%	100%	100%	8%	100%
COLLSITE	LATITUDE	LONGITUDE	ELEVATION	COLLDATE
97%	93%	93%	88%	98%
BREDCODE	SAMPSTAT	ANCEST	COLLSRC	DONORCODE
0%	95%	0%	0%	100%
DONORNUMB	OTHERNUMB	DUPLSITE	STORAGE	MLSSTAT
99%	92%	100%	100%	98%
REMARKS	GR_CLASS	PLOIDY	REG_YEAR	SYNONYM_
4.6%	100%	100%	0%	0%
EXP_CODE	SITE_DES	HERBAR_	PRINC_ATTR	ENTRY_DATE
0%	0%	0%	100%	0%
MAN_CENTER	AVAILAB	AEGISSTAT		
-	-	100%		