

# Report of a Working Group on Leafy Vegetables

**Second Meeting, 8-9 October 2013, Ljubljana, Slovenia**  
L. Maggioni, R. van Treuren, U. Lohwasser and E. Lipman





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**The European Cooperative Programme for Plant Genetic Resources (ECPGR)** is a collaborative programme among most European countries aimed at contributing to national, sub-regional and regional programmes in Europe to rationally and effectively conserve *ex situ* and *in situ* Plant Genetic Resources for Food and Agriculture and increase their utilization. The Programme, which is entirely financed by the member countries, is overseen by a Steering Committee composed of National Coordinators nominated by the participating countries and a number of relevant international bodies. The Coordinating Secretariat is hosted by Bioversity International. The Programme operates through nine networks in which activities are carried out through a number of permanent working groups or through ad hoc actions. The ECPGR networks deal with either groups of crops (cereals; forages; fruit; oil and protein crops; sugar, starch and fibre crops; vegetables) or general themes related to plant genetic resources (documentation and information; *in situ* and on-farm conservation; inter-regional cooperation). Members of the working groups and other scientists from participating countries carry out an agreed workplan with their own resources as inputs in kind to the Programme.

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#### **Cover illustration**

Lettuce (*L. sativa*) in flower in traditional home garden, Robidišče, Northwest Slovenia. Courtesy of © J. Verbič, Agricultural Institute of Slovenia, Ljubljana, Slovenia.

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## SUMMARY REPORT OF THE MEETING

### Introduction

The second meeting of the Working Group on Leafy Vegetables of the European Cooperative Programme for Plant Genetic Resources (ECPGR) was held during 8-9 October 2013 in Ljubljana, Slovenia. It was organized in collaboration with the Agricultural Institute of Slovenia, Ljubljana.

### *Opening of the meeting (welcome and agenda)*

Rob van Treuren, Chair of the Working Group (WG), opened the meeting with thanks to the local organizers and particularly to Jelka Šuštar-Vozlič. He then thanked the ECPGR Secretariat for the efforts made to encourage National Coordinators to offer unused country quotas, which enabled the participation in the meeting of WG members from the Czech Republic, Germany, Hungary, Italy, Poland and the UK. Countries that donated their unused quotas (Belgium, France, Lithuania and Switzerland) were also thanked.

The agenda was presented and accepted by the participants with small modifications.

### *Introduction by the hosting organization*

Jelka Šuštar-Vozlič welcomed the participants on behalf of the Agricultural Institute of Slovenia (AIS). She presented the main facts and highlights about Slovenia. Forests cover 60% of the land and 33% is cultivated, but 72% of the agricultural land is in less favoured areas. Agriculture is characterized by land fragmentation, with family-tended small-sized fields. Only 43.5% of the farms are specialized in a crop or raise cattle. The vegetable supply is dependent on imports for most crops, except cabbage. The AIS is the leading public research institution in agriculture, under the auspices of the Ministry of Agriculture and Forestry. It was founded in 1898 and currently employs 175 people, of whom 84 are researchers. It is a non-profit institute, carrying out research, education and verification of quality, with a budget of 7 M €/year.

The Crop Science Department, including the Slovene Plant Gene Bank (SPGB) is dedicated to plant breeding and genetics, production technology and physiology of plant nutrition as well as to seed certification.

The SPGB has been financed by the Ministry since 1996, as part of the Slovene Plant Genetic Resources Programme, the aims of which are to maintain, evaluate, regenerate and preserve Slovenian autochthonous species, ecotypes, populations and landraces of agricultural, medicinal and aromatic plants. The SPGB collection includes Slovenian varieties, old varieties, landraces, various populations, clones and lines bred from autochthonous plants and ecotypes from the natural habitat important for food and agriculture.

The SPGB coordinates conservation activities as part of collaboration and sharing of responsibility with several institutions within the country.

Joži J. Cvelbar welcomed the WG on behalf of the Agriculture Directorate of the Ministry of Agriculture, Forestry and Food. She noted the ongoing close collaboration between the National Coordinator on plant genetic resources (PGR) and her Directorate, which is in charge of following international affairs, including the International Treaty on Plant Genetic Resources for Food and Agriculture and other FAO matters. She wished the meeting every success.

## National reports

All the participants introduced themselves by giving an overview of their leafy vegetables collections, of key activities regarding leafy vegetables and reported the main bottlenecks regarding the management of collections within their countries.

### Albania

(Sokrat Jani)

In Albania, spinach and lettuce are the most important leafy vegetable crops in cultivated area and production. A total of 39 leafy vegetable accessions are conserved at the Agricultural Technology Transfer Center (ATTC), Lushnja (12 *Lactuca*, 12 *Cichorium*, 9 *Spinacia*, 2 *Atriplex*, 2 *Eruca* and 2 *Rumex*). In some rural areas, landraces are used, mostly for consumption in old households. Most of these landraces, especially lettuce and spinach, are distinguished for some special features such as good taste, or high tolerance or resistance to disease and pests.

The National Gene Bank, located in Tirana, is working this year to complete the documentation of vegetable crops according to the European Plant Genetic Resources Catalogue (or European Internet Search Catalogue, EURISCO) system.

In the meantime, ATTC-Lushnja has organized some activities for the management and conservation of leafy vegetable species' accessions, including the evaluation of lettuce accessions for suitability for the local market, characterization of cultivated lettuce accessions according to the minimum descriptor list, regeneration of lettuce, chicory, endive and rocket accessions, exploration and collecting of wild species (*Amaranthus*, *Atriplex*, *Chenopodium*, *Lepidium*, *Portulaca*, *Rumex* and *Taraxacum*). These are used for consumption in rural households, mainly in the southern districts.

Bottlenecks affecting the management of genetic resources are due to the severe reduction of funding after 2007, when the management of the National Gene Bank passed from the auspices of the Ministry of Agriculture to those of the Agricultural University of Tirana.

Safety duplication is also a bottleneck for different reasons: insufficient quantities of seed are available for parts of the collection. ATTC-Lushnja does not have facilities to process seeds (cleaning, drying, fumigation, packaging), while the National Gene Bank does not currently have the financial resources for regeneration, preparation and safety duplication. Opportunities for collaboration with other countries to ensure safety duplication should be considered.

### Bulgaria

(Totka Todorova)

Lettuce and spinach are among the most used spring vegetables in Bulgaria. The collection of leafy vegetables maintained at the Institute for Plant Genetic Resources (IPGR), Sadovo, mainly consists of lettuce, spinach and a very few accessions of *Asparagus*, *Atriplex*, *Cichorium*, *Cynara*, *Rheum* and *Rumex*. The collection of lettuce includes 882 accessions, which belong to var. *capitata* and var. *romana*. Most accessions are advanced cultivars (729) obtained from other genebanks and institutes (e.g. from the Netherlands, USA, Germany, UK, Spain, Italy, the Czech Republic and others). A small part (77) of the collection is made up of landraces collected within the country, while 76 accessions are breeding lines. More than 50% of the accessions were characterized with 28 local descriptors. About 65% of the accessions are placed under long-term storage at -18°C; the remaining part is under short-term storage at +6°C. The spinach collection includes 197 accessions. Only 7 of these are local varieties, while the other samples are duplicates. About 45% of the spinach accessions are under long-term storage and 76% were characterized with local descriptors.



Continued characterization and regeneration of the lettuce and spinach collections is planned for the near future.

## Czech Republic

(Ivana Doležalová)

The systematic collecting, study and conservation of plant germplasm is supported by the Ministry of Agriculture. The National Programme on Conservation and Utilization of Plant Genetic Resources and Agrobiodiversity (2012-2016) is subject to Law No. 148/2003. Twelve institutions participate in the Programme, coordinated by the Crop Research Institute in Prague (CRI). Genetic resources of vegetables are maintained at the Department of Genetic Resources for Vegetables, Medicinal and Special Plants in Olomouc. The main activities include gathering and collecting, documentation and characterization, regeneration and conservation, distribution to users, international cooperation (within ECPGR and AEGIS) and research activities. The collection of leafy vegetables comprises a total of 1571 accessions, of which 1408 are *Lactuca* accessions. *Lactuca sativa* is represented by 841 accessions, of which the large majority (92%) are cultivars. The wild *Lactuca* collection (567 accessions) is represented by *L. serriola*, *L. saligna*, *L. virosa* and other species. All passport data are part of the national documentation system EVIGEZ, but not the evaluation data. Regeneration is carried out in isolation cages (*L. sativa*) or in the greenhouse (wild *Lactuca* species). Between 2006 and 2009, 218 accessions of leafy vegetables were regenerated, but a large part of the wild lettuce and chicory collection is still not regenerated.

Regenerated accessions are stored in the Gene Bank Department of CRI in Prague at  $-18^{\circ}\text{C}$ . Accessions are also stored in Olomouc as a working collection at  $-20^{\circ}\text{C}$ . Thirty-nine *Lactuca sativa* cultivars (Czech varieties as 'Lednický', 'Safír', 'Smaragd', 'Kamýk', 'Valašský', etc.) are stored as safety duplicates at the Slovak Gene Bank in Piešťany.

Priorities for the near future are the regeneration of wild *Lactuca* species (ca. 60% of the collection), including taxonomic redetermination, regeneration of the chicory collection (ca. 60% of the collection), and inclusion of evaluation data into the EVIGEZ database.

## France

(Pascal Coquin)

Genetic resources collections in France are managed through networks, with one public structure and other partners (seed companies, non-governmental organizations (NGOs), etc.). National coordination has been lacking since 2008, but the process to re-establish a National Coordinator is ongoing and should be concluded in 6-12 months.

Artichokes and cardoons (conserved by the Groupe d'Etude et de contrôle des Variétés Et des Semences (GEVES), Cavaillon and five partners) are not organized in a network. Respectively 27 and 4 accessions are available. Activities include regeneration and conservation through active collection (30 plants), safety duplication (5 plants) and long-term collection (5 plants): all accessions are maintained by three partners. Evaluation and genetic analysis depend on project funds, such as the EU projects CYNARES (2007-2011).

The national chicory collection (conserved by GEVES, Brion and 10 partners) consists of 840 available accessions. Characterization activities focus on morphology and inter-simple sequence repeat (ISSR) analysis. Evaluation is carried out for reaction to diseases (*Alternaria*, *Phytophthora*, *Thielaviopsis*) and bitterness (sesquiterpenes and a standardized taste test). The International Chicory Database is maintained by GEVES. The main bottlenecks of the chicory collection are the backlogs for regeneration and the need to eliminate unnecessary duplicates and to organize safety duplication.

The national lettuce collection (300 *L. sativa* and 53 wild *Lactuca* accessions) is conserved by the Institut National de la Recherche Agronomique (INRA)-Avignon, with safety

duplicates in Warwick, UK. Evaluation is carried out for reaction to diseases (*Bremia*, *Xanthomonas* and nematodes). The bottlenecks are the regeneration needs and the fact that the collection was dedicated to the last lettuce INRA programme and its destiny after the conclusion of the programme is uncertain.

### **Georgia**

(Ana Gulbani)

The Genebank of the Agricultural University of Georgia is the only genebank in the country, conserving more than 3000 accessions of cereals, legumes and vegetables and other crops.

Long-term storage is maintained at  $-18^{\circ}\text{C}$ . The leafy vegetables collection consists of three accessions of *Lactuca georgica*, two of *L. serriola*, one of *L. saligna* and five *Spinacia*. The collection is expected to grow since proper facilities for storage are now available. The Institute of Botany is planning to collect wild *Lactuca*.

In recent years, collecting missions in Georgia were undertaken for *Lactuca* by the United States Department of Agriculture-Agricultural Research Station (USDA-ARS) and by the Palacký University, Czech Republic, and for spinach by the Wageningen University and Research Centre, The Netherlands (WUR).

The bottlenecks of the collection are the lack of interest from local donors to fund work on leafy vegetables, which are neglected and underutilized. The collection requires regeneration and characterization.

### **Germany**

(Ulrike Lohwasser)

The German genebank is based at the Leibniz Institute of Plant Genetics and Crop Plant Research (IPK), Gatersleben and is operating with a Quality Management System certified according to ISO 9001. The Genebank Information System (GBIS) is available online ([http://gbis.ipk-gatersleben.de/gbis\\_i](http://gbis.ipk-gatersleben.de/gbis_i)). The operational genebank manual of IPK was compiled in 2011 and is available on the ECPGR website. The collection of *Lactuca*, *Cichorium* and *Spinacia* consist of 1124, 687 and 214 accessions respectively. Several other minor leafy vegetables are conserved, and notable among these are 1034 *Chenopodium* accessions. Storage is maintained at  $-18^{\circ}\text{C}$  and 10% relative humidity. Safety duplicates are sent to the Svalbard Seed Vault (currently one-fifth of the entire German collection). The International Minor Leafy Vegetables Database is maintained at IPK, as a result of the EU project "Leafy vegetables germplasm, stimulating use" and contains evaluation data for *Atriplex*, *Eruca* and *Valerianella*.

### **Hungary**

(Attila Kristó)

Different institutions in Hungary conserve a total estimate of 1173 leafy vegetable accessions. The Research Centre for Agrobiodiversity (RCA), Tápiószéle, maintains 954 accessions (499 *Lactuca*, 63 *Cichorium*, 73 *Rumex*, 94 *Spinacia* and 225 other minor leafy vegetables). About 37% of the accessions are of national origin. The long-term storage is carried out at  $-20^{\circ}\text{C}$  in airtight glass jars. The Genebank Standards for Plant Genetic Resources for Food and Agriculture endorsed by FAO in April 2013 have been adopted by RCA.

The National Strategy on genetic resources foresees increased synchronization of the activities at national level, including the provision of data to the national database as of 2014. Data on traditional knowledge related to landraces will also be recorded. Increasing focus will be on the use of genebank material for on-farm programmes, involving local communities, as well as collecting throughout the country and strengthening public awareness and international collaboration.

## Israel

(Alex Beharav)

The objectives of the research on *Lactuca* at the Institute of Evolution of the University of Haifa are related to collecting and studying genetic diversity in natural populations of wild *Lactuca* species. Specifically, the study is devoted to morphological traits, taxonomic validation, identification of natural putative hybrids, study of bolting control in *L. georgica*, genetic diversity, outcrossing rates, species definition, disease resistance (*Bremia lactucae*) and chemical composition.

*L. sativa* is part of a reproductively isolated group that includes the wild species *L. serriola*, *L. saligna* and *L. virosa* (in order of decreasing sexual compatibility with *L. sativa*). Of these three wild species, only *L. serriola* represents the primary genepool. Six other wild species are taxonomically close to the cultivated lettuce: *L. aculeata*, *L. scarioloides*, *L. azerbaijanica*, *L. georgica*, *L. dregeana* and *L. altaica*. However, these are less widespread and the status of some of them as distinct species is unclear. Studies are ongoing to clarify their taxonomic status and crossing potential.

The Institute of Evolution maintains 1249 lettuce and 40 chicory accessions, while the Israeli Genebank of Bet Dagan holds a smaller number of lettuce, chicory and other minor leafy vegetable accessions. Since Israel is not a signatory to the International Treaty and to AEGIS, the Israeli accessions are currently not eligible for inclusion into the European Collection.

## Italy

(Teodoro Cardi)

Leafy vegetable accessions are maintained by four institutions in Italy. The genebank at the Institute of Plant Genetics in Bari maintains 296 accessions, including *Lactuca* (98), *Cichorium* (91), *Eruca* (38), *Spinacia* (30) and other minor leafy vegetables.

Lettuce and chicory collections are maintained at the Agricultural Research Council institution of Monsampolo del Tronto. The lettuce collection includes 14 lettuce landraces from Italy, 100 wild species accessions and several commercial varieties and breeding lines. Key activities are marker development and association mapping approaches to identify resistance to fungi and insects and breeding for bolting tolerance, low nitrate accumulation and development of new typologies. The chicory collection includes 20 landraces from Italy and several commercial varieties and breeding lines. Key activities are related to breeding of *Cichorium endivia* var. *crispa* and *C. endivia* var. *latifolium*. Main targeted traits are cold resistance, leaf colour and shape, improved shelf life, early bolting tolerance, "heart" self-whitening and rot tolerance.

A rocket collection is maintained at the Agricultural Research Council institution of Pontecagnano. Both *Eruca* and *Diplotaxis* landraces, cultivars and breeding lines are conserved. Key activities are the evaluation of sexual compatibility, genetic diversity studies, evaluation of resistance to bacterial, fungal and virus diseases, analysis of glucosinolate content, breeding for low nitrate accumulation and for leaf typologies.

An *Asparagus* collection is maintained at the Agricultural Research Council institution of Montanaso Lombardo. Various landraces, wild species and breeding lines are maintained. Key activities are the production of androgenetic diplo-haploids by anther culture, the evaluation of androgenetic clones for vigour, fertility, disease resistance and the production of interspecific hybrids.

An artichoke collection is maintained at the Agricultural Research Council institutions of Monsampolo del Tronto and of Pontecagnano. Twenty Italian landraces and 150 breeding lines are maintained. The main key activities in support of breeding is focused on *in vitro* gynogenesis ability, development of morphological and molecular markers to characterize

the landraces, clonal selection, preservation and recovery of pathogen-free plant material, evaluation for resistance to virus, etc.

### **The Netherlands**

(Rob van Treuren)

The Dutch national genebank, established in 1985, operates under an ISO 9001 certified Quality Management System. It is focused on vegetable crops. Accessions are distributed according to Standard Material Transfer Agreements (SMTAs) (5500 seed samples on average per year).

The leafy vegetables collection includes 2815 accessions (2377 lettuce, 387 spinach, 31 corn salad, 17 rocket and 3 purslane) and 989 of these accessions have been included in the European Collection. There are no severe regeneration backlogs in the collection. Cooperation with breeding companies facilitates seed multiplication. Characterization is carried out in-house, while evaluation is carried out jointly with breeding companies, mainly focusing on evaluation for resistance to pests and diseases. Documentation data are included in the national information system (GENIS) and are available to the user community.

The collection has recently developed its scope with acquisitions of modern lettuce varieties and wild species of *Lactuca* from the Caucasus, of wild species of *Spinacia* from Central Asia and the Caucasus, of wild species of corn salad from the Netherlands and of landraces and wild species of asparagus from the Caucasus.

Cooperation is well developed with other genebanks for safety duplication, with the plant breeding industry for acquisition, regeneration and evaluation, and with research institutes for studies on lettuce genomics (UC Davis) and lettuce metabolomics (WUR).

### **Poland**

(Teresa Kotlińska)

The leafy germplasm collection is maintained at the Research Institute of Horticulture (InHort) in the framework of the National Programme on Genetic Resources of Vegetable Crops, supported by the Ministry of Agriculture. The leafy vegetables collection contains 757 accessions from 10 genera. The major collections are of lettuce, asparagus and red beet.<sup>1</sup> The number of accessions per type of sample is as follows: 384 advanced cultivars, 304 landraces, 18 breeding materials and 51 wild species.

The Polish asparagus collection is based on advanced cultivars and traditional or local cultivars and ecotypes. The collection has been maintained at the Poznań University of Life Sciences since 1974. Currently the collection includes 110 accessions originating from 13 countries. In the year 2000 a rhubarb field collection was started at the Warsaw University of Life Sciences (SGGW). Currently the field collection consists of 12 accessions transferred from Wageningen. Information about existing landraces of rhubarb in different regions of Poland was gathered. These materials will be progressively introduced into the collection.

The lettuce collection includes mainly advanced cultivars and landraces of different forms. Landraces of stem lettuce called *gląbiki krakowskie*, traditionally grown in the surroundings of Krakow in the southern part of Poland, are the most interesting accessions in the collection.

During the period 2009-2013 20 collecting missions were organized by InHort Skierniewice, 17 in Poland and 3 in Lithuania. During these missions 31 accessions of leafy vegetables were gathered.

Regeneration and evaluation are carried out by breeding companies or agricultural universities on the basis of an agreement with InHort.

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<sup>1</sup> *Beta* is not in the mandate of the Leafy Vegetables WG, but red beet is included in the Polish leafy vegetables collection.

Seed samples of the accessions are freely available if there are enough seeds. Up to now the collected accessions of leafy vegetables have not been safety duplicated.

The base collection of seed samples are dried to 3–8% of moisture content and stored in screw-top glass jars at –18°C or –20°C.

Landraces of lettuce, rhubarb, sorrel and red beet collected in the genebank more than 30 years ago are provided to farmers for reintroduction in the original localities.

InHort cooperates with scientific institutions and breeders, which conduct research on the plant species of interest. The cooperation covers regeneration of seeds or vegetative parts, maintenance of field collections (e.g. asparagus, rhubarb), evaluation of morphological and marketable characters, resistance to pathogens, etc. The collected material is used in breeding programmes and other studies.

## Slovenia

(Jelka Šuštar-Vozlič)

The leafy vegetables collection in the Slovenian Gene Bank contains *Lactuca* (227), *Diplotaxis* (19), *Cichorium intybus* (9) and *Valerianella* (6) accessions. Key activities include collecting, regeneration, characterization and evaluation, storage (+4°C, –20°C), exchange, research and breeding. The lettuce collection contains 177 accessions from Slovenian origin. Among these, the most common is ‘Ljubljanska ledenka’. This is an old Slovene autochthonous variety that originates from Ljubljana and its surroundings. In the 19th century it was spread to Austria and the Czech Republic. It was characterized by a red leaf edge. ‘Ljubljanska ledenka’ is considered as an ‘umbrella variety’ and some of the varieties derived from it are also included in the Common Catalogue of Varieties of the EU under the synonyms ‘Laibacher Eis’ 2, 3 and 4, with the characteristic red leaf edge, although this trait has been lost in Slovenian material during the past decades due to selection. This trait has been maintained in some accessions acquired from other genebanks and it could be reintroduced into Slovenian cultivars as well.

## UK

(Charlotte Allender)

The UK collections include 2654 leafy vegetable accessions held at Warwick Genetic Resources Unit (1811), the Millennium Seed Bank (814) and the Heritage Seed Library (29), and the Rhubarb collections held at two Royal Horticultural Society Gardens (Wisley, 100 cultivars and Harlow Carr, 130 taxa). The most represented genus is *Lactuca* (1591), followed by *Chenopodium* (177), *Rumex* (145), *Lepidium* (136) and *Spinacia* (124).

The Leafy Vegetables collection at Warwick Genetic Resources Unit (GRU) is used as a resource for active research programmes. A lettuce diversity set of 96 lines from Warwick and the Centre for Genetic Resources, The Netherlands (CGN), capturing natural genetic and morphological variation, was genotyped using 682 SNP markers and screened for resistance to the aphid *Nasanovia ribis-nigri*, nitrate accumulation and post-harvest discoloration. Other research is carried out on chicory (diversity set selection in both *C. intybus* and *C. endiva*, and evaluation of resistance to *N. ribis-nigri*) and rocket (genetic control of flowering time).

## Update on ECPGR and developments of AEGIS and EURISCO

Lorenzo Maggioni, ECPGR Coordinator, updated participants on the status of the ongoing Phase VIII (2009-2013) of the ECPGR Programme. The budget of the Leafy Vegetables WG and its planned use were presented: € 13 520 for the second meeting and € 7840 for a

workshop to develop a standard molecular characterization protocol for lettuce, which was eventually not organized.

Participants were informed about the steps leading to Phase IX of ECPGR, following the ECPGR Independent External Review of July 2010. Phase IX (2014-2018) will be launched with a total budget of € 2.5 M, new objectives and a new operational structure. As the result of a tendering process, the decision was made to move the Secretariat to Bonn, Germany, where it will be hosted by the Global Crop Diversity Trust, as of January 2016<sup>2</sup>, while the European Internet Search Catalogue, EURISCO, will be transferred to IPK in Gatersleben, Germany.

EURISCO currently contains passport data of more than 1.1 million accessions from over 300 collections in Europe. A plan to include characterization and evaluation (C&E) data in EURISCO, developed by the ECPGR Documentation and Information Network (Doc&Info Network), is expected to be implemented during the next Phase of ECPGR, following the transfer of EURISCO to IPK.

Regarding the establishment of *A European Genebank Integrated System* (AEGIS), the aim is to conserve genetically unique and important accessions for Europe and make them available for breeding and research. Such material will be safely conserved under conditions that ensure genetic integrity and viability in the long term. Thirty-three countries have signed the Memorandum of Understanding to be members of AEGIS and 53 genebanks have signed Associate Membership Agreements with their respective National Coordinators.

The European Collection, under development, is made up of dispersed accessions ("unique and/or important") that need to be identified and approved as European Accessions by the holding countries; these accessions are maintained by genebanks as a decentralized collection. At the time of the meeting the Collection included 11 524 accessions, mainly from the Dutch and German genebanks.

Regarding the selection procedure for the European Accessions, so far two complementary approaches have been promoted: 1. Selection of Most Appropriate Accessions (MAAs) by WGs based on their own selection criteria; 2. Offers by countries based on country of origin and uniqueness. However, it has become increasingly clear that the proposed steps were heavily leaning on two mistaken assumptions, i.e. (i) the availability of sufficient data to allow decision-making in EURISCO and the Central Crop Databases, and (ii) that the various parties involved in the selection (WG members, genebank curators, National Coordinators), would be able to respond quickly and agree on the proposed candidate accessions.

Therefore, the ECPGR Secretariat developed the following more straightforward approach for the selection of European accessions, where the central role would be played by the member countries, while the Working Groups would assume a supervisory and monitoring role:

1. Associate Member institutes/genebanks recommend to National Coordinators a list of accessions they maintain, for inclusion into the European Collection.
2. The National Coordinator considers the recommendations and makes the final decision, ensuring that the agreed conservation and availability conditions will be met.
3. Accessions are flagged in EURISCO as part of the European Collection.
4. The Working Groups maintain technical oversight over the comprehensiveness of the European Crop Collection, the existence of possible gaps, monitor the management of the Crop Collection, including adherence to the AEGIS Quality System (AQUAS) and

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<sup>2</sup> Owing to the decision of the Trust in November 2013 to withdraw its offer, the move of the Secretariat to Bonn is no longer scheduled.

prepare annual workplans for regeneration and other activities that should be coordinated at the European or sub-regional level.

Criteria for selection would need to respect the [Selection requirements](#) agreed by the Steering Committee (SC), consider as a priority those accessions that have originated in the individual country and apply other considerations that would indicate the uniqueness of the accessions. In case of obvious duplications that may be noted at any subsequent stage, it is suggested that the two holding genebanks agree on the final status of the duplicates, including the possibility of declaring one accession as the original and the other as a safety duplicate.

The AEGIS Quality System (AQUAS) principles were described, including the need for consensus, agreement on minimum standards, the acknowledged need for capacity building, minimum bureaucracy and establishment of a monitoring system. The System is composed of a number of elements, some of them already in place and others under development:

1. A template for compilation by each associate member, to be published online, thereby increasing transparency about current genebank operational standards;
2. Generic genebank operational standards to be agreed at the WG level, based on the standards on seed, field and *in vitro*/cryopreservation approved by the FAO Commission in April 2013 ([Genebank Standards for Plant Genetic Resources for Food and Agriculture](#));
3. Minimum crop-specific technical standards (complementing generic standards) to be agreed at the WG level;
4. AEGIS Safety Duplication Policy;
5. AEGIS Distribution Guidelines (in preparation)<sup>3</sup>;
6. Reporting and monitoring mechanism (in preparation).

### Evaluation and update of the Working Group's workplan

R. van Treuren presented the status of progress of the Working Group against the workplan which had been agreed in November 2009 in Catania. The list of completed tasks includes:

1. Descriptor lists for *Eruca* and *Valerianella* available on the ECPGR website
2. Compilation of status overviews of collections
3. Gaps for Spanish accessions in the Leafy Vegetables Databases identified and filled
4. Finalization of the EU GENRES project
5. WG meeting held in 2013
6. Data on genebank operations available from collection holders (partly realized).

Other items (not completed) which were discussed were as follows:

#### a) *Data of available Lactuca accessions from Israel included in the databases*

No further follow-up was required, since the Group decided to no longer invest in Central Crop Databases (see below, pp. 16-17).

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<sup>3</sup> Update at January 2014: the document, entitled *Guidelines for Distribution of Material from the European Collection*, has been finalized and is available from the AEGIS Web site (see [here](#)).



***b) Descriptor lists and regeneration protocols available for Asparagus***

This item was not completed since Katerina Smekalova, who was in charge of it, left her position. The Group thought that it would be valuable to bring this task to completion.

**Workplan**

- Ivana Doležalová offered to check whether anyone in the Czech Republic would be able to draft the protocols and will inform the Group not later than the end of November.
- Teodoro Cardi will also check whether anyone in Italy could contribute and will remain in contact with Ivana about this.<sup>4</sup>

***c) Updated status overview of collections available***

Regarding the opportunity for continuing the overview of collections available, the Group concluded that it would be useful to know the safety duplication status and the regeneration status of accessions.

**Workplan**

- It was agreed that the current status overview of collections available will be put on the ECPGR website as soon as R. van Treuren provides the file to the ECPGR Secretariat.<sup>5</sup>
- R. van Treuren will circulate to the group spread sheets requesting information on backlogs regarding safety duplication and regeneration, in order to update the status of the collection and identify needs.

***d) Workshop on molecular markers***

The molecular markers workshop that was supposed to be combined with the planned WG meeting in 2009 was cancelled due to the cancellation of the WG meeting. The WG felt that such a workshop aimed at the definition of standard markers would no longer be useful, since markers evolve rapidly and in the near future germplasm characterization will most likely be carried out by high-throughput sequencing. It was agreed not to put this item back on the agenda.

***e) Activities related to the European Collection***

Discussions were postponed as AEGIS-related activities formed separate, specific topics on the meeting agenda.

**The European Collection**

Rob van Treuren introduced the discussion about the development of the European Collection as part of the AEGIS initiative. He stressed the importance of improving coordination and sharing responsibilities.

In the workplan agreed in 2009 regarding AEGIS, the Leafy Vegetables WG decided to focus initially on lettuce and spinach. Nominations of AEGIS accessions by WG members were expected to be based on availability of seed, reliability of passport data and avoidance of selection of internal duplicates. An integrated analysis of the information provided by the WG members would be used for the identification of duplication groups and the selection of Most Appropriate Accessions (MAAs). Currently, only data from five collections have been integrated and this WG, like many others, was struggling with insufficient data for the

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<sup>4</sup> Update at December 2013: It was agreed that Agostino Falavigna (former WG member from Italy) and Dr Neugebauerová (Czech Republic) will prepare a draft proposal together.

<sup>5</sup> The overview was uploaded as an Excel file on the [Leafy Vegetables WG's web page](#) on 13/12/2013.

proper selection of MAAs. The alternative strategy initiated by Germany and the Netherlands and elaborated by the Secretariat, would be a possible choice for the WG. This alternative foresees that the selection of accessions is autonomously made by the individual countries. The implication of a selection carried out by individual countries would mean a changed role for the WG, consisting of providing feedback to the countries on national selections and of improving the composition of the European Collection. The latter would require checking for duplicates among AEGIS accessions after integration of the national selections; nominating additional MAAs among the remaining, non-selected accessions; identifying serious collection gaps and explore possibilities to fill the gaps; coordinating the removal of regeneration backlogs of unique material and coordinating the acquisition of novel material.

The availability of “Duplicate finder” was mentioned. This is a simple tool to assist in the identification of potential duplicates, based on passport data. The software is available online (<http://documents.plant.wur.nl/cgn/pgr/aegisdf/>).

### Discussion

The following round of comments was made by the country representatives, who were asked to give an update on the status of national progress in the implementation of AEGIS:

**Albania:** no information on progress.

**Bulgaria:** no information on progress.

**Czech Republic:** the country is fully operational regarding AEGIS. Sixty accessions of lettuce and three of spinach were nominated for inclusion in the European Collection, but the list will be shortened to 30-40, since there are not yet sufficient characterization data. It was however pointed out that the accessions do not necessarily need to be fully characterized before entering the European Collection.

**France:** there is a positive attitude towards AEGIS which is shared by all the WG members. However, many questions still need an answer at the national level, such as the identification of a National Coordinator, the absence of a National Inventory Focal Point, and the future of many collections. In summary, internal issues needs to be solved, but the attitude towards AEGIS is generally positive.

**Georgia:** In principle there should be no problem with the implementation of AEGIS. However, the initiative depends on the National Coordinator and on ministerial support, which is currently not secured.

**Germany:** the country is fully operational regarding AEGIS and several accessions have been included in the European Collection.

**Hungary:** the decision whether to proceed with the implementation of AEGIS will depend on a strategy to be agreed at ministerial level.

**Israel:** it will be a political decision at the level of the National Coordination and ministerial authorities whether Israel will become a member of AEGIS or not.

**Italy:** there is an ongoing dialogue between the National Coordinator and the Ministry of Agriculture regarding the opportunity for Italy to become a member of AEGIS.

**The Netherlands:** the country is fully operational regarding AEGIS and several accessions have been included in the European Collection.

**Poland:** it is necessary to solve some internal problems, such as the need to improve the organization of the national collection (proper documentation, knowledge of seed availability, regeneration status and safety duplication) and also to formalize the AEGIS agreements for Associate Membership.

**Slovenia:** discussions are still taking place on which leafy vegetable accessions to include in the European Collection. It has still not been decided which criteria to use.

**UK:** there is the intention to find a national way forward, which may still take some time. Some UK collections are actually global, including donated material; therefore the criteria for proper selection need to be developed. The initial step will be to verify that accessions are available and safety-duplicated.

### **Recommendation(s)**

- It was agreed that there was no reason to continue working on the scenario proposed in Catania and that it would be better to wait for individual countries to follow the revised procedure.
- It was also agreed that the future role of the WG would be:
  - To provide feedback on national selections
  - To improve the composition of the European Collection
    - \* Check for duplicates among AEGIS accessions after integration of the national selections
    - \* Nominate additional MAAs among the remaining, non-selected accessions
    - \* Identify serious collection gaps (and explore possibilities to fill gaps)
    - \* Coordinate the removal of regeneration backlogs of unique material
    - \* Coordinate the acquisition of novel material.
- WG members were invited to encourage the National Coordinators to implement the mechanism leading to national selection of accessions for the European Collection. The WG will need to monitor the evolution of this process and will only start analysing the collection once a reasonable number of accessions have been included. When that stage is reached, selection criteria to be applied at the regional level will need to be discussed.

### **Genebank standards for leafy vegetables**

R. van Treuren introduced the discussion on crop-specific standards to be adopted by the Leafy Vegetables WG, as part of the AEGIS Quality System (AQUAS). He stressed that a set of policies, processes and procedures need to be followed by all AEGIS members in order to ensure appropriate quality of the activities. Transparency in genebanks' operations and adoption of procedures according to agreed minimum standards are fundamental for collaboration in AEGIS.

The Workplan of the WG devoted its initial focus on lettuce and spinach, promoting an inventory of genebank procedures among WG members and the development of a list with

agreed minimum standards. The recently revised FAO [Genebank Standards for Plant Genetic Resources for Food and Agriculture](#) were suggested for adoption by the WGs as part of AQUAS. The WG was therefore requested to evaluate whether the FAO standards were suitable for leafy vegetables and whether any additions/modifications were required. Data from eight members were collected before the meeting, regarding protocols currently in use for lettuce and spinach. These were the basis for a discussion on the potential standards which can be agreed for the Leafy Vegetables WG.

The following list indicates the FAO standards and the corresponding decision made by the Leafy Vegetables Working Group (LV) regarding the adoption of the same or a different standard:

### **Seed drying**

- Environmental temperature during drying (°C)
  - FAO (4.2.1.): 5-20°C
  - LV: Agreed
- Relative humidity during drying (%)
  - FAO (4.2.1.): 10-25%
  - LV: Agreed
- Target seed moisture content
  - FAO (4.2.1): Equilibrium
  - LV: Agreed

### **Seed storage**

- Time between seed harvesting and long-term seed storage (months)
  - FAO: No standard
  - LV: Target is within 12 months, but depending on the workload, longer time is acceptable. Also for temporary storage it is recommended to use optimal circumstances, i.e. cool and preferably air-tight or oxygen-free conditions.
- Minimum seed quantity for uptake in the collection (number of seeds)
  - FAO: No standard
  - LV: No standard
- Temperature (°C) during long-term storage (base collection)
  - FAO (4.2.3.):  $-18 \pm 3^{\circ}\text{C}$
  - LV: Agreed
- Temperature (°C) during medium-term storage (active collection)
  - FAO (4.2.4.): 5-10°C
  - LV: Agreed
- Temperature (°C) during short-term storage (active collection)
  - FAO (paragraph 37): Ambient (max. 25°C)
  - LV: Agreed
- Relative humidity during storage (%)
  - FAO (4.2.4):  $15 \pm 3$
  - LV: It depends on how the storage is arranged. It is not considered sensible to define an absolute %.

**Seed viability monitoring**

- Maximum period between receipt/regeneration of a seed sample and initial viability testing (months)
  - FAO (4.3.1.): Within 12 months after receipt of the sample at the genebank.
  - LV: Agreed with standard, but depending on the workload, a longer period is acceptable.
- Minimum initial germination for most seeds of cultivated crop species (%)
  - FAO (4.3.2.): >85%
  - LV: Aiming at 80%, but for special material lower percentages are also acceptable.
- Minimum initial germination for accessions or species that normally do not reach high levels (%)
  - FAO (4.3.2.): Lower values than 85% are acceptable
  - LV: Agreed
- Time interval between successive viability tests (years)
  - FAO (4.3.3.): Viability monitoring test intervals should be set at one-third of the time predicted for viability to fall to 85% of initial viability or lower depending on the species or specific accessions, but no longer than 40 years.
  - LV: The FAO standard is acceptable for spinach (long-lived species), but for lettuce (short-lived species) intervals of 10 years are recommended, unless internal experimental data prove that the period can be prolonged.  
*Background:* On one hand, lettuce has proved to maintain seed viability for longer time than previously thought, and on the other hand, viability testing is a very expensive task which needs to be performed as efficiently as possible.
- Viability threshold for the regeneration/re-collection of accessions (%)
  - FAO (4.3.4.): 85% or lower of initial viability, depending on the species or specific accessions
  - LV: Agreed
- Number of seeds used for viability testing
  - FAO: No standard
  - LV: 50 (as recommended minimum target)  
*Background:* Comparison tests with 50 or 200 seeds were made at IPK, Germany and there was no big difference in the results. It remains a fact that the confidence interval using 200 seeds is considerably smaller compared to the use of 50 seeds. Below 50 seeds the data seem unreliable. It could be possible to distinguish between homogeneous cultivars and other material. Less than 50 seeds would be acceptable for homogeneous cultivars, but not for other materials.

**Seed regeneration**

- Seed depletion threshold (minimum number or weight of remaining seeds)
  - FAO (4.4.1): Seed quantity lower than what is required for three sowings of a representative population of the accession
  - LV: Agreed
- Number of plants for the regeneration of cultivated material
  - FAO (4.4.2.): Sufficient number to maintain genetic integrity
  - LV: Agreed. The numbers used by the group are acceptable as a guideline. Lettuce: 10-15 plants with the possibility to make this number higher if necessary for seed increase or for highly heterogeneous samples, which may apply, for

instance, to certain landraces; or lower if it is known that it is an homogeneous accession. Spinach: minimum of 45-50 plants.

- Number of plants for the regeneration of wild species
  - FAO (4.4.2.): Sufficient number to maintain genetic integrity
  - LV: Agreed. The numbers used by the Group are acceptable as a guideline. Lettuce: 15 plants, but keeping in mind that the number should be higher for outcrossing species, ideally reaching 50 plants. Spinach: minimum of 45–50 plants, higher number if needed to increase the seed yield.
- Minimum number of plants used for seed harvesting
  - FAO (4.4.2.): Sufficient number to maintain genetic integrity
  - LV: At least half of the number of plants grown for regeneration, with the understanding that the number can be lower if the accessions would otherwise be lost.
- Regeneration environment for cultivated material
  - FAO (paragraph 67): No standard, the most species-specific favourable conditions
  - LV: Agreed
- Regeneration environment for wild species
  - FAO (paragraph 67): No standard, the most species-specific favourable conditions
  - LV: Agreed
- Protective measures to avoid contamination for outcrossing, wild species
  - FAO (4.4.2.): Adequate measures to protect genetic integrity
  - LV: Isolation in protected environment (cages, tunnels, nets, etc.)
- Vector used for insect-pollinated, wild species
  - FAO: No standard
  - LV: Lettuce: appropriate vector for outcrossing species (e.g. bumble bees, flies, etc. if grown under isolation)

#### Seed distribution

- Number of seeds per accession distributed to users
  - FAO (4.8.4): Minimum of 30-50 viable seeds for most species
  - LV: Agreed

#### Workplan

- In order to define the standards for chicory, P. Coquin agreed to circulate a simplified template, similar to the one used for lettuce and spinach, to the WG members and to collect information on the standards currently used in European genebanks (**task to be started in March 2014**).
- On the basis of the above exercise, the Chair will moderate a discussion in order to reach an agreement on the standards for chicory (**within June 2014**).
- For minor leafy vegetables it should be possible to define a few categories, identify to which category the various species belong and then propose the respective protocols and standards. C. Allender agreed to prepare a series of draft recommendations and circulate them by email for comments and endorsement (**task to be completed by the end of the year 2013**).

## Central Crop Databases

Regarding the relationship between EURISCO and the Central Crop Databases (CCDBs), L. Maggioni explained that the WGs are finding it increasingly difficult to sustain the development of CCDBs, but frustration is also building up because of the fact that EURISCO does not contain enough passport and crop-specific data to select AEGIS accessions. At the same time, EURISCO is the official repository of potential AEGIS accessions, while the CCDBs do not contain data verified and cleared by any national authority. Different WGs have expressed apparently contrasting opinions, suggesting in some cases abandoning the CCDBs and investing rather more in EURISCO. In other cases, WGs have confirmed that they would rather rely on the CCDBs, which remain more flexible and suitable for crop-specific needs and can accommodate functions that EURISCO will never have (synonyms, duplicates, photos, geographic information system (GIS), taxonomy standards, molecular, pedigree, *in situ* data, etc.).

A paper by Hintum et al. (2010)<sup>6</sup>, written on behalf of the Doc&Info Network, foresees the development of ECCDBs into user-oriented crop portals providing access to information beyond the present C&E data, i.e. all data useful for research and breeding of a particular crop.

Considering the uneasiness of several WGs regarding the respective roles of EURISCO and the CCDBs as well as the need to bring all WGs to the same level of understanding and collaboration about a vision for PGR documentation in Europe, the SC agreed to allocate funds for a meeting of the Doc&Info WG<sup>7</sup> in 2014, specifically dedicated to the above and related issues.

R. van Treuren summarized the status of the International Leafy Vegetables Databases, which were largely developed thanks to the GENRES project between 2007 and 2010. The Chicory, Lettuce, Spinach and Minor Leafy Vegetables Databases are all accessible through a common homepage (<http://documents.plant.wur.nl/cgn/pgr/LVintro/>). All the databases share some common features: they include only accessions that are available for distribution, they are not focused on Europe, but also include data from outside of Europe, they are based on 35 passport descriptors, provide online search facilities, links to institutional databases, contact details of the curators and downloadable data files in Excel format. They respectively contain 11 697 (lettuce), 2027 (spinach), 1766 (chicory) and 4493 (minor leafy vegetables) accession data and a total of 34 (lettuce), 11 (spinach), 19 (chicory) and 16 (minor leafy vegetables) characterization and evaluation data files.

The databases have received only limited maintenance and further development after the end of the GENRES project.

A discussion on the future of the CCDBs should clarify whether it is desirable and convenient to further invest in their development, updating passport data, extending and improving access to C&E data and other aspects. Alternatively, should EURISCO be preferred as the main focus for future investment, it should be possible not to lose the positive features of the CCDBs and the availability of the existing data should be ensured to the user community.

## Discussion

Several Group members expressed the view that it would be difficult to ensure the continuation of the CCDBs without additional project funds and therefore it would be wise

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<sup>6</sup> Hintum TJL van, Begemann F, Maggioni L. 2010. The European *ex situ* PGR Information Landscape. In Maurer L, Tochtermann K, editors. Information and Communication Technologies for Biodiversity Conservation and Agriculture. Shaker Verlag, Aachen. pp.155-171.

<sup>7</sup> The Documentation and Information Network will be maintained in Phase IX as a Working Group.



to focus future investments on one common database, i.e. EURISCO. It would however be essential that EURISCO could in future provide all the data and additional features currently available from the CCDBs. It was also stressed that C&E data should become searchable as part of relational databases in the future, since static files would not be very appealing for the users.

It was mentioned that crop portals prototypes were being developed experimentally at CGN, The Netherlands, on lettuce and potato, providing additional information on traits, links, etc.

### **Recommendations**

- Possibilities should be explored by the Doc&Info WG to create searchable databases for C&E data. At least it should become possible to search for the accessions that have more data and also to establish links to existing accession data on different websites.
- The Leafy Vegetables Databases should, for the time being, be maintained online, but should include a note that they are not going to be further updated, under the expectation that further developments will be made in EURISCO.
- It is recommended that EURISCO should provide links to curator and genebank details and ordering tools. Links to institutional websites should also provide access to images of the individual accessions.

### **ECPGR Phase IX: organizational structure and priorities**

The new goal and objectives of the ECPGR, as agreed by the Steering Committee (SC) at its 12th meeting in Bratislava (December 2010), were presented. The main changes to the mode of operation of the ECPGR in the next Phase were also explained to the Group. These include the elimination of Networks and the confirmation of existing Working Groups, but now these are to be formed by pools of experts rather than by country representatives. Proposals for activities in line with ECPGR objectives will be evaluated and approved every 6 months, with each activity typically not exceeding € 15 000 and the participation of a maximum of 12 members. A country quota system will be maintained.

Challenges for the future were identified as the uncertain/reduced financial commitment of a few countries in Phase IX and the need to establish the effective operation of the Secretariat in a new environment, with a new ECPGR mode of operation to be tested and implemented. Opportunities also exist, considering that the European Collection is being established and can become the focus for the regional “state of the art” of *ex situ* conservation (including capacity-building). *In situ* and on-farm conservation “concepts” are being prepared and their endorsement by the National Coordinators will strengthen the possibilities for collaboration in this area. Further development of EURISCO to better serve the needs of all WGs will be an expected output of Phase IX. Plans are being made for a meeting of the Doc&Info WG (mid-2014) aimed at clarifying the future developments of EURISCO (characterization and evaluation (C&E) data; Central Crop Databases (CCDBs) as crop portals; Global Information Systems). Dialogues and collaboration with the European Commission (EC) and with germplasm users are expected to be strengthened.

### **Working Group’s workplan for Phase IX**

The decisions made by the Working Group during the previous sessions of the meeting are summarized below:

1. Selection of accessions for AEGIS: the WG should wait for the European Collection to take shape through national initiatives and then start monitoring the composition of the Collection.
2. WG members are expected to promote nominations of AEGIS accessions by their respective countries.
3. Surveys of regeneration and safety duplication status will be carried out and assistance would be sought in case of backlogs.
4. Operational genebank standards for chicory and minor leafy vegetables will be developed.
5. The International Leafy Vegetables Databases will continue to be maintained online, but further developments will for preference be made as part of the EURISCO development. The ECPGR documentation workshop that is planned for 2014 should also give indications to inspire and guide future action.
6. Development of a minimum descriptor list and regeneration protocol for *Asparagus*.

Other proposals and expressions of interest for future WG's activities were noted:

A. Beharev expressed interest in collecting *Lactuca* wild relatives belonging to the primary gene pool and currently missing from the genebanks.

U. Lohwasser expressed interest in promoting the use of diversity that is present in genebanks' accessions via introduction or re-introduction into cultivation, in collaboration with NGOs and farmers. Currently, an experiment along these lines is ongoing in Germany.

A. Kristo mentioned that a similar strategy is ongoing at the Hungarian genebank, aimed at re-introducing old landraces into cultivation.

T. Kotlińska confirmed that the same action is being undertaken in Poland, to re-introduce old cultivars and landraces to the original areas of cultivation, as has happened in the case of plum.

Regarding the proposed possibility to work on molecular markers, it was remarked that not many genebanks were active in this field and also that in the near future the focus will rather be on sequencing strings of traits associated to given accessions.

### **Election of Chair and Vice-Chair**

Rob van Treuren was elected as Chair of the WG and Ulrike Lohwasser accepted the invitation to fill the position of Vice-Chair.

### **Concluding remarks and closure of the meeting**

Participants expressed satisfaction with the achievements of the meeting and the appropriate decisions that were taken. The local organizers of the Agricultural Institute of Slovenia were warmly thanked for their excellent hospitality and efficiency. The Group had the opportunity to visit the genebank and lab facilities and to participate in a wine-tasting session organized by the Oenological Laboratory.

In conclusion, it was noted that this Working Group meeting was the last of its type before the start of a different mode of operation to be implemented in Phase IX.

## APPENDICES

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## Appendix I. Workplan

*(Agreed at the Second Meeting of the Leafy Vegetables Working Group, 8-9 October 2013, Ljubljana, Slovenia)*

Activities	Responsibility	Deadline
<b>Regeneration protocols for <i>Asparagus</i></b>		
Check whether anyone in the Czech Republic or Italy would be able to draft or contribute to the drafting of the protocols and inform the Group	I. Doležalová for Czech Republic T. Cardi for Italy	End November 2013
<b>Updated status overview of collections</b>		
Provide the file to the ECPGR Secretariat	R. van Treuren	As soon as possible after the meeting
Upload on the ECPGR website the current status overview of available collections	ECPGR Secretariat	Upon reception of the file
Circulate to the group spread sheets requesting information on backlogs regarding safety duplication and regeneration in order to update the status of the collection and identify needs	R. van Treuren	As soon as possible after the meeting
Fill in the requested information	WG members	By the deadline indicated upon reception of spreadsheets
<b>Define the crop-specific standards for chicory</b>		
Circulate a template for chicory standards to the WG members and collect information on the standards currently used in European genebanks	P. Coquin	Starting March 2014
Fill in the requested information	WG members	By the deadline indicated upon reception of spreadsheets
Based on the above, moderate a discussion to reach an agreement on the standards for chicory	WG Chair	To be completed by June 2014
<b>Define the crop-specific standards for minor leafy vegetables</b>		
Define a few categories, identify to which category the various species belong and then propose the respective protocols and standards Prepare a series of draft recommendations and circulate them by email for comments and endorsement	C. Allender	To be completed by end 2013

## Appendix II. Acronyms and abbreviations

AEGIS	A European Genebank Integrated System
AIS	Agricultural Institute of Slovenia, Ljubljana, Slovenia
AQUAS	AEGIS Quality System
ATTC	Agricultural Technology Transfer Center, Lushnja, Albania
C&E	Characterization and evaluation
CCDB	Central Crop Database
CGN	Centre for Genetic Resources, Wageningen, The Netherlands
CRI	Crop Research Institute, Prague-Ruzyne, Czech Republic
ECPGR	European Cooperative Programme for Plant Genetic Resources
EU	European Union
EURISCO	European Internet Search Catalogue
GEVES	Groupe d'Etude et de contrôle des Variétés Et des Semences (Group for the Study and Monitoring of Varieties and Seeds), France
InHort	Research Institute of Horticulture, <a href="#">Skierniewice, Poland</a>
INRA	Institut National de la Recherche Agronomique (National Institute for Agronomical Research), France
IPGR	Institute for Plant Genetic Resources "K. Malkov", Sadovo, Plovdiv, Bulgaria
IPK	Leibniz-Institut für Pflanzengenetik und Kulturpflanzenforschung (Leibniz Institute of Plant Genetics and Crop Plant Research), Gatersleben, Germany
ISSR	Inter-simple sequence repeat
MAA	Most Appropriate Accession ( <i>for AEGIS</i> )
NGOs	Non-governmental organization
PGR	Plant genetic resources
RCA	Research Centre for Agrobiodiversity, Tápiószéle, Hungary
SC	Steering Committee
SGGW	Warsaw University of Life Sciences, Warsaw, Poland
SMTA	Standard Material Transfer Agreement
SPGB	Slovene Plant Gene Bank
USDA-ARS	United States Department of Agriculture-Agricultural Research Station, USA
WUR	Wageningen University and Research Centre, The Netherlands

## Appendix III. Agenda

### Second meeting of the ECPGR Leafy Vegetables Working Group 8-9 October 2013, Ljubljana, Slovenia

#### Monday, 7 October

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Arrival of participants

#### Tuesday, 8 October

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09.00–09.10	Opening of the meeting (welcome and agenda) ( <i>Rob van Treuren</i> )
09.10–09.30	Introduction by the hosting organization ( <i>Jelka Šuštar-Vozlič, Vladimir Meglič</i> )
09.30–10.30	Presentations by participants ( <i>All participants</i> )
10.30–11.00	Coffee break
11.00–12.30	Presentations by participants (continued) ( <i>All participants</i> )
12.30–13.30	Lunch
13.30–14.00	Update on ECPGR and developments of AEGIS and EURISCO ( <i>Lorenzo Maggioni, Jan Engels</i> )
14.00–14.30	Evaluation and update of the Working Group's workplan ( <i>Rob van Treuren</i> )
14.30–15.00	The European Collection ( <i>introduced by Rob van Treuren</i> )
15.00–15.30	Tea break
15.30–17.00	The European Collection (continued)
20.00	Joint dinner

#### Wednesday, 9 October

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09.00–10.30	Genebank standards for leafy vegetables ( <i>introduced by Rob van Treuren</i> )
10.30–11.00	Coffee break
11.00–12.30	Central Crop Databases ( <i>introduced by Rob van Treuren</i> )
12.30–13.30	Lunch
13.30–14.00	ECPGR Phase IX: organizational structure and priorities ( <i>Lorenzo Maggioni</i> )
14.00–15.00	WG's workplan for Phase IX and election of Chair and Vice-Chair
15.00–15.30	Concluding remarks and closure of the meeting
15.30–16.00	Tea break
16.00–17.00	Visit to genebank and lab facilities
17.00–18.00	Wine-tasting event



## Appendix IV. List of participants

### Second meeting of the ECPGR Leafy Vegetables Working Group 8-9 October 2013, Ljubljana, Slovenia

*N.B. Contact details of participants updated at the time of publication. The composition of the Working Group is subject to changes. The full list, constantly updated, is available from the Leafy Vegetables WG's Web page ([http://www.ecpgr.cgiar.org/networks/vegetables/leafy\\_vegetables.html](http://www.ecpgr.cgiar.org/networks/vegetables/leafy_vegetables.html)).*

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