Global *Allium* genetic resources

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ECPGR *Allium* meeting, October 11-12 2022

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Centre for Genetic Resources, The Netherlands (CGN)

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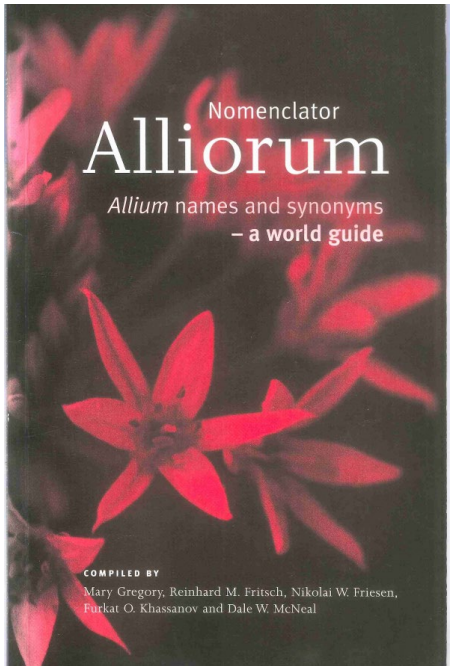
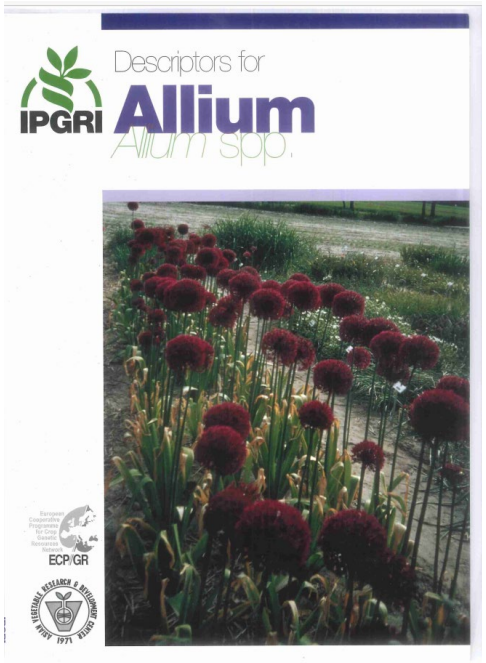
The importance of an overview of global *Allium* genetic resources

- To obtain a clearer picture of the information present concerning *Allium* genetic resources worldwide, on the between and within
    - species, genebank, region, ... level

- On the basis of this information informed decisions can be made for: enlargement/rationalization genebank collections, collecting missions, etc

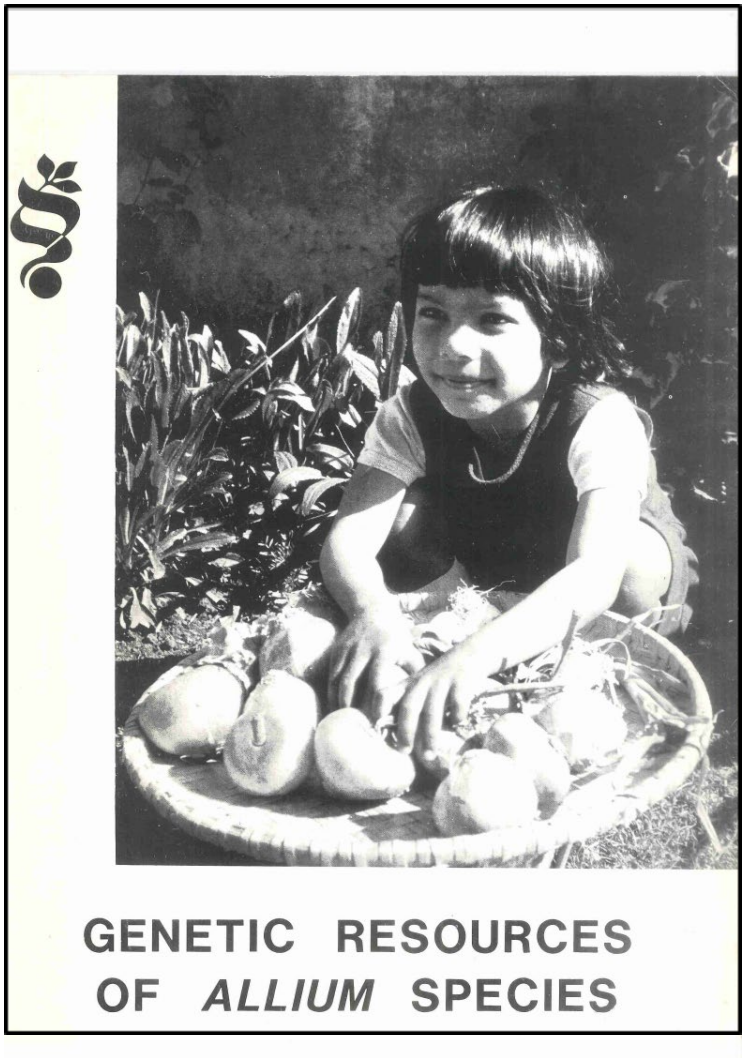
Important aspects in building GR db's





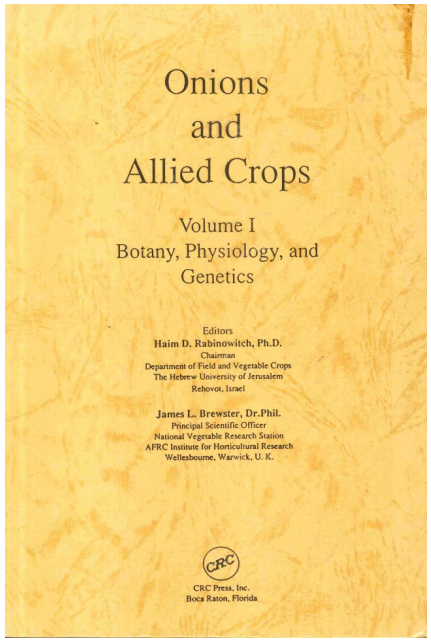
- Proper identification of botanical names: Nomenclator Alliorum (1998)
- *Allium* descriptors: passport + C&E data (2001)

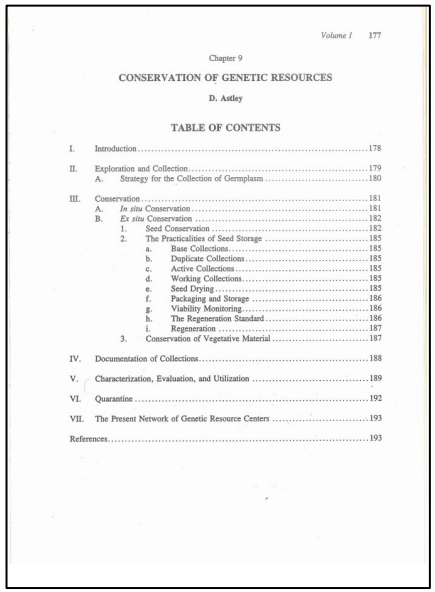
Historical aspects global *Allium* resources



- Astley, Innes & vd Meer (1982)
- Identified major *Allium* collections worldwide species:
- 19 institutes from 15 countries
- 5856 (7 cultivated species) + 324 (wild) + 3222 (VIR) = 9402 acc (IPK: 9 species!!)
- Draft *Allium* descriptor list
- Priority list for future collecting missions (onions LR first!)

Historical aspects global *Allium* resources





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Chapter 9

CONSERVATION OF GENETIC RESOURCES

D. Astley

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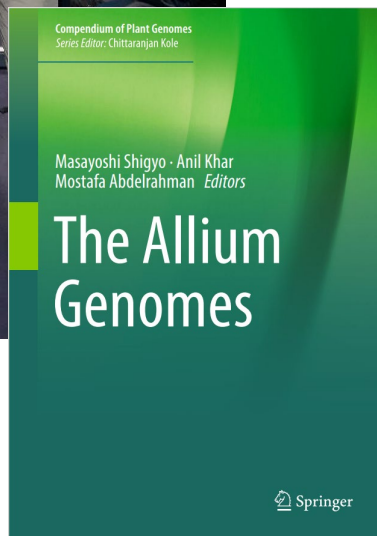
- Astley (1990). Conservation of Genetic Resources; In: Onions and Allied Crops (Rabinowitch & Brewster Eds.)
- A text on genebank management procedures: from collecting to utilization

Historical aspects global *Allium* resources



- Keller & Kik (2018) *Allium* genetic resources; In: The *Allium* genomes (Shigyo et al; Eds.)
- An updated text on the basis of the Astley (1990); text comprising all aspects of genebank management and a number of related issues

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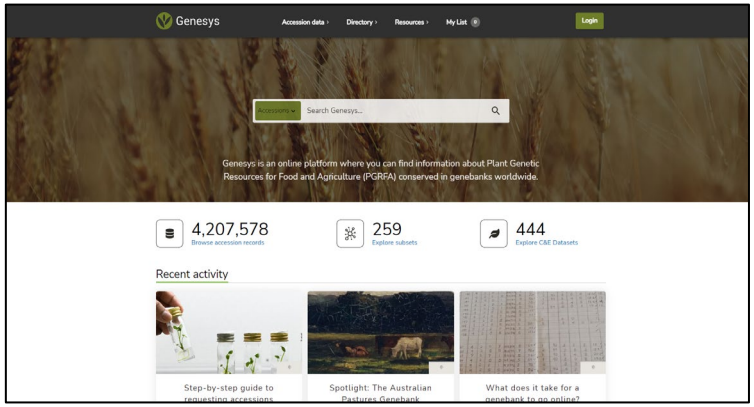
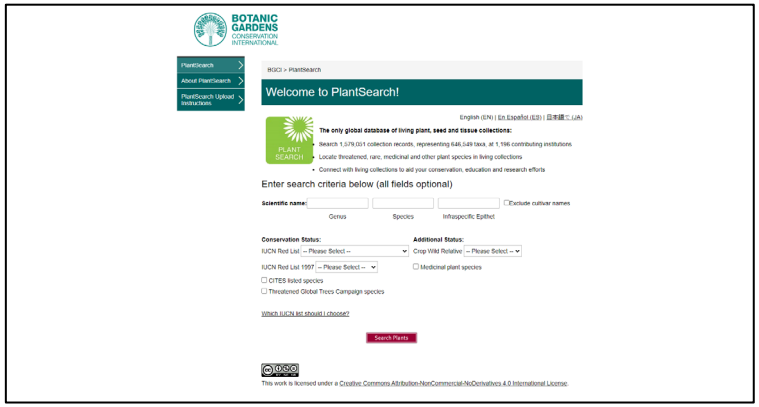
Which are the important global crop portals

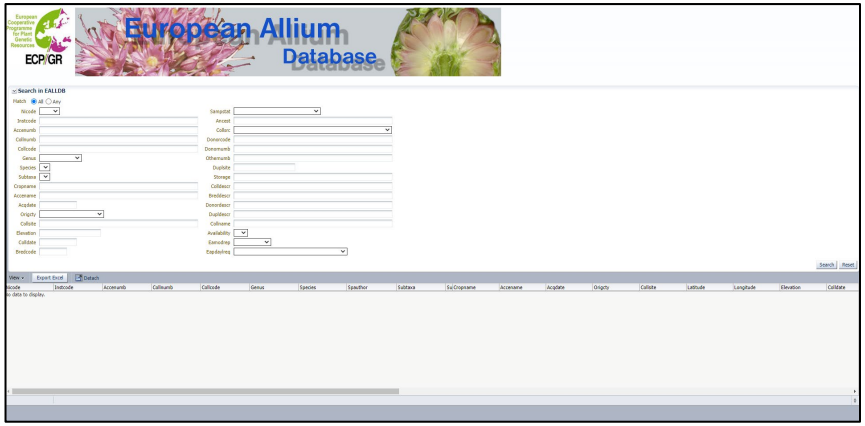


- Genebanks: most important one:
  - GENESYS (www.genesys-pgr.org)



- Botanical gardens: most important one:
  - PLANTSEARCH (https://tools.bgci.org/plant_search.php)

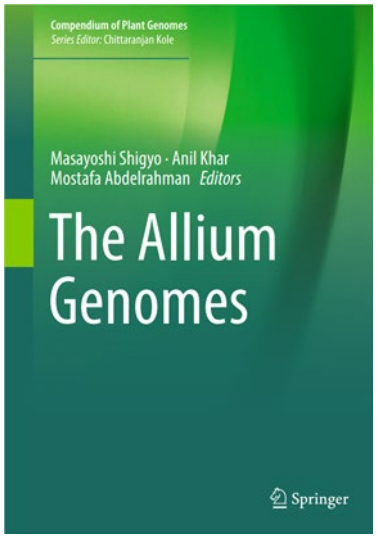
Specific *Allium* crop portals



- *Allium* database at IPK: EAllDB
  - https://eralldb.ipk-gatersleben.de

NOTE!!

- Rest of the presentation based on Keller & Kik (2018); data retrieved mostly from GENESYS



Overview global Allium crop portals

- Total # of *Allium* accessions present in:
  - GENESYS: 20627
  - PLANTSEARCH: 6270

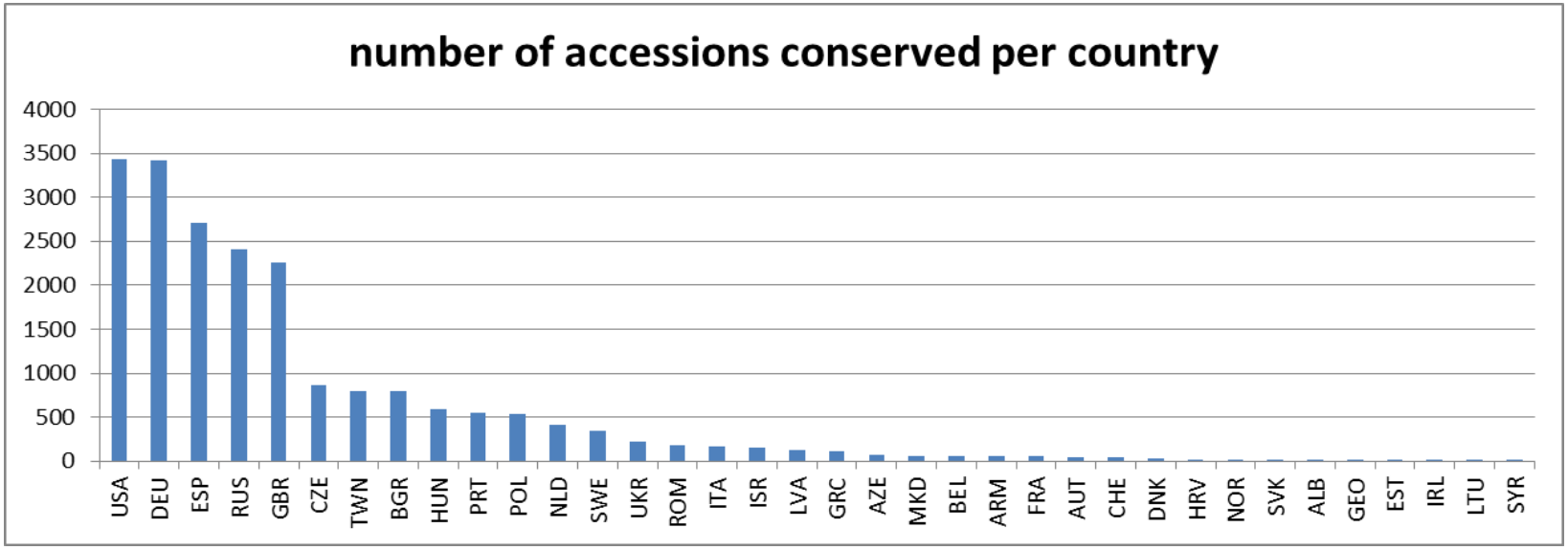
Subgenus	total # of species	# unique species in bg	# unique species in gb	# species in common	total # species in bg & gb	% # species in bg & gb and # species	# acc bg	# acc gb
Allium	434	41	54	79	174	40	1442	7244
Amerallium	180	38	19	52	109	61	1341	524
Anguinum	14	3	2	1	6	43	115	45
Butomissa	4	0	0	4	4	100	196	223
Caloscordum	3	0	0	1	1	33	3	5
Cepa	32	5	7	17	29	91	873	10031
Cyathophora	5	1	0	2	3	60	78	18
Melano-crommyum	170	9	58	57	124	73	1080	526
Micro-scordum	1	1	0	0	1	100	7	0
Nectaro-scordum	3	0	0	3	3	100	34	8
Polyprason	60	16	13	25	54	90	310	222
Porphyro-prason	1	0	0	1	1	100	65	16
Reticulato-bulbosa	85	13	10	15	38	45	203	117
Rhizirideum	45	9	9	15	33	73	408	353
Vvedenskya	1	0	0	1	1	100	0	3
?							115	1292
Total	1038	136	172	273	581	56	6270	20627

of acc. of cult. *Allium* spec. in bg and gb

Subgenus/ Species	# accessions	Botanical garden	Genebank		Subgenus/ Species	# accessions	Botanical garden	Genebank
Allium					***Butomissa***			
ampeloprasum	2013	161	1852		*ramosum*	103	45	58
sativum	4504	130	4634		*tuberosum*	299	142	157
macrostemon	23	14	9		***Cepa***			
rotundum	127	30	97		*fistulosum*	975	105	870
Amerallium					*altaicum*	136	42	94
canadense	49	38	11		*cepa*	8660	215	8445
hookeri	15	11	4		*chinense*	33	16	17
kunthii	12	7	5		*oschaninii*	48	18	30
neapolitanum	117	76	41		*pskemense*	66	38	28
ursinum	177	103	74		*schoenoprasum*	607	256	351
wallichii	30	26	4		*x proliferum*	81	0	81
Anguinum					***Polyprason***			
victorialis	150	104	46		*obliquum*	63	42	21
					Rhizirideum			
					nutans	121	60	61

of accessions conserved per country

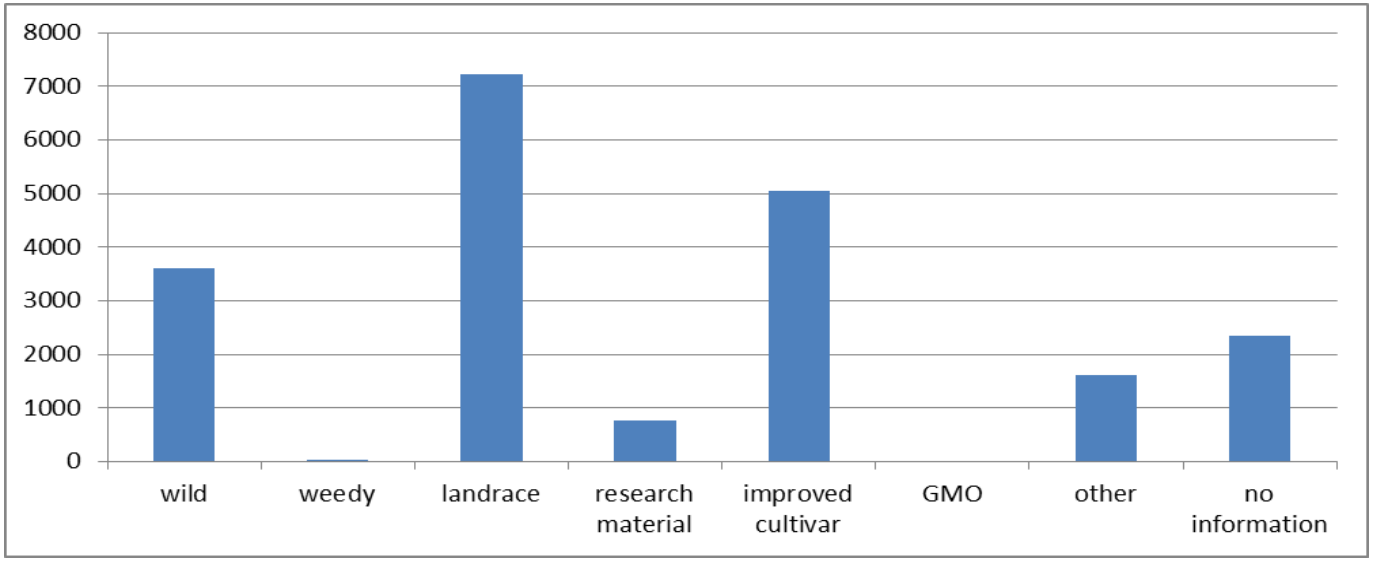
- most accessions conserved: USA, GER (IPK!), ESP, RUS
- 86 countries



Composition of global *Allium* collections

- via SAMPSTAT descriptor

The number of *Allium* accessions per biological status of the material held in genebanks worldwide based on GENESYS



Methods of conservation

- The method of conservation of *Allium* accessions as provided by GENESYS
  - Seed: 7661 accessions
  - Field: 4468 accessions
  - Cryo: 340 accessions
  - *In vitro*: 136 accessions

Availability and safety duplication

- Generative material (seeds):
  - total # of accessions: 20627
  - availability: 1999 available; 1571 not available; 17053 not specified
  - safetly duplication:19998 duplicated at Svalbard; 18511 duplicated at 16 sites
- Vegetative material (bulbs):
  - *Allium* field collection Olomouc is duplicated at IPK
  - 200 garlic accessions in cryo maintained at CZE, DEU and POL (trilaterial safetly duplication)

Duplication of accessions

Holding country	No. of *Allium* acc held	No. of *Allium* accs with DONORCODE/ DONORDESCR	% of duplication
ARM	57	1	2
AUT	44	15	34
AZE	40	1	3
BGR	816	374	46
CHE	50	48	96
CZE	817	666	82
DEU	2772	789	28
ESP	1882	262	14
FRAU	54	33	61
GBR	2153	1784	83
HUN	590	230	39
ITA	170	1	1
LTU	1	1	100
NGB	312	120	38
NLD	428	428	100
POL	548	320	58
ROU	176	15	9
SVK	5	5	100
UKR	229	20	9

- Cannot be analysed via GENESYS; but via EURISCO using as a proxy DONOR CODE and DONOR DESCRIPTION this is possible
- Duplication between genebanks varies between 1-100% with a mean of 47%.

Conclusions

- The development of crop portals has greatly improved the knowledge of the content of global *Allium* genetic resources.
- A new conservation technique has been developed for *Allium*: cryo conservation.
- Almost all *Allium* accessions have been safety duplicated.
- Large gaps still present in global *Allium* collections: both on the within and between species level.
    - the need for *Allium* collecting missions is still present, however the international PGR exchange regime is not really helpful in this respect.

Thanks for your attention

More information:

- www.wur.nl/cgn
- chris.kik@wur.nl

Thanks to Helena for coordinating the ECPGR *Allium* group!!

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