

# Genebank Certification & Genebank Metrics

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# Genebank Certification

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- **FAO-WIEWS (Feb 2023):**
  - 425 genebanks in Europe with 2 063 707 accessions

what does this mean?

what are these genebanks, can we rely on them conserving our PGR for our (grand-)children?

do users have access to this material?

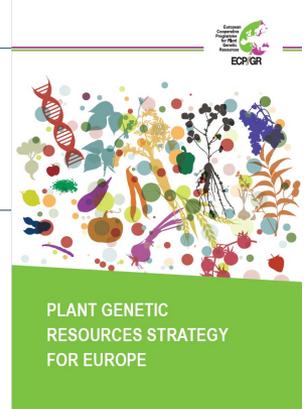
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# Genebank Certification

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- definition of 'genebank'
  - a genebank conserves PGR for future generations of users and makes it available to the current
    - conservation: according to the FAO Genebank Standards (or similar level standards)
    - availability: under the SMTA of the IT-PGRFA

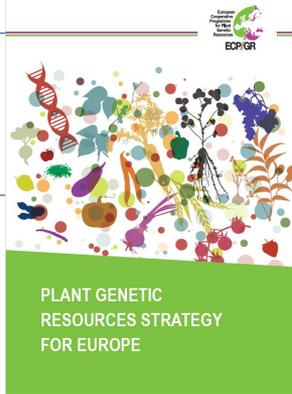
# Genebank Certification



## ■ PGR Strategy for Europe

- *by 2030, the PGR diversity in European genebanks is conserved reliably and made accessible for sustainable use, by improving the efficiency and efficacy of the European genebank infrastructure*
- the European *ex situ* conservation system will be raised to a level of excellence in terms
  - long-term quality
    - conservation management
    - viability
    - genetic integrity
    - phytosanitary protection
  - accessibility of conserved material to users

# Genebank Certification



## ■ PGR Strategy for Europe

- establish a certification system, that is economically sustainable and accessible to genebanks and collection holders, based on a quality management system (AQUAS) with standards and a (external) monitoring system
  - consolidating AQUAS using generic FAO genebank conservation standards and agreed crop-specific adaptations when appropriate, along with simple and inexpensive performance indicators and a reporting system
  - establish and run a monitoring system, based on both internal and independent peer reviews and a certification mechanism

# Genebank Certification

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- establish a genebank certification system
  - within the EU project Pro-GRACE: work-package on setting up a 'blueprint for a genebank certification system'
    - collaboration with Crop Trust and CGIAR Genebank Initiative towards further developing the Genebank Quality Management System
    - assure political support via Inter-governmental Technical Working Group of the CGRFA
      - "The Working Group also recommended that FAO look into options on how and which capacity-building and evaluation mechanisms could be created to support genebanks in reaching the Genebank Standards and explore the possibility for creating an acknowledgement system."

# Genebank Certification

from: Janny van Beem, pers. comm.

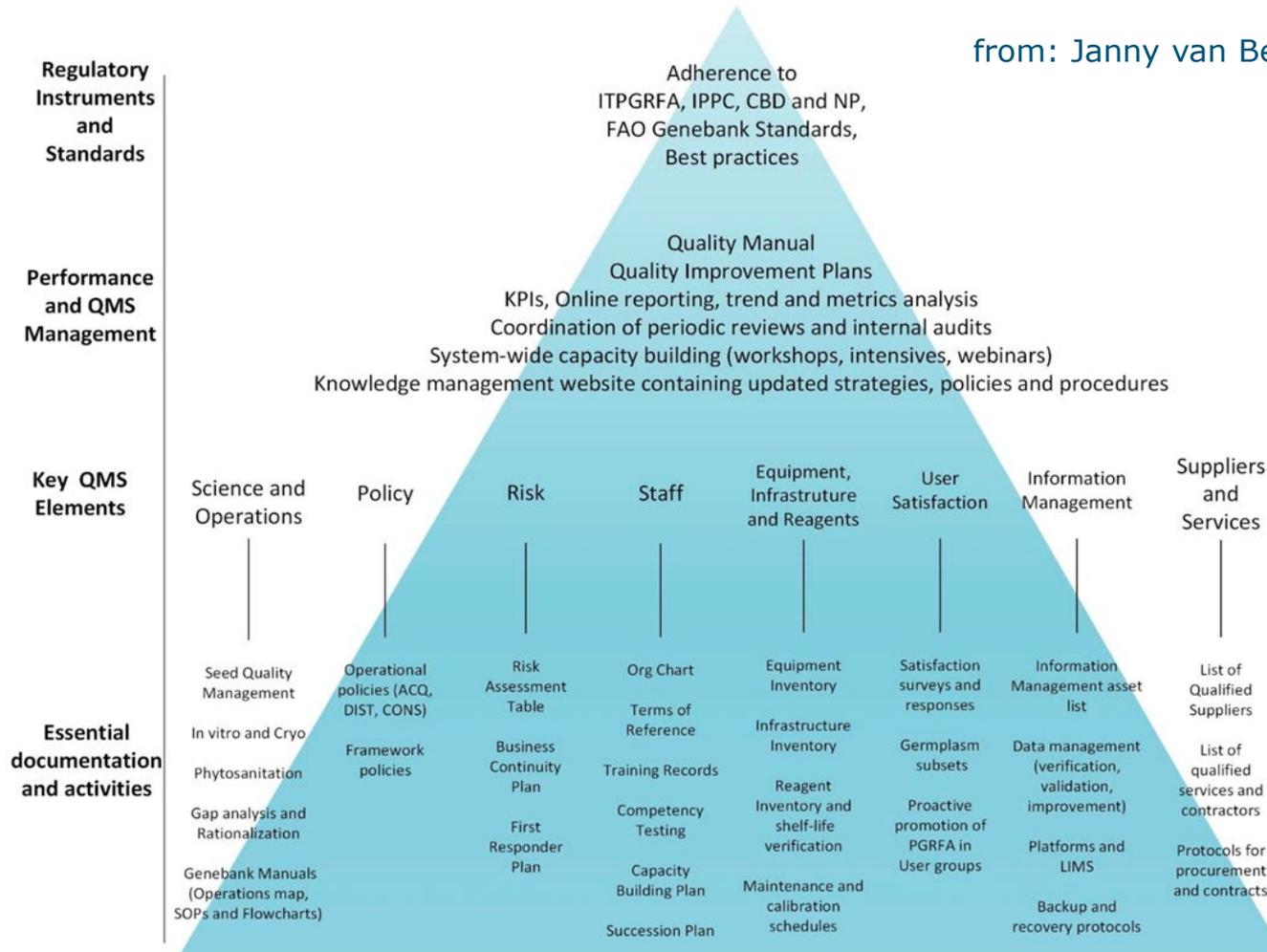


Figure 1. Key elements and regulatory framework of the Genebank QMS.

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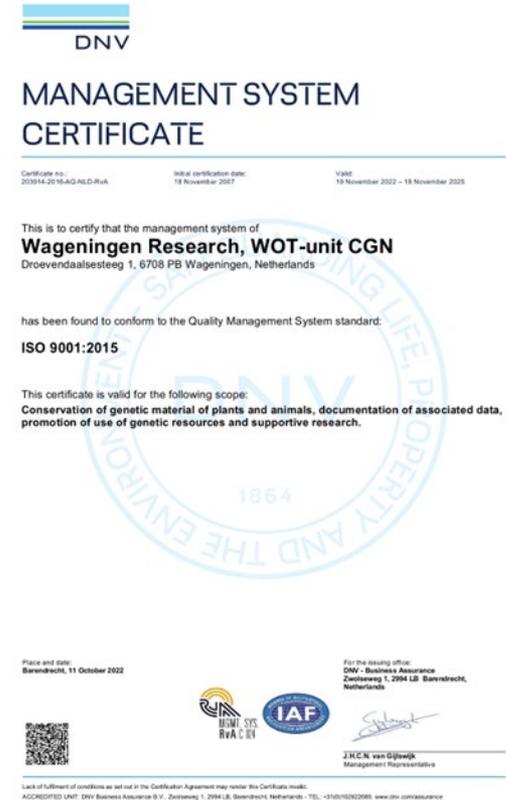
# Genebank Certification

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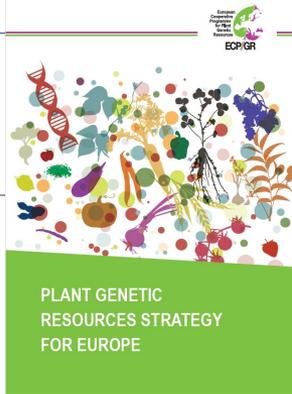
- required elements of a certification system
  - genebank needs quality management system
    - standard operating procedures (SOPs)
    - reporting/monitoring system
  - SOP's need to meet agreed standards
    - agreed standards (FAO genebank standards, crop-specific specifications)
    - an authority needs to check and approve
  - compliance needs to be confirmed independently
    - monitoring/certifying authority
  - costs (for individual genebanks) need to be kept low

# Genebank Certification

- some European genebanks have experience with quality management
- CGIAR (Crop Trust) developed Genebank Quality Management System



# Genebank Certification



- PGR Strategy for Europe
  - create capacity building and facility improvement mechanisms that support genebank managers to achieve the standards needed for certification
    - establish monitoring system for identifying needs for capacity and facility improvement
    - create capacity building activities
      - websites, publications and social media
      - staff exchanges
      - conferences
      - training material at all levels
    - support facility improvement

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# Genebank Metrics

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- Genebank Metrics are a tool for monitoring the genebank
  - some should always be present others give detail but are not essential
    - number of accessions vs number of accessions of European origin
- should be relatively easy to calculate by any well organised genebank
  - scripted once (can be difficult) – so that it can be calculated without effort
    - not able to calculate the metrics implies that documentation is not sufficiently organised

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# Genebank Metrics

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- Genebank Metrics are a tool for monitoring the genebank
  - show status of collection and activity of genebank
  - categories
    - size and composition of the collection
    - data and documentation
    - conservation
    - availability
    - distribution
  - types
    - metrics describing the status at a certain Moment
    - metrics describing the activity in a certain Period

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# Genebank Metrics

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- Genebank Metrics are a tool for monitoring the genebank
  - metrics are based on concepts and SOPs
    - 'accession' is the basis of all calculations
      - maintained according to the protocols
    - 'base sample' is used to conserve the accession
      - germination should be monitored of this sample
    - depending on SOP
      - e.g. 'number of accessions that need a germination test'

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# Genebank Metrics

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- CGN developed (draft) list of Genebank Metrics
  - 10 mandatory
    - number of accessions
    - number of results of germination tests on base samples generated and stored in the reporting period
    - number of accessions that need a germination test
    - etc.
  - 36 elaborations
    - number of accessions of wild or weedy populations

# Genebank Metrics

23-mar-2023

Period 2018-2022

## COMPOSITION

Cnr	Crop	# accessions	% wild/weedy	% landrace	% cultivar	% other/unkn.	% from NL	% from Asia	% from Africa	% from N. America	% from S. America	% from Europe	% from Oceania	% other/unkn.	time in coll.	# new 2018-2022	# out 2018-2022
1	wheat	4914	10%	44%	27%	19%	4%	39%	8%	4%	2%	39%	2%	6%	33.4	5	1
2	barley	2664	3%	57%	16%	23%	13%	45%	14%	2%	1%	31%	0%	5%	36.0		2
3	flax	951	1%	5%	30%	65%	5%	8%	2%	15%	10%	28%	1%	36%	23.6		1
4	peas	1015	1%	34%	51%	14%	24%	20%	9%	8%	1%	48%	2%	12%	32.9	5	
5	oat	398	2%	16%	52%	30%	20%	2%	4%	13%	3%	73%	1%	5%	36.7		1
6	lettuce	2564	41%	7%	47%	5%	23%	22%	2%	4%	0%	61%	0%	10%	28.9	160	4
7	cruciferae	1796	2%	18%	63%	18%	35%	15%	10%	1%	0%	68%	0%	6%	31.9	7	2
8	maize	487		59%	3%	39%	3%	40%	0%	16%	1%	28%		15%	34.1		
12	faba beans	720		55%	32%	14%	10%	28%	19%	3%	0%	43%	0%	7%	31.8	3	11
14	lolium	398	13%	19%	57%	11%	73%	2%		1%		95%	1%	2%	26.1	1	
15	clover	263	58%	25%	15%	2%	77%	12%		0%		84%		4%	28.9		
16	spinach	541	20%	23%	26%	31%	22%	59%	1%	0%		32%		8%	25.4	61	11
17	allium	433	10%	22%	59%	9%	16%	22%	13%	6%		48%	2%	9%	23.8	8	3
34	timothy	108	6%	6%	66%	21%	79%	5%	1%			92%		3%	27.9		
35	cocksfoot	42	50%		29%	21%	52%	7%				88%		5%	29.0		
36	lupin	68	1%	1%	28%	69%	37%					100%			31.5		
37	tomato	1337	8%	9%	60%	23%	7%	7%	2%	28%	7%	40%	1%	15%	26.9	2	
38	pepper	1177	5%	30%	44%	20%	6%	15%	5%	18%	12%	37%	1%	12%	21.1	128	1
39	eggplant	516	5%	61%	18%	16%	2%	52%	19%	5%		12%	0%	12%	23.2	6	
40	cucumber	924	0%	15%	40%	45%	17%	31%	3%	14%	1%	46%	1%	5%	23.6		2
41	potato	1475	85%	14%		0%	0%			13%	83%	0%		4%	23.3	4	
42	meadow grass (	135	42%		58%		99%			1%		99%			17.6	3	2
43	fescue	78	1%		97%	1%	85%	1%		1%		92%		5%	18.8	1	
44	caraway	23	70%	9%	17%	4%	22%	4%				91%		4%	8.9	3	
45	agrostis	11			100%		100%					100%			19.9		
48	melon	79		53%	29%	18%	20%	47%	18%			25%		10%	12.4		
49	lily	40	100%				0%	63%		5%		18%		15%	16.0		
50	carrot	14	100%				64%	21%		14%		64%			9.0		
51	black salsify	34	6%	6%	82%	6%	50%					97%		3%	8.7	3	
52	lamb's lettuce	47	15%	9%	64%	13%	49%					94%		6%	9.5	1	
53	asparagus	34	44%	44%	9%	3%	0%	100%							2.2	34	
54	common bean	4			100%		50%					100%			1.0	4	
	CGN collection	23290	16%	30%	35%	20%	16%	26%	7%	7%	7%	43%	1%	9%	29.4	439	41



# Genebank Metrics

23-mar-2023

Period 2018-2022

Cnr Crop	# accessions	DOCUMENTATION			CONSERVATION														
		PDCI	# phenotypes	% DOIs	age base (yrs)	base germination 2018-2022		regeneration 2018-2022		base germination reads		base regeneration reads		low germination low seed amount		safety duplicated		Collegue Genebank	Svalbard
1 wheat	4914	8.1	8.4	100.0%	29.2	3026	62%	307	6%	332	7%	177	4%	154	29	4910	99.9%	4909	4436
2 barley	2664	8.5	12.9	100.0%	28.6	1865	70%	231	9%	70	3%	297	11%	283	23	2664	100.0%	2664	2450
3 flax	951	6.8	15.1	100.0%	24.5	835	88%			9	1%	24	3%	7	19	951	100.0%	934	951
4 peas	1015	7.7	17.0	100.0%	32.0	621	61%	2	0%	1	0%	28	3%	8	22	1014	99.9%	1010	918
5 oat	398	8.1	0.7	100.0%	28.7	237	60%	53	13%	66	17%	11	3%	7	7	398	100.0%	397	380
6 lettuce	2564	8.1	44.8	100.0%	31.1	1921	75%	21	1%	59	2%	12	0%	8	4	2555	99.6%	2554	2437
7 cruciferae	1796	8.3	17.8	100.0%	30.8	1215	68%	132	7%	11	1%	174	10%	167	8	1796	100.0%	1796	1692
8 maize	487	7.0	10.4	100.0%	33.5	455	93%	13	3%	13	3%	20	4%	14	8	487	100.0%	487	454
12 faba beans	720	6.9	12.0	100.0%	28.9	449	62%	25	3%	16	2%	54	8%	23	37	718	99.7%	717	550
14 lolium	398	7.4		100.0%	26.1	161	40%	11	3%	38	10%	16	4%	16		398	100.0%	397	333
15 clover	263	8.3	1.1	100.0%	27.2	73	28%	1	0%			5	2%	5		263	100.0%	263	166
16 spinach	541	7.3	37.0	100.0%	25.7	314	58%	49	9%			29	5%	3	26	541	100.0%	541	341
17 allium	433	8.1	25.8	100.0%	21.0	211	49%	24	6%	22	5%	49	11%	37	16	432	99.8%	432	356
34 timothy	108	7.0		100.0%	29.1	85	79%	1	1%			1	1%	1		108	100.0%	108	48
35 cocksfoot	42	6.8		100.0%	20.4	3	7%					2	5%	2		42	100.0%	42	29
36 lupin	68	7.3	1.6	100.0%	25.6	41	60%	8	12%			14	21%	14	1	68	100.0%	68	57
37 tomato	1337	7.9	38.1	100.0%	29.2	670	50%	11	1%	119	9%	16	1%	4	12	1337	100.0%	1337	1053
38 pepper	1177	7.9	45.2	100.0%	21.7	387	33%	69	6%	49	4%	20	2%	10	10	1177	100.0%	1177	989
39 eggplant	516	8.1	38.4	100.0%	29.8	141	27%	20	4%	101	20%	3	1%	3		515	99.8%	514	475
40 cucumber	924	7.0	17.4	100.0%	25.1	170	18%	2	0%	122	13%	5	1%	5		924	100.0%	924	736
41 potato	1475	8.5	5.4	100.0%	26.7	655	44%	20	1%	78	5%	112	8%	94	19	1470	99.7%	1469	640
42 meadow grass (	135	8.1	5.2	100.0%	17.3	24	18%	3	2%	5	4%	1	1%	1		135	100.0%	132	128
43 fescue	78	7.8		100.0%	21.4	2	3%					1	1%	1		78	100.0%	77	63
44 caraway	23	7.8		100.0%	8.9	19	83%	1	4%							23	100.0%	23	23
45 agrostis	11	7.8		100.0%	21.0											11	100.0%	11	
48 melon	79	8.0	20.1	100.0%	14.1	2	3%	2	3%	1	1%	1	1%	1		79	100.0%	79	78
49 lily	40	6.5		100.0%	22.0							5	13%	1	4	40	100.0%	40	
50 carrot	14	8.7		100.0%	10.5											14	100.0%	14	14
51 black salsify	34	8.0	17.3	100.0%	10.4	3	9%	3	9%	1	3%					34	100.0%	34	34
52 lamb's lettuce	47	7.6	13.8	100.0%	12.1	1	2%	1	2%	5	11%					47	100.0%	47	45
53 asparagus	34	8.0		100.0%	7.2	21	62%	7	21%							27	79.4%	27	13
54 common bean	4	8.0		100.0%	3.5	4	100%	4	100%							0	0.0%		
CGN collection	23290	7.9	19.4	100.0%	28.1	13611	58%	1021	4%	1118	5%	1077	5%	869	245	23256	99.9%	23224	19889



# Genebank Metrics

23-mar-2023

Period 2018-2022

Cnr Crop	# accessions	AVAILABILITY			DISTRIBUTION														
		readily available	legal reasons	phyto reasons	# ever distributed	# ever distr. out	# distr. / yr in coll	# out 2018-2022	#out to NL	% to Asia	% to Africa	% to N. America	% to S. America	% to Europe	% to Oceania	% to commercial	% to public	% to NGO's	% to persons
1 wheat	4914	4913	100.0%	1	19457	12729	0.08	1384	364	26%	2%	0%	98%	18%	69%	12%	1%		
2 barley	2664	2663	100.0%	1	8370	4418	0.05	685	79	12%	0%	100%	3%	90%	6%	1%			
3 flax	951	951	100.0%		1751	723	0.03	95	2	2%	5%	95%	65%	32%	1%	2%			
4 peas	1015	1014	99.9%	1	4741	3310	0.10	299	113	38%	16%	28%	56%	57%	33%	10%			
5 oat	398	398	100.0%		1857	1207	0.09	209	173	83%			100%	20%	1%	77%	3%		
6 lettuce	2564	2564	100.0%		39576	34329	0.47	5222	1914	37%	44%	3%	54%	0%	86%	13%	0%	0%	
7 cruciferae	1796	1793	99.8%	3	25737	22635	0.40	3356	426	13%	43%	6%	51%	0%	37%	61%	1%	1%	
8 maize	487	486	99.8%	1	1147	503	0.03	41	7	17%			100%	12%	15%	73%			
12 faba beans	720	718	99.7%	2	2443	1724	0.08	699	365	52%		0%	100%	1%	97%	2%	0%		
14 lolium	398	398	100.0%		511	273	0.03	3	1	33%			100%	100%					
15 clover	263	263	100.0%		909	696	0.10	22	11	50%			100%	27%	59%	14%			
16 spinach	541	541	100.0%		16807	14438	1.01	1688	308	18%	16%	1%	61%	22%	24%	76%		0%	
17 allium	433	428	98.8%	5	6138	4837	0.47	487	187	38%	40%	2%	59%	0%	69%	28%		3%	
34 timothy	108	108	100.0%		130	30	0.01	0											
35 cocksfoot	42	42	100.0%		46	33	0.03	9					100%	100%					
36 lupin	68	68	100.0%		348	258	0.12	78	25	32%			100%	21%	51%	28%			
37 tomato	1337	1337	100.0%		10246	7272	0.21	554	250	45%	6%	3%	3%	88%	48%	52%	0%		
38 pepper	1177	1176	99.9%	1	17070	14148	0.54	879	347	39%	2%	3%	3%	93%	71%	26%	1%	2%	
39 eggplant	516	516	100.0%		3610	3260	0.29	791	92	12%	64%	2%	34%	15%	84%	0%	1%		
40 cucumber	924	924	100.0%		6675	5975	0.28	854	239	28%	27%	4%	69%	70%	27%	2%	1%		
41 potato	1475	1470	99.7%	5	9334	7821	0.21	557	399	72%			100%	49%	49%			2%	
42 meadow grass (	135	135	100.0%		116	60	0.02	0											
43 fescue	78	78	100.0%		7	2	0.00	2					100%	50%	50%				
44 caraway	23	23	100.0%		112	49	0.22	36	24	67%			100%	67%	33%				
45 agrostis	11	11	100.0%		2	1	0.00	1					100%	100%					
48 melon	79	79	100.0%		555	474	0.49	181	20	11%	51%	18%	31%	51%	46%	2%			
49 lily	40	40	100.0%		111	111	0.18	40	40	100%			100%	100%					
50 carrot	14	14	100.0%		98	68	0.54	29	15	52%	48%		52%	97%	3%				
51 black salsify	34	34	100.0%		110	15	0.05	7				86%	14%		14%	86%			
52 lamb's lettuce	47	47	100.0%		271	167	0.44	86	47	55%			98%	2%	71%	27%	1%	1%	
53 asparagus	34	34	100.0%		183	34	0.41	19	13	68%			100%	68%	32%				
54 common bean	4	4	100.0%		0	0	0.00	0											
CGN collection	23290	23270	99.9%	20	178468	141600	0.22	18313	5461	30%	28%	1%	8%	63%	0%	50%	46%	3%	1%



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# Genebank Metrics

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- (draft) list of Genebank Metrics will be
  - used by several genebanks
    - IPK & WorldVeg
  - improved and published
  - (hopefully) used in reporting and communication

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# Genebank Metrics

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- aim: develop a list of standard genebank metrics
  - used by many genebanks
    - creating transparency
    - element of certification
  - basis for reporting to funding agencies, FAO SoW, etc.
  
- if you want your genebank(s) to join in, send me an email!

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# Thank you for your attention !

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