SVALBARD GLOBAL SEED VAULT

Annual Progress Report 2019

NordGen

NordGen report on the agreement on the funding, management and operation of the Svalbard Global Seed Vault

Contents

Front page photo: The Norwegian Minister of Agriculture and Food Olaug Vervik Bollestad and her Slovak colleague Gabriela Matecna (right) depositing the first box of Slovakian seeds into Svalbard Global Seed Vault, assisted by director Pavol Hauptvogel at Plant Production Research Center Piestany which is hosting the Slovak national gene bank.

2019 at a glance

- In total 32,572 safety duplicates from 7 depositors were added to the Seed Vault collection in 2019. By the end of the year the total holding of seed accessions in the Seed Vault was 992,032 samples.
- In addition, the Ministry of Natural Resources and Environmental Conservation in Myanmar completed the security collection of orchid seeds from Myanmar rainforests by depositing 36 more accessions in the Seed Vault. The total number of conserved orchid accessions is 491.
- Six new institutes signed the Deposit Agreement in 2019, located in Sudan, Germany, Poland, Romania, South-Korea and United Kingdom. Three gene banks deposited seeds for the first time in 2019, located in Slovakia, Poland and Sudan, the latter as result of a reorganisation of their national gene bank.
- The comprehensive upgrade of the Seed Vault facility that started in 2018 was completed during 2019. This was marked by a key handover ceremony hosted by Statsbygg, with the Norwegian Minister of Agriculture and Food (MAF) in October. The ceremony was combined with a visit from the Slovak Agriculture Minister that accompanied the first seed deposit from Slovakia's national gene bank.
- Together with partners MAF and Crop Trust, NordGen organized a side-event focusing on the Seed Vault at the ITPGRFA Governing Body meeting in Rome in November.

Foreword

NordGen manages and operates the seed deposits at the Svalbard Global Seed Vault in partnership with the Norwegian Ministry of Agriculture and Food (MAF) and the Global Crop Diversity Trust (Crop Trust) and in accordance with the Three Party Agreement between the partners. We are now in the second ten-year agreement phase that is valid from 1st of July 2017.

The objective of the Seed Vault is to provide a safety net for the international conservation system of plant genetic resources, and to contribute to securing the maximum amount of plant genetic diversity of importance to humanity for the long term. The success of the Seed Vault has continued this year both measured in terms of participation from the global gene bank community and in terms of public interest and awareness about the purpose of the Seed Vault. By the end of 2019, the Seed Vault holds 992,032 safety duplicates representing wide inter- and intra-specific crop diversity deposited by 78 genebanks from around the world.

The Svalbard Global Seed Vault is a flagship project for NordGen, and 2019 was the twelfth year of operation. We take great pride in the role we play in this project and I take this opportunity to thank our partners MAF and the Crop Trust for the good collaboration.

I would also like to thank Statsbygg for the excellent working relationship we have at Svalbard, at this occasion in particular for high quality management of the Seed Vault technical upgrade project taking place during the last two years. We see that the confidence and global interest for the Svalbard Global Seed Vault has increased significantly after the celebration of the 10-year anniversary in 2018 and after technical upgrade of the Seed Vault construction. This is also manifested by the fact that twelve new gene banks have signed the depositor agreement during 2018 and 2019.

Lise Lykke Steffensen
Executive director NordGen

1. Introduction

This annual progress report for the Svalbard Global Seed Vault gives an overview of the NordGen operation and activities related to the Seed Vault in 2019. NordGens' responsibilities are stated in the Three Party Agreement providing for the long term funding, management and operation of the Svalbard Global Seed Vault. The annual progress report is prepared by NordGen in accordance with obligations in the Three Party Agreement Article 3.19.a).

The overall guidelines for the NordGen mission is to fulfil the objectives for the Svalbard Global Seed Vault as they are expressed in the standard Depositor agreement between depositors and the Royal Norwegian Ministry of Agriculture and Food, saying that the Seed Vault was established with the "*objective to provide a safety net for the international conservation system of plant genetic resources, and to contribute to the securing of the maximum amount of plant genetic diversity of importance to humanity for the long term in accordance with the latest scientific knowledge and most appropriate technique*".

The operation of the Seed Vault is a collaborative endeavour at several levels. At the management level NordGen collaborates closely with MAF and the Crop Trust. At the facility operation level NordGen cooperates with Statsbygg in Longyearbyen. At the seed logistics level we cooperate with the institutions sending safety duplicates as well as the chain of logistics and security partners during shipment and transport to the Seed Vault. The partnerships at all levels have worked very well also in 2019.

2. Seed deposits and depositors in 2019

The year of 2019 has been an intermediate year regarding the number of deposited seed accessions and participating gene banks. The major seed deposit at the celebration of the 10 year anniversary in 2018 that included many gene banks and seed samples and the invitation for taking part in a new major seed deposit event in February 2020 that was issued quite early in 2019, lead to low numbers of deposited seed samples in 2019. In total 32,572 safety duplicates from 7 depositors were added to the Seed Vault collection in 2019.

Four Seed Vault openings for receiving seeds were organized in 2019, in March, June, August and October (table 1). By the end of the year the total holding of seed accessions in the Seed Vault was 992,032 samples (table 2).

In October, ICARDA (International Centre for Agricultural Research in Dry Areas) completed the withdrawal of all seed samples that were deposited in the Seed Vault from their former gene bank in Aleppo, Syria. In total 116,484 accessions have been returned to ICARDA's new gene bank facilities in Lebanon and Morocco. At the same occasion, ICARDA deposited 28500 accessions. A majority of them has been multiplied by using seed samples that have been withdrawn from the Seed Vault.

Table 1. Seed Vault deposits and dates in 2019

Depositor / Date of deposit			
29th of March	**Acronym**	**Code**	**Accessions**
SADC Plant Genetic Resources Centre	SPGRC	ZMB030	1023
6th June			
Seed Savers Exchange	SSE	USA974	339
Margot Forde Germplasm Centre	AGRESEARCH	NZL001	199
Ministry of Natural Resources and Environmental Conservation	MNREC	MMR075	36[1)]
20th August			
SADC Plant Genetic Resources Centre	SPGRC	ZMB030	1158
22nd October			
National Agricultural and Food Centre	NAFC RIPP	SVK001	630
International Centre for Agricultural Research in Dry Areas	ICARDA	SYR002	28500
Plant Breeding and Acclimatization Institute	IHAR	POL003	406
Agricultural Plant Genetic Resources Conservation and Research Centre	APGRC	SDN002	317

[1)] *Wild orchid species seeds, not included in the Seed portal*

Table 2. Deposited and withdrawn seed accessions pr year and in total for the years 2008-2019. Figures showing status at the end of each year.

Year	Deposited pr year	Deposited in total	Withdrawals	Current holdings
2008	320549	320549		320549
2009	169505	490054		490054
2010	111101	601155		601155
2011	113364	714519		714519
2012	58078	772597		772597
2013	29155	801752		801752
2014	38052	839804	3[1)]	839801
2015	36130	875934	38073[2)]	837858
2016	42979	918913		880837
2017	64403	983316	54354[2)]	890886
2018	92638	1075954		983524
2019	32572	1108526	24064[2) 3)]	992032
Totals	**1108526**	**1108526**	**116494**	**992032**

[1)] *Three Hordeum accession withdrawn by NordGen for regeneration*

[2)] *ICARDA withdrawals in 2015, 2017 and 2019*

[3)] *Seven Secale accessions withdrawn by Agroscope, Switzerland for regeneration*

In total, eight gene banks deposited 32,572 seed samples in 2019. Two gene banks deposited seeds for the first time in 2019: The National Agricultural and Food Centre in Slovakia and the Plant Breeding and Acclimatization Institute in Poland. In addition, due to reorganisation of the genetic resource program in Sudan, the Agricultural Plant Genetic Resources Conservation and Research Centre (APGRC) deposited seeds for the first time under this name and also took over the ownership and responsibility of previously deposited seeds from the former Agricultural Research Corporation in Sudan.

The Myanmar Ministry of Natural Resources and Environmental Conservation deposited seeds of 36 different orchid species in June, bringing the total number of seed samples from this project up to 491. This was their third and final deposit of threatened orchids from Myanmar rainforests, collected in a project supported by Norway. As not being species of importance for food and agriculture, the Myanmar orchid seeds are not included in the Seed Portal database.

Six new institutions signed the Deposit Agreement in 2019, located in South-Korea, Germany, Poland, Romania, United Kingdom and the above mentioned APGRC from Sudan. By the end of 2019 NordGen has signed Deposit Agreements (DA) with 91 institutions. A complete list of depositors, signed agreements and current seed deposits is included in Annex 1 to this report. Further details and key figures for the years 2014 to 2019 for seed deposits, stored boxes, depositors and seed deposit events are shown in Annex 3.

Twelve of the current 78 depositors are International Agricultural Research Institutes (IARCs), 61 are national gene banks and universities, two are regional genebanks and three are NGO gene bank collections. One of the depositors is a private company that has deposited seeds in cooperation with the country's government (Singapore).

Figure 1 shows the proportion and numbers of safety duplicates deposited by different categories of genebanks by the end of 2019. The largest share of the current holdings in the Seed Vault is deposited by IARCs represented by institutes belonging to the Consultative Group of International Agricultural Research Centres (CGIAR), the Asian Vegetable Research Centre (AVRDC) and the Tropical Agricultural Research and Higher Education Centre (CATIE), all holding collections of PGRFA in trust for the UN Food and Agriculture Organisation (FAO).

Considering the national and subnational collections, a significant number of the depositors are located in developing regions; however, the numbers of safety duplicates sent from institutes in developing regions are smaller than the numbers sent from institutes in developed regions.

A routine for transferring previous seed deposits to new gene bank institutions after reorganisation and/or merging of institutions has been developed. In total, four depositors have made organizational changes, causing that the ownership and responsibility for previous deposits have been changed.

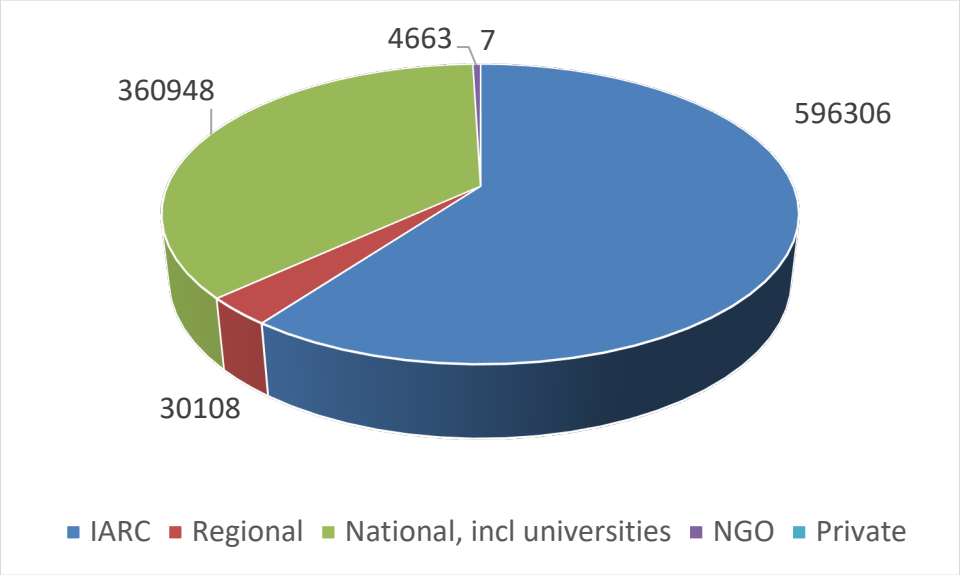

Figure 1. The proportion and numbers of safety duplicates currently deposited in The Vault at the end of 2019 by different categories of genebanks. The distinction between national gene banks and universities is not clearly defined as universities in some countries have responsibilities as national gene banks. Therefore, these two categories are merged in the graph and figures.

In total, 113 new seed boxes were taken into the Seed Vault in 2019. Over the years, 3094 regular seed boxes have been deposited in the Vault, while 325 boxes have been taken out. By the end of the year 2769 regular seed boxes are stored in the Vault. Test boxes and boxes with seeds not included in the Seed Portal are not included in this number. The capacity of the current shelving is 2880, which means that by the end of 2019 there are less than 100 free box locations in seed storage hall #2.

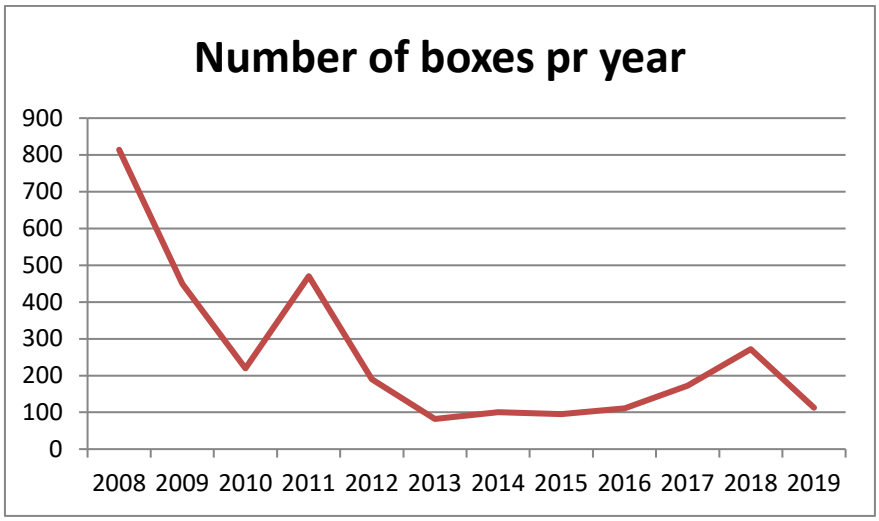

Figure 2. Numbers of boxes arriving per year 2008-2019. (Withdrawals not shown.)

3. The International Advisory Panel

Initial plans for the second meeting of the International Advisory Panel (IAP) scheduled for February 2020 has been made by the end of 2019 and members have been appointed:

- Yasmina El Bahloul INRA, Morocco (chair)
- Ahmed Amri, ICARDA, Morocco
- Juan Lucas Restrepo, Bioversity, Italy
- Godfrey Mwila SPGRC, Zambia
- Rosa Lia Barbieri, Embrapa, Brazil
- Külli Annama, ECRI, Estonia
- Kristin Børresen, Graminor, Norway

4. Public awareness activities

In accordance with article 4 in the Three Party Agreement and with the agreed work plan and budget for 2019, NordGen works considerably with public outreach activities, in cooperation with the partners. Information about the Svalbard Global Seed Vault is passed on through several platforms: responding to questions about the operation from the public and from media, presentations and lectures for different scientific and public audiences, social media posts, written articles and giving press interviews. Lectures and written articles are listed in annexes 4 and 5.

NordGen has through 2019 participated in a Seed Vault communication working group organized by the Ministry of Agriculture and Food. The group has been attended by the three partners MAF, Crop Trust and NordGen and in addition the Norwegian Ministry of Foreign Affairs and Statsbygg.

No external visitors have been given access to the interior of the Seed Vault in 2019, partly due to the ongoing construction works and partly due to new visitor policies. The strict visitor regulations have, however, not reduced the interest from media for featuring the Seed Vault on different platforms. NordGen staff has received media in Longyearbyen and given interviews and lectures at all seed deposit occasions in 2019.

Significant parts of the public contact workload consist of responding to requests, mainly received by email. All serious emails are responded to. Requests range from simple questions for visiting the Vault and seed donations to more labour demanding press inquiries and media interviews and various offers for collaboration.

The volume of emails and requests for information from media and others have increased significantly in 2019 compared to 2018. Due to the large volume, NordGen has not been able to update accurate records of all requests, however, estimates indicate that the number of inquiries that have been responded to has been doubled from 2018 to 2019.

NordGen believes that the reason for increased attention is both the celebration of the 10 year anniversary in 2018 and the technical upgrade of the Seed Vault construction, that also by many, is connected to the severe climate change scenarios related to Svalbard and the Arctic in general.

NordGen participated in the eight session of the Governing Body of the ITPGRFA in Rome in November 2019 and organized a side-event together with the other Seed Vault partners. An exhibition model of the Svalbard Global Seed Vault was produced for this meeting by the ITPGRFA Secretariat in cooperation with the Norwegian Ministry of Agriculture and Food. The model has hereafter been sent to NordGen in Alnarp for potential re-use.

Figure 3. The Seed Vault model and exhibition in the FAO building in Rome during the ITPGRFA Governing Body meeting in November 2019. Photo: Sara Landqvist.

5. Additional comments related to NordGen staff involvement

Work plan and budget for 2019 have been presented according to a new project account design decided by the three Seed Vault partners. The 2019 accounts in Annex 2 present the spending in accordance with this set-up. Some additional comments related to the approved budget are given below.

The Management and operation of the Seed Vault carried out by NordGen involves a range of NordGen staff members. In addition to the Seed Vault Coordinator, NordGen executive director has been involved in overall policy and management issues. NordGen director and staff have participated in a significant number of meetings organised by MAF, i.e. contact meetings with the Seed Vault partners and in the External advisory council for the construction upgrades.

Administrative staff covers annual budgets and financial statements to be presented to MAF and Crop Trust and bookkeeping's of records and original vouchers in accordance with Nordic Council of Ministers practice. NordGen reports on its work throughout the year in meetings between the partners and in the annual progress report. NordGen staff assists in the Seed Vault operations with document handling, archive and organizing events and travels.

IT-staff maintains and updates the two Seed Vault databases handling information about seed deposits: the box storage system database and the safety duplicate database with basic data of all stored material. The databases are maintained on separate servers at NordGen headquarters in Sweden. All data are backed-up daily to two different locations; a dedicated backup server and a remote server located in another town.

Development of a new version of the Seed Portal has been planned and initiated during 2019. Requirements is described in project documents and a contract has been signed with the company Sopra Steria for the development. The new Seed Portal will be implemented in 2020.

Public relation activities are carried out and coordinated by the NordGen communication manager and the Seed Vault Coordinator. The Seed Vault communication group with representatives from the three partners had more meetings during 2019 and has been working extensively on different documents and policies for the Seed Vault communication activities. Several NordGen staff members have been involved in discussions on and development of working instructions and guidelines for technical work at the Seed Vault with the aim of increasing the working environment quality and the security when working in the Seed Vault.

NordGen staff has as usual assisted in seed handling at the Seed Vault at the four seed handling occasions in Svalbard. Most seed shipments in 2019 have been sent directly to Svalbard, and not as formerly through Jetpak at Oslo airport. This solution has worked well in 2019.

Logistics at Svalbard have been coordinated by NordGen and handled in collaboration with the local logistics company PPL. Screening and security at arrival in Svalbard has been handled in collaboration with the airport authorities at Longyearbyen airport and the security company Securitas. Statsbygg has provided support with logistics and technical backstopping during deposit openings at Svalbard. Seed Vault openings for receiving seeds have been coordinated with Statsbygg and the ongoing building works.

6. Projects

6.1. Long term seed storage experiments

The so called NordGen 100 year experiment for testing of longevity of seeds was established in December 1986 in Coal Mine #3 owned by Store Norske Spitsbergen Kulkompani. Seed samples have been withdrawn for testing every fifth year (every 2.5 years up till 2006), the last set so far was tested in 2017. The report *Seed longevity and survival of seed borne diseases after 30 years conservation in permafrost. Report from the 100 year storage experiment* was published in 2019.

During 2019, NordGen has planned for a new long term seed longevity experiment in the Seed Vault together with project partners from 5 other gene banks: NRSSL (Thailand), IPK (Germany), ICRISAT (India), INIAV, (Portugal) and Embrapa (Brazil). Together with NordGen, these gene banks will provide seeds from 13 different crops for experimental purposes. The first seeds for the experiments have been produced by IPK during 2019.

6.2. Printing accession data on nanofilm

Data about seed samples that are deposited in the Seed Vault is currently conserved in electronic databases. To increase the security and integrity of accession data, a feasibility study about printing seed data on nanofilm has been carried out in 2019 by a working group consisting of representatives from IPK, Crop Trust assisted by CIP and NordGen. The Piql company, that is producing this kind of film, has provided information and carried out test production of film.

The working group delivered the report *Feasibility study and pilot project: Seed Vault accession data on a migration free, long-term storage medium* to the Seed Vault partners in May 2019. The report recommends printing of accession data related to the seed samples that are conserved in the Seed Vault on nanofilm.

7. Financial result

Budget and spending for 2019 as well as funding and working capital fund status are shown in Annex 2. The financial result as the difference between budget and spending for 2019 shows a surplus SEK 427,913.

However, budget for the second meeting of the International Advisory Panel was included in the budget for 2019, and due to the postponement of this meeting the amount SEK 471,000 has been transferred to the 2020 budget. Taking this into account the economic result shows a deficit of SEK 43,087.

The deficit is explained by the costs for the Seed Vault model exhibition that was produced for the IT Governing body meeting in November. The production and transport costs of SEK 63,082 were not included in the Seed Vault budget for 2019.

Except from this, the spending on the different activity areas is quite in line with the budget. Due to unclarity about to which activity area the planning of the new Seed Longevity experiment in the Seed Vault should be recorded, unbudgeted use of personnel resources has been recorded at the budget line Long term storage experiment, account 709519. This overspending has been compensated by lower spending at accounts 709514 and 709525.

The current Working Capital Fund was established in 2018, at the beginning of a new ten-year Three Party agreement period. The surplus in 2018, SEK 23,940 was added to the fund in 2018. As the accounts for 2019 show a deficit, the current balance of the fund by the end of 2019 is negative with a total deficit of SEK -19,597.

Annex 1. Depositor agreements

List of depositors to the Svalbard Global Seed Vault listed in order of Deposit Agreement signature. Updated pr 31. Dec. 2019.

Acronym	Country	Institute name	Wiews code	SDA	Accessions end 2019
WARDA	International, Benin	Africa Rice Center	BEN089	2007/2008	17700
CIAT	International, Columbia	Centro Internacional de Agricultura Tropical	COL003	2007/2008	56264
CATIE	International, Costa Rica	The Tropical Agricultural Research and Higher Education Center	CRI001	2007/2008	1314
ILRI	International, Ethiopia	International Livestock Research Institute	ETH013	2007/2008	5724
ICRISAT	International, India	International Crop Research Institute for the Semi-Arid Tropics	IND002	2007/2008	111173
ICRAF	International, Kenya	World Agroforestry Centre	KEN023	30.01.2008	1095
CIMMYT	International, Mexico	Centro Internacional de Mejoramiento de Maiz y Trigo	MEX002	2007/2008	158218
IITA	International, Nigeria	International Institute of Tropical Agriculture	NGA057	2007/2008	22268
CIP	International, Peru	Centro Internacional de la Papa	PER001	2007/2008	9206
IRRI	International, Philippines	International Rice Research Institute	PHL001	2007/2008	125493
ICARDA	International, Syria	International Centre for Agricultural Research in Dry Areas	SYR002	2007/2008	71229
AVRDC	International, Taiwan	The World Vegetable Center	TWN001	2007/2008	16622
NORDGEN	Regional, Sweden	Nordic Genetic Resource Center	SWE054	30.01.2008	24864

IPK	Germany	Leibniz Institute of Plant Genetics and Crop Plant Research	DEU146	30.01.2008	54209
CGN	Netherlands	Centre for Genetic Resources	NLD037	30.01.2008	20238
PGRI-NARC	Pakistan	Plant Genetic Resources Institute, National Agricultural Research Centre	PAK001	30.01.2008	4622
SSE	USA	Seed Savers Exchange	USA974	30.01.2008	3893
NGBK	Kenya	Kenya Agricultural & Live-stock Research Organisation (KALRO): Genetic Resources Research Centre	KEN015	26.02.2008	1314
NAC	South Korea	National Agrobiodiversity Center	KOR043	06.05.2008	13185
IAS	Macedonia	Institute of Agriculture Skopje	MKDxxx	11.06.2008	0
NCPGR	India	National Burea of Plant Genetic Resources	IND001	04.07.2008	225
VIR	Russia	N.I. Vavilov All-Russian Scientific Research Institute of Plant Industry	RUS001	04.07.2008	6082
RAC	Switzerland	Station Federale de Recherches en Production Vegetale de Changins	CHE001	27.10.2008	10377
EMBRAPA	Brazil	The Brazilian Agricultural Research Corporation	BRA008	06.11.2008	1319
AFT	Ireland	Oak Park Research Centre	IRL001	16.01.2009	577
DAFF	Ireland	Department of Agriculture, Food and Rural Development	IRL029	22.01.2009	396
TARI	Taiwan	Taiwan Agricultural Research Institute	TWN006	26.02.2009	10503
UAAS	Ukraine	Institute of Plant Production n.a. V.Y. Yurjev of UAAS	UKR001	03.03.2009	2782
PGRC	Canada	Plant Gene Resources of Canada, Canadian Genetic Resources Program	CAN004	05.11.2009	31955

ILRF	Georgia	I. Lomouri Research Institute of Farming.	GEO001	23.02.2010	305
AAS	North Korea	Pyongyang AAS	PRK013	18.03.2010	5700
UNALM	Peru	Universidad Nacional Agraria La Molina	PER002	25.05.2010	1296
ICCI	Israel	Institute of Cereal Crop Improvement, Tel Aviv University	ISR003	23.06.2010	900
DELEP	USA	Desert Legume Program. University of Arizona	USA971	24.08.2010	134
ARC	Sudan	Agricultural Research Corporation	SDN034	18.10.2010	Transferred to SDN002
SPGRC	Regional, Zambia	SADC Plant Genetic Resources Centre	ZMB030	09.11.2010	5244
NAGREF	Greece	National Agricultural Research Organization	GRC035	02.02.2011	25
ICABIOGRAD	Indonesia	Indonesian Center for Agricultural Biotechnology and Genetic Resources	IDN179	02.02.2011	1050
MPGRPPD	Myanmar	Department of Agricultural Research	MMR003	23.02.2011	718
INIAP	Ecuador	Instituto Nacional Autónomo de Investiga-ciónes Agropecuarias	ECU076	12.04.2011	168
NARO	Uganda	National Agricultural Research Organization	UGA031	26.05.2011	777
BARI	Bangladesh	Plant Genetic Resource Centre, Bangladesh Agricultural Research Institute	BGD164	10.06.2011	0
LSB	Italy	University of Pavia, Department of Earth and Environmental Sciences, Lombardy seed bank	ITA411	23.06.2011	2
NACGRAB	Nigeria	National Centre for Genetic Resources and Biotechnology	NGA010	06.09.2011	800
IRAG	Guinea	Institut de Recherche Agronomique de Guinée	GIN020	07.10.2011	0

RNGRC	Tajikistan	Republican National Genetic Resource Center	TJK027	14.11.2011	1646
AGRI	Azerbaijan	Genetic Resources Institute of the Azerbaijan National Academy of Sciences	AZE015	17.02.2012	1522
INRB	Portugal	Instituto Nacional de Recursos Biológicos	PRT005	05.03.2012	Transferred to PRT001
ISABU	Burundi	Agricultural Research Institute of Burundi	BDI003	19.06.2012	439
IER	Mali	Institute of Rural Economy	MLI002	19.09.2012	158
PSARTI	Mongolia	Plant Science Agricultural Research Institute	MNG030	02.10.2012	160
INIA La Platina	Chile	Unidad de Recursos Genéticos -INIA La Platina	CHL002	03.10.2012	Transferred to CHL044
AUG	Georgia	Georgia State Agrarian University	GEO028	15.10.2012	120
NPGRL	Philippines	National Plant Genetic Resources Laboratory	PHL129	18.10.2012	2254
ASAU	Armenia	Armenian State Agrarian University, Laboratory of Plant Gene Pool and Breeding	ARM035	16.12.2012	175
CN FCRC	Thailand	Chainat Field Crops Research Center	THA214	01.03.2013	150
UzRIPI	Uzbekistan	Uzbek Research Institute of Plant Industry	UZB006	01.03.2013	2038
SARDI	Australia	South Australian Research and Development Institute	AUS006	12.06.2013	Transferred to AUS167
AGG	Australia	Australian Grains Genebank/Australian Tropical Crops Collection	AUS165	26.11.2013	7486
BWPRC	Japan	National University Corporation Okayama University	JPN009	26.11.2013	5268
NRSSL	Thailand	National Rice Seed Storage Laboratory for Genetic Resources, Rice Department	THA012	14.08.2013	167

AGES	Austria	Austrian Agency for Health and Food Safety, Dept. for Plant Genetic Resources	AUT001	17.03.2014	1457
BGRIPGR	Bulgaria	Institute for Plant Genetic Resources "K.Malkov"	BGR001	17.03.2014	933
NCGRP	USA	National Center for Genetic Resources Preservation, USDA	USA996	SIGNED 18.01.2015	120745
NFSC	Norway	The Norwegian Forest Seed Centre	NOR056	08.01.2015	208
Luke	Finland	Natural Resources Institute Finland	FIN027	21.01.2015	7
CRI	Czech Republic	Crop Research Institute	CZE122	28.08.2015	1168
UCR-CIA	Costa Rica	Universidad de Costa Rica	CRI092	08.09.2015	6
PdeP	Peru	Parque de la Papa	PER862	09.09.2015	750
AGRESEARCH	New Zealand	Margot Forde Germplasm Centre	NZL001	11.1.2016	1921
CHAIPATT	Thailand	Chaipattana Foundation	THA513	11.2.2016	20
APG	Australia	Australian Pastures Gene Bank	AUS167	11.3.2016	28493
GRIBL	Bosnia & Herzegovina	Genetic Resources Institute, University of Banja Luka	BIH039	16.6.2016	921
INRA	France	National Institute for Agricultural Research	FRA040	16.6.2016	2
TLL	Singapore	Temasec Life Sciences Laboratories Ltd.	SGP008	19.8.2016	7
JHI	UK	James Hutton Institute	GBR251	09.11.2016	1033
MNREC	Myanmar	Myanmar Ministry of Natural Resources and Environmental Conservation	MMR075	09.11.2016	491
RPCNASBAF	Belarus	Scientific Practical Centre of the National Academy of Sciences of Belarus for Arable Farming	BLR011	17.01.2017	341

ETKI	Estonia	Estonian Crop Research Institute	EST019	25.10.2017	133
SVKPIEST	Slovak Republic	National Agricultural and Food Centre	SVK001	08.01.2018	630
INIAV	Portugal	Banco Português de Germoplasma Vegetal	PRT001	26.02.2018	229
INIA	Chile	Instituto de Investigaciones Agropecuarias	CHL044	06.04.2018	145
DOA	Thailand	Department of Agriculture, Ministry of Agriculture and Cooperatives	THA032	09.08.2018	32
UKVGB	United Kingdom	University of Warwick	GBR006	13.08.2018	101
LSFRI	Latvia	Latvian State Forest Research Institute "Silava"	LVA009	28.10.2018	0
BDNA	South-Korea	Baekdudaegan National Arboretum	KOR048	03.06.2019	0
APGRC	Sudan	Agricultural Plant Genetic Resources Conservation and Research Centre	SDN002	13.09.2019	1512
JKI	Germany	Julius Kühn Institute	DEU451	30.09.2019	0
IHAR	Poland	Plant Breeding and Acclimatization Institute	POL003	09.10.2019	406
BRGV	Romania	Suceava Genebank "Mihai Cristea"	ROM007	23.10.2019	0
MSN, Kew	United Kingdom	Royal Botanic Gardens, Kew	GBR004	18.12.2019	0

Annex 2. Budget and spending 2019

Budget and Spending - Svalbard Global Seed Vault
NordGens management and operation 2019

Activity area/activity	Cost Category	Budget currency SEK	Actual currency SEK	
Directing and interaction with partners	Personnel	391 100	394 267	
709513	Travels	45 000	38 414	
	Sub-total	**436 100**	**432 681**	
Administration, planning and documentation	Personnel	238 575	242 299	
709524	Travels	0	7 110	
	Sub-total	**238 575**	**249 409**	
Liaising with depositors and handling of seeds	Personnel	281 300	302 373	
709515	Travel	96 000	92 206	
	Contracted services	30 000	22 583	
	Sub-total	**407 300**	**417 162**	
Data management	Personnel	156 025	93 149	
709514	Preparing datasets	0	0	
	Travel	12 000	0	
	Sub-total	**168 025**	**93 149**	
Communication attracting new depositor gene banks	Personnel	109 850	90 677	
709525	Travel	40 000	7 490	
	Sub-total	**149 850**	**98 167**	
Public awareness activities	Personnel	682 451	632 278	
709516	Production Exhibition Italy	0	63 082	
	Travel	72 000	59 307	
	Sub-total	**754 451**	**754 667**	
International Advisory Panel	Personnel	286 025	78 340	
709517	Travel	140 000	61 467	
	Meeting costs	120 000	0	
	Sub-total	**546 025**	**139 807**	
Long term storage experiment	Personnel	0	114 236	
709519	Location hire	6 000	0	
	Sub-total	**6 000**	**114 236**	*
Feasibility study	Personnel	54 925	77 343	
accession data on long-term storage medium	Travel	100 000	21 811	
709523	Meeting costs	60 000	94 906	
	Sub-total	**214 925**	**194 060**	*
	Budget and Result Total SEK	**2 921 251**	**2 493 338**	
	Result actual due to budget		**427 913**	
Exchange rate December 31 2019, 1 EURO=10,43 SEK	**Total EURO**	**280 082**	**239 054**	

* This project is funded exclusively by the Norwegian Ministry of Agriculture and Food

Result, Funding and Working capital 2018-2019

Result	**2018**	**2019**
Result	2 664 265	2 493 338

Funding	**2018**	**2019**
Crop Trust	1 226 337	1 306 798
NordGen	100 000	102 000
LMD	1 361 868	1 512 003
	2 688 205	**2 920 801**

Working capital fund	**2018**	**2019**
Working capital fund	23 940	427 463
Total Working capital fund 31.12.2019		451 403
IAP costs transferred from 2019 to 2020		-471 000
Currency adjusted Working capital fund 31.12.2019		**-19 597**

Annex 3. Deposit key figures

Seed deposits, depositors, seed boxes in the Seed Vault and seed deposit events for 2014-2019, actual numbers for each year and accumulated figures.

Year	2017	2018	2019
Seed accessions [1) 2)]			
Accessions deposited	64403	92638	32572
Deposited accessions in total, by 31.12	983316	1075954	1108526
Withdrawals	54354		24064
Withdrawals in total by 31.12.	92430	92430	116494
Seed Vault collection by 31.12	890886	983524	992032
Depositors			
Depositors	15	30	7
New depositors	3	3	3
Depositors in total by 31.12	74	77	80
New signatories	2	6	6
Signatories in total by 31.12	79	85	91
Number of deposit events	4	3	4
Seed boxes [1)]			
Number of deposited boxes	173	277	113
Deposited boxes in total	2704	2981	3094
Number of retrieved boxes	161		36
Retrived boxes in total	289	289	325
Boxes in Seed Vault by 31.12	2415	2692	2769

1) Test seed samples and test boxes are not included

2) Deposited seeds samples not registered in the Seed Portal database are not included. These are seeds from Svalbard native flora and orchid seeds from Myanmar.

Annex 4. Lectures and presentations 2019

Lectures and presentations about the Svalbard Global Seed Vault by NordGen staff

Lise Lykke Steffensen:

10.11. NordGen – operational manager of the Svalbard Global Seed Vault. Side-event at the ITPGRFA Governing Body meeting. Rome, Italy.

Åsmund Asdal:

21.2. Svalbard Globale Frøhvelv – Noahs ark i Arktis. Foredrag for Agder Energi, Arendal, Norway

12.3. Biomangfold som forutsetning for matsikkerhet – fra ville kornslag i Mesopotamia til 150000 poser hvete på Svalbard. Pensjonistuniversitetet Gjøvik, Norway

28.3. Svalbard Global Seed Vault. Presentation for NIBIO, Tjøtta Research Station staff, Longyearbyen, Svalbard

4.5. What is biodiversity and why does it matter to us? Svalbard Global Seed Vault. TEDx-talk, Verona, Italy.

3.6. The Svalbard Global Seed Vault. Presentation for visitors from Baekdudaegan National Arboretum and Seed Vault, South-Korea. NordGen, Alnarp, Sweden

8.6. Svalbard Global Seed Vault – Noah's Ark for Seeds in the Arctic. Agri/Cultures. Seed-Links Exhibition. Conserving Cultural Connections with Seeds, Longyearbyen, Svalbard

17.8. Svalbard globale frøhvelv. Foredrag på Den Norske Filmfestivalen, Haugesund, Norway

23.8. Svalbard globale frøhvelv. Orientering for studenter ved Utenriksdepartementets aspirantkurs, Oslo

9.10. The Svalbard Global Seed Vault. Presentation at Plant Breeding and Acclimatization Institute (IHAR), Warszawa, Poland.

21.10. Svalbard Global Seed Vault. Presentation for Ministers of Agriculture and Food and delegations from Norway and Slovakia, Longyearbyen, Svalbard

23.10. Svalbard Global Seed Vault – Noah's Ark for Seeds in the Arctic. Lecture for an Estonian farmers group, Skandagra, Longyearbyen, Svalbard

24.10. Svalbard Global Seed Vault – Noah's Ark for Seeds in the Arctic. Lecture for students from Stockholm Royal Institute of Art, Longyearbyen, Svalbard

4.11. The Svalbard Global Seed Vault – securing gene bank collections in the Arctic. CBB5 Conference, Budapest, Hungary.

12.12. Results from the 100 years trial in Gruve 3 at Svalbard. Conference Nordic Gene Bank 40 years. NordGen, Alnarp, Sweden

Roland von Bothmer:

14.1 Växtförädling, GMO och genetiska resurser – The society *Lunda-Akademikerna, Lund University*

19.5 Betydelsen av växtförädöing och genetiska resuser för världens livsmedelsförsörjning – *General lecture, SLU, Alnarp*

29.10 Är moderniteten ett miljövänligt alternativ? – *Lund Philosophy Society, Lund University*

5.11 Introduktion växtförädling och genetiska resurser – *Basic course in education for Horticultural engineers, SLU, Alnarp*

Annex 5. Publications 2019

Publications about the Svalbard Global Seed Vault by NordGen staff

Asdal, Å. 2019. Forord i E. Svalheim. Folka og Landskapet. En vandring i artsrike kulturmarker. Fagbokforlaget 2019. ISBN: 978-82-450-2518-7

Asdal, Å., G. Brodal, S. Solberg, F. Yndgaard, R.v. Bothmer & E. Meen. Seed longevity and survival of seed borne diseases after 30 years conservation in permafrost. Report from the 100 year storage experiment. http://norden.diva-portal.org/smash/record.jsf?pid=diva2%3A1370439&dswid=-2570

Asdal, Å. 2019. Svalbard Global Seed Vault: Noah's Ark for Seeds in the Arctic. In Seeds. Proceedings from Oxford Symposium on Food and Cookery 2018. Edited by Mark McWilliams. Prosoect books 2019.

Asdal, Å. 2019. Svalbard Global Seed Vault – conserving genetic resources for global food security. A arca de Noe das sementes. Proceedings from Conferencia 40 Anos Banco Portugues de germopasma vegetal. Conservacao de Recursos Geneticos Vegetais. 06 Outubro 2017. Edited by Nuno Canada et. al. ISBN 978-989-8713-13-1

Asdal, Å., G. Brodal, S. Solberg, F. Yndgaard, R.v. Bothmer & E. Meen. 2019. The ongoing 100-Years Trial in Permafrost. In 40 years of Nordic Collaboration in Plant Genetic Resources. Edited by S. Solberg & F. Yndgaard. Published by Nordic Genetic resource Center, Alnarp, Sweden. ISBN: 978-91-981510-9-1

Asdal, Å. & R.v. Bothmer. 2019. The Svalbard Global Seed Vault – Operated by NordGen. In 40 years of Nordic Collaboration in Plant Genetic Resources. Edited by S. Solberg & F. Yndgaard. Published by Nordic Genetic resource Center, Alnarp, Sweden. ISBN: 978-91-981510-9-1

Steffensen, L.L., J. Axelsson & Å. Asdal. 2019. Global Seed Vault: A pledge to Mankind. Indian J. Plant Genet. Resour. 32(3): 303-306 (2019) DOI 10.5958/0976-1926.2019.00031.7