



The Systematic Garden – How to manage missing taxa?

Dr. Ralf Omlor, Mainz University Botanical Garden, Germany

15th April 2016 | IrisBG Europe User Conference Amsterdam

Botanischer Garten



- garden founded in 1946
- permanent staff: 27 gardeners, head gardener, curator, education officer
- size roughly 9 hectare
- about 8500 taxa

The Systematic Garden



- one of the largest Systematic Gardens with about 2000 taxa, many annual and biennial species
- families and genera arranged according to APG II (and APG III in part)
- wealth of information on propagation, cultivation, winter protection, etc. for each individual species
- gardeners receive lists with information on all taxa destined in the beds

The thematic Garden – typical workflow

Curator

creates a preliminary list of taxa for a new thematic garden

enters the final list with details on propagation and cultivation in the database

will enter the planted items in the database and create the required labels

has to think about other projects; hard to keep track of the initial planting list

Gardener

knows a lot about propagation and cultivation of these taxa

receives the final planting list and will plant all taxa that are already available

gets an inventory list (this will only contain taxa already planted)

has to compare planting list and inventory list in search for missing taxa



The thematic Garden – ideal workflow

Curator

creates a preliminary list of taxa for a new thematic garden

enters the final list with details on propagation and cultivation in the database

will enter the planted items in the database and create the required labels

Gardener

knows a lot about propagation and cultivation of these taxa

receives the final planting list and will plant all taxa that are already available

gets a combined list which contains all taxa of the planting list and accession data of those taxa currently existent in the beds

easy to keep track of the initial planting list and to search for missing taxa



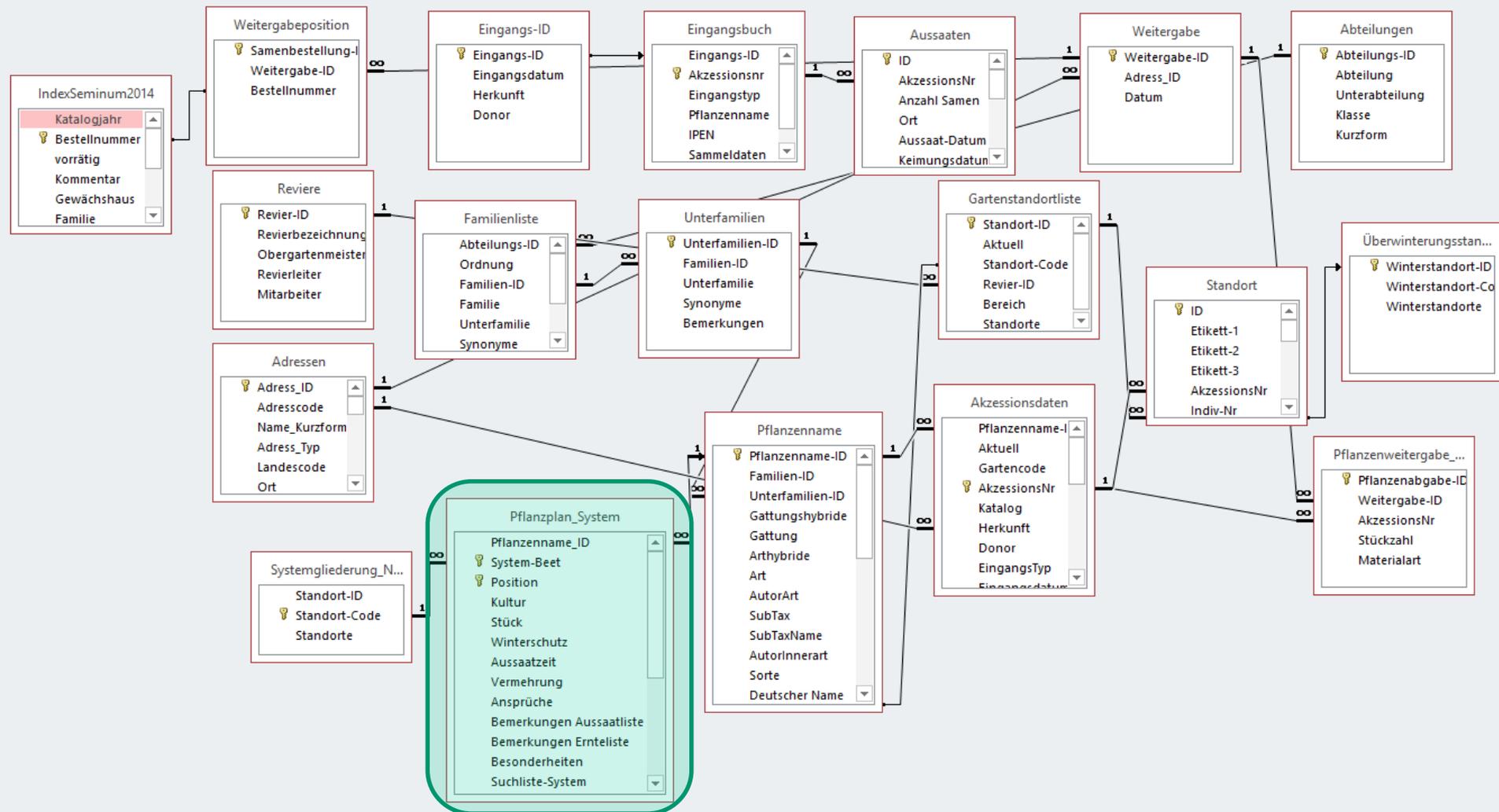
From 2000 to 2015 we used a MS Access database

The image shows the Microsoft Access 2010 interface. The ribbon at the top includes tabs for DATEI, START, ERSTELLEN, EXTERNE DATEN, and DATENBANKTOOLS. The ribbon contains various icons for actions like 'Ansicht', 'Einfügen', 'Filtern', 'Sortieren und Filtern', 'Alle aktualisieren', 'Neu', 'Speichern', 'Löschen', 'Suchen', and 'Textformatierung'. Below the ribbon, the 'Alle Access-Objekte' pane is visible on the left, listing categories like Tabellen, Abfragen, Formulare, Berichte, and Makros. The main workspace shows a 'Main Switchboard' and 'Beziehungen' tabs. A large green banner at the top of the workspace reads 'Datenbank Botanischer Garten Mainz'. Below this banner, a list of tasks is displayed with checkboxes:

- Adressverwaltung
- Bestandsdaten verwalten
- Berichte erstellen
- Etiketten
- Pflanzlisten, Suchlisten
- Index Seminar erstellen
- Eingangsbuch und Samenversand
- Datenbank schließen



From 2000 to 2015 we used a MS Access database



Sowing-List in alphabetical order

Aussaatliste Systematische Abteilung (Teil I)

Pflanzenname	Beet	Such.	AkzNr	Best.	Kult.	Ernte	Aussaat	Stück	Bemerkungen	Saat	Pikiert	Gepfl.
<i>Acorus calamus</i>	SYS-03a	<input type="checkbox"/>	19-23210	Ja	p							
<i>Aegilops geniculata</i>	SYS-07b	<input type="checkbox"/>	19-21580	Ja	a	III		20	Direkt in Mt 35 im Kasten			
<i>Aegilops speltoides</i>	SYS-07b	<input type="checkbox"/>	19-21570	Ja	a	III		20	Direkt in Mt 35 im Kasten			
<i>Aegilops triuncialis</i>	SYS-07b	<input type="checkbox"/>	201202603	Ja	a	III		20	Direkt in Mt 35 im Kasten			
<i>Agapanthus africanus</i>	SYS-06b	<input type="checkbox"/>	19-53170	Ja	p-k							
<i>Agropyron cristatum</i>	SYS-07b	<input type="checkbox"/>	19-21460	Nein	p							
<i>Agrostis castellana</i>	SYS-08a	<input type="checkbox"/>	200311401	Ja	p							
<i>Agrostis gigantea</i>	SYS-08a	<input type="checkbox"/>	199707314	Ja	p							
<i>Aira caryophylla</i>	SYS-08a	<input type="checkbox"/>	19-36920	Ja	a	III		30	Direkt in Mt 35 im Kasten			
<i>Aira elegantissima</i>	SYS-08a	<input type="checkbox"/>	199707904	Ja	a	III		30	Direkt in Mt 35 im Kasten			
<i>Alisma plantago-aquatica</i>	SYS-03a	<input type="checkbox"/>	19-20940	Ja	p							
<i>Allium angulosum</i>	SYS-04b	<input type="checkbox"/>	19-37360	Ja	p							
<i>Allium caeruleum</i>	SYS-04b	<input type="checkbox"/>	201112001	Nein	p							
<i>Allium christophii</i>	SYS-04b	<input type="checkbox"/>	201212201	Nein	p							

Pflanzenname	Beet	Such.	AkzNr	Best.	Kult.	Ernte	Aussaat	Stück	Bemerkungen	Saat	Pikiert	Gepfl.
<i>Alopecurus pratensis</i>	SYS-08a	<input type="checkbox"/>	200903106	Nein	p							
<i>Alopecurus rendlei</i>	SYS-08a	<input type="checkbox"/>	19-63030	Ja	a		III	20	Direkt in Mt 35 im Kasten			
<i>Alstroemeria aurea</i>	SYS-03b	<input type="checkbox"/>	201309401	Nein	p				2014/15: In Anzucht HS-18			
<i>Alstroemeria aurea</i>	SYS-03b	<input type="checkbox"/>	201308801	Nein	p				2014/15: In Anzucht HS-18			
<i>Alstroemeria ligtu</i>	SYS-03b	<input type="checkbox"/>	19-55990	Nein	p							
<i>Ampelodesmos mauritanicus</i>	SYS-07a	<input type="checkbox"/>	19-61160	Nein	(k)-p							
<i>Amphicarpum purshii</i>	SYS-10a	<input checked="" type="checkbox"/>		Nein	(p) a							
<i>Andropogon gerardii</i>	SYS-10b	<input type="checkbox"/>	201301505	Ja	p							
<i>Andropogon glomeratus</i>	SYS-10b	<input checked="" type="checkbox"/>		Nein	p							
<i>Andropogon virginicus</i>	SYS-10b	<input checked="" type="checkbox"/>		Nein	p							
<i>Anemopsis californica</i>	SYS-02	<input type="checkbox"/>	19-23300	Ja	p-k							
<i>Antheophora pubescens</i>	SYS-10a	<input type="checkbox"/>	199666180	Ja	a		III		T			
<i>Anthericum liliago</i>	SYS-06a	<input type="checkbox"/>	19-67250	Ja	p							
<i>Anthericum ramosum</i>	SYS-06a	<input type="checkbox"/>	19-37490	Ja	p							
<i>Anthoxanthum aristatum</i>	SYS-08a	<input type="checkbox"/>	199803602	Ja	a		III	20	Direkt in Mt 35 im Kasten			

taxa which are presently missing are still on the list

Beet	No	Pflanzenname	Familie	Kult.	AkzNr	Best.	Ernte	Suchl.	Winter	Bemerkungen
SYS-03b										
SYS-03b	01	Alstroemeria ligtu	Alstroemeriaceae	p	19--55990	Nein		<input type="checkbox"/>	L	
SYS-03b	02	Alstroemeria aurea	Alstroemeriaceae	p	201309401	Nein		<input type="checkbox"/>	-	2 Herkünfte in Anzucht HS 18
SYS-03b	02	Alstroemeria aurea	Alstroemeriaceae	p	201308801	Nein		<input type="checkbox"/>	-	2 Herkünfte in Anzucht HS 18
SYS-03b	03	Colchicum bommuelleri	Colchicaceae	p	19--56000	Nein		<input type="checkbox"/>	-	
SYS-03b	04	Colchicum cilicicum	Colchicaceae	p	199817201	Nein		<input type="checkbox"/>	-	
SYS-03b	05	Bulbocodium vernum	Colchicaceae	p	200608203	Ja		<input type="checkbox"/>	-	
SYS-03b	06	Gloriosa superba 'Rothschildiana'	Colchicaceae	k	200604208	Ja		<input type="checkbox"/>	H	Überwinterung in Seerosenkorb trocken
SYS-03b	06	Gloriosa superba 'Rothschildiana'	Colchicaceae	k	200905201	Nein		<input type="checkbox"/>	H	Überwinterung in Seerosenkorb trocken
SYS-03b	07	Zigadenus elegans ssp. elegans	Melanthiaceae	p	19--66310	Ja		<input type="checkbox"/>	-	
SYS-03b	08	Zigadenus elegans ssp. glaucus	Melanthiaceae	p	19--66170	Ja		<input type="checkbox"/>	-	
SYS-03b	09	Veratrum nigrum	Melanthiaceae	p	19_45150	Ja		<input type="checkbox"/>	-	
SYS-03b	10	Veratrum album ssp. lobelianum	Melanthiaceae	p		Nein		<input checked="" type="checkbox"/>	-	
SYS-03b	11	Smilax aspera	Smilacaceae	p	19--60000	Ja		<input type="checkbox"/>	L	
SYS-03b	12	Gagea villosa	Liliaceae	p	201005101	Ja		<input type="checkbox"/>	-	
SYS-03b	13	Gagea lutea	Liliaceae	p	201112002	Nein		<input type="checkbox"/>	-	
SYS-03b	14	Calochortus venustus	Liliaceae	p-k	201212204	Nein		<input type="checkbox"/>	D + L	Mit Dach außer in der Blütezeit
SYS-03b	15	Tulipa turkestanica	Liliaceae	p	201112009	Nein		<input type="checkbox"/>	-	
SYS-03b	16	Tulipa tarda	Liliaceae	p	201112008	Nein		<input type="checkbox"/>	-	
SYS-03b	17	Tulipa undulatifolia	Liliaceae	p	19--61510	Ja		<input type="checkbox"/>	-	
SYS-03b	18	Tulipa clusiana var. clusiana	Liliaceae	p	201212208	Nein		<input type="checkbox"/>	-	
SYS-03b	19	Tulipa polychroma	Liliaceae	p	201112007	Ja		<input type="checkbox"/>	-	
SYS-03b	20	Tulipa linifolia	Liliaceae	p	201112006	Nein		<input type="checkbox"/>	-	
SYS-03b	21	Tulipa praestans	Liliaceae	p	19--36240	Ja		<input type="checkbox"/>	-	2011/12: eingeschlagen im Kasten
SYS-03b	21a	Tulipa orphanidea 'Whittallii'	Liliaceae	p	201112011	Nein		<input type="checkbox"/>	-	

Are we able to produce our lists from IrisBG ?

The screenshot shows the IrisBG - Botanical Garden Collection Management software interface. The window title is "IrisBG - Botanical Garden Collection Management". The menu bar includes "File", "Window", and "Help". The main window is titled "Botanischer Garten".

The left sidebar contains the following menu items:

- Collections
 - Accessions
 - Item management
 - Localities
 - Projects
 - Inbox
- Taxonomy
 - Taxa
 - Taxonomic groups
- Reports
 - Reports
 - Maps
 - Labels
- Events
- Management
- Store
- Authorization
- Definitions
- Maintenance

The main content area displays the "IrisBG" logo and the text "Botanical Garden Collection Management". To the right of the text is a detailed illustration of a yellow iris flower. Below the title, the following information is displayed:

Version: **3.5.5.16022 - 10.02.2016**
Database: **IrisBG-1: IrisBG-1.srv.uni-mainz.de**
License: **Botanischer Garten der Johannes Gutenberg-Universität Mainz**
Users: **5**

At the bottom of the main content area, there is a logo for "2004-2016 Digital Forvaltning AS / Botanical Software Ltd" and a small green shield icon with three yellow dots.

Step 1: define Custom attributes and Code lists

IrisBG - Botanical Garden Collection Management

File Data Window Help

Botanischer Garten

Custom attributes
Manage user defined custom attributes

Save

Target	Column name	Description	Code list	Data type	For...	Comme...	Sort	Field name
Taxon	Winter prot...		Winter protection	Code				AtrT_Winter_protection
Taxon	Prop. info		Prop. info	Code				AtrT_Prop_info
Taxon	Prop. time		Prop. time	Code				AtrT_Prop_time
Taxon	Prop. quantity	Anzahl der im SYS vo...		String	10			AtrT_Prop_quantity
Taxon	Cult. mode	Art der Kultur	Cult. mode	Code				AtrT_Cult_mode
Taxon	Sowing list	Bemerkungen Aussa...		String	50			AtrT_Sowing_list
Taxon	Harvest list	Bemerkungen Ernteliste		String	50			AtrT_Harvest_list
Taxon	Search list	Suchliste	Search list	Code				AtrT_Search_list

8 rom 08.12.2015 17:37:49

Step 1: define Custom attributes and Code lists

IrisBG - Botanical Garden Collection Management

File Data Window Help

Botanischer Garten

Code lists
Manage common code lists

Save

Code list	Value	Name	Default	Comments	Sort
+ Ocean type					
+ Period					
+ Prop. history					
- Prop. info					
Prop. info	w	w	<input type="checkbox"/>	Aussaat warm (Schwitzkasten)	1
Prop. info	K	K	<input type="checkbox"/>	Kaltkeimer	2
Prop. info	L	L	<input type="checkbox"/>	Lichtkeimer	3
Prop. info	L,w	L,w	<input type="checkbox"/>	Lichtkeimer, warm	4
Prop. info	L,K	L,K	<input type="checkbox"/>	Lichtkeimer + Kaltkeimer	5
Prop. info	D	D	<input type="checkbox"/>	Direktaussaat	6
Prop. info	S	S	<input type="checkbox"/>	Selbstaussaat	7
Prop. info	(S)	(S)	<input type="checkbox"/>	unsichere Selbstaussaat	8
Prop. info	S/D	S/D	<input type="checkbox"/>	Selbstaussaat (+ Direktsaat)	9
Prop. info	S/K	S/K	<input type="checkbox"/>	Selbstaussaat (+ Kaltkeimer)	10
Prop. info	St	St	<input type="checkbox"/>	Stecklingsvermehrung	11
Prop. info	St,w	St,w	<input type="checkbox"/>	Steckling, warm	12
Prop. info	Ws	Ws	<input type="checkbox"/>	Wurzelschnittling	13
+ Prop. time					
+ Provenance					
+ Regional Red list					
+ Search list					
+ Sex type					
+ Task type					

224 *** 18.03.2015 22:20:42

Step 2: Import your data

IrisBG - Botanical Garden Collection Management

File Data Window Help

Botanischer Garten Max search 5000

Taxa and nomenclature
Manage taxa and nomenclature

Taxon name: **Aegilops geniculata** Family: **Poaceae** Save Expire...

Names Details Parentage Images References

Properties

Restriction° Provisional°

Description

Description°

Life form° Hardiness° einjährige Pflanze

Usage type° notes°

Label text°

Keywords°

Occurrence

Distribution° notes° Mittelmeergebiet - SW...

Habitat° notes°

IUCN Red List°

Attributes

Name	Value
Cult. mode	a
Harvest list	
Prop. info	
Prop. quantity	20
Prop. time	III
Search list	
Sowing list	Direkt in Mt 35 im Kasten
Winter protection	

Themes

Type°	Description	R...
-------	-------------	------

Type items

Type name	Type specimen	Item
-----------	---------------	------

System tasks
Configurations
Import data

1 rom 13.01.2016 12:13:18

Step 3: define the sequence of taxa for each bed

IrisBG - Botanical Garden Collection Management

File Data Window Help

Botanischer Garten

Tasks
Manage tasks

Task

No° Status° date~ 1 ● Open 23.11.2015 Date start~ end~

Name~ SYS-03a Contact°

Type° Systemliste Exp. cost Act. cost

Description Comments

Priority° Owner° 0... Omlor, Ralf Reg. init. date rom 23.11.2015

Save

Delete...

Entries kind° Taxon

Code/Name°	Info-1	Info-2	Comments	Image	Status	Sort /
* Click here to add a new row						
Acorus calamus			Kies, Wasserbecken 80x80x35		● Open	1
Tofieldia calyculata			Kies, Wasserbecken 80x80x35		● Open	2
Orontium aquaticum			Kies, Wasserbecken 100x150x35		● Open	3
Lysichiton camtschatce...			Kies, Wasserbecken 100x150x60		● Open	4
Spirodela polyrhiza			Kies, Wasserbecken 80x80x35		● Open	5
Lemna trisulca			Kies, Wasserbecken 80x80x35		● Open	6
Arum italicum					● Open	7
Dracunculus vulgaris					● Open	8
Sauromatum venosum					● Open	9
Zantedeschia aethiopica			Kies, Wasserbecken 100x150x35		● Open	10
Calla palustris			Kies, Wasserbecken 100x150x35		● Open	11
Pistia stratiotes			Kies, Wasserbecken 100x150x35		● Open	12
Hydrocharis morsus-ranae			Kies, Wasserbecken 100x150x35		● Open	13
Flodea canadensis			Kies, Wasserbecken 100x150x60		● Open	14

1 / 25

1 / 1 rom 08.04.2016 12:37:27

Step 4: create a planting list for each bed

A1	EventName	EntrySort	EntryFamilyEx	EntryTaxonName	EntryComment	AtrT_Winter_protection
1	SYS-03a	1	Acoraceae	Acorus calamus	Kies, Wasserbecken 80x80x35	
2	SYS-03a	2	Tofieldiaceae	Tofieldia calyculata	Kies, Wasserbecken 80x80x35	
3	SYS-03a	3	Araceae	Orontium aquaticum	Kies, Wasserbecken 100x150x35	
4	SYS-03a	4	Araceae	Lysichiton camtschatcensis	Kies, Wasserbecken 100x150x60	
5	SYS-03a	5	Araceae	Spirodela polyrhiza	Kies, Wasserbecken 80x80x35	
6	SYS-03a	6	Araceae	Lemna trisulca	Kies, Wasserbecken 80x80x35	
7	SYS-03a	7	Araceae	Arum italicum		
8	SYS-03a	8	Araceae	Dracunculus vulgaris		Laub und Reisig
9	SYS-03a	9	Araceae	Sauromatum venosum		Laub und Reisig
10	SYS-03a	10	Araceae	Zantedeschia aethiopica	Kies, Wasserbecken 100x150x35	Laub und Reisig
11	SYS-03a	11	Araceae	Calla palustris	Kies, Wasserbecken 100x150x35	
12	SYS-03a	12	Araceae	Pistia stratiotes	Kies, Wasserbecken 100x150x35	Gewächshaus
13	SYS-03a	13	Hydrocharitaceae	Hydrocharis morsus-ranae	Kies, Wasserbecken 100x150x35	
14	SYS-03a	14	Hydrocharitaceae	Elodea canadensis	Kies, Wasserbecken 100x150x60	
15	SYS-03a	15	Butomaceae	Butomus umbellatus	Kies, Wasserbecken 100x150x60	
16	SYS-03a	16	Alismataceae	Sagittaria sagittifolia	Kies, Wasserbecken 100x150x60	
17	SYS-03a	17	Alismataceae	Alisma plantago-aquatica	Kies, Wasserbecken 100x150x35	
18	SYS-03a	18	Juncaginaceae	Triglochin palustre	Kies, Wasserbecken 100x150x35	
19	SYS-03a	19	Aponogetonaceae	Aponogeton distachyos	Kies, Wasserbecken 100x150x60	
20	SYS-03a	20	Potamogetonaceae	Potamogeton crispus	Kies, Wasserbecken 100x150x60	
21	SYS-03a	21	Potamogetonaceae	Potamogeton natans	Kies, Wasserbecken 100x150x60	
22	SYS-03a	22	Nartheciaceae	Narthecium ossifragum	Kies, Wasserbecken 80x80x35 (ab Herbst 2016)	
23	SYS-03a	23	Alismataceae	Caldesia parnassifolia	Kies, Wasserbecken 80x80x35	
24	SYS-03a	24	Dioscoreaceae	Dioscorea villosa	Klettergerüst	
25	SYS-03a	25	Dioscoreaceae	Dioscorea tokoro	Klettergerüst	Laub und Reisig

this is fine for the „typical workflow“ described earlier

Step 5: now, try to create a combined list

The screenshot displays the 'IrisBG - Botanical Garden Collection Management' application. The interface is divided into several sections:

- Left Sidebar:** A navigation menu with categories like 'Collections', 'Taxonomy', 'Reports', 'Events', 'Management', 'Store', 'Authorization', 'Definitions', and 'Maintenance'. The 'Reports' category is expanded, and 'Reports' is highlighted with a green box.
- Reports Section:** A table listing various reports. The 'SYS Aussaat' and 'SYS Ernte' reports are highlighted with green boxes. The table has columns for 'Code' and 'Name'.

Code	Name
01	Accession objects
02	Accession items
Item02	Items data
ItemInv	Items data for inventory
ItemTrees	Items Trees
Prop01	Propagations
SYS Aussaat	Items data for SYS sowing list
SYS Ernte	Items data for SYS harvesting list
03	Taxa
04	Events
05	Management
06	Statistics
10	Store
99	Miscellaneous
- Items data for SYS harvesting list:** A configuration panel for the selected report. It includes a 'Saved filters' dropdown and a list of filters for 'Item' and 'Event'.
 - Item filters:**
 - Item type
 - Item status
 - Label type
 - Item location code: begins with '20•SYS-03a•', Sort order: Ascending, 0
 - Item location name
 - Item location ref.: begins with [empty], Sort order: Ascending, 1
 - Item location map ref.
 - Item location type
 - Item status type: is equal Existing, Sort order: Ascending, 0
 - Item status date
 - Condition
 - Item no
 - Cons. no
 - Label ok
 - Image count
 - Event filters:**
 - Event name: is equal Task 1: SYS-03a

- Right Panel:** Buttons for 'View...', 'Print...', and 'Export...'.

Step 5: now, try to create a combined list

Excel spreadsheet showing a list of plant specimens. The columns are labeled: DATEI, START, EINFÜGEN, SEITENLAYOUT, FORMELN, DATEN, ÜBERPRÜFEN, ANSICHT, Corel PDF Fusion. The data columns are A through L.

ItemLocation	ItemLocat	TaxonName	Family	AtrT_Cult	AccNoFull	AtrT_Winter_protection	AtrT_Harvest_list
SYS-03a	01	Acorus calamus	Acoraceae	p	190023210		
SYS-03a	03	Orontium aquaticum	Araceae	p	190063020		
SYS-03a	04	Lysichiton camtschatcensis	Araceae	p	201208401		
SYS-03a	05	Spirodela polyrhiza	Araceae	p	190066970		
SYS-03a	06	Lemna trisulca	Araceae	p	190066980		
SYS-03a	07	Arum italicum	Araceae	p	200604205		Samen einsenden
SYS-03a	08	Dracunculus vulgaris	Araceae	p	200710801	L	Samen einsenden
SYS-03a	09	Sauromatum venosum	Araceae	p	200605905	L	
SYS-03a	10	Zantedeschia aethiopica	Araceae	p	190053430	L	
SYS-03a	11	Calla palustris	Araceae	p	190062950		Kühl in H2O lagern
SYS-03a	12	Pistia stratiotes	Araceae	k	190022080	H	
SYS-03a	13	Hydrocharis morsus-ranae	Hydrocharitaceae	p	190020980		
SYS-03a	14	Elodea canadensis	Hydrocharitaceae	p	190020970		
SYS-03a	15	Butomus umbellatus	Butomaceae	p	190020930		
SYS-03a	16	Sagittaria sagittifolia	Alismataceae	p	190020950		
SYS-03a	17	Alisma plantago-aquatica	Alismataceae	p	190020940		
SYS-03a	18	Triglochin palustre	Juncaginaceae	p	190021000		
SYS-03a	19	Aponogeton distachyos	Aponogetonaceae	p	200814501		F-Lagerung im KS: Keimung!
SYS-03a	20	Potamogeton crispus	Potamogetonaceae	p	190021040		
SYS-03a	21	Potamogeton natans	Potamogetonaceae	p	200814502		
SYS-03a	22a	Caldesia parnassifolia	Alismataceae	p	201408301		
SYS-03a	23	Dioscorea villosa	Dioscoreaceae	p	200906703		
SYS-03a	24	Dioscorea tokoro	Dioscoreaceae	p	200908611	L	

fine, but *Tofieldia calyculata* destined for position 02 is missing

Are we able to produce our lists from IrisBG ?

IrisBG
Botanical Garden Collection Management

Version: 3.5.5.16022 - 10.02.2016
Database: IrisBG-1: IrisBG-1.srv.uni-mainz.de
License: Botanischer Garten der Johannes Gutenberg-Universität Mainz
Users: 5

2004-2016 Digital Forvaltning AS / Botanical Software Ltd

Using tasks and reports in IrisBG you can get nice planting lists, but apparently they cannot be combined with accession data.