	EUROPEAN COMMISSION RESEARCH AND INNOVATION DG	Periodic Report

Project No: 266394

Project Acronym: PGR Secure

Project Full Name: Novel characterization of crop wild relative and landrace resources as a basis for improved crop breeding

Periodic Report

Period covered: from 01/03/2011 **to** 29/02/2012

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Project coordinator name:
Dr. Nigel Maxted

Project coordinator organisation name:
THE UNIVERSITY OF BIRMINGHAM

Version: 1

Periodic Report

PROJECT PERIODIC REPORT

Grant Agreement number:	266394
Project acronym:	PGR Secure
Project title:	Novel characterization of crop wild relative and landrace resources as a basis for improved crop breeding
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Declaration by the scientific representative of the project coordinator (1)

I, Dr. Nigel Maxted THE UNIVERSITY OF BIRMINGHAM , as scientific representative of the coordinator of the project PGR Secure and in line with the obligations as stated in Article II.2.3 of the Grant Agreement declare that:

The project has achieved most of its objectives and technical goals for the period with relatively minor deviations.

The attached periodic report represents an accurate description of the work carried out in this project for this reporting period.

The public website is up to date.

To my best knowledge, the financial statements which are being submitted as part of this report are in line with the actual work carried out and are consistent with the report on the resources used for the project (section 6) and if applicable with the certificate on financial statement.

All beneficiaries, in particular non-profit public bodies, secondary and higher education establishments, research organisations and SMEs, have declared to have verified their legal status. Any changes have been reported under section 5 (Project Management) in accordance with Article II.3.f of the Grant Agreement.

Name	Dr. Nigel Maxted THE UNIVERSITY OF BIRMINGHAM
Date	04/05/2012

This declaration was visaed electronically byShelagh KELL(ECAS user name nkellksh) on 04/05/2012

1. Publishable summary

Summary description of project context and objectives
See attached pdf document.
Description of work performed and main results
See attached pdf document.
Expected final results and potential impacts
See attached pdf document.

Project public website address:	http://www.pgrsecure.org

2. Core of the report

Project objectives, Work progress and achievements, and project management during the period
The Project Summary Pdf document contains the core of the report.

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Section 1: Publishable summary

1.1 Summary description of project context and objectives

Introduction

Our food depends on the continued availability of novel sources of genes to breed new varieties of crops which will thrive in the rapidly evolving agri-environmental conditions we are now faced with as a result of climate change. Wild plant species closely related to crops (crop wild relatives, or CWR) and traditional, locally adapted crop varieties (landraces, or LR) are vital sources of such genes, yet these resources are themselves threatened by the effects of climate change, as well as by a range of other human-induced pressures and socio-economic changes. Further, while the value of CWR and LR for food security is widely recognized, there is a lack of knowledge about the diversity that exists and precisely how that diversity may be used for crop improvement. This is despite the importance of these resources being recognized in a number of policy instruments, including the FAO Global Plan of Action for the conservation and sustainable use of PGRFA (GPA), FAO International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), CBD Global Strategy for Plant Conservation, CBD Strategic Plan for Biodiversity 2011–2020, and European Strategy for Plant Conservation. PGR Secure aims to address these issues by: a) developing fast and economic methods to identify and make available genetic material that can be used by plant breeders to confer resistance to new strains of pests and diseases and tolerance to extreme environmental conditions such as drought, flooding and heat stress—the biotic and abiotic pressures which are rapidly evolving and having an increasingly detrimental effect on crop productivity; and b) developing a Europe-wide systematic strategy for the conservation of the highest priority CWR and LR resources to secure the genetic diversity needed for crop improvement.

PGR Secure context: a call for a step change in agrobiodiversity conservation and use

The EC Biodiversity Action Plan for Agriculture (www.epbrs.org/PDF/EPBRS-IR2004-BAP%20Agriculture.pdf) highlighted the need for a step change in crop cultivar production in Europe to ensure food security across the continent, particularly in light of the adverse impacts of climate change on crop yields, as well as to respond to rapidly changing consumer demands. If these requirements are to be met, plant breeders need a broader pool of diversity to supply the necessary range of traits, as well as greater efficiency in characterization and evaluation techniques to locate the desired traits and speed up the production of new varieties. The Action Plan also argued that maintaining the *status quo* for agrobiodiversity conservation and use is no longer tenable and that a step change in systematic conservation and use is also required. The two major components of agrobiodiversity that offer the broadest range of diversity for breeders are CWR and LR, but there is currently a gap between their conservation and use and they remain under-exploited by the user community. In order to meet the needs of future generations, there are four key areas that need to be addressed: 1) development of novel approaches to characterization and evaluation to replace traditional resource intensive phenotypic methods; 2) systematic *in situ* and *ex situ* CWR and LR conservation; 3) understanding the needs of the user community; and 4) improved CWR and LR information management and accessibility.

PGR Secure: answering the call

The overarching goal of PGR Secure is to underpin European food security in the face of climate change by advancing CWR and LR diversity conservation and use. To achieve this goal PGR Secure has four research themes: 1) novel characterization techniques, 2) CWR and LR conservation, 3) improved use of CWR and LR by breeders, and 4) informatics (see Figure 1). The objectives of

themes 1 and 3 are to improve breeders' use of conserved CWR and LR diversity by applying novel characterization techniques such as genomics, transcriptomics, metabolomics, high-throughput phenotyping and GIS-based predictive characterization. Clarity will be achieved through dialogue of exactly what breeders need to bridge the conservation–use gap and to facilitate the flow of selected material and knowledge from the project to the plant breeding community. The objectives of themes 2 and 4 are to enhance CWR and LR species and genetic diversity conservation through the development of CWR and LR inventories and systematic conservation strategies, and to improve the management and accessibility of CWR and LR conservation and trait data.

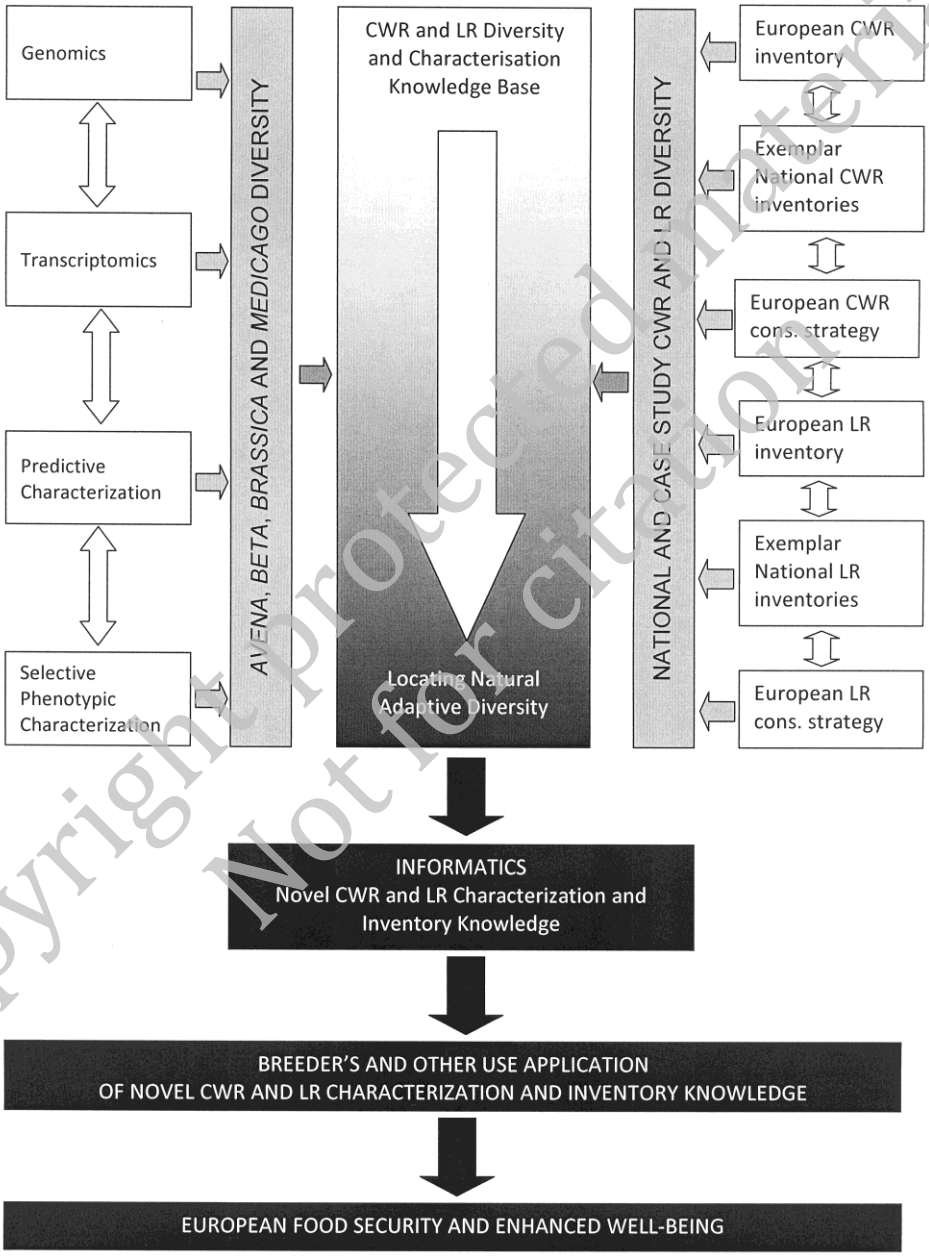

Figure 1. Schematic diagram of interrelated project themes

1.2 Description of work performed and main results

Theme 1: novel characterization techniques

Progress has been made in the identification of plant material resistant against the cabbage aphid and the cabbage whitefly through the development and application of a novel high throughput method for phenotyping gene bank accessions of *Brassica*. Initial results indicate that some accessions show resistance against the target pests and the level of resistance depends on accession and plant age.

Two predictive characterization methods for identifying *ex situ* accessions and *in situ* populations that might harbour abiotic and biotic resistance traits for improving crop performance in climate change-induced environments have been tested. The 'ecogeographic method', which involves collecting information on the environmental conditions most likely to support the adaptive development of target traits and selecting accessions and populations that belong to localities where these environmental conditions are found, is the most workable approach due to the paucity of evaluation data that are required to apply the 'predictive computer modelling method' which is based on and demands *a priori* known trait evaluation data from a subsample of the accessions and populations under consideration.

Theme 2: CWR and LR conservation

The workshop, 'Conservation strategies for European crop wild relative and landrace diversity' was convened to discuss and agree a strategic approach to European and national CWR and LR conservation. Attended by 101 delegates from 38 European countries, it comprised a review of the current state of the art of CWR and LR conservation in Europe, available approaches and methods for their conservation and discussion on their practical application. Participants shared knowledge on current national activities and agreed on the way forward.

National CWR checklists for five case study countries have been produced and prioritized using a range of criteria to create the CWR National Inventories (NIs). Each strategy follows a similar general model but has been adapted according to factors such as the number of native CWR present, the economic use of the related crops, and national conservation and utilization priorities. Progress in the development of LR conservation strategies for three case study countries will inform a model for national LR conservation across Europe. A major step forward is a set of descriptors for collecting, recording and making available LR data that will be adopted by the ECPGR and used to manage national LR NIs throughout Europe.

Theme 3: improved use of CWR and LR by breeders

Understanding the needs of the CWR and LR user community, including gene banks, public research institutes, commercial plant breeding companies, agro-NGOs and government, is fundamental to improve the links between conserved CWR and LR resources and their use in plant breeding programmes for crop improvement. To this end, extensive semi-structured interviews have taken place in northern, central and southern Europe with representative organizations in each of the stakeholder groups to gather information on current availability and use of CWR and LR, identify barriers to their utilization in plant breeding and crop production, and to describe the interaction between stakeholder groups within a country or region. The results are a first indication of the strengths and weaknesses of national PGR programmes and the external factors determining the conservation and utilization of PGR. They were used for a preliminary SWOT analysis of national and

regional PGR programmes and will inform the development of an online questionnaire to target the wider stakeholder community.

Theme 4: informatics

A conceptualization framework for the Trait Information Portal (TIP) has been developed with the input of the stakeholder community via meetings and an online user requirements survey which was formulated to understand what information breeders are looking for and how they look for it, and to provide an opportunity to gather breeders' expectations of the TIP. Five priority services were identified, including the capacity to download data, the availability of information on taxonomy, georeferenced data and codes used for data checking, the need for mapping and analytical tools and the capacity to upload data. The TIP will have a simple platform architecture accommodating input and output data types and will include three different entry points—trait information, CWR and LR inventories— allowing users to choose their entry/access point to the information they require, while maintaining the capacity to link or tap into existing online sources of information.

1.3 Expected final results and potential impacts

The expected final results of the project are: a) enhanced techniques to identify useful adaptive traits and to accelerate plant breeding; b) national and Europe-wide conservation strategies for high priority European CWR and LR resources; c) greater awareness amongst the plant breeding community of the breadth of genetic material available from CWR and LR and of the enhanced access to CWR and LR diversity for crop improvement; d) improved communication between the conservation and end user communities; and e) a resource base for access to CWR and LR conservation and trait data for use by the full range of stakeholders. The potential impacts are: a) better access to and wider take-up of CWR and LR resources in plant breeding programmes, leading to increased capacity and options for crop improvement to support European farming and back-stop food security; b) wider national level action on conservation of European CWR and LR resources; and c) improved knowledge to inform coherent planning of plant breeding and agrobiodiversity conservation policy in Europe—all of which will ultimately result in greater European food security.

These results and impacts will benefit a range of stakeholders including: a) small and large plant breeding companies, b) scientists and policy-makers in public and private research institutes, c) farmers and others working in the agricultural sector, d) plant gene banks, protected areas and the broader conservation community; e) government agencies and non-governmental organizations involved in plant conservation, plant breeding and national or local nutrition and food supply issues, and f) the European Commission. However, it is the use of CWR and LR by plant breeders that will have potentially the greatest economic and social impact in Europe. A critical issue currently hindering the wider use of these resources was highlighted in FAO's Second Report on the State of the World's Plant Genetic Resources for Food and Agriculture (www.fao.org/agriculture/crops/core-themes/theme/seeds-pgr/sow/sow2/en/) which stated that: "Considerable opportunities exist for strengthening cooperation among those involved in the conservation and sustainable use of PGRFA, at all stages of the seed and food chain. Stronger links are needed, especially between plant breeders and those involved in the seed system, as well as between the public and private sectors". Recognizing that the success of the initiative hinges on bridging the gap between the conservation and use communities, the PGR Secure project seeks to strengthen these links and therefore involves collaboration between European policy, conservation and breeding sectors throughout Europe.

Sustainability of the results is also critical to the success of the project. Thus, the project was initiated by and involves members of the already well established *In Situ* and On-farm Conservation Network (www.ecpgr.cgiar.org/networks/in_situ_and_on_farm.html) of the ECPGR from throughout Europe, who will be actively involved in planning, promoting and implementing national CWR and LR conservation strategies. Further, the Consortium itself includes members of plant breeding and conservation research institutes, a SME specializing in the field of molecular genetics and applied genomics, as well as Europe's primary plant breeding research network, the European Association for Research in Plant Breeding (EUCARPIA), all of which have an interest in utilizing and taking forward the project results to benefit the wider conservation and use communities. In turn, and to further improve the dissemination and uptake of the results, the Consortium is supported by an External Advisory Board which involves senior researchers in plant breeding and plant genetic resources for food and agriculture (PGRFA) conservation and policy, as well as a Breeders' Committee comprising plant breeders and pre-breeders of major European food crops.

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2.1 Project objectives for the period

2.1.1 Work package objectives

During the period March 01 2011 to February 29 2012, progress was made towards achieving the following general and specific[1] work package (WP) objectives.

WP1: Phenomics and genomics

General objectives for the period

- High throughput phenotyping to identify accessions differing in resistance towards sap-feeding insects.
- Preliminary assessment of the secondary metabolite content of CWR/LR.
- Preparation for the transcriptomics work.

WP2: Informatics

General objectives for the period

- Produce a web-based CWR and LR Trait Information Portal (TIP) building on existing databases that will: (a) provide useful trait information (phenomics, genomics and transcriptomics data) on European crop wild relative (CWR) and landrace (LR) diversity, particularly for the case study genera, Avena, Beta, Brassica and Medicago; (b) provide baseline biodiversity information on CWR and LR diversity and its conservation; (c) establish links with related existing information systems regarding genomic characterization (e.g., EMBL Nucleotide Sequence Database) and ensure integration with other relevant PGRFA information systems (e.g., CWRIS, EURISCO, ECCDB, ENSCONET) across Europe.
- Research predictive characterization as a means of identifying CWR and LR *in situ* populations/*ex situ* accessions of diverse crop types (*Avena* for cereals, *Beta* for root/tubers, *Brassica* for leafy vegetables, and *Medicago* for legumes) which are likely to contain desirable traits through the innovative approach of Focused Identification of Germplasm Strategy (FIGS), as well as to explore the broad utilization of FIGS methodology to aid breeders' selection of CWR and LR accessions.

Specific objectives for the period

- Collate datasets on sap-feeding insect resistance traits and produce the case study database (MS6, D2.1)
- Produce distribution maps of *Brassica* and *Medicago* CWR and LR (MS7)
- Produce a European map of ecogeographic regions (MS8)
- Produce environment profiles of the habitats of CWR and LR likely to contain target insect resistance (MS9)
- Publish report on Trait Information Portal conceptualization ontology (MS10)

[1] Specific WP objectives are based on the deliverables and milestones due to be delivered/achieved in the period and are therefore not included for all WPs.

WP3: CWR conservation

General objectives for the period

- Produce national and Europe-wide inventories of CWR diversity that contain basic biodiversity data and are moderated by national PGR programmes.

- Undertake exemplar national CWR conservation strategy case studies of Finland, Spain Italy and the United Kingdom (UK) that prioritize *in situ* and *ex situ* conservation actions.

Specific objectives for the period

- Nominate national focal points (NFPs) for the development of national CWR conservation strategies (MS16)

- Send draft national CWR checklists to NFPs (MS17)

- Agree an outline implementation plan for national CWR conservation strategies with NFPs (MS18)

- Establish the national CWR conservation strategy helpdesk (MS19)

WP4: LR conservation

General objectives for the period

- Produce a Europe-wide LR inventory of (at least) the case study taxa (*Avena*, *Beta*, *Brassica* and *Medicago*) and make it available as a web-enabled Europe-wide inventory that contains basic biodiversity data and is moderated by national PGR programmes.

- Undertake exemplar national LR conservation strategy case studies of Finland, Italy and the UK.

- Undertake a European LR priority gene pool (Avena, Beta, Brassica and Medicago) analysis and develop a specific European conservation strategy.

- Drawing on PGR Secure priority gene pool case studies and two country inventories, along with ECPGR On-farm Working Group activities and existing information sources, develop a generic European LR conservation strategy that reviews European LR wealth, conservation status, prioritized *in situ* and *ex situ* conservation actions and links to breeder based exploitation of LR diversity.

Specific objectives for the period

- Nominate national focal points (NFPs) for the development of national LR conservation strategies (MS28)

- Agree an outline implementation plan for national LR conservation strategies with NFPs (MS29)

- Convene a LR conservation workshop (MS30)

WP5: Engaging the user community

General objectives for the period

- To identify, visualize and discuss with the European CWR / LR diversity stakeholders concerned (breeders (large and small), public research institutes, gene banks and NGOs) in Europe the present needs concerning CWR and LR use.

Specific objectives for the period

- Identify and list country key persons (MS39)
- Identify and list stakeholders (MS40)
- Produce a report on identification of and discussions with stakeholders (D5.1)

WP6: Dissemination and training

General objectives for the period

- To disseminate the PGR Secure project results to the CWR and LR conservation and breeder communities across Europe, particularly web-enabled the Europe-wide inventories of CWR and LR diversity and the Trait Information Portal in order to promote the use of the natural diversity of CWR and LR and its useful traits in breeding programmes.
- To raise scientific, professional and general public awareness of the PGR Secure project, its plans, results and potential benefits and to establish the link between the conservation and the CWR / LR diversity user communities, namely breeders, farmers and other users of germplasm, through workshops, publications and a final dissemination conference.

Specific objectives for the period

- Publish the project website (D6.1)
- Convene CWR and LR conservation workshops (MS47)
- Produce CWR and LR conservation workshop reports (D6.2)

WP7: Management

General objectives for the period

- Complete the milestones in time and deliver the deliverables.
- Make sure that the Consortium contractual duties are carried out. Support and strengthen the participants to comply with the EU regulations and their contractual and legal requirements.
- Set up an effective communication infrastructure and foster the integrative process within the Consortium.

Specific objectives for the period

- Execute and sign the project Consortium Agreement (MS54)
- Initiate the production of the first periodic report (D7.1)

2.1.2 Work package tasks

In order to make progress towards/meet the stated objectives, activities were undertaken related to the following tasks:

- **WP1: Phenomics and genomics** – 1.1: High throughput phenotyping; 1.2: Metabolomics; 1.4: Transcriptomics
- **WP2: Informatics** – 2.1: Trait Information Portal; 2.2: Predictive characterization
- **WP3: CWR conservation** – 3.1: European and national CWR inventories; 3.2: Exemplar national CWR conservation strategies
- **WP4: LR conservation** – 4.1: LR inventory; 4.2: Exemplar national LR conservation strategies; 4.3: European LR priority gene pool conservation strategy; 4.4: Generic European LR conservation strategy
- **WP5: Engaging the user community** – 5.1: Identification of and discussions with European stakeholders in the PGR conservation and use community
- **WP6: Dissemination and training** – 6.1: Project website; 6.2: Web-enabled Europe-wide inventories of CWR and LR diversity; 6.3: Web-enabled Trait Information Portal; 6.4: Publications; 6.5: Workshops and training
- **WP7: Management** – 7.1: Project Management; 7.2: Communication management

2.2 Work progress and achievements during the period

2.2.1 WP1: Phenomics and genomics (WP leader: Ben Vosman, DLO)

Work package 1 will demonstrate how novel phenomics, genomics and transcriptomics technologies can be used to speed up plant breeding. The focus is on the identification of resistance factors against the cabbage aphid (*Brevicoryne brassicae*) and the cabbage whitefly (*Aleyrodes proletella*).

Task 1.1: High throughput phenotyping. Task Leader: DLO. Partners involved: UoB (P01), DLO (P02)

The first step is the development and application of a novel high throughput method for phenotyping gene bank accessions of *Brassica*. A protocol for the evaluation of cabbage landraces and wild relatives for resistance towards whitefly and aphids under natural infestation (choice test) was developed. The no-choice test for whitefly resistance was carried out according to the protocol developed by Broekgaarden *et al*. (2012).

Plant material for a field trial was selected based on the core collection established by Boukema *et al*. (1997) enhanced with all available crop wild relatives (CWR) and some landraces (LR) which originate from eastern Europe and Russia. In total, 434 *Brassica* accessions, 105 CWR and 329 LR were selected (Table 1).

The field experiment of 2011 was conducted at two different locations: one in Wageningen, the Netherlands by P02 and the other in Stratton Audley near Bicester by P01. At both locations, five week old plants were transplanted in the field. Plant growth and natural infestation (a choice test) of

cabbage aphids and whiteflies were monitored. The work by P01 focused on cabbage aphid and the work by P02 on cabbage whitefly.

Table 1. *Brassica* species—CWR and LR—that were screened for resistance against cabbage aphids and whitefly

Species	No. of accessions
B. bourgeaui	2
B. cretica	10
B. fruticulosa	15
B. incana	10
B. insularis	1
B. macrocarpa	2
B. maurorum	2
B. montana	7
B. oleracea	370
B. rapa	3
B. rupestris	3
B. spinescens	1
B. villosa	8
Total	**434**

In Wageningen the complete set of 434 accessions were planted on the 30th of May 2011. In this field experiment the focus was on cabbage whitefly, of which the natural infection was very low, probably due to the wet and cold summer of 2011 in the Netherlands. It was not possible to distinguish susceptible from resistant accessions. Therefore, no-choice tests with clip cages containing five female whiteflies were performed on the field grown cabbage plants, using whiteflies obtained from a rearing at WUR Plant breeding (Broekgaarden *et al*., 2012).

Two preliminary tests were conducted on all 434 accessions to eliminate a large part of the most susceptible accessions. After seven days the clip cages were removed and the number of whitefly (alive/dead) and the number of eggs were counted. We used two selection criteria to select our candidate resistant lines. All accessions with zero adult survival and/or accessions with an oviposition rate (eggs/female/day) lower than one (normal range between one and four) were selected. This brought the total number of candidates down to 100. A third test with four biological replicates was carried out on the 100 selected accessions and 10 controls. For several reasons, such as uneven leaf surfaces that allowed whiteflies to escape from the clip cages, it was not possible to obtain a complete dataset for all accessions tested. Therefore, the analysis had to be restricted to 77 accessions (21 CWR, 49 LR and 7 controls).

The results showed that resistance to cabbage whitefly can be found among *Brassica oleracea* subsp. *capitata* LR. This is similar to the resistance that was found in a commercial white cabbage F1 hybrid variety by Broekgaarden *et al*. (2012). The highest level of resistance in CWR was found in *B. villosa*. All eight *B. villosa* accessions tested in the field experiment passed the preliminary selection and six yielded sufficient data for the statistical analysis. Four *B. villosa* accessions are represented in the most significant group. This confirms the resistance earlier found by Ramsey *et al*. (1996) in *B. villosa*. In the field experiment one *B. incana* accession was found with almost complete resistance against the cabbage whitefly when considering survival and oviposition rate. Conversely, susceptible

B. incana accessions were also found. This opens the possibility for studying the genetics of whitefly resistance using an intraspecific *B. incana* cross population.

In Bicester, a subset of 200 accessions —including all 105 CWR accessions and a random selection of LR—were planted in three replicate blocks. Each of the three plots was scored for the presence of whitefly and aphids. There were large differences in developmental state among the accessions —some were in the late stages of flowering while others remained still fully vegetative—which made it difficult to find all aphids on a plant. Comparison of the data on the three replicate plots revealed 17 resistant accessions (nine CWR and eight LR), which showed no aphid infestation in any of the three sub-plots. These resistant plants were mainly *Brassica oleracea*, with two *B. incana* and one *B. villosa*. Fourteen susceptible genotypes were identified, with the *B. oleracea* dominance broken by a single *B. cretica* and a single *B. villosa*, but split equally between seven CWR and seven LR. With the addition of seven accessions identified in the Netherlands this currently leaves us with 38 aphid resistant candidates.

Currently in consultation, P01 and P02 are confirming their choice of genotypes through no-choice greenhouse experiments and are securing seed stocks. The no-choice greenhouse experiments are being conducted to confirm the resistance to cabbage aphid and cabbage whitefly that was found in the field experiments of 2011. Preliminary results confirm resistance to cabbage whitefly in 12 week old *B. oleracea* subsp. *capitata* landraces. On six week old plants, the differences between resistant and susceptible *capitata* accessions were very small. This indicates that the resistance is plant age related, similar to the results shown by Broekgaarden *et al*. (2012). Within the selected CWR accessions there is already some level of resistance present in plants that are six weeks old. Some *B. incana*, *B.villosa* and *B. montana* accessions are significantly different at that age from the resistant and susceptible control lines that were also used in the *B. oleracea* subsp. *capitata* LR experiment. The test for CWR with plant age of 12 weeks will be performed in the coming months. The first results on cabbage aphid, at plant age of six weeks, show no significant differences between the tested CWR. Three more experiments will follow in the coming months—one on six week old plants and two on 12 week old plants.

The selected resistant material will be the starting point for a segregating population that can be used in further research by P02. Once resistant genotypes are confirmed, P01 will begin a rolling program of EPG screening of this interesting material which will complement the subsequent transcriptomic analysis (Task 1.4).

P01 has undertaken preliminary work on aphid feeding on *Brassica* spp. using electrical penetration graph (EPG) which has not raised any problems for the foreseen actual screening in 2012. There is no evidence from literature (Ellis *et al*., 1998; Schliephake, 2003) that resistance can be found in young plants. If the resistance is plant age dependent, like the resistance found by Broekgaarden *et al*. (2012) for cabbage whitefly, EPG should be performed on older plants.

Task 1.2: Metabolomics. Task Leader: DLO. Partners involved: DLO

Based on results from Broekgaarden *et al*. (2012), it is likely that compound(s) found in phloem sap cause the resistance in *B. oleracea* subsp. *capitata*. Because it is not known on which compound(s) the resistance is based, a pilot experiment was performed to measure metabolites in phloem sap. Phloem sap was isolated from 12 week old resistant and susceptible *capitata* accessions and analysed using liquid chromatography – mass spectrometry (LC-MS). The first results show that it is not possible to measure concentrated samples on the LC-MS. However, using a solid-phase

extraction column and concentrated samples, some metabolites can be detected in the phloem. Further experiments will be necessary to optimize the procedure. Based on these results, leaf material or phloem sap will be used for LC-MS metabolite analysis in a set of 125 accessions.

Task 1.4: Transcriptomics. Task Leader: UoB. Partners involved: UoB, UNOTT

In preparation for the transcriptomics work P01 has now undertaken trial RNA extractions from *Brassica* leaves which works extremely well.

Partner 10, UNOTT has not triggered any staff time specifically for this project as their main contribution does not start until month 15 at the earliest. However, as part of their ongoing work in related areas and following up on suggestions made at the kick-off meeting they have expanded their chip experience:

1. They have trialed the new *Arabidopsis* "ATH2" GeneST 1.0 peg-array from Affymetrix and have performed 24 hybridizations to compare the function of this chip with the older ATH1 and are preparing a publication for dissemination of this comparison.

2. Since the kick-off meeting, they have hybridized their first 200 *Brassica* samples to the *Brassica* exon chip and have a good idea of the slightly unusual processing requirements for this chip.

3. They have performed over 500 more ATH1 hybridizations since the kick-off meeting and used the 'xspecies' technique on three new crop species (and several animal species); publications are in preparation.

WP1: Deviations from Annex I

No significant deviations have occurred during the current reporting period except that Tasks 1.2 and 1.4 have started earlier than originally indicated in Annex I.

P02, DLO notes that in the field experiment we found several *B. oleracea* subsp. *capitata* to be resistant to whitefly. This resistance looks very similar to the one that we have already identified in the cultivar 'Riviera' (Broekgaarden *et al*. 2012). In the project we will create a few segregating populations, which in Task 1.5 can be used for quantitative trait loci (QTL) mapping and linking candidate genes to the identified QTLs[2] (i.e., data integration). In the past few years we have created an F2 population resulting from a cross between the cultivars 'Christmas drumhead' and 'Riviera'. This population has been phenotyped (no-choice) for whitefly resistance in the field in 2011 and currently we are sequencing a bulk of F2 individuals for marker generation (the sequencing data is expected to be available by the end of March 2012). This F2 population, the phenotyping data and the marker data will be brought into the PGR Secure project as background. We will then carry out the QTL analysis on this population, which will mean we will start earlier with Task 1.5 activities. Of course we will continue also the work on generating new segregating populations, but focussed on other *Brassica* types, as for the moment there is no benefit in making additional populations of *capitata*. This slight deviation will not have any impact on other tasks (except that Task 1.5 will be started earlier than planned) or on the available resources.

[2] Candidate genes may come from the sequencing data to be obtained, expression studies and/or from the metabolomics analysis.

2.2.2 WP2: Informatics (WP leader: Carlo Fadda, BIOVER)

Task 2.1: Trait Information Portal. Involved partners: all partners

The lead project partner, BIOVER has been working with the development team on the refinement of the conceptualization/design for the Trait Information Portal (TIP) mockup.

During the project the conceptualization framework for the TIP and the first generic ideas were presented to the PGR Secure Consortium at the project kick-off meeting, 15–16 March 2011 in the United Kingdom, where feedback was received and discussed. The second step consisted in laying the foundations for a wider understanding and up-take of the TIP concept and further identification of breeders' needs for the tool. This was done primarily through a user requirements survey addressed to the breeders' community. The results of this survey were presented at the CWR and LR conservation training workshop held in Palanga, Lithuania, 7–9 September 2011.

The survey was formulated so as to: (i) understand what information breeders were looking for; (ii) how they look for this information; and (iii) provide an opportunity to gather breeders' expectations for this tool. Five priority services were identified through the breeders' survey, among which the top priority was identified as the capacity to download data; secondly, the availability of information on taxonomy, georeferenced data and any type of codes used for data checking; followed by the need for both mapping and analytical tools for those data; and lastly the capacity to upload data (to send fresh data or update data in the information system) (see Figure 1).

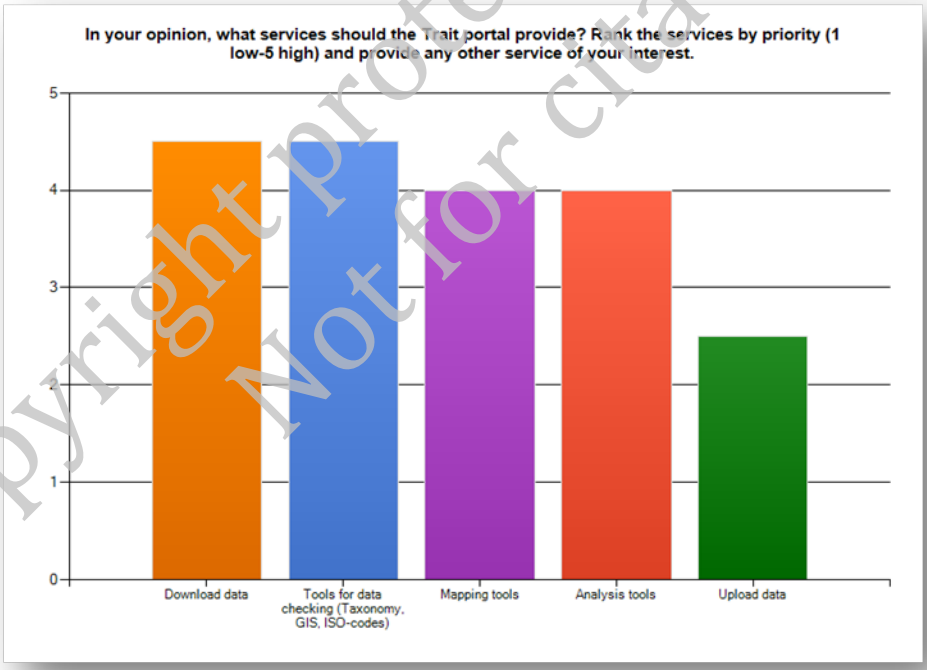

Figure 1. Results of the breeders' survey on what services the TIP should provide and priority services of interest to breeders

In addition to the survey, the TIP development team at Bioversity International has sought feedback from the PGR Secure project partners to gain an even better understanding of expectations of the

TIP; including data types required, features envisaged, type of links, and ontology groups to be established.

A Joint PGR Secure/European Cooperative Programme for Plant Genetic Resources (ECPGR) workshop was convened on 7–9 September 2011, in Palanga, Lithuania, entitled 'Conservation strategies for European crop wild relative and landrace diversity'. At this workshop, the TIP concept was presented under the title 'Development of a European information system for CWR and LR conservation and use data and implementation of the Trait Information Portal—Pieces of the Puzzle' (www.pgrsecure.bham.ac.uk/sites/default/files/meetings/palanga/P06_European_CWR_and_LR_Info_System_and_TIP_Dias.pdf). On this occasion the main focus was to promote the TIP concept for the use of ontologies (controlled vocabularies) for traits, CWR, LR and crop-specific data. The way forward is therefore to use a 'Triontology'—CWR, LR and Crop-Trait Ontologies. The presentation given demonstrated the effectiveness and value in using these tools as a starting point, and consideration was given to using them in the development of the TIP as part of the PGR Secure project. Possible PGR Secure ontology groups of interested partners/contributors for *Avena*, *Brassica*, *Beta* and *Medicago* CWR and LR were identified.

The TIP framework concept was then presented at the PGR Secure first annual consortium meeting held in Perugia, Italy in December 2011, where it was approved by the Consortium.

The TIP will have a simple platform architecture accommodating input and output data types, as follows and as illustrated in Figure 2. The system will:

- Use a document store database system;
- Have an upload system with flexible template driven options for data being sent by providers;
- Include and use the Generation Challenge Programme (GCP) data annotation and trait ontology curation tools developed by the Bioversity team;
- Be searchable through ontology-driven views;
- Include information on traits, locations, trial sites, georeferences, geographical information;
- Use web scraping (scrape-off related information/data) to include external data sources, molecular data, bibliography, characterization and evaluation data, images, etc.;
- Link with external information sources;
- Provide data analysis outputs.

Additionally, the TIP will include three different entry points (trait information, CWR and LR inventories), allowing users to choose their entry/access point to the information they require, while maintaining the capacity to link or tap into existing online sources of information such as GENESYS, EURISCO and the European Central Crop Databases (ECCDBs).

The TIP framework is now in its second phase, which involves actually producing the TIP framework, previously only presented as a concept.

The rationale behind the TIP conceptualization framework was to allow the development team to use and further enhance existing and evolving resources being developed in other communities of practice, so as not to reinvent the wheel. This is the spirit which has driven the development and evolution of the TIP during the first year of the PGR Secure project.

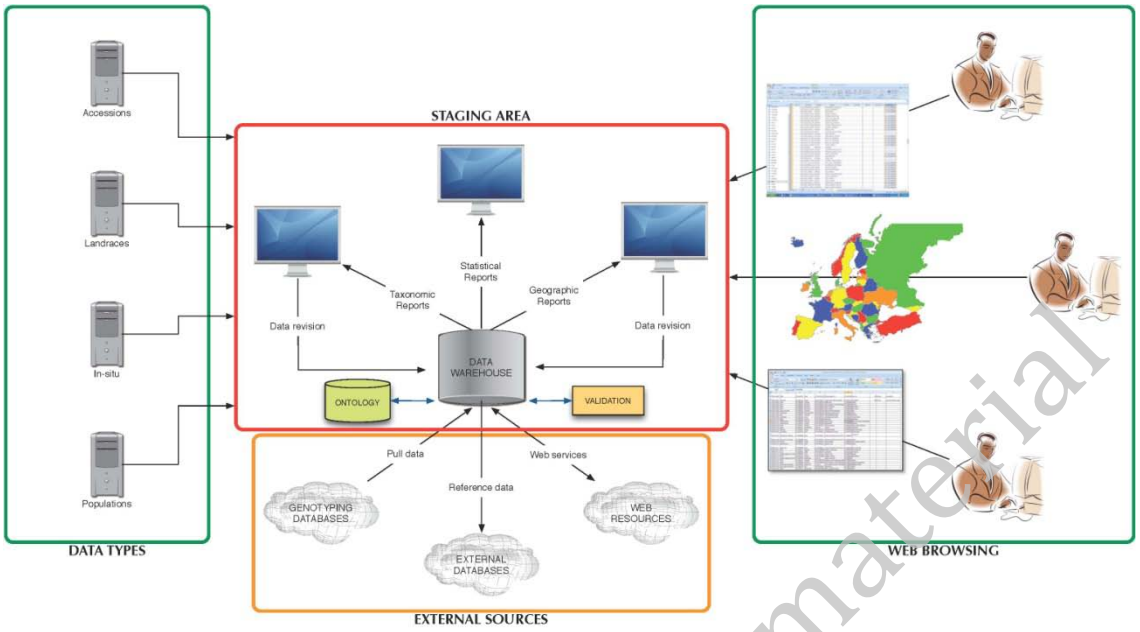

Figure 2. TIP platform architecture

The next steps are to develop the ontologies followed by the mockup with a preliminary testing using project data.

The TIP conceptualization framework, as described above, was submitted for publication in the PGR Secure CWR newsletter in February 2012 (month 12).

Task 2.2: Predictive characterization. Involved partners: UoB, DLO, BIOVER, UNIPG, JKI, MTT, URJC, SXS, UNOTT

The objective of Task 2.2 is to test the Focused Identification of Germplasm Strategy (FIGS) approaches on LR and CWR from the project's four target genera (*Avena*, *Beta*, *Brassica* and *Medicago*), to identify potential accessions and *in situ* populations that might harbour abiotic and biotic resistance traits of interest to breeders as well as to conservationists.

FIGS (Mackay and Street, 2004) emerged as an approach to target accessions more likely to possess specific genetic variation sought by breeders. FIGS was a collaborative development involving researchers from the International Centre for Agricultural Research in the Dry Areas (ICARDA, Syria), the Australian Winter Cereals Collection and the Russian N.I. Vavilov Research Institute of Plant Industry (VIR, Russian Federation). It involves gathering available information and knowledge to facilitate the identification of candidate accessions. Geographic information system (GIS) tools and statistical and modelling techniques can then be used to select the candidate accessions for evaluation, based on an understanding of relationships between traits and the environment.

A predictive computer modelling method is used to identify material with potential abiotic or biotic resistance traits. This method is based on and demands *a priori* known trait evaluation data from a subsample of the accessions and populations under consideration, in addition to environmental data for the whole occurrence dataset. The FIGS method, addressing abiotic traits in the absence of evaluation data, is based on collecting information on the environmental conditions most likely to support the adaptive development of these target traits and selecting for those accessions and

populations that belong to localities where these environmental conditions are found; we call it here the 'ecogeographic method'.

Both methods were tested during the current reporting period. The main activities undertaken were the following and are described in detail below:

1. Collecting data and validating data quality
2. Implementing the FIGS 'ecogeographical method'
3. Implementing the FIGS 'predictive computer modelling method'

These activities were carried out by BIOVER and URJC staff and two consultants, Mauricio Parra-Quijano and Dag Terje Endresen were involved in the implementation of these activities. On 1–3 June 2011 URJC hosted a meeting in Madrid with the BIOVER group to organize the different steps involved in this task and devise a way to carry them out successfully. Participants decided to organize two separate workshops that would enable team members and collaborators to conduct the FIGS approach and, at the same time, perform the predictive characterization task. These two workshops were held in December 2011 (at Bioversity HQ in Rome) and in January 2012 (at URJC in Madrid.

1. Collecting data and validating data quality

An essential first step for the use of FIGS is to compile all necessary datasets, such as passport data, ecogeographic and evaluation data. The application of FIGS requires the availability of passport data that include geographical coordinates of the collecting sites or at least location information sufficiently detailed to allow georeferencing. Presence data records were therefore collected by URJC and BIOVER staff for occurrences of all four genera within Europe. For the genera *Avena*, *Beta* and *Brassica*, the occurrence data previously compiled within the AEGRO project (http://aegro.jki.bund.de/aegro/) provided an ideal starting point and all occurrences of European origin were extracted from those datasets. Occurrence data for *Medicago* were extracted from the European Central Medicago databases (www.ecpgr.cgiar.org/germplasm_databases/list_of_germplasm_databases/crop_databases/crop_database_windows/medicago_annual.html, www.ecpgr.cgiar.org/germplasm_databases/list_of_germplasm_databases/crop_databases/crop_database_windows/medicago_per.html), GRIN Taxonomy for Plants (USDA, ARS, National Genetic Resources Program, 2011) and SINGER (http://singer.cgiar.org/). All records without location information were excluded from the datasets.

Those occurrences (about 12,000), for which only location information was available, were georeferenced by URJC collaborators using the GEOLocate tool (www.museum.tulane.edu/geolocate/). Records with low quality coordinates (i.e., those to degree level for sexagesimal format or without fraction for decimal format) were checked with the same tool.

The quality of the coordinates was then evaluated with a methodology that had been developed by Dr. Mauricio Parra-Quijano. The georeferences were examined and classified using three criteria:

- Precision of coordinates and locality descriptions (COORQUAL)
- Occurrence in suitable sites for plants (SUITQUAL)

- Concordance between locations described by passport data and locations derived from coordinates (LOCALQUAL).

Each accession was assigned a score between 0 and 20 according to these three criteria, where 0 corresponds to absence of coordinates, occurrence in unsuitable sites or lack of concordance, and 20 to the most precise, appropriate or concordant georeferencing case. The scores corresponding to the three criteria were added to obtain a unique evaluation parameter in a 0–60 scale. To simplify the evaluation, the 0–60 scale was then transformed to a 0–100 scale, corresponding to the TOTQUAL or TOTQUAL100 parameter.

The following ecogeographic data were extracted and yielded 108 ecogeographic variables for the presence points:

- Geophysical data from Digital Elevation Model (Rabus *et al*., 2003)
- Soil data from harmonized World database (www.iiasa.ac.at/Research/LUC/External-World-soil-database/HTML/)
- Climate data from Wordclim (www.worldclim.org/)

Trait evaluation data for abiotic and biotic stresses for the four genera were extracted from GRIN Taxonomy for Plants (USDA, ARS, National Genetic Resources Program, 2011) and the ECCDBs and compiled in a database.

2. Implementing the 'ecogeographic method' of FIGS

BIOVER and URJC have gathered and compiled information on the biotic and abiotic stress factors that may be of greatest interest for the four target crop genera (*Avena, Beta, Brassica* and *Medicago*), through contact with experts, project partners and literature research. The identified traits are the following: aluminum toxicity in *Avena*; drought tolerance in *Beta*; salinity and drought tolerance in *Brassica*; and frost, drought, and aluminium toxicity tolerance in *Medicago*. The FIGS study addressing these abiotic traits is based on collecting information on the environmental conditions most likely to support the adaptive development of these target traits; we call it the 'ecogeographic method'.

This method was first implemented during the first FIGS internal partner workshop, held from 6–9 December 2011 at Bioversity HQ in Rome, which was planned and facilitated by Dr. Mauricio Parra-Quijano (consultant, Universidad Politécnica de Madrid), and was attended by BIOVER and URJC project team staff.

In order to create a baseline dataset for the application of the FIGS methodology, the occurrence data were integrated with the ecogeographic data. A quality threshold was applied to exclude records with very low quality of georeferences. Approximately 18,000 of the occurrences were considered to have an acceptable georeferenced coordinate quality. The resulting subsets for the four genera were the following: *Avena* LR (3855 records), *Avena* CWR (3900 records), *Beta* LR (1614 records), *Beta* CWR (1596 records), *Brassica* LR (3606 records), *Brassica* CWR (886 records), *Medicago* LR (149 records) and *Medicago* CWR (2153 records).

During the workshop, a protocol was discussed and decisions made concerning the process of obtaining predictive characterization subsets for traits related to abiotic stress (see www.pgrsecure.bham.ac.uk/sites/default/files/meetings/FIGS/PGRSecureWP2_Workshop_1_Dec20

11_minutes_final.pdf[3]). Data analysis is carried out using the software 'R' (www.r-project.org/). A general R script was developed that allows application of the method to different crops and traits. One requirement is the availability of a European ecogeographic land characterization (ELC) map of the genus for which a FIGS subset is to be developed. This map was available for *Beta* at the time of the workshop (an output of the AEGRO project) and a first FIGS subset was identified for drought resistance in *Beta*.

Since the workshop, ELC maps have also been developed for the other three genera. These will allow the generation of FIGS subsets for the remaining crop gene pools, adapting the R script to the specific genus and trait of interest. One critical aspect in this approach is the selection of the environmental variables and critical thresholds that are most appropriate to describe the environmental conditions most suitable to contain each of the desired traits. Current efforts are focused on applying the algorithm with different alternative selections of environmental variables and discussing and evaluating the results.

3. Implementing the 'predictive computer modelling method' of FIGS

The second FIGS workshop held from 9–12 January 2012 at URJC in Madrid looked into the application of predictive computer modelling on the project genera. This workshop was facilitated by Dr. Dag Terje Endresen (consultant, Global Biodiversity Information Facility), who also prepared data for use during the workshop. The modelling method, based on trait evaluation data, aims to calibrate a predictive computer model with R to identify genebank accessions and populations with a higher density of genetic variation for a target trait. It uses known trait data as a training set to calibrate the model. Climatic data and other environmental data layers serve as the explanatory or independent multivariate variables. In this workshop, significant progress was made in the development of an R script that would execute all steps of this method using different calibrating algorithms, such as Knn, generalized boosted regression and random forests, among others.

While we have sufficiently large datasets with occurrence data for the ecogeographic method, the quantity of available evaluation data proved to be a major limitation. The typical number of trait evaluation data points per species extracted from the data sources was fewer than ten, although some of the species had a few hundred trait data points. However, when matching the germplasm occurrences and accessions with trait data to the occurrences in our final datasets, the number of data points per species dropped considerably and left—even in the best cases—less than 50 records per species. This number is not sufficient to apply this method. An attempt was made to identify additional evaluation data sets for the target genera that are not included in the public databases, from which we had downloaded the data, but we did not succeed in finding additional datasets. This approach cannot therefore be pursued but will not have an impact on the achievement of the deliverables.

WP2: Deviations from Annex I

It was recognized at the kick-off meeting in March 2011 that it would not be possible to complete D2.1 by the initially indicated date (month 6) and month 18 is now the targeted delivery date. The associated milestones are expected to be delivered well in time to meet the month 18 delivery date.

[3] Document is not publicly available; it is available in the partner intranet (password protected).

Changes made to the workplan at the kick-off meeting (namely that the results of D2.1 will no longer link to Task 1.1) mean that this delay will not have any impact on other tasks or the use of resources.

As Task 2.2 is no longer tied to the activities and objectives of WP1, the targets of predictive characterization have been expanded from tolerance to primary insect diseases in the four target crop genera (especially aphids in *Brassica*) to all kinds of traits of tolerance to abiotic and biotic stress of primary importance for the four target genera. The implication of the URJC team in this task has ended up being larger than what was initially projected.

2.2.3 WP3: CWR conservation (WP leader: Nigel Maxted, UoB)

2.3.1 Task 3.1: European and national CWR inventories. Partners involved: UoB, BIOVER, UNIPG

The objective of Task 3.1 is to provide support for the production of national CWR inventories in European countries and to begin the process of creating a European CWR inventory based on the national inventories (NIs). This bottom-up approach is important as it is the responsibility of individual nations to conserve and sustainably utilize their national CWR diversity (along with all other biodiversity) and any concerted action will be implemented at national level, even when driven by policy at European level. The planned approach (italicized) and corresponding achievements within the first 12 month reporting period were as follows:

a. *ECPGR Secretariat to contact ECPGR National Coordinator for each European country to invite them to prepare their national CWR inventory and nominate a responsible person (possibly drawn from the ECPGR In Situ and On Farm Conservation Network or EURISCO In Situ National Focal Points) as a National Focal Point (NFP) for inventory and strategy activities.*

The ECPGR Secretariat and PGR Secure Project Coordinator wrote to the National Coordinators (NCs) in all 42 European countries in May 2011 to inform them about the project's aims, the assistance available via the PGR Secure project to help national PGR programmes to generate and implement conservation strategies for national CWR (and LR) diversity, and to invite them to nominate NFPs to develop the CWR NIs (and subsequent CWR conservation strategies) and to attend the CWR and LR conservation training workshop held in Palanga Lithuania, 7–9 September 2011. Thirty-six members (or their representatives) of the ECPGR Wild Species Conservation in Genetic Reserves Working Group of the *In Situ* and On-Farm Conservation Network were nominated by NCs to participate in the development of the national CWR conservation strategies and to attend the CWR training workshop, of which 33 confirmed their participation and were funded by PGR Secure (the majority from the UoB budget[4]) to participate in the workshop. In addition, 19 *In Situ* National Focal Points (NFPs[5]) (associated with the ECPGR Documentation and Information Network) were nominated and 18 participated in the workshop[6]; the attendance of these participants was funded by ECPGR.

[4] Christoph Germeier (JKI) and José Iriondo (URJC) funded their participation from their own PGR Secure budgets.

[5] Since the CWR and LR conservation training workshop was convened, ECPGR has re-designated NFPs as National Inventory Focal Points (NIFPs).

[6] Note that some *In Situ* NFPs are also members of the Wild Species Conservation in Genetic Reserves Working Group; these delegates participated in WG1, CWR conservation, while the rest (18 delegates) participated in WG3, CWR and LR Information management. Further, many *In Situ* NFPs are also On-farm NFPs; therefore, these delegates participated in WG3 in both capacities.

b. The NFP would be provided with the national data set extracted from the existing PGR Forum CWR Catalogue for Europe and the Mediterranean as a basis for their national inventory.

NCs in all European countries were provided with the national data sets extracted from the CWR Catalogue for Europe and the Mediterranean (Kell *et al*., 2005) following completion of the PGR Forum project in 2006. The data sets were provided again to the participants at the training workshop on a memory stick which also included a comprehensive set of references as part of the training materials provided during the workshop. Some of the participants at the workshop were NCs themselves but it was apparent that the previously sent national CWR checklists extracted from the CWR Catalogue were unknown to them or had not been passed on to the members of the Wild Species Conservation in Genetic Reserves Working Group or NFPs. This only strengthened the need for continuing support and guidance to be provided to national programmes in the development of their national CWR conservation strategies, the NI being the first step in the process.

c. *A CWR conservation workshop for NFPs would be organized in the first year of the project to provide training in national CWR inventory and national CWR conservation strategy development, full details are provided in WP 6 Dissemination*.

The combined CWR and LR conservation training workshop organized jointly with ECPGR was held in Palanga, Lithuania, 7–9 September 2011 (see Task 6.5 and D6.2 for more details).

*d. National implementation of agreed workshop targets by NFPs. Note: although the national inventory would aim to be CWR species comprehensive, as a minimum it would cover the four case study crop gene pools (*Avena*,* Beta*,* Brassica *and* Medicago *spp.).*

During the CWR conservation training workshop, an implementation plan was agreed with the members of the Wild Species Conservation in Genetic Reserves Working Group and NFPs. The basic steps in the process of developing the CWR NI are:

- Starting from the national CWR checklist extracted from the CWR Catalogue for Europe and the Mediterranean, harmonize the checklist according to the national flora (taxonomic classifications accepted by national experts); or
- Match the national flora with a list of crop genus names (only feasible when a digitized flora is available); or
- Use a bottom-up approach and only select CWR of a limited number of crops; this approach is not comprehensive but may be more appropriate when a digitized flora is not available or for countries with a relatively large flora (see the workshop report and Powerpoint presentations available at www.pgrsecure.org/palanga_workshop for further details).
- Prioritize the inventory (this is the next step in the process of developing the national CWR conservation strategy)[7].

[7] There was some discussion at the workshop regarding the meaning and scope of a CWR NI. It was suggested that the complete list of national CWR diversity (including CWR of all types of crops) should be referred to as a national checklist, while the CWR NI should only constitute the reduced (prioritized) list of CWR.

e. *A helpdesk facility would be available throughout the project to provide NFPs with advice and support in implementing the agreed national workshop targets.*

Participants in the CWR conservation training workshop were informed about the availability of the PGR Secure CWR conservation helpdesk and were asked to complete a 'helpdesk questionnaire' to help identify national programme needs and focus the remit of the helpdesk facility[8]. Since the workshop, helpdesk support has been provided via email to assist a number of countries in planning or implementing their national CWR conservation strategy; namely, Belarus, the Czech Republic, Finland, Italy, Spain and the United Kingdom.

A helpdesk web page has been published (www.pgrsecure.org/helpdesk), the content of which will be developed during the next 6 month period. Periodic updates and improvements will be implemented during the lifetime of the project. Regular contact will also be maintained with the members of the Wild Species in Genetic Reserves Working Group and NFPs during the lifetime of the PGR Secure project in order to encourage the development of their national CWR conservation strategies and offer advice and support during the planning stages.

The attendance of the training workshop participants was fully covered by PGR Secure project funds and ECPGR. The workshop facilitators emphasized that while project funding was not available to assist National Programmes in the creation of NIs and the national CWR conservation strategies, and that national investment would be expected to fully implement all the targets agreed at the workshop, technical support (access to resources and advice) would be available during the lifetime of the PGR Secure project.

2.3.2 Task 3.2: Exemplar national CWR conservation strategies. Partners involved: UoB, MTT, URJC, UNIPG

United Kingdom national CWR conservation strategy (UoB)

During the current reporting period the first steps have been taken to create an inventory of priority CWR in the UK, and more specifically for England and Scotland. The decision was taken to use the checklist developed by Maxted *et al.* (2007) containing 1524 CWR species in the UK, as a starting point for prioritization. This checklist was derived from the CWR Catalogue for Europe and the Mediterranean (Kell *et al.*, 2005) and harmonized with accepted taxonomic classifications used by UK experts.

All national conservation agencies in the UK have been contacted with a request for support in the decision-making process for development of an inventory of priority CWR species and to aid the development of conservation actions for CWR in each of the devolved countries of the UK. Positive responses have so far been received from Natural England and Scottish Natural Heritage (SNH).

Through consultation with Natural England, four criteria were selected as a basis for prioritization of CWR in England, as outlined below (consultation with experts from SNH is yet to begin).

Use of the related crop

To assign priority to relatives of crop species used for food, forage or fodder, economic use data were extracted from GRIN Taxonomy for Plants (USDA, ARS, National Genetic Resources Program,

[8] Questionnaire responses indicate that some countries have created a CWR checklist or partial checklist, but little or no further work has been undertaken towards the development of national CWR conservation strategies.

2011). Of the initial checklist of 1524 CWR species, 314 have been identified as related to crops used for food, forage or fodder.

Economic value of the associated crop

Taking a lead from the method used by Kell *et al*. (2012), we are currently using production quantity data at the global, European and national levels from FAOSTAT (FAO, 2012), along with monetary value data from Eurostat (European Union, 1995–2012) as well as production quantity and monetary value data at the UK level to infer economic value.

Degree of relatedness to the crop

Using the Gene Pool concept of Harlan and de Wet (1971), or the Taxon Group concept (Maxted *et al*., 2006) where gene pool data are unavailable, priority will be assigned to CWR in Gene Pools 1B and 2 and Taxon Groups 1B, 2 and 3. To achieve this, data have been extracted from the 'global checklist of priority CWR' (Vincent *et al*., 2012).

Population change

Data have been extracted from Braithwaite *et al*. (2006) which show whether UK plant species populations have increased, have been stable or have decreased between two field studies carried out in 1987 and 2004.

Collaboration has begun with the Centre for Ecology and Hydrology (CEH) using Countryside Survey data to analyse CWR locations, habitats and ecology across the UK. This analysis will answer key questions, including:

- Where are CWR most commonly found in the wider landscape of the UK?
- Have common CWR changed in abundance over time?

The information gained from this analysis will support the development of appropriate conservation actions with an aim to systematically conserve UK CWR.

Field studies are planned for the Lizard Peninsula in Cornwall and are to be carried out during May and June of 2012 and for the same time period in 2013. Based on taxon distribution data provided by the Botanical Society of the British Isles (BSBI), Maxted *et al*. (2007) carried out a complementarity analysis and identified the Lizard Peninsula as one of the most important sites for the establishment of a CWR protected area in the UK. CWR populations on the Lizard will be sampled in order to carry out a genetic diversity analysis using amplified fragment length polymorphisms (AFLPs) to compare levels of genetic diversity at this site with genetic diversity of populations of the same taxa elsewhere in the UK. If the Lizard contains substantial or unique genetic diversity it will justify the establishment of this site as the UK's first CWR genetic reserve.

Access to various datasets has been granted. These include the database of the BSBI for all UK plant records, the Environmental Recording in Cornwall Automated Database (ERICA) containing all plant records for Cornwall, and the Environmental Records Centre for Cornwall and the Isles of Scilly (ERCCIS), which has provided further habitat data for the Lizard, Cornwall.

Finland national CWR conservation strategy (MTT)

Based on current knowledge, about 2500 vascular plant species occur in Finland (Hämet-Ahti *et al*., 1998; Lampinen and Lahti, 2011). Among them, 2334 CWR taxa were recognized based on the CWR Catalogue for Europe and the Mediterranean (Kell *et al*., 2005). Taxonomy was checked using the Field Flora of Finland (Hämet-Ahti *et al*., 1998, 2005) and the PlantList (www.theplantlist.org). Threatened/protected subspecies which were not in the draft list were added. Hybrids, synonymic taxa and apomictic species, such as *Taraxacum* spp., *Hieracium* spp. and *Ranunculus auricomus* group were removed, and neophytes were included. This taxonomic harmonization resulted in 1905 CWR taxa in the Finnish CWR checklist.

Key organizations operating in plant conservation in Finland are the Finnish Environment Institute, botanic gardens, natural history museums, universities, Ministry of Agriculture, Ministry of Forestry, MTT Agrifood Research Finland and NordGen.

A total of 9% of the area of Finland is protected under the Nature Conservation Act or the Act on the Protection of Wilderness Reserves. Conservation work involves cooperation between volunteers, conservation organizations, professional researchers and authorities. The Nature Conservation Decree protects 131 vascular plants, out of which 117 are CWR. In all, 46 plant species found in Finland are listed in Annexes II, IV and V of the EU Habitats Directive, and 26 of them are CWR.

Out of the 2503 vascular plant species found in Finland, 76% (1905 species) are CWR, 1362 of which are indigenous or archaeophytes[9] (Hämet-Ahti *et al*., 1998, 2005; Lampinen and Lahti, 2009). The main CWR families are Poaceae, Rosaceae, Cyperaceae, Brassicaceae and Asteraceae—all with more than 100 species.

A high percentage of threatened plant species in the new Red List for Finland (Rassi *et al*., 2010) are CWR; 150 of the 197 threatened species (Critically Endangered – CR, Endangered – EN and Vulnerable – VU), 96 of the 122 Near Threatened (NT) species and five of the six Regionally Extinct (RE) species are CWR. In all, 13% of all CWR are threatened and 18% of the indigenous/archaeophyte CWR are threatened in the IUCN sense.

The CWR checklist was prioritized to create the Finnish CWR NI and to enable further analysis. To achieve this, three main criteria and 12 subcriteria were used:

1. Relative threat
    a. Finnish Vascular Plant Red List Category 2010
    b. National protection status
    c. Species listed in the EU Habitats Directive Annexes II, IV and V
    d. Endemism in Europe
    e. OEK species[10]
2. Value
    a. Yield of CWR-related main crops in Finland in 2010

[9] Introduced before 1500 AD

[10] European species which Finland is responsible for conserving since a minimum of 20% of their European distribution is within the country.

b. Yield of CWR-related herb crops in Finland
c. High priority human food crops in Europe based on production quantity and economic value

3. Use

a. Medicinal/pharmaceutical use, food, forage/fodder plants
b. Species listed in Annex I of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)
c. Nordic mandate species[11]
d. Species in GP1b and GP2

Only indigenous and archaeophyte CWR taxa were selected (1360 species) (i.e., no alien and neophytic[12] taxa were included). All CWR listed in the threat categories CR, EN, VU and RE in the Finnish Red Data Book 2010 were included in the prioritized list (150 species). Among the NT CWR, those with at least one point in the 'use' criteria were included (16 species). The species that were not threatened but had more than three points out of the 12 prioritization criteria were also included (57 species). This process resulted in a prioritized list of 223 species.

Ex situ gap analysis was started. In all, 31 of the 223 priority taxa are found in active *ex situ* conservation in four botanic gardens (Helsinki, Oulu, Turku and Joensuu). 25 taxa are cultivated in living collections, nine taxa are stored as seeds and two *in vitro.* Other collections still have to be screened. There is no seed bank in Finland. NordGen has Finnish collections but it does not focus on wild species.

In situ gap analysis was also started. There are currently no conservation efforts directed specifically to CWR, but since most priority CWR are threatened, some of them are included in the following conservation programmes:

- The Ministry of the Environment has a responsibility to organize the monitoring of native species and to protect them. Altogether, 34 priority CWR species have a conservation action plan by the Finnish Environment Institute.
- The Ministry of Forestry is responsible for conservation, management and monitoring of all species on its land. Altogether, 11 priority CWR species are found under their extended national responsibility—a special *in situ* conservation, management and monitoring plan.
- The Finnish Forest Research Institute has a programme to conserve the genetic resources of forest trees. Two of the priority CWR species are included in this programme; both *in situ* and *ex situ*.

[11] List of mandate CWR made by NordGen thematic working groups
[12] Introduced after 1500 AD

Spain national CWR conservation strategy (URJC)

In the development of the Spain national CWR conservation strategy, it was planned to follow a top-down approach focusing on the entire national CWR flora. The URJC team decided, based on the huge number of Spanish CWR (over 6500 species – Kell *et al*., 2008a) and operability criteria, to focus only on CWR selected from a previous subset of genera chosen by their importance for the Spanish economy and food security for the country and the world. Instead of starting from the checklist of Spanish CWR extracted from the CWR Catalogue for Europe and the Mediterranean (Kell *et al*., 2005), which includes over 6500 species, the URJC team started the inventory from a reduced list of about 830 species obtained from the prioritized genera related to the important crops. Thus, the development of a prioritized list of CWR of Spain has been initiated. This list is subdivided into four categories according to the uses of the crops of reference (food, fodder and forage, ornamental and other uses). The methodology followed can be summarized in four steps:

1. A list of crop genera has been elaborated according to its real or potential contribution to food security worldwide (estimated by their inclusion in Annex 1 of the FAO ITPGRFA (FAO, 2001) or incorporation in breeding plans) and economic importance for the country (considered by their inclusion in the Spanish Annuary of Agricultural Statistics (Ministerio de Medio Ambiente, Medio Rural y Marino, 2010), having any registered cultivars or production in MT or ha, among other variables). Ornamental genera were included by consulting the most recent Annual Report of the Community Plant Variety Office (European Union, 2011) and the list of the protected taxa by the members of the Union (UPOV, 2010). In addition, experts were consulted in order not to miss any crop of importance. In this sense, on 23 September 2011, a meeting was held with Lucía de la Rosa and Juan Fajardo from CRF (Centro de Recursos Fitogenéticos), the central institution where plant genetic resources for Spain are coordinated. The generated list contained 202 genera and was subdivided into four main categories according to uses: 1) food, 2) forage and fodder, 3) ornamental and 4) other uses.

2. These genera of crops of importance were evaluated for attributes such as the number of registered varieties in Spain, other possible uses, number of crops, origin and natural distribution of the species within the genus, and whether wild species of the genus were found in Spain (including the Canary Islands). To prioritize genera of importance, three criteria were applied: a) genera must be listed in Annex 1 of the ITPGRFA or in the Spanish Annuary of Agricultural Statistics, b) they must contain at least one species native to Spain and c) must have any registered varieties in Spain. In addition to these, additional genera were included due to their undoubted socio-economic importance for the country although they have no registered varieties in Spain; for example, *Lavandula*, *Hypericum, Gentiana* or *Narcissus*. Finally, further genera were added because of their importance in breeding programmes (e.g., *Aegilops*, *Brachypodium* and *Patellifolia*). These considerations led to a final list of 54 genera divided into the above-mentioned four categories (food: 33 genera; fodder and forage: 10 genera; ornamental: 5 genera and other uses: 6 genera).

3. For each of the selected genera, all CWR species occurring in Spain were identified using the national flora (Flora Iberica, Castroviejo *et al.*, 1986–2011) for reference when available (it is still incomplete), and other bibliography and information resources like the Anthos Project (www.anthos.es). The total number of species was 842 (food related species: 301; fodder and forage related species: 263; ornamental related species: 200; other uses related species: 78).

4. For each of the CWR species identified, a database was built where information was collated on endemicity, threat status, Gene Pool and Taxon Group classifications, number of chromosomes, inclusion in the Habitats Directive, etc. The URJC team has completed this database for the food group and is building the same structure for the rest of the groups.

Criteria for prioritization within the food group were also decided based on the inclusion of the taxa in Gene Pools 1B and 2 or in Taxon Groups 1B, 2 and 3, the threat status according to IUCN Red List Categories CR, EN, VU or NT, and endemicity. 148 food related CWR species that accomplished one or more of these criteria were selected to be part of the prioritized CWR inventory of Spain. In addition to Ms. Luisa Rubio and Prof. José M. Iriondo, Prof. Elena Torres also contributed to this task.

The *in situ* gap analysis for the 148 food-related prioritized CWR species has been started. For this aim distribution data for all species was downloaded from the Global Biodiversity Information Facility (GBIF) through its data portal (http://data.gbif.org/welcome.htm). Downloaded information went through a preliminary treatment in order to harmonize taxonomy according to Flora Iberica. The gap analysis is being carried out with help of a Geographic Information System using ArcGIS software (version 10.0) (ESRI, 2010).

Concerning the national implementation of the CWR conservation strategy of Spain, the URJC team held a meeting in June 2011 with Mr. Fernando Latorre, the Spanish ECPGR NC, to inform him about the PGR Secure project and the interest in including the Spanish CWR NI within the targets of the Spanish Biodiversity Conservation Strategy. Previous talks conducted with the Service of Biodiversity of the Secretary of Environment had not been successful because the Service of Biodiversity considered CWR species to be linked to PGR and therefore outside their competence and belonging to the Office of Registration of Cultivars under the management of the Secretary of Agriculture, which deals with PGR. With the mediation of the Spanish ECPGR NC, the PGR Secure project and the Spanish CWR NI were finally included in the final text of the Spanish Biodiversity Conservation Strategy that was approved on 30 September 2011. Additionally, further contacts were established with Ricardo Gómez Calamaestra, responsible for the Spanish Inventories on Biodiversity (July 2011) and with Prof. Alejandro Lagos, who is providing technical assistance to the Ministry of Environment in the development of the regulation of access to biodiversity and PGR to inform them on progress with the preparation of the Spanish CWR NI.

Italy national CWR conservation strategy (UNIPG)

From September 2011 to February 2012 UNIPG has reviewed the CWR checklist for Italy extracted from the CWR Catalogue for Europe and the Mediterranean (Kell *et al*., 2005), matching it with the national checklist included in the database system 'anArchive' (www.anarchive.it/anArchive/specie/browser.jsp). This checklist is the result of the continuous updating of the Italian checklist of vascular flora (Conti *et al*., 2005, 2007) and takes into account the main bibliographical sources (e.g., Marchetti, 2004; Arrigoni, 2006; Greuter, 2008; Celesti-Grapow *et al*., 2010; Raimondo *et al*., 2010) and specialist monographs concerning taxonomic revisions and new national records (e.g., Marcenò and Silvestre Gristina, 2010; Ronse *et al*., 2010; Conti *et al*., 2011). Seven thousand, four hundred and thirty taxa from mainland Italy, 2684 from Sardinia and 2422 from Sicily included in the original list of CWR were reviewed. This list was improved by removing duplicate records and adding for each taxa the most common synonyms (up to 12); further, some additional genera containing cultivated species were added. The result was a checklist

composed of 9918 taxa from mainland Italy, 3383 from Sardinia and 3820 from Sicily; including specific and intraspecific rank, alien, native and cultivated taxa. It is planned to publish the check list within 2012 (Landucci *et al.*, in prep).

The next step was a prioritization of the list of genera. The following prioritization criteria were discussed and agreed in the UNIPG team:

1. The uses of the crops: food, fodder and forage, ornamental and other uses.
2. The importance of each group of crops for food security in the country.
3. The importance of each crop in the Italian economy.
4. The level of diversification of the crop (in terms of the number of cultivated varieties and landraces) in Italy and the presumed area of domestication (i.e., giving precedence to crops domesticated in Italy).
5. The estimated risk of loss of populations belonging to a certain genus in the country.

Considering the huge number of Italian CWR, their distribution and the resources available for this work package, the UNIPG team decided to apply the prioritization criteria in a stringent manner to focus attention only on CWR of greatest importance for the Italian economy and food security.

Food and fodder species were given the highest priority. *Allium, Aegilops, Apium, Asparagus, Astragalus, Avena, Beta, Brassica* complex, *Cichorium, Cynara, Daucus, Foeniculum, Fragaria, Hordeum, Lactuca, Lathyrus, Malus, Medicago, Mentha, Olea, Onobrychis, Pistacia, Pisum, Prunus, Pyrus, Rubus, Trifolium, Vaccinium, Vicia* and *Vitis* were initially considered as priority genera. Among them, food species were considered the most important. The list was then further prioritized considering their possible domestication area in Italy and their diversification level. *Apium*, *Cynara*, *Beta, Brassica* and *Foeniculum* were the resulting priority genera. Prioritization on the basis of criterion number five finally yielded *Beta* and *Brassica,* which include three (five taxa including intraspecific ranks) and 19 (39 taxa including intraspecific ranks) CWR species in Italy, respectively.

A possible approach to develop an Italian strategy for CWR conservation was also discussed taking into account the available resources and operability criteria. It is planned to:

- Initially check the presence of populations belonging to the prioritized species *in silico* (relying on the data stored in the above mentioned anArchive project).
- Verify population presence and census by field surveys in some areas of Italy in order to assess consistency of previously recorded data with actual data and estimate the eventual loss of populations.
- Verify their inclusion in protected areas and identify areas that need to be protected.
- Estimate protection needs in general. The evaluation of census on some sample populations will also give information on possible management interventions.

Using available bibliographic data, UNIPG has presently compiled a first list of *Apium*, *Avena*, *Beta*, *Brassica* and *Prunus* CWR present in the Umbria region which is in press (Panella *et al*., in press; see also Task 6.4).

Czech Republic national CWR conservation strategy (UoB)

The development of a national CWR conservation strategy for the Czech Republic (CZ) is an additional output of the project (i.e., it is not stated as an expected activity in the Grant Agreement)—see deviations from Annex I, below. To achieve this, UoB is utilizing the time and expertise of a volunteer wishing to gain experience in this field and working with the responsible experts from the PGR National Programme of CZ, as well as other national experts (e.g., from herbaria and crop research institutes).

Creation of the CZ CWR checklist

The initial CZ CWR checklist was generated by matching a digitized database of the Czech National Flora containing 5043 taxa (Kubát *et al*., 2002) with the list of crop genera generated in the process of creating the CWR Catalogue for Europe and the Mediterranean (Kell *et al*., 2005), augmented with crop genera from a national crop database (VURV, 2012). The resulting list was refined, removing incomplete and duplicate records. This process resulted in a checklist containing 3457 taxa and includes alien, native and cultivated taxa.

Prioritization of the CZ CWR checklist

Two groups of CWR were identified as having the greatest socio-economic importance in the Czech Republic: 1) CWR of food crops, and 2) CWR of forage and fodder crops.

Food CWR prioritization

The CZ CWR checklist (3457 taxa) was matched with a list of global food crop genera derived from i) major and minor food crops listed in Groombridge and Jenkins (2002), ii) crop genera whose use is listed as food in GRIN Taxonomy for Plants (USDA, ARS, National Genetic Resources Program, 2012), iii) crop genera listed in Annex 1 of the ITPGRFA (FAO, 2001) and iv) crop genera whose use is listed as food in the CZ Crop Database (VURV, 2012; Table 2). This approach was taken to be inclusive of all possible crop genera. It should be noted that GRIN Taxonomy includes taxa that are used both in their wild form and cultivated; however, the use of GRIN Taxonomy added no unique taxa. This process yielded 1269 taxa.

Table 2. Use codes in the CZ Crop Database that correspond to food crops

Use Code	Crop Use
B	Beet and other root crops
C	Cereals
F	Fruit (woody plants)
H	Vegetables
L	Food legumes
O	Oil plants
S	Potatoes
V	Grape
Z	Maize and minor cereals

Further prioritization was based on national crop production statistics which were retrieved from FAOSTAT (FAO, 2012). Note that this approach includes all CWR native to CZ that are included in the European Red List of Vascular Plants (see Kell *et al*., 2012). Further editing of this priority list involved removal of taxa that are alien to CZ or only cultivated. The final priority list of food CWR comprises 94 taxa.

Forage/fodder crop prioritization

The CZ CWR checklist (3457 taxa) was matched with a list of crop genera used for forage and fodder in CZ, yielding 124 taxa. Once alien and cultivated species were removed, a final priority list of 62 forage and fodder taxa was generated.

The CZ CWR checklist was also matched against a list of grasses in the CZ Crop Database. These represent the focus of a grass research division, so not all are used as forage crops. Using GRIN Taxonomy for Plants economic use data, non-forage grasses were removed from the list, along with cultivated and alien taxa. Further, since many grasses are so widespread across Europe, only the more restricted range taxa were prioritized: arbitrarily, only those taxa with records in 30 or fewer geographic units in Euro+Med PlantBase (2006–). This resulted in a final priority list of 56 grass taxa.

Review and addition

The preliminary priority lists detailed above were scrutinized for errors. The list was then circulated to national PGR experts in CZ for review to provide the opportunity to add taxa deemed to be of high importance in CZ. Without this additional step, ornamental, medicinal, many endemic and culturally important CWR would be omitted from the list.

WP3: Deviations from Annex I

The Consortium is contracted to develop national CWR conservation strategies for Finland and Spain. In addition, strategies for Albania, Cyprus, the Czech Republic, Italy and the UK are being developed; in part with project funds but also with the addition of funding from other sources as well as student and volunteer time. The addition of these national CWR conservation strategies will strengthen the outputs and add value to the project.

2.2.4 WP4: LR conservation (WP leader: Valeria Negri, UNIPG)

Task 4.1: European LR inventory. Partners involved: UoB, BIOVER, UNIPG, MTT

The general objective of WP4 is to identify the relevant interventions that will secure and improve the *in situ* and *ex situ* conservation of European landrace (LR) diversity as a means of promoting LR use by breeders and local communities. However, there is much less information available for European LR diversity than for CWR diversity. Prior to the development of the above mentioned interventions, it is necessary to have an understanding of the diversity of European LR and their current conservation status. Consequently, the first objective of WP4 is to create a European inventory of LR maintained *in situ* (i.e., on-farm and in garden) as the required information basis.

The aim of Task 4.1 is to provide help in generating national LR inventories in European countries to initiate the process of creating a European LR inventory based on the national inventories (NIs). A European LR inventory can only be based on NIs because the responsibility to conserve and sustainably use LR diversity (as well as any other biodiversity component) lies with individual nations and any concerted action will be implemented at national level, even when driven by policy at European level.

At present, no European-wide LR inventory has been developed, although some information has been already published (see Veteläinen *et al.*, 2009; Negri *et al*., 2012) and tools favouring LR data recording and sharing of information on existing on-farm/in garden conservation activities have been already been made available on the web by the On-farm Conservation Working Group of the ECPGR *In Situ* and On-farm Conservation Network (see www.ecpgr.cgiar.org/Networks/Insitu_onfarm/Docs/OnfarmDescr_DRAFT271107.pdf) and by UNIPG (see: www.sharinginformation.eu/). The planned approach (italicized) and corresponding achievements within the first 12 month reporting period were as follows:

a) ECPGR Secretariat to contact ECPGR National Coordinator for each European country and invite them to prepare their national LR inventory, and nominate a responsible person (possibly drawn from the ECPGR In Situ and On-farm Conservation Network or EURISCO In Situ National Focal Points) as a National Focal Point (NFP) for LR inventory activities.

Similar to what is reported for WP3, Task 3.1, the ECPGR Secretariat and PGR Secure Project Coordinator wrote to the National Coordinators (NCs) in all 42 European countries in May 2011 to inform them about the project's aims, the assistance available via the PGR Secure project to help national PGR programmes to generate and implement conservation strategies for national LR (and CWR) diversity, and to invite them to nominate NFPs to develop the LR NIs (and subsequent LR conservation strategy) and to attend the CWR and LR conservation training workshop held in Palanga Lithuania, 7–9 September 2011. Thirty-four members (or their representatives) of the ECPGR On-farm Conservation Working Group of the *In Situ* and On-Farm Conservation Network were nominated by NCs to participate in the development of the national LR conservation strategies and to attend the LR conservation training workshop[13], of which 31 confirmed their participation and were funded by PGR Secure (the majority from the UNIPG budget[14]) to participate in the workshop.. In addition, 21 On-farm National Focal Points (NFPs[15]) (associated with the ECPGR Documentation and Information Network) were nominated and 20 participated in the workshop[16]; the attendance of these participants was funded by ECPGR.

b) The NFP would be provided with the data/resources useful to build up inventories.

The NFPs were provided with a comprehensive set of references (included on a memory stick as part of the training material) and informed about tools for LR data recording and sharing of information on existing *in situ* (i.e., on-farm/in garden) conservation activities during the workshop. Although most of these references and tools were already made public through the ECPGR On-farm Conservation Working Group of the *In Situ* and On-Farm Conservation Network website (www.ecpgr.cgiar.org/networks/in_situ_and_on_farm/on_farm_wg.html), few delegates were aware of them. This only strengthens the need for continuing support and guidance to be provided to national programmes in the development of their national LR conservation strategies—the NI being the first step in the process.

[13] Including N. Maxted, Chair of the *In Situ* and On-farm Conservation Network and Wild Species Conservation in Genetic Reserves Working Group, and V. Negri, Chair of the On-farm Conservation Working Group.
[14] Gert Poulsen (NordGen) and Merja Veteläinen (MTT) funded their participation from their own PGR Secure budgets.
[15] Since the CWR and LR conservation training workshop was convened, ECPGR has re-designated NFPs as National Inventory Focal Points (NIFPs).
[16] Note that some On-farm NFPs are also members of the On-farm Conservation Working Group; these delegates participated in WG2, LR conservation, while the rest (20 delegates) participated in WG3, CWR and LR Information management. Further, many On-farm NFPs are also *In Situ* NFPs; therefore, these delegates participated in WG3 in both capacities.

c) A LR conservation workshop for NFPs would be organized in the first year of the project to provide training in national LR inventory and national LR conservation strategy development.

The combined CWR and LR conservation training workshop organized jointly with ECPGR was held in Palanga, Lithuania, 7−9 September 2011. The workshop addressed the following subjects: methods for creating LR NIs, distribution of extant LR, LR threat assessment (baseline assessment of LR extinction and genetic erosion), use potential, making data available, inventory prioritization at local level, gap analysis, use of the LR NIs, characterization of LR diversity, linking local LR to local community use, linking LR diversity to breeders' use, production of national LR conservation strategies (see Task 6.5 and D6.2 for more details).

d) National implementation of agreed workshop targets by NFPs. Note: although the national inventory would aim to be species comprehensive, as a minimum it would cover the four case study crop gene pools (Avena, Beta, Brassica and Medicago spp.).

During the LR conservation training workshop an implementation plan was agreed whose basic steps are to:

1. Collect information on LR that are still maintained *in situ* by using a minimum set of descriptors to be developed on the basis of the suggestions received during the workshop (see below).
2. Build up LR NIs,
3. Make data available to PGR Secure.

However, national delegates underlined during the workshop that lack of resources in the National Programmes for creating LR NIs will possibly make it difficult to put into practice the agreed work plan. Following the workshop and in order to accomplish Step 1, the WP4 team (UNIPG, MTT, UoB and BIOVER) elaborated a new draft of the LR descriptors (www.pgrsecure.bham.ac.uk/sites/default/files/documents/helpdesk/LR_DESCRIPTORS_PGR_Secure_draft.pdf) which takes into account the inputs received by the members of the On-farm Conservation WG, On-farm NFPs and other members of the ECPGR Documentation and Information Network during the CWR and LR conservation training workshop. In order to inform and facilitate a future compilation of a European *in situ* maintained LR inventory on the basis of an agreed standard of information, this draft was sent to the ECPGR Documentation and Information Network members on March 8 2012, asking for comments within a month. The draft descriptors will provide the basis of the web-enablement of the LR NIs (Task 6.2) and inform the LR ontology being developed in the context of the TIP (Tasks 2.1 and 6.3).

e) A helpdesk facility would be available throughout the project to provide NFPs with advice and support in implementing the agreed national workshop targets.

A helpdesk web page has been published by UoB (www.pgrsecure.org/helpdesk) which presently includes the draft LR descriptors (www.pgrsecure.bham.ac.uk/sites/default/files/documents/helpdesk/LR_DESCRIPTORS_PGR_Secure_draft.pdf). The content of the helpdesk will be developed during the next 6 month period and periodic updates and improvements will be implemented during the lifetime of the project.

The attendance of the training workshop participants was fully covered by PGR Secure project funds and ECPGR. The workshop facilitators emphasized that while project funding was not available to assist National Programmes in the creation of NIs and the national LR conservation strategies, and that national investment would be expected to fully implement all the targets agreed at the

workshop, technical support (access to resources and advice) would be available during the lifetime of the PGR Secure project.

Task 4.2: Exemplar national LR conservation strategies. Partners involved: UoB, UNIPG, MTT

Italy national LR conservation strategy (UNIPG)

The first step in drawing up a conservation strategy for Italy is to compile an inventory of LR maintained *in situ* (on-farm and in garden). Considering the Italian legislative frame which assigns to the Italian Regions the responsibility for plant genetic resources (PGR) conservation, an official inventory of LR in Italy can only be obtained on the basis of information provided by each Region. This list can eventually be integrated by unofficial data retrievable from the literature.

Letters to Regional officers in charge of local PGR asking for support in recording data were sent early in January 2012.

In addition, some of the Italian Regions have implemented Regional laws for the safeguard of agrobiodiversity (Regional laws: Tuscany n. 50/1997, n. 64/2004; Lazio n. 15/2000; n. 11/2002, Marche n. 12/2003; Friuli Venezia Giulia n. 11/2002; Emilia Romagna n. 1/2008 and later updates) and for some of them LR data are available from the internet (http://germoplasma.arsia.toscana.it/Germo/ and www.arsial.it/portalearsial/RegistroVolontarioRegionale/, for Tuscany and Lazio, respectively).

An initial list LR from central Italy was already compiled. It includes 939 records. Geographical mapping of the LR was also carried out (Figure 3).

Figure 3. Geographical mapping of LR recorded in central Italy

In drawing up the Italian strategy, the guidelines for *in situ/ex situ* conservation already produced within the frame of the National Plan for Agrobiodiversity Conservation (published February 14th, 2010) will be taken into due account (Marino, 2010).

Finland national LR conservation strategy (MTT)

During the current reporting period, we started baseline national inventory of some LR species.

The earlier Finnish inventories of cereal LR have been compiled (see Heinonen and Veteläinen, 2011). The LR cereal inventory carried out by MTT during 2006-2008 resulted in 47 notifications of old cereal landraces on 35 farms. We prepared a realization plan to update this cereal LR inventory and a new call for LR cereals.

We planned and prepared a new kind of channel for LR calls: television (TV) programmes. We tested it with cereals and potato onions.

The first call for LR potato onions was announced via a TV call. A journalist visited an old farmer of a potato onion and followed the purification process of the same potato onion at the MTT laboratory, and a journalist announced the call for other old potato onions. The call (about 10 minutes) was broadcast in October 2011 on the national TV channel in prime time. The TV show has about 500,000 viewers. This approach resulted in 17 previously unknown maintainers of old potato onions.

The TV call for LR cereals will be announced during March 2012. This TV call was planned with a famous chef who has their own cooking programme using local and organic foods. The chef and the researcher (M. Heinonen) visited a farmer in eastern Finland growing very old LR barley. The TV chef with a chef of a local restaurant cooked meals with this particular barley (starters, main course, side dishes and desserts). The meals were both traditional and modern ones. The TV cooking programme has about 50,000 viewers.

The first *ex situ* analysis of LR cereals, potato onions, apples and pears are complete. In the *ex situ* collections, there are 27 accessions of LR potato onions in field genebanks at MTT Agrifood Research Finland and 24 *in vitro* accessions. In *ex situ* storage at NordGen there are 13 accessions of LR oats, 51 of LR barley, 82 of LR rye and 7 of LR wheat. Gap analysis has not yet been carried out, but it is clear that *ex situ* collections are lacking cereal LR of coastal areas and northern Finland. *Ex situ* gap analysis has been undertaken for native apple varieties and native local pear varieties comparing data from old pomological literature to *ex situ* collections. Currently, there are 51 Finnish native apple varieties in *ex situ* collections at MTT Agrifood Research Finland. About 20 native apple varieties are missing. In *ex situ* collections, there are 10-15 native local pear varieties which might be of Finnish origin.

Extra national funding has been received to extend LR inventories to native pear and apple varieties. The *in situ* inventory process has been planned: how to locate native apples and pears in their original gardens and near their original area. Calls for native local apples and pears will be announced periodically county by county. The first call will be announced in March 2012 in southwest Finland at a garden fair. The garden fair has about 20,000 visitors.

UK national LR conservation strategy (UoB)

The initial phase in the UK has been divided between (a) a landrace survey of the West Midlands region around Birmingham, and (b) planning of complementary LR inventory, conservation and use activities across the UK.

<u>Landrace survey of the West Midlands region</u>

A survey of allotment sites was undertaken across the West Midlands region and a total of 20 sites were sampled with questionnaire data collated from 83 plot holders. Questions asked centred around five topics: participant, site, crops grown and cultivation details, seeds and sources of

information. Analysis of results enabled the creation of an inventory of LR grown; a total of 66 crops and 149 LR were discovered with a significant link found between the growth of LR and maintainer ethnicity. In several instances plot holders could not recall LR names and therefore 73% of LR discovered were unnamed. The inventory acted as baseline data for the creation of complementary conservation strategies employing both *in situ* and *ex situ* techniques. An attempt at assigning initial conservation priority value to LR was made. The need to promote growth of LR through community seed swaps and demonstration gardens was made to maintainers and is it hoped this will promote and sustain the growth of LR within the Midlands for years to come.

The 'Enhancing Conservation and Use of Untapped UK Vegetable and Fruit Landrace Diversity' project

The aim of the 'Enhancing Conservation and Use of Untapped UK Vegetable and Fruit Landrace Diversity' project is to systematically inventory, conserve and enhance the use of UK vegetable and fruit LR diversity as a basis for meeting changing market demands and promoting UK food security in a time of climate change. The project will specifically focus on vegetable and fruit LR because they are commodity groups with the largest number of extant LR in the UK. The project will involve: (i) completion of the inventory of UK vegetable and fruit landrace (VFLR) diversity and the writing of a Strategy for UK LR Conservation and Use, (ii) enhanced use of UK VFLR diversity by breeders via the study and promotion of adaptive traits, (iii) active conservation to identify priority VLR diversity for inclusion in the most relevant *ex situ* collections to serve as a safety backup for the *in situ* VFLR diversity, (iv) the development of policy options for the implementation of the Strategy for UK VFLR Conservation and Use , and (v) raising public and professional awareness of the rich, unique value of UK VFLR diversity. The project will involve all major PGR institutes in the UK: Agri-Food and Biosciences Institute of Northern Ireland, Garden Organic, John Innes Centre, National Fruit Collection at University of Reading, Science and Advice for Scottish Agriculture, Scottish Crop Research Institute, University of Aberystwyth, Warwick Genetic Resources Unit, University of Warwick HRI and will be led by the University of Birmingham. Complementary funding of €1M has been obtained for the project from the UK Department for Environment, Food and Rural Affairs and work will commence in the Autumn of 2012.

Task 4.3: European LR priority gene pool conservation strategy. Partners involved: UoB, BIOVER, UNIPG, MTT

Basic data needed to develop the European *Avena, Beta, Brassica* and *Medicago* conservation strategy are progressively being collected.

Task 4.4: Generic European LR conservation strategy. Partners involved: UoB, BIOVER, UNIPG, MTT

A possible strategic approach to conserve crop LR in Europe was recently reviewed (Veteläinen *et al.*, 2012). Its practical implementation is in progress.

WP4: Deviations from Annex I

The inclusion of the UK national LR conservation strategy in the project work plan was a last minute addition to the project suggested by the Project Officer. As UoB only has an allocation of 1.10 PM for WP4 which was intended for overseeing the implementation of the WP4 work programme, additional funding has been sought to develop the UK strategy (as reported above).

2.2.5 WP5: Engaging the user community (WP leader: Chris Kik, DLO)

Task 5.1: Identifying European stakeholders in the PGR conservation and use community. Partners involved: DLO, JKI, NordGen

Introduction

After the start of the PGR Secure project in March 2011, key persons were approached in selected countries and requested to support WP5 of the PGR Secure project (see Appendix I). A list of questions was compiled for interviews with the various stakeholders involved in PGR exchange within Europe. Amongst others, information and knowledge on these interviews is intended to be used for formulating appropriate questions for the various stakeholders in a later stage of the project (mid 2012) concerning an online questionnaire. The analysis of the interviews and the answers collected via the online questionnaire will be used as a basic input for a workshop in 2013/14 on the utilization of PGR in Europe. In this report a summary of this interview compilation is given.

The stakeholders initially included were genebanks, research organizations, breeding companies and agro-NGOs. After a first round of interviews the government was also included, being an important stakeholder. Around 20–25 questions per stakeholder were formulated to analyse the PGR network in different countries and to obtain answers on the utilization of PGR in various European countries. The interview method is called 'semi-structured' or 'guideline-based'.

For practical reasons related to the location of the partners involved in this work package, Europe was divided in three regions—north, middle and south—and countries were selected per region, which were thought to be representative. For north Europe, Denmark, Estonia, Finland, Iceland, Latvia, Lithuania, Norway and Sweden were selected; for middle Europe, Austria, Bulgaria, Czech Republic, Germany, the Netherlands, Poland, Romania and Slovenia, and for south Europe, Greece, Italy and Spain. Later France was included as additional country.

Paid key persons and/or consultants were appointed per country who prepared lists of stakeholders. From these lists a number of representative organizations were selected to be interviewed. These interviews took place in 2011 from June onwards. Per interview, around 1–2 hours were needed and per country around 1–1.5 weeks were needed to complete all interviews. The interviews were in a number of cases taped via a digital voice recorder. The completed question and answer form was sent to the interviewee for a check and most if not all the textual suggestions by the interviewed person were accepted. These harmonized interviews were used as a basis for writing a country report in which a preliminary SWOT analysis was also included with a number of action points. As regards the selected north European countries, regional reports will be written.

Northern Europe

Country key persons were identified for Denmark, Estonia, Finland, Iceland, Latvia, Lithuania, Norway and Sweden. These key persons prepared lists of stakeholders in their countries and a total of 89 stakeholders were identified for northern Europe. Of these stakeholders, 19 were interviewed—three representing genebanks, six public research, eight commercial breeding and two agro-NGOs (Table 3). Stakeholders in Finland and Lithuania still need to be interviewed.

Table 3. Organizations interviewed in northern Europe

Stakeholder group	Countries	Organizations
1. Genebank	Estonia	– The Genebank at Jõgeva Plant Breeding Institute, Jõgeva
	Latvia	– Genetic Resources Centre at the Latvian State Forestry Research Institute 'Silava' – Salaspils Pure Horticultural Research Centre, Pure
2. Public research	Denmark	– Department of Agriculture and Ecology, Faculty of Life Sciences, University of Copenhagen – Molecular breeding group, Department of Agriculture and Ecology, Faculty of Life Sciences, University of Copenhagen – Agrologica, Mariager
	Estonia	– Institute of Gene Technology, Tallinn University of Technology, Tallin
	Iceland	– The Agricultural University of Iceland, Borgarnes
	Norway	– Department of Plant and Environmental Sciences, Norwegian University of Life Sciences, Ås
3. Commercial breeding	Denmark	– Nordic Seed, Holeby – DLF trifolium, Roskilde
	Estonia	– Jõgeva Plant Breeding Institute, Jõgeva
	Latvia	– State Stende Cereal Breeding Institute, Dizstende – State Priekuli Plant Breeding Institute, Priekuli
	Norway	– Graminor AS, Bjørke forsøksgård, Ridabu
	Sweden	– Lantmännen Lantbruk in Svalöv – Lantmännen Lantbruk in Lännäs
4. Agro-NGO	Denmark	– Frøsamlerne, Tjele
	Estonia	MTÜ Maadjas

Cooperation among the Nordic countries (Denmark, Finland, Iceland, Norway and Sweden) is well developed and they have a single joint genebank for all five countries called the Nordic Genetic Resource Centre (NordGen). In Estonia, Latvia and Lithuania, there is a single genebank dealing with plant genetic resources in each country (at Jõgeva, Salaspils and Kedainiai distr.). The Estonian, Latvian, Lithuanian and Nordic genebanks are cooperating and information on their collections is publically available from the same website, SESTO at NordGen (www.nordgen.org/sesto/) and also from EURISCO (http://eurisco.ecpgr.org/). Accessions can be ordered from all the genebanks and characterization and evaluation of CWR and LR is taking place. However, for the Estonian and Latvian genebanks this information is not available in the public online databases, and they both state that this would be an important next step to improve accessibility of the data.

Both LR and CWR are used in public research and even though the research groups generally focus on basic research and education, all interviewees think that genetics/breeding is an important topic within their group. Systematic characterization and evaluation is conducted and in most countries this data are then transferred into databases. Except for Norway, there are no national programmes that promote LR or CWR research. The interviewees identified a lack of available funding as the

major constraint for this kind of research, as well as a lack of political priority at national and international levels.

Nearly all of the interviewed commercial breeders have used LR or CWR in their breeding programme but most of them state that they have not used them recently, or very little. In recent times the use has been more frequent in Estonia and Latvia than in the Nordic countries. The most commonly given explanation for not including LR or CWR in breeding is that it takes more time to produce a new variety than using highly bred material and that the demand for speed has increased. However, the commercial breeders cooperate within public-private-partnership programmes on the utilization of LR and CWR.

The two agro-NGOs interviewed are quite different. Frøsamlerne is Denmark's largest NGO and members are systematically collecting landraces, describing them and documenting information in a database. MTÜ Maadjas on the other hand, is a recently founded, small Estonian NGO, which as yet lacks funding and is run on a voluntary basis. Both NGOs cooperate with genebanks, public research organizations, breeders, or other NGOs in their own country.

Middle Europe

Austria

Based on the information in published national reports and the expertise of Paul Freudenthaler acting as key person, a draft interview plan was jointly developed by P. Freudenthaler/G. Neuhaus and respective stakeholders of the four groups (genebanks, public research institutes, NGOs and breeding companies) (Table 4) were interviewed during a country visit in August 2011. One stakeholder, the NGO Arche Noah, was interviewed by telephone.

Table 4. Organizations interviewed in Middle Europe

Stakeholder group	Countries	Organizations
1. Genebank	Austria	– Österreichische Agentur für Gesundheit und Ernährungssicherheit GmbH (AGES), Linz – Höhere Bundeslehranstalt und das Bundesamt für Wein- und Obstbau, Klosterneuburg (fruit genetic resources, grapevine)
	Bulgaria	– Institute of Plant Genetic Resources, Sadovo, Plovdiv
	Czech Republic	– Crop Research Institute (CRI), Ruzyně/Prague – CRI Viticulture Research Station Karlštejn, Karlštejn – CRI Department Vegetable and Special Crops, Olomouc
	Germany	– IPK, Gatersleben – JKI, Siebeldingen
	Poland	– IHAR-PIB, Radzikow – Laboratory of Potato Gene Resources and Tissue Culture, Bonin
	Romania	– National Genebank, Suceava
	Slovenia	– Agriculture Institute of Slovenia, Ljubljana (KIS) – Institute of Hops and Brewery, Žalec – Agriculture Faculty, University of Maribor

Stakeholder group	Countries	Organizations
2. Public research	Austria	– Agrar-Forschungseinrichtung Raumberg-Gumpenstein, Irdning
	Bulgaria	– Research Institute of Mountain Stockbreeding and Agriculture, Troyan – Department of Breeding, Maintenance and Introduction of Vegetable Crops, Research Institute "Maritsa", Sadovo, Plovdiv
	Czech Republic	– AGRITEC, Research, Breeding and Services, Šumperc
	Germany	– University of Göttingen, Department of Crop Science – JKI, Quedlinburg
	Poland	– IHAR-PIB, Research Division, Botanical Garden, Bydgoszcz
	Romania	– Vegetable Research and Development Station, Bacau – National Institute for Agriculture Research and Development, Fundulea
	Slovenia	– Agriculture Institute of Slovenia, Ljubljana – Biotechnical Faculty of the University of Ljubljana
3. Commercial breeding	Austria	– Reinsaat, Schiltern
	Bulgaria	– Institute of Forage Crops, Pleven – Soybean Experimental Station, Pavlikeni
	Czech Republic	– SELGEN, Stupiče
	Germany	– KWS Lochow GmbH, Bergen – Hild Samen GmbH, Marbach
	Poland	– Smolice Breeding Company – Zamarte Breeding Company
	Romania	– SC Procera Agrochemicals, Romania SRL, Fundulea – Farmacia Naturii, Bacau
	Slovenia	– Semenara Ltd., Ljubljana
4. Agro-NGO	Austria	– Arche Noah, Schiltern
	Bulgaria	– Agriculture Association, Plovdiv
	Czech Republic	– PRO-Bio, Šumperc
	Germany	– VERN, Greiffenberg – VEN, Schandelah
	Poland	– Association for Old Cultivars, Pokrzydowo/Torun – Ekoland, Ecological Food Manufactures Pokrzydowo/Torun
	Romania	– Biomold Association, Bacau
	Slovenia	– Association for elementary schools, agricultural activities – Urban Furrows, Maribor

Austria is a country with a considerable LR and CWR diversity. In particular, LR of crops like cereals, beans and fruit genetic resources are well adapted to highly diverse regional ecogeographic conditions. The genebank at the AGES is well organized, functioning and has good interaction with all stakeholder groups. In 2005, the National Biodiversity Commission (NBC) adopted an updated

National Biodiversity Strategy but a National Action Plan for conservation and sustainable use of genetic resources is lacking. Although the institutional structures for genebank facilities required for PGR are well developed, the PGR systems would benefit from a national action plan for PGR. Characterization and evaluation of accessions by genebank and public research institutions is mostly limited by a lack of sufficient funds. Commercial breeders working in the private sector integrate LR into the initial breeding process of crops. While LR and ecotypes are integrated into the initial breeding steps, the use of CWR in breeding is very restricted. The agro-NGO Arche Noah, acting as seed saver, has significant impact within Austria and even in Germany.

Czech Republic

In July, 2011 Ladislav Dotlacil, Director of the genebank department at the Crop Research Institute (CRI) at Ruzyně/Prague agreed on participating in this survey. Based on a comprehensive list of potential interviewees and institutions—including genebanks (3), public research institutes (10), breeding companies (10) and NGOs (2)—an interview plan was jointly developed. Six interviews were conducted during a one week stay in August 2011 following the visits and discussions held in Austria (Table 4).

The national genebank in the Czech Republic based at three locations (1) Ruzyně/Prague, (2) Olomouc and (3) Karlštejn, maintains comprehensive *ex situ* collections and is crop-specifically organized. Collections have been sufficiently evaluated and all data are accessible via EURISCO. The comprehensive genebank work is well organized and functioning. The same holds true for the cooperation between public breeding research and the commercial breeding sector. Today, several commercial breeding companies (mostly former state institutions) are involved in crop-specific pre-breeding approaches. The close relationship between public research and the private breeding sector facilitates the performance of public-private-partnership projects in the field of PGR conservation, characterization and use. Researchers in the public sector use LR but the utilization of CWR is mostly limited to certain crop groups. Fruit crops are of national origin, unique and therefore of special interest. Agro-NGOs acting as consultants cover a broad range of topics in agriculture have built a well-developed communication platform and maintain contacts with farmers all over the country.

Poland

In March 2011, Drs. Jerzy and Elzbieta Czembor accepted to act as consultants. Stakeholders were interviewed during a visit in late August 2011; one interview (IHAR-PIB) was postponed and performed by email later (Table 4).

The genebank of the IHAR is the national coordinating institution for the PGR programme comprising three universities, seven research institutes, four (former state) breeding companies and the botanical garden Bydgoszcz. The genebank work is well organized and functioning. Passport data have been uploaded to EURISCO from where users can access accessions. Within the limits of the available funds characterization and evaluation is performed and the data recorded in a database. Besides cereals, fruit crops of national origin are taken into account. Public breeding researchers used LR in breeding programmes in former times and were also very much engaged in research on CWR. The cooperation with the public breeding research and commercial breeding sector is well developed. Nowadays, in a few crop specific projects, pre-breeding with LR and CWR is performed by breeding companies in close cooperation with IHAR. The visited agro-NGO maintains an

impressive number of contacts with farmers working in traditional farming systems. A good interaction between all stakeholder groups was noted by the interviewer.

Bulgaria

Liliya I. Krasteva contributed to the project as a key person and consultant. Interviews with the selected organizations were conducted during September 2011 (Table 4).

The genebank department of the Institute of Plant Genetic Resources "Konstantin Malkov" at Sadovo hosts the *ex situ* collection of agriculture and horticulture plants and acts as the coordination point for all activities concerning PGR. The genebank work is well organized. The genebank maintains a highly diverse and systematically characterized collection. However, the upgrading of the information system is still pending due to limited financial means. Another point of concern is the evaluation of accessions, which is mainly limited by a lack of appropriate equipment and financial means. Public research institutes in Pleven and Sadovo specialize in breeding research on fodder plants and on characterization and utilization of vegetable germplasm. Both institutes use LR and CWR in breeding projects. The Research Institute at Troyan follows a research programme on extensive grassland. As the public research sector is closely affiliated with the breeding sector, the flow of ideas and materials is facilitated. It was not possible to get any information from a commercial plant breeding company. As a representative of the agro-NGO stakeholder group, the Secretary of the Agriculture Association was interviewed—an organization mainly working on an honorary basis that functions as an umbrella association supporting farmers in establishing local markets. A commercial breeding sector is apparently lacking, which may be taken as a short-coming.

Romania

Silvia Strajeru who was identified as key person proposed Creola Brezeanu PhD to act as consultant. Dr. Brezeanu assisted in translation of interviews. The organizations interviewed are listed in Table 4.

The national genebank in Suceava mainly focuses on cereal crops and beans. The genebank system and its facilities are well developed and organized. In the future, intensifying of the molecular characterization of genetic resources including LR and CWR is envisaged. As regards public research, projects are focused mainly on the improvement of local varieties of vegetables and aromatic and medicinal plants. The public research and commercial breeding sectors are closely cooperating. Auspicious first attempts to bring CWR and LR into use are being pursued in a new venture within the commercial pharmaceutical breeding sector and in oil crops. Breeding of pharmaceutical plants will promote the use of CWR and LR. The agro-NGO Biomold mainly works on a project basis in close cooperation with the genebank, public research (VRDSB) and built up networks with other NGOs, to preserve local LR and support farmers in establishing new markets.

Slovenia

In July 2011, Dr. Vladimir Meglič assisted as key person and consultant. Interviews were conducted in late November with the organizations shown in Table 4.

The Agriculture Institute of Slovenia is responsible for the national genebank collection and related research. The genebank work is well organized. Public research is mainly performed at universities (Ljubljana/Maribor) and addresses two topics: education and development of new cultivars. Few breeding companies with breeding programmes in horticulture and in agriculture crops are based in the country. Slovenia´s breeding sector is in a stage of renovation and very young breeding

programmes are ongoing. Commercial breeding is performed in close cooperation with research and acts on market request. Native LR are used to develop varieties for the national and Balkan markets. Both, public research and the commercial breeding sector are cooperating well. Besides several small organizations, about five agro-NGOs are present. The NGO Urban Furrows collaborates with the national genebank (KIS) and with farmers. The use of CWR in breeding programmes is very limited, whereas LR are used by commercial breeders and NGOs.

Germany

Dr. L. Frese performed telephone interviews with the stakeholders shown in Table 4 in February 2012.

The IPK genebank is certified according to DIN EN ISO 9001:2008, audited by DQS. An online genebank information system allows passport data to be retrieved and samples to be ordered. The well-organized genebank facilitates access to the germplasm conserved which has considerably promoted the use of genetic resources in Germany and abroad. Depending on the crop, between 0 and 3% of the crop-specific collection that is distributed falls into the category of 'landrace/CWR'. The IPK collections are systematically characterized and evaluated, either in cooperation with external partners or in house. The JKI grapevine genebank collection is well maintained, systematically characterized and evaluated. Access to passport data and grapevine germplasm is provided online. Public research institutions conduct a wide range of projects in which LR and CWR play a key role. The research projects are partly performed in the frame of private-public-partnership programs. Data on genebank accessions generated in joint projects is recorded and sent back to the genebank(s) while breeding companies use the research material to improve the elite breeding pool. The activities of agro-NGOs range from very successful public relation work to the establishment of market niches for LR. Although improvements are always possible, it can be stated that Germany runs a fully integrated PGR conservation and utilization system which is based on a National Action Plan for PGRFA. All interviewed stakeholders noted the absence of a well-organized and online accessible data repository for characterization and evaluation data which is a major reason why genebank collections cannot be fully exploited.

Southern Europe

Greece

A. Katsiotis PhD (University of Athens), as key person, prepared a list of stakeholders including two genebanks, three agro-NGOs, three breeding companies and seven research organizations (Table 5). Interviews were performed from September 9 to 16 2011.

Based on the interviews held, the picture emerged of an inadequately functioning PGR system in the country. Utilization of PGR from genebanks through public research projects was often limited as the PGR held in storage were not really accessible for users. Also the genebank operation of the national genebank was negatively influenced by a limited budget and inadequate control of the government. Many collections of the NAGREF research institutes were threatened as the storage conditions of these collections were far below standards. The only vegetable breeding company in the country worked together with Greek and foreign PGR providers to develop new cultivars. The agro-NGOs did function well as they had built up networks of maintainers of LR around them. Interviewing the government proved to be impossible due to reasons unknown.

Table 5. Organizations interviewed in southern Europe

Stakeholder group	Countries	Organizations
1. Genebank	Greece	– GGB (Thessaloniki) – Maich (Chania)
	Italy	– CNR Bari (Bari) – CRA Fruit Tree Research Centre (Rome)
	Spain	– CRF (Madrid) and COMAV (Valencia)
2. Public research	Greece	– NAGREF Fodder Crops & Pastures Institute (Larissa) – NAGREF Cereal Institute (Thessaloniki) – University of Thessaly (Volos) – University of Athens (Athens)
	Italy	– University of Bologna (Bologna) – CRA vegetables (Monsampolo del Tronto)
	Spain	– Neiker (Vitoria-Gasteiz) – IRTA (Lleida)
3. Commercial breeding	Greece	– Spirou (Athens)
	Italy	– Bejo Italy (Pisignano) – Cora Seeds (Cesena) – SAIS (Cesena) – SIS (San Lazzaro di Savena) – Porfiri (Urbisaglia) – Assosementi (Bologna)
	Spain	– Syngenta Seeds (Almeria) – Semillas Fitó (Barcelona) – Ramiro Arnedo (Calahorra)
4. Agro-NGO	Greece	– Peliti (Mesochori) – Aegilops (Volos)
	Italy	– Rete Semi Rurali (Florence) – Regional network of Tuscany (Florence)
	Spain	– Llavors d'Aci, Carcaixent (Valencia) – RAERM (Murcia)
5. Government	Spain	– Ministry of Environment, Rural and Marine Affairs (Madrid)

Spain

J. Fajardo MSc (CRF, Madrid), as key person, developed a stakeholder list with 34 genebanks, 41 research institutes, 24 NGOs, 36 breeders/seed producers, and 17 (regional) or 1 (national) government(s). The stakeholders (Table 5) were interviewed by J. Fajardo and C. Kik.

The genebank system functions satisfactorily as the content of the collections held by genebanks is visible via the internet and accessions are stored in a reasonable/good way. Points of concern are the limited fine-tuning between the regional genebanks and the limited utilization of the collections by users. The interaction between the government and central genebank on PGR issues is open and direct. The collections at the public research institutes are primarily being used by themselves and research cooperation with breeding companies or other users takes place infrequently. However, the development of new cultivars using Spanish PGR in an interaction between research organizations and private breeding companies is limited. The agro-NGO Red de Semillas, which consists of a network of regional organizations, is a significant national stakeholder and has an effect

on Spanish PGR policy. Within this network local landraces are being cultivated in mostly organic conditions.

Italy

F. D'Antuono PhD (University of Bologna), as key person, started to develop a list of stakeholders which eventually consisted of three genebanks, 24 research organizations, 35 breeding companies / seed producers, and two agro-NGOs. The organizations interviewed are listed in Table 5.

The government was not interviewed due to agenda incompatibilities. The interviews by F. D'Antuono and C. Kik took place from November 20–26, 2011. The situation in Italy concerning the storage of PGR was poor/reasonable as most probably many genebanks maintain their PGR under sub-optimal conditions. Also, the accessibility of the collections is poor as it is not precisely known which accessions are present in collections. Currently, large updating activities of collections in public research institutes (CRA and CNR organizations) are taking place. Consequently, breeding companies cannot benefit optimally from these collections. The agro-NGO community is reasonably developed in Italy and sometimes supported by the regional government. The national and regional government has not really created awareness of access and benefit sharing (ABS) regulations at the CRA and CNR institutes, as lack of knowledge concerning these regulations was present.

WP5: Deviations from Annex I

In December 2011, the project team suggested to involve France as the fourth country of the southern region in the analysis as in this country the PGR system and the utilization of PGR is organized in a different manner as compared to Spain, Italy and Greece. This suggestion was supported by the PGR Secure Breeders' Committee.

The stakeholders initially included were genebanks, research organizations, breeding companies and agro-NGOs. After a first round of interviews, the government was also included, being an important stakeholder. This group could not be addressed up to now in all visited countries via the semi-structured interviews.

For the northern countries, interviews were not aggregated at country level but to the level of a regional report due to the low number of stakeholders that could be addressed up to now and to regional specificities. Interviews in The Netherlands, France, Finland and Lithuania still need to be carried out; these will take place in the first half of 2012.

2.2.6 WP6: Dissemination and training (WP leader: Carlo Fadda, BIOVER)

Task 6.1: Website for PGR Secure. Task leader: UoB. Involved partners: UoB, BIOVER

The project website (www.pgrsecure.org) was constructed by Partner 1, UoB, and is hosted and managed by UoB. The public pages comprise: home page, work package descriptions, list of collaborators, partner contact details, the crop wild relative (CWR) and landrace (LR) conservation helpdesk, and pages dedicated to disseminating the outputs and products associated with the CWR and LR conservation training workshop. The site includes a password protected intranet for project collaborators, which provides access to meeting documents and presentations (consortium and other internal project meetings), and contract and reporting documents. The website is periodically updated with new information as the project progresses.

Task 6.2: Web-enabled Europe-wide inventories of CWR and LR diversity. Task leader: BIOVER. Involved partners: UoB, BIOVER, UNIPG, JKI, MTT, URJC

In order to facilitate the eventual web-enablement of the Europe-wide inventories of CWR and LR diversity, work is underway to develop CWR and LR ontologies to manage the data associated with CWR and LR NIs, as well as the associated data types that will be linked to the NIs (e.g., ecogeographic data, trait data). Part of this process has involved the development of LR descriptors which were previously drafted by the ECPGR On-farm Conservation Working Group of the *In Situ* and On-farm Conservation Network, but were extensively modified since discussions which took place at the CWR and LR conservation training workshop (see report on Task 6.5) by the WP4 collaborators, UNIPG, MTT, UoB and BIOVER. This draft has been published in the PGR Secure website (helpdesk pages) at: www.pgrsecure.bham.ac.uk/sites/default/files/documents/helpdesk/LR_DESCRIPTORS_PGR_Secure_draft.pdf and has been submitted to the ECPGR Documentation and Information Network for review. In addition, UoB has provided all relevant documentation to BIOVER regarding the CWR information management model—the Crop Wild Relative Information System (CWRIS) (Kell *et al*., 2008b) and CWRML (Moore *et al*., 2005–2008, 2008)—developed in the context of the FP5 project, PGR Forum (www.pgrforum.org). UoB and URJC have also provided to BIOVER the list of data types included in the UK and Spain CWR NIs being developed in the context of WP3. The Task 6.2 activities are also linked to Tasks 6.3 and 2.1 (development of the Trait Information Portal), as well as to Tasks 3.1–3.4 and 4.1–4.4 as the CWR and LR information management models provide the essential backbone to the development of national and European CWR and LR conservation strategies.

Task 6.3: Web-enabled Trait Information Portal. Task leader: BIOVER. Involved partners: UoB, DLO, BIOVER, JKI, NordGen

As reported under Task 2.1, BIOVER has been working with the TIP development team on the refinement of the conceptualization/design for the TIP mockup. A key driver leading to the successful web-enablement of the TIP is the collation of views and suggestions from the PGR Secure consortium and wider stakeholder community. During the current reporting period, views and suggestions from breeders and other potential users were obtained, either though surveys such as the one reported under Task 2.1 or direct contact with stakeholders during interviews and meetings, as reported under Task 5.1. Task 6.3 links closely with WPs 1, 2, 3, 4 and 5, aspects of which inform the design (and eventual web-enablement) of the TIP. As the TIP develops, feedback from these WPs and from the stakeholder community will continue in support of the implementation of this task.

Task 6.4: Publications. Task leader: BIOVER. Involved partners: all partners

Introductory brief and newsletters

During the current reporting period, Partners 3 (BIOVER) and 1 (UoB) initiated the production of an introductory brief for the project which is targeted towards different audiences (plant breeders, agrobiodiversity conservationists, policy makers, general public) and will be published in the key European languages on the project website early in the second reporting period.

Production of the first two newsletters (one focused on CWR and the other on LR) was also initiated during the current reporting period by Partners 1 (UoB) and 4 (UNIPG). All other project partners have contributed to the newsletters.

The CWR newsletter is a continuation of *Crop wild relative* (ISSN 1742-3694 (Online); ISSN 1742-3627 (Print) but as there are no funds dedicated to printing the newsletters, it will only be published online on the project website. The current issue, *Crop wild relative* Issue 8, focuses mainly on disseminating the aims, objectives and activities of the PGR Secure project, although it also contains additional articles and information on CWR conservation and utilization which are not directly related to the project but which are of broader interest to the project stakeholder community. The newsletter is produced in full colour and the current issue comprises 44 pages. It is expected to be published online in April 2012.

The LR newsletter, *Landraces*, is a new publication which will be published in a similar format to *Crop wild relative*. The first issue, similarly to *Crop wild relative* Issue 8, will focus mainly on disseminating the aims, objectives and activities of the PGR Secure project but will also contain additional articles and information on LR conservation and utilization which are not directly related to the project, but that are of broader interest to the project stakeholder community. The newsletter is expected to be published in May 2012.

Other publications

Publications which are either direct products of the work undertaken in the PGR Secure project or closely related and therefore of relevance to the project are listed in Appendix 2.

Task 6.5: Workshops and training. Task leaders: UoB, DLO, UNIPG. Involved partners: UoB, DLO, UNIPG, JKI, NordGen

One of the goals of PGR Secure is to assist national PGR programmes to generate and implement conservation strategies for national CWR and LR diversity (see also the progress reports on WPs 3 and 4). The workshop, 'Conservation strategies for European crop wild relative and landrace diversity' (www.pgrsecure.org/palanga_workshop) was convened to discuss and agree a strategic approach to European and national CWR and LR conservation that will result in systematic conservation of these important resources. To achieve this goal, the following subjects were covered:

- Revision / modification of already existing national CWR inventories (e.g., previously generated by the FP5 funded PGR Forum project)
- Creation of new national CWR and LR inventories where necessary
- Baseline threat assessment of CWR / LR extinction / genetic erosion
- CWR / LR diversity prioritization and *in situ* and *ex situ* gap analysis
- Creation / collation of desirable additional national data sets (e.g., distribution, threat status, use potential)
- Data quality and data standards
- Use of national CWR and LR inventories
- Traditional and novel characterization of CWR / LR diversity

- Development and implementation of national CWR / LR conservation strategies by the ECPGR Network members.

Aimed at National Focal Points (NFPs), the objectives of the workshop were:

- To provide training and guidance on the creation and updating of the national CWR and LR inventories.

- To make progress on the mechanisms to upload CWR and LR data onto EURISCO.

The workshop was organized by UoB, UNIPG, ECPGR and the Nature Research Centre, Lithuania (workshop hosts). As reported under Tasks 3.1 and 4.1, the PGR Secure Project Coordinator and ECPGR Secretariat sent a letter to the ECPGR National Coordinators (NCs) of the 42 European countries to invite them to nominate members of the ECPGR *In Situ* and On-Farm Conservation Network (Wild Species Conservation in Genetic Reserves Working Group and On-Farm Working Group) and *In Situ* and On-Farm NFPs (associated with the ECPGR Documentation and Information Network) to attend the workshop. Official nominations were received from NCs of 38 countries and these were for 36 members (or their representatives) of the Wild Species Conservation in Genetic Reserves Working Group, 34 members (or their representatives) of the On-Farm Working Group, 21 *In Situ* NFPs and 30 On-Farm NFPs (with some overlap as some individuals are members of more than one group). In total, 102 delegates from 39 countries (including one member of the PGR Secure EAB from the USA) attended the workshop.

The main topics covered during the workshop were a) the development of national CWR and LR inventories; b) CWR and LR prioritization, diversity analysis and threat assessment; c) data collection, management and exchange; d) linking conservation to use; and e) the development and implementation of national CWR and LR conservation strategies by the ECPGR Network members. The workshop consisted of a series of presentations on the current state of the art of CWR and LR conservation in Europe, available approaches and methods for CWR and LR conservation and specific case studies, followed by group discussions to address the practical application of the available approaches and methods, share knowledge on current national activities and agree on the way forward.

An initial plenary session provided participants with an overview of progress in CWR and LR conservation in Europe, an introduction to the PGR Secure project, an outline of strategic approaches that will result in comprehensive CWR and LR conservation in Europe, an overview of the *status quo* regarding CWR and LR information management in Europe, and an introduction to the Trait Information Portal (TIP) being developed in the context of the PGR Secure project. Participants were also informed about the aims and objectives of PGR Secure WP5, 'Engaging the user community' and of the availability of the project's CWR and LR conservation helpdesk.

After the plenary session, the delegates were divided into three working groups—CWR conservation, LR conservation, and documentation and information—for detailed discussions on the development of national and European CWR and LR conservation strategies. An interim reporting session was convened during the workshop to enable feedback from each working group to be taken into account in the final working group sessions.

Forty-two delegates attended the working group 1 (CWR conservation) session (33 funded by UoB's PGR Secure budget), including trainers and facilitators, to discuss a strategic approach to national

and European CWR conservation. Training was provided in national CWR conservation strategy planning, how to create a CWR NI, options for CWR prioritization, how to undertake CWR *in situ* and *ex situ* gap analysis, available methods for ecogeographic and genetic diversity data analysis, and threat assessment. After an interim working group feedback session, participants were informed about the available descriptors for CWR conservation data management and in a final session, participants discussed and agreed a way forward for the development of national CWR conservation strategies.

Training was mainly provided by staff of UoB (including an invited speaker from the Botanic Garden of Lisbon), with additional support from URJC, the University of Helsinki (who is working in collaboration with PGR Secure Partner 7, MTT) and Bioversity. URJC provided training in ecogeographic data analysis and gave a presentation on progress in prioritizing CWR of Spain. Prof. Iriondo (URJC) also participated as the rapporteur for working group 1 to provide feedback for the plenary session. Sessions were chaired by PGR Secure partners and other experts present at the workshop.

Thirty-three delegates attended the working group 2 (LR conservation) session (32 funded by UNIPG's PGR Secure budget), including trainers and facilitators, to discuss a strategic approach to national and European LR conservation. Training on the nature of LR (their definitions and genetic structure), their importance (in local economies, in developing new and environmentally friendly agronomic systems, in breeding and participatory breeding) and possible applications of on-farm conservation was given drawing on experience gained in several countries. Training and guidance on the creation of the LR NIs was also provided and data types and format to be recorded for the purposes of PGR Secure was discussed. In particular, an implementation plan on the creation of NIs and on how to contribute to PGR Secure aims was agreed, as follows: 1) collect information on LR that are still maintained *in situ* by using a minimum set of descriptors, 2) build up LR NIs, 3) make data available to PGR secure.

Following the workshop, and in order to accomplish Step 1, the WP4 team (UNIPG, MTT, UoB and BIOVER), elaborated a LR descriptors draft (www.pgrsecure.bham.ac.uk/sites/default/files/documents/helpdesk/LR_DESCRIPTORS_PGR_Secure_draft.pdf) which takes into account the inputs and comments received during the workshop. This draft was also recently sent to the ECPGR Documentation and Information Network members with a request for comments since the Network offered its cooperation on the topic. The development of the LR descriptors is linked to Tasks 6.2, 6.3 and 2.1 which are related to the development of the TIP and web-enablement of the CWR and LR NIs, as well as to Tasks 4.1–4.4 as the descriptors provide the essential backbone to the development of national and European LR conservation strategies.

The LR sessions were led by Valeria Negri and Renzo Torricelli (UNIPG). MTT was also involved in planning and facilitating the LR sessions and in providing training in LR NI and conservation strategy development, giving six presentations at the workshop.

NordGen also participated in the workshop, primarily to present WP5.

The workshop presentations are available via the PGR Secure website at: www.pgrsecure.org/palanga_presentations.

A comprehensive report of the workshop is available for consultation/download at: www.pgrsecure.bham.ac.uk/sites/default/files/meetings/palanga/CWR_and_LR_Workshop_Report_FINAL.pdf.

WP6: Deviations from Annex I

- The project website is being hosted by UoB instead of Bioversity because of costs associated with hosting at Bioversity.

- Two training workshops—one on CWR conservation and the other on LR conservation were originally planned to take place over five days each. At the project kick-off meeting, the project's EC Project Officer suggested combining the two workshops into one to save funds and increase opportunities for collaboration; therefore, the two workshops were combined into one. At a later date, the ECPGR Coordinator suggested that in addition to members of the *In Situ* and On-Farm Conservation Network being nominated to attend the workshop, the ECPGR *In Situ* and On-Farm NFPs (associated with the Documentation and Information Network) should also be invited. As a result, the workshop involved many more delegates than originally expected (106 planned to attend, 102 attended), which placed a greater demand on the time and resources of the organizers than expected. In order to balance the need for additional resources, the workshop was shortened to three days which was considered sufficient in order to cover the topics as originally planned. As the workshop was very successful, these deviations are considered to have had a positive outcome with additional benefits for the project.

- Partner 7, MTT played an important role in planning and providing training during the LR conservation training workshop. Partner 8, URJC played a major in providing training and rapporteuring during the CWR conservation training workshop.

2.2.7 Person-months used per WP and per partner

The person-months (PMs) planned[17], actual[18] and remaining[19] per WP and per partner during the reporting period are shown in Table 6.

Table 6. PMs planned (grey shaded), actual (no shading) and remaining (black) per WP and per partner during the reporting period

Partner	1 UoB	2 DLO	3 BIOVER	4 UNIPG	5 JKI	6 NORDGEN	7 MTT	8 URJC	9 SXS	10 UNOTT	WP totals	Notes
WP 1	38.00	58.00	0.00	0.00	0.00	0.00	0.00	0.00	12.00	5.00	**113.00**	
	11.61	16.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**28.15**	
	26.39	41.46	0.00	0.00	0.00	0.00	0.00	0.00	12.00	5.00	**84.85**	
WP 2	1.10	0.40	20.00	1.00	0.50	1.00	1.00	1.60	1.20	0.50	**28.30**	
	0.25	0.65	10.00	0.00	0.00	0.00	0.00	1.89	0.00	0.00	**12.79**	
	0.85	-0.25	10.00	1.00	0.50	1.00	1.00	-0.29	1.20	0.50	**15.51**	
WP3	14.00	0.00	2.00	1.00	0.00	0.00	8.00	24.00	0.00	0.00	**49.00**	
	9.10	0.00	0.00	1.29	0.00	0.00	3.09	7.79	0.00	0.00	**21.27**	[20]
	4.90	0.00	2.00	0.29	0.00	0.00	4.91	16.21	0.00	0.00	**27.73**	
WP4	1.10	0.00	2.00	32.50	0.00	0.00	8.00	0.00	0.00	0.00	**43.60**	
	0.00	0.00	0.00	3.03	0.00	0.00	1.04	0.00	0.00	0.00	**4.07**	[21, 22]
	1.10	0.00	2.00	29.47	0.00	0.00	6.96	0.00	0.00	0.00	**39.53**	
WP 5	0.00	7.00	0.00	0.00	21.00	6.00	0.00	0.00	0.00	0.00	**34.00**	
	0.00	3.00	0.00	0.00	13.50	2.71	0.00	0.00	0.00	0.00	**19.21**	[23]
	0.00	4.00	0.00	0.00	7.50	3.29	0.00	0.00	0.00	0.00	**14.79**	

[17] The number of PMs planned per WP as stated in Annex I.
[18] The actual number of PMs spent on the WP during the reporting period.
[19] The number of PMs remaining per partner and per WP.
[20] UNIPG: Following the Project Officer's request of a larger involvement of UNIPG in WP3, UNIPG will shift part of the WP4 planned PMs (11 PMs) to WP3.

[21] UNIPG: Following the Project Officer's request of being involved in WP3, UNIPG will shift part of the WP4 planned PMs (11 PMs) to WP3.

[22] UNIPG: Due to a new Italian law on the matter of research and University (law n.240/2010) and relative administrative regulations, it was not possible to hire staff to help in WP4 up to February 2012. As a consequence, UNIPG permanent staff had to supply their time instead.
[23] JKI: During the first two years, mainly temporary staff capacity is deployed, while in 2013 until the project end only permanent staff PMs will be used.

Partner	1 UoB	2 DLO	3 BIOVER	4 UNIPG	5 JKI	6 NORDGEN	7 MTT	8 URJC	9 SXS	10 UNOTT	WP totals	Notes
WP 6	6.00	0.50	17.00	6.00	7.00	1.00	0.00	0.00	0.00	0.00	**37.50**	
	7.74	0.00	6.00	2.80	0.30	0.23	0.50	0.48	0.00	0.00	**18.05**	[24, 25]
	-1.74	0.50	11.00	3.20	6.70	0.77	-0.50	-0.48	0.00	0.00	**19.45**	
WP 7	14.00	2.00	1.00	0.50	1.00	1.00	0.50	1.00	1.00	0.50	**22.50**	
	4.97	0.65	1.00	1.01	0.40	0.65	0.50	0.96	0.76	0.13	**11.03**	[26]
	9.03	1.35	0.00	-0.51	0.60	0.35	0.00	0.04	0.24	0.37	**11.47**	
Partner totals	**74.20**	**67.90**	**42.00**	**41.00**	**29.50**	**9.00**	**17.50**	**26.60**	**14.20**	**6.00**		
	33.67	**20.84**	**17.00**	**8.13**	**14.20**	**3.59**	**5.13**	**11.12**	**0.76**	**0.13**		
	40.53	**47.06**	**25.00**	**32.87**	**15.30**	**5.41**	**12.37**	**15.48**	**13.44**	**5.87**		

[24] UoB: The organization of the joint PGR Secure/ECPGR CWR and LR training workshop involved a very high injection of staff time. More PMs will be used on the development and maintenance of the project website, and on the production of newsletters and the project's introductory brief.

[25] UNIPG: Due to a new Italian law on the matter of research and university (law n.240/2010) and administrative regulations, it was not possible to hire staff to help in organizing the CWR and LR training workshop in the few months between the receipt of funds and the workshop. As a consequence, permanent staff time was used instead.

[26] UNIPG: More PMs were used than expected due to UNIPG hosting the first annual consortium meeting (including the executive meeting of the Consortium Committee) in Perugia.

2.3 Project management

2.3.1 Consortium management tasks and achievements during the period

Management tasks and achievements of the Coordinator

As specified by Article II.2.3 of the Grant Agreement (GA), the Coordinator (UoB) has:

a) Administered the financial contribution of the EU regarding its allocation between beneficiaries and activities in accordance with the GA and the decisions taken by the Consortium Committee[27]. The coordinator has ensured that all the appropriate payments due in the current period have been made to the other beneficiaries;

b) Kept the records and financial accounts making it possible to determine at any time what portion of the financial contribution of the EU has been paid to each beneficiary for the purposes of the project;

c) Informed the Commission of the distribution of the financial contribution of the EU and the date of transfers to the beneficiaries, as required by the GA and by the Commission;

d) Monitored the compliance by beneficiaries with their obligations under the GA.

As specified by Article II.16.5 of the GA, during the current period the Coordinator has:

- Coordinated the production and signature of the Consortium Agreement (CA), as well as ensuring that attachment 5 of the CA (list of members and other contact persons) is up-to-date;
- Carried out the overall legal, ethical, financial and administrative management of the project;
- Carried out other general project management activities; including:
  - Organizing meetings of the Consortium Committee and External Advisory Board (EAB);
  - Writing/collating Consortium Committee and EAB meeting reports;
  - Collating and drafting the project's dissemination, capacity building and exit strategies;
  - Creating and updating the password protected partner intranet which contains details of project meetings as well as contractual and reporting information;
  - Maintaining regular communication with/providing advice to the Consortium Committee on matters related to project management, contractual obligations and reporting;
  - Maintaining regular communication with the members of the project's EAB and facilitating their participation at Consortium and other meetings;
  - Maintaining regular communication with the members of the project's Breeders' Committee;

[27] The Consortium Committee is the executive body of the project responsible for overseeing the managerial and financial operation of the project. It is chaired by the Project Coordinator (Dr. Nigel Maxted) and its members are representatives of each beneficiary organization plus the Chair of the EAB and the Project Manager. As defined by the CA, the Consortium Committee is the ultimate decision making body of the Consortium.

- Collating amendments to Annex I of the GA (corrections to WP descriptions and addition of a new beneficiary – see below) and preparing a contract amendment;
- Coordinating the production of the first internal interim report (month 8);
- Initiating the production of the first periodic report (D7.1).

Management tasks and achievements of the rest of the Consortium

In addition to management tasks undertaken by the Coordinator, the other members of the Consortium Committee have:

- Contributed to the drafting and finalization of the CA;
- Coordinated the signature of the CA and transmittance of original signed documents to the Coordinator;
- Informed the Coordinator of changes to members of the Consortium Committee representing their respective beneficiary organizations;
- Assisted in the preparation of a contract amendment;
- Contributed to the preparation of agendas for meetings of the Consortium Committee and EAB;
- Contributed to the preparation of Consortium Committee and EAB meeting reports;
- Attended Consortium Committee meetings (integral to the project kick-off and first annual consortium meetings) to discuss and agree on managerial and financial operation of the project;
- Contributed to the project's dissemination, capacity building and exit strategies;
- Prepared the first interim internal and periodic financial reports.

2.3.2 Problems which have occurred and how they were solved or envisaged solutions

- The accession of the new beneficiary, EUCARPIA to the Consortium has not gone as smoothly as anticipated, mainly due to a misunderstanding regarding the requirement for a beneficiary to manage their own budget. However, agreement has now been made between the relevant partners (UoB, DLO, JKI and NORDGEN) and EUCARPIA regarding a budget transfer and it is foreseen that the request for the contract amendment will be sent to the Commission by the end of May 2012.
- At the kick-off meeting it was noted that Annex I is not in line with the final agreed WP descriptions. This has now been resolved and the necessary amendments will be made as part of the contract amendment associated with the addition of the new beneficiary, EUCARPIA.
- Some costs associated with the kick-off meeting (e.g., venue hire, catering costs, flight bookings) were incurred before the start date of the project. Some partners had to use alternative budgets and subsequently transfer costs at a later date.

- A delay in the completion and signature of the contract documents caused a delay for some partners in setting up an account for the project. This caused complications for some partners with regard to expenditure incurred in the period before their project account could be set up and involved the use of alternative budgets and subsequent transfer of costs at a later date.

2.3.3 Changes in the Consortium

- A new beneficiary, Partner 11, EUCARPIA was invited to join the Consortium and the procedures for their accession to the GA have been initiated.

- Partner 3, BIOVER changed their membership of the Consortium Committee due to staff changes:

  - Dr. Michael Mackay took over leadership of WPs 2 and 6 from Dr. Ehsan Dulloo during the period 17 October 2011 to 17 February 2012;

  - Dr. Carlo Fadda took over leadership of WPs 2 and 6 from Dr. Michael Mackay as of 20 February 2012.

- Partner 6, NORDGEN changed their membership of the Consortium Committee due to staff changes:

  - Dr. Anna Palmé took over as collaborator from Dr. Gert Poulsen as of 01 February 2012.

- Partner 7, MTT changed their membership of the Consortium Committee due to staff changes:

  - Dr. Maarit Heinonen took over as collaborator from Dr. Merja Veteläinen as of 01 January 2012.

- Dr. Ehsan Dulloo, formerly the member of the Consortium Committee representing Partner 3, BIOVER joined the EAB following his move from BIOVER to FAO.

- Dr. Merja Veteläinen, formerly the member of the Consortium Committee representing Partner 7, MTT joined the EAB following her move from BIOVER to Boreal Plant Breeding Ltd.

2.3.4 List of project meetings, dates and venues

Meetings convened during the period

- Kick off meeting, 15–16 March 2011, The Malthouse, Lyme Regis, United Kingdom (organized and hosted by UoB)

- Joint PGR Secure/ECPGR workshop, 'Conservation strategies for European crop wild relative and landrace diversity, 7–9 September 2011, Hotel Palangos vėtra, Palanga, Lithuania (organized by UoB, UNIPG, ECPGR and the Nature Research Centre (NRC), Lithuania; hosted by the NRC)

- First Breeders' Committee Meeting, 08 November 2011, Hotel Königshof, Bonn, Germany (organized and hosted by JKI)

- Focused Identification of Germplasm Strategy (FIGS) workshop 1, 6–9 December 2011, Bioversity HQ, Rome, Italy

- First annual consortium meeting, 14–15 December 2011, University of Perugia, Italy (organized by UNIPG and UoB; hosted by UNIPG)

- Focused Identification of Germplasm Strategy (FIGS) workshop 2, 9–12 January 2012, Universidad Rey Juan Carlos, Móstoles, Madrid, Spain

Meetings planned during the period

- Second annual consortium and mid-term review meeting, 23–25 October 2012, Larnaca, Cyprus (organized by UoB; hosted by the Agricultural Research Institute of the Ministry of Agriculture of Cyprus)

Further information about project meetings, including reports, can be found in the partner intranet.

2.3.5 Project planning and status

The project tasks are proceeding as planned (see Table 6 of Annex I to the Grant Agreement — GANTT chart indicating timing of the different WPs and their components); however, some of the deliverables and milestones are expected to be submitted/achieved later than planned (see Section 2.3.6).

2.3.6 Impact of possible deviations from the planned deliverables and milestones

There are currently no foreseen significant deviations from the planned deliverables and milestones. Minor changes to the scope of D2.1 and MS6, MS7 and MS8 are planned as part of the aforementioned contract amendment; however, these changes will not have any impact on meeting the overall project objectives and will in fact increase the scope of these outputs which will have a positive impact on the project's achievements.

Some of the deliverables and milestones are expected to be submitted/achieved later than planned (see Section 3, deliverables and milestones tables); however, it is not expected that these deviations will have any significant impact on meeting the overall project objectives.

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The following country key persons were identified in the various countries and supported the WP5 team either by providing advice or as paid consultants.

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Appendix 2. Publications

This list includes publications which are either direct products of the work undertaken in the PGR Secure project or closely related and therefore of relevance to the project. Publications are listed by the project partner who is lead author. Oral communications given at conferences are included, apart from those presented at the CWR and LR conservation training workshop which are published in the public domain at: http://www.pgrsecure.org/palanga_presentations.

Partner 1, UoB

Bilz, M., Kell, S.P., Maxted, N. and Lansdown, R.V. (2011) *European Red List of Vascular Plants*. Luxembourg: Publications Office of the European Union. ISBN 978-92-79-20199-8. http://ec.europa.eu/environment/nature/conservation/species/redlist/downloads/European_vascular_plants.pdf

Fielder, H., Hopkins, J., Smith, C., Kell, S., Ford-Lloyd, B. and Maxted, N. (2012) UK wild species to underpin global food security: species selection, genetic reserves and targeted collection. *Crop Wild Relative* 8 (in press).

Ford-Lloyd, B.V., Schmidt, M., Armstrong, S.J., Barazani, O., Engels, J., Hadas, R., Hammer, K., Kell, S.P., Kang, D., Khoshbakht, K., Li, Y., Long, C., Lu, B., Ma, K., Nguyen, V.T., Qiu, L., Ge, S., Wei, W., Zhang, Z. and Maxted N. (2011) Crop wild relatives – undervalued, underutilized, and under threat? *Bioscience* 61(7), 559–565.

Kell, S. and Maxted, N. (2012) The Palanga workshop: European PGRFA experts convene to develop national strategy protocols for CWR and landrace diversity conservation. *Crop Wild Relative* 8 (in press).

Kell, S.P., Maxted, N. and Bilz, M. (2012) European crop wild relative threat assessment: knowledge gained and lessons learnt. In: Maxted, N., Dulloo, M.E., Ford-Lloyd, B.V., Frese, L., Iriondo, J.M. and Pinheiro de Carvalho, M.A.A. (eds.) *Agrobiodiversity Conservation: Securing the Diversity of Crop Wild Relatives and Landraces*. CAB International, Wallingford. Pp. 218–242.

Kell, S.P., Maxted, N., Frese, L. and Iriondo, J.M (2012) *In situ* conservation of crop wild relatives: a strategy for identifying priority genetic reserve sites. In: Maxted, N., Dulloo, M.E., Ford-Lloyd, B.V., Frese, L., Iriondo, J.M. and Pinheiro de Carvalho, M.A.A. (eds.) *Agrobiodiversity Conservation: Securing the Diversity of Crop Wild Relatives and Landraces*. CAB International, Wallingford. Pp. 7–19.

Kell, S., Negri, V., Torricelli, R., Maxted, N., Maggioni, L. and Fielder, H. (compilers) (2012) *Conservation Strategies for European Crop Wild Relative and Landrace Diversity. Report of the Joint PGR Secure/ECPGR Workshop, 7–9 September 2011, Palanga, Lithuania*. http://www.pgrsecure.bham.ac.uk/sites/default/files/meetings/palanga/CWR_and_LR_Workshop_Report_FINAL.pdf

Magos Brehm, J., Ford-Lloyd, B.V., Maxted, N. and Martins-Loução, M.A. (2012) Using neutral genetic diversity to prioritise crop wild relative populations: a Portuguese endemic case study for *Dianthus cintranus* Boiss. & Reut. subsp. *barbatus* R. Fern. & Franco. In: Maxted, N., Dulloo, M.E., Ford-Lloyd, B.V., Frese, L., Iriondo, J.M. and Pinheiro de Carvalho, M.A.A. (eds.) *Agrobiodiversity*

Conservation: Securing the Diversity of Crop Wild Relatives and Landraces. CAB International, Wallingford. Pp. 193–210.

Maxted, N. (2012) *Lathyrus belinensis*: a CWR discovered and almost lost. *Crop Wild Relative* 8 (in press).

Maxted, N. and Kell, S. (2012) PGR Secure: enhanced use of traits from crop wild relatives and landraces to help adapt crops to climate change. *Crop Wild Relative* 8 (in press).

Maxted, N. and Kell, S. (2012) CWR horizon scanning: what are we doing and what should we be doing? *Crop Wild Relative* 8 (in press).

Maxted, N. and Kell, S.P. (2012) New EUCARPIA Partnership in EU FP7 Collaborative Project – Novel characterization of crop wild relative and landrace resources as the basis for improved plant breeding. *EUCARPIA Bulletin* 39, 27–31.

Maxted, N., Kell, S. and Magos Brehm, J. (2011) *Options to promote food security: on-farm management and* in situ *conservation of plant genetic resources for food and agriculture*. Commission on Genetic Resources for Food and Agriculture, FAO, Rome, Italy. 27 pp.

Maxted, N., Kell, S.P., Ford-Lloyd, B.V., Dulloo, M.E. and Toledo, A. (2012) Toward the systematic conservation of global crop wild relative diversity. *Crop Science* 52(2), 774–785.

Maxted, N., Hargreaves, S., Kell, S.P., Amri, A., Street, K., Shehadeh, A., Piggin, J. and Konopka, J. (2012) Temperate forage and pulse legume genetic gap analysis. *Bocconea* 24, 5–36.

Maxted, N., Dulloo, M.E., Ford-Lloyd, B.V., Frese, L., Iriondo, J.M. and Pinheiro de Carvalho, M.A.A. (eds.) (2012) *Agrobiodiversity Conservation: Securing the Diversity of Crop Wild Relatives and Landraces*. CAB International, Wallingford. 365 pp.

Maxted, N. *et al.* (2012) Current and future threats and opportunities facing European crop wild relative and landrace diversity. In: Maxted, N., Dulloo, M.E., Ford-Lloyd, B.V., Frese, L., Iriondo, J.M. and Pinheiro de Carvalho, M.A.A. (eds.) *Agrobiodiversity Conservation: Securing the Diversity of Crop Wild Relatives and Landraces*. CAB International, Wallingford. Pp. 333–353.

Maxted, N., Magos Brehm, J. and Kell, S. (in prep.) *Conservation and Sustainable Use of PGRFA: A Toolkit for National Strategy Development.* FAO Commission on Genetic Resources for Food and Agriculture.

Preston, J.M., Maxted, N., Sherman, R., Munro, N. and Ford-Lloyd, B.V. (2012) What's in a name: a closer look at heritage variety definition. In: Maxted, N., Dulloo, M.E., Ford-Lloyd, B.V., Frese, L., Iriondo, J.M. and Pinheiro de Carvalho, M.A.A. (eds.) *Agrobiodiversity Conservation: Securing the Diversity of Crop Wild Relatives and Landraces*. CAB International, Wallingford. Pp. 152–160.

Teeling, C., Maxted, N. and Ford-Lloyd, B.V. (2012) The challenges of modelling species distribution: a case study of wild cherry (*Prunus avium* L.) in Europe. In: Maxted, N., Dulloo, M.E., Ford-Lloyd, B.V., Frese, L., Iriondo, J.M. and Pinheiro de Carvalho, M.A.A. (eds.) *Agrobiodiversity Conservation: Securing the Diversity of Crop Wild Relatives and Landraces*. CAB International, Wallingford. Pp. 29–35.

Vincent, H., Wiersema, J., Dobbie, S., Kell, S., Fielder, H., Castenada, N. Guarino, L., Eastwood, R. and Maxted, N. (in prep.) A prioritized crop wild relative inventory to help underpin global food security.

Partner 2, DLO

Kik, C., Poulsen, G., Neuhaus, G. and Frese, L. (2012) PGR Secure: Engaging the user community. *Crop Wild Relative* 8 (in press).

Pelgrom, K., Sharma, G., Broekgaarden, C., Voorrips, R., Bas, N., Pritchard, J., Ford-Lloyd, B. and Vosman, B. (2012) Looking for resistance to phloem feeders in *Brassica oleracea*. *Crop Wild Relative* 8 (in press).

Vosman, B. (2012) A phenomics and genomics approach to the use of landraces and crop wild relatives for crop improvement. *Crop Wild Relative* 8 (in press).

Partner 3, BIOVER

Dias, S. (2012) Pieces of the puzzle—Trait Information Portal. *Crop Wild Relative* 8 (in press).

Thorman, I. (2012) Applying FIGS to crop wild relatives and landraces in Europe. *Crop Wild Relative* 8 (in press).

Partner 4, UNIPG

Barocco, R., Pacicco, L, Venanzoni, R., Veronesi, F. and Negri, V. (2011) *Strategy Development to Identify the Most Appropriate Areas for* In Situ *Conservation of Plant Genetic Resources*. Poster presented at the Associazione Genetica Italiana_Società Biologia Vegetale_Società Italiana di Genetica Agraria joint annual congress, Assisi (I) 19–22 September 2011.

Landucci, F., Panella, L., Gigante, D., Donnini, D., Venanzoni, R., Torricelli, R. and Negri, V. (2012) Floristic and vegetation databases as tools for CWR surveys: a case study from Central Italy. *Crop Wild Relative* 8.

Landucci, F., Panella, L., Gigante, D., Donnini, D., Venanzoni, R. and Negri, V. (in prep.) Italian crop wild relatives to underpin global food security: a check list.

Negri, V. and Torricelli, R. (2012) Building the Italian inventory of landraces maintained *in situ*. *Landraces* 1 (in press).

Negri, V. and Torricelli, R. (2012) Successful examples of landraces rescue in Italy: the emmer wheat of Monteleone di Spoleto. *Landraces* 1 (in press).

Negri, V., Barocco, R., Pacicco, L., Veronesi, F., Venanzoni, R. (2012) An approach towards prioritizing landrace rich areas as a priority for protection in Europe. In: Maxted, N., Dulloo, M.E., Ford-Lloyd, B.V., Frese, L., Iriondo, J.M. and Pinheiro de Carvalho, M.A.A. (eds.) *Agrobiodiversity Conservation: Securing the Diversity of Crop Wild Relatives and Landraces*. CAB International, Wallingford. Pp. 118–124.

Negri, V., Faseoula, D., Heinonen, M., Holubec, V., Musayev, M., Spataro, G., Veteläinen, M. and Vögel, R. (2012) European on-farm conservation activities: an update from six countries. In: Maxted, N., Dulloo, M.E., Ford-Lloyd, B.V., Frese, L., Iriondo, J.M. and Pinheiro de Carvalho, M.A.A. (eds.) *Agrobiodiversity Conservation: Securing the Diversity of Crop Wild Relatives and Landraces*. CAB International, Wallingford. Pp. 327–332.

Panella, L., Donnini, D., Gigante, D., Negri, V. and Venanzoni, R. (2011) *Crop Wild Relatives of* Apium*,* Avena*,* Beta*,* Brassica *and* Prunus *genera in Umbria.* Poster presented at the 106° Società Botanica Italiana Congress, Genova (I) 21–24 September 2011.

Panella, L., Gigante, D., Donnini, D., Venanzoni, R., Negri, V. (in press) Progenitori selvatici e forme coltivate di Apiaceae, Chenopodiaceae, Poaceae e Rosaceae: prime indagini per il territorio dell'Umbria (Italia Centrale) *Quaderni di Botanica Applicata*.

Torricelli, R., Tiranti, B., Spataro, G., Castellini, G., Albertini, E., Falcinelli, M. and Negri, V. (submitted) Differentiation and structure of an Italian landrace of celery (*Apium graveolens* L.): inferences for on farm conservation. *Genetic Resources and Crop Evolution*.

Torricelli, R., Silveri, D.D., Ferradini, N., Venora, G., Veronesi, F. and Russi, L. (2012) Characterization of the lentil landrace 'Santo Stefano di Sessanio' from Abruzzo, Italy. *Genetic Resources and Crop Evolution* 59, 261–276.

Partner 5, JKI

Frese, L., Bjorn, G.K., Branca, F., Ford-Lloyd, B.V., Germeier, C.U., Iriondo, J.M., Katsiotis, A., Kell, S.P., Maxted, N., Negri, V. and Pinheiro de Carvalho, M.A.A. (2012) Genetic reserve conservation of European crop wild relative and landrace diversity. In: Maxted, N., Dulloo, M.E., Ford-Lloyd, B.V., Frese, L., Iriondo, J.M. and Pinheiro de Carvalho, M.A.A. (eds.) *Agrobiodiversity Conservation. Securing the Diversity of Crop Wild Relatives and Landraces*. CAB International, Wallingford. Pp. 1–6.

Germeier, C.U., Iriondo, J.M., Frese, L., Höhne, C. and Kell, S.P. (2012) Population level information management for crop wild relatives. In: Maxted, N., Dulloo, M.E., Ford-Lloyd, B.V., Frese, L., Iriondo, J.M. and Pinheiro de Carvalho, M.A.A. (eds.) *Agrobiodiversity Conservation. Securing the Diversity of Crop Wild Relatives and Landraces*. CAB International, Wallingford. Pp. 256–263.

Partner 7, MTT

Heinonen, M. and Veteläinen, M. (2011) Cereal landrace farmers in Finland and their motivation to on-farm conservation. *NJF Report vol. 7 no. 1/2011*. Pp. 51–55.

Veteläinen, M., Negri, V., Maxted, N. (2012) A second look at the European strategic approach to conserving crop landraces. In: Maxted, N., Dulloo, M.E., Ford-Lloyd, B.V., Frese, L., Iriondo, J.M. and Pinheiro de Carvalho, M.A.A. (eds). *Agrobiodiversity Conservation: Securing the Diversity of Crop Wild Relatives and Landraces*. CAB International, Wallingford, UK. Pp. 181–185.

Partner 8, URJC

Draper, D., Rubio, M.L., Martín, C., Martínez-Laborde, J., González-Benito, M.E., Iriondo, J.M. and de la Cruz Rot, M. (2011) *Optimización de la Conservación Ex Situ de los Recursos Fitogenéticos de Origen Silvestre en España: Sectorización Ambiental y su Validación*. V Congreso de la Sociedad de Biología de la Conservación de Plantas. Es Mercadal, Menorca, 28 septiembre–1 octubre 2011 (congress poster presentation).

Iriondo, J.M., Maxted, N., Kell, S.P., Ford-Lloyd, B.V., Lara-Romero, C., Labokas, J. and Magos Brehm, J. (2012) Quality standards for genetic reserve conservation of crop wild relatives. In: Maxted, N., Dulloo, M.E., Ford-Lloyd, B.V., Frese, L., Iriondo, J.M. and Pinheiro de Carvalho, M.A.A. (eds.) *Agrobiodiversity Conservation. Securing the Diversity of Crop Wild Relatives and Landraces*. CAB International, Wallingford. Pp. 72–77.

Iriondo, J., Parra-Quijano, M., Lara-Romero, C., Carreño, F., Maxted, N., Kell, S. and Ford-Lloyd, B.V. (2012) Where and how? Genetic reserve site selection and development of common quality standards. *Crop Wild Relative* 8 (in press).

Parra-Quijano, M., Iriondo, J.M., De la Cruz, M. and Torres, E. (2011) Strategies for the development of core collections based on ecogeographical data. *Crop Science* 51, 656–666.

Parra-Quijano, M., Iriondo, J.M., Torres, E. and De la Rosa, L. (2011) Evaluation and validation of ecogeographical core collections using phenotypic data. *Crop Science* 51, 694–703.

Parra-Quijano, M., Torres, E. and Iriondo, J.M. (2011) *Colección Optimizada de Recursos Fitogenéticos*. VII Simposio Internacional de Recursos Genéticos para América Latina y el Caribe. Quito, 21– 23 Noviembre 2011 (congress oral communication).

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3. Deliverables and milestones tables

Deliverables (excluding the periodic and final reports)

Del. no.	Deliverable name	Version	WP no.	Lead beneficiary	Nature	Dissemination level	Delivery date from Annex I (proj month)	Actual / Forecast delivery date	Status	Comments
1	High throughput phenotypi ng	0.0	1	STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK	Report	RE	24	28/02/2013	Not submitted	
2	Metabolomics	0.0	1	STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK	Report	RE	30	31/08/2013	Not submitted	
3	Next generation sequencin g	0.0	1	ServiceXS BV	Report	RE	36	28/02/2014	Not submitted	
4	Transcriptomics	0.0	1	THE UNIVERSITY OF BIRMINGHAM	Other	RE	36	28/02/2014	Not submitted	
5	Identification of candida te genes	0.0	1	STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK	Report	RE	42	31/08/2014	Not submitted	
1	Case study database	0.0	2	INTERNATIONAL PLANT GENETIC RESOURCES INSTITUTE*IPGRI	Other	PU	6	31/08/2011	Not submitted	
2	FIGS usage Guidelines	0.0	2	INTERNATIONAL PLANT GENETIC RESOURCES INSTITUTE*IPGRI	Report	PU	12	29/02/2012	Not submitted	
3	TIP conceptualization fra mework	1.0	2	INTERNATIONAL PLANT GENETIC RESOURCES INSTITUTE*IPGRI	Report	PU	12	22/03/2012	Submitted	

4	TIP developed and tested	0.0	2	INTERNATIONAL PLANT GENETIC RESOURCES INSTITUTE*IPGRI	Prototype	RE	24	28/02/2013	Not submitted	
5	TIP on-line publication	0.0	2	INTERNATIONAL PLANT GENETIC RESOURCES INSTITUTE*IPGRI	Other	PU	34	31/12/2013	Not submitted	
1	European crops and CWR in ventory	0.0	3	MAA JA ELINTARVIKETALOUDEN TUTKIMUSKESKUS	Report	PU	16	30/06/2012	Not submitted	
2	Exemplar national CWR con servation strategies	0.0	3	THE UNIVERSITY OF BIRMINGHAM	Report	PU	30	31/08/2013	Not submitted	
3	European priority gene po ol CWR conservation strat egy	0.0	3	THE UNIVERSITY OF BIRMINGHAM	Report	PU	35	31/01/2014	Not submitted	
4	European generic CWR cons ervation strategy	0.0	3	THE UNIVERSITY OF BIRMINGHAM	Report	PU	35	31/01/2014	Not submitted	
1	Finnish LR conservation s trategy	0.0	4	MAA JA ELINTARVIKETALOUDEN TUTKIMUSKESKUS	Report	PU	38	30/04/2014	Not submitted	
2	Italian LR conservation s trategy	0.0	4	UNIVERSITA DEGLI STUDI DI PERUGIA	Report	PU	38	30/04/2014	Not submitted	
3	UK LR conservation strate gy	0.0	4	THE UNIVERSITY OF BIRMINGHAM	Report	PU	38	30/04/2014	Not submitted	
4	LR Strategy for case stud ies	0.0	4	UNIVERSITA DEGLI STUDI DI PERUGIA	Report	PU	40	30/06/2014	Not submitted	
5	Generic LR conservation S trategy	0.0	4	UNIVERSITA DEGLI STUDI DI PERUGIA	Report	PU	40	30/06/2014	Not submitted	

1	Report on identification and discussions with stak eholders	0.0	5	STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK	Report	PU	12	29/02/2012	Not submitted	
2	Transfer of material and knowledge to breeders	0.0	5	STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK	Other	RE	18	31/08/2012	Not submitted	
3	List of interesting Avena /Beta accessions	0.0	5	STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK	Report	RE	19	30/09/2012	Not submitted	
4	Preliminary SWOT analysis	0.0	5	STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK	Report	PU	21	30/11/2012	Not submitted	
5	Publication on trends CWR /LR use in breeding in Eu rope	0.0	5	STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK	Report	PU	36	28/02/2014	Not submitted	
6	Web based map of stakehol ders	0.0	5	STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK	Prototype	PU	39	31/05/2014	Not submitted	
7	New partnerships list	0.0	5	STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK	Report	RE	40	30/06/2014	Not submitted	
8	Transfer of pest marker i nformation to breeders	0.0	5	STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK	Other	PU	41	31/07/2014	Not submitted	
1	Project website	1.0	6	INTERNATIONAL PLANT GENETIC RESOURCES INSTITUTE*IPGRI	Other	PU	6	28/09/2011	Submitted	
2	CWR and LR conservation w orkshop reports	1.0	6	THE UNIVERSITY OF BIRMINGHAM	Report	PU	6	29/02/2012	Submitted	

3	Project newsletters	0.0	6	THE UNIVERSITY OF BIRMINGHAM	Other	PU	39	31/05/2014	Not submitted	
4	First user stakeholder me eting	0.0	6	STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK	Report	PU	24	28/02/2013	Not submitted	
5	TIP potential user list	0.0	6	INTERNATIONAL PLANT GENETIC RESOURCES INSTITUTE*IPGRI	Report	PU	24	28/02/2013	Not submitted	
6	Web-enabled CWR and LR in ventories	0.0	6	INTERNATIONAL PLANT GENETIC RESOURCES INSTITUTE*IPGRI	Other	PU	34	31/12/2013	Not submitted	
7	Second user stakeholder m eeting	0.0	6	STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK	Report	PU	35	31/01/2014	Not submitted	
8	Dissemination conference proceedings	0.0	6	INTERNATIONAL PLANT GENETIC RESOURCES INSTITUTE*IPGRI	Other	PU	36	28/02/2014	Not submitted	
1	First periodic report	0.0	7	THE UNIVERSITY OF BIRMINGHAM	Report	PU	12	29/02/2012	Not submitted	
2	Second periodic report	0.0	7	THE UNIVERSITY OF BIRMINGHAM	Report	PU	30	31/08/2013	Not submitted	
3	Final Report	0.0	7	THE UNIVERSITY OF BIRMINGHAM	Report	PU	42	31/08/2014	Not submitted	

Milestones

Milestone no.	Milestone name	Work package no	Lead beneficiary	Delivery date from Annex I	Achieved Yes/No	Actual / Forecast achievement date	Comments
1	Phenotyping protocol	1	2	30/11/2011	Yes	01/06/2011	Phenotyping protocol established and available by contacting lead beneficiary
2	Accessions for phenotyping selected	1	2	30/11/2011	Yes	01/05/2011	Set of accessions selected for phenotyping and list of accessions available by contacting lead beneficiary
6	Datasets on sap-feeding insect resistance traits	2	3	30/06/2011	Yes	31/01/2012	Datasets containing information on biotic and abiotic resistance traits in Avena, Beta, Brassica and Medicago available in partner intranet
7	Distribution maps of Brassica and Medicago CWR and LR produced	2	3	30/06/2011	Yes	29/02/2012	Distribution maps of Avena, Beta, Brassica and Medicago CWR and LR produced and available in partner intranet
8	European map of ecogeographic regions produced	2	3	30/06/2011	Yes	31/03/2012	Ecogeographic Land Characterization (ELC) maps for Avena, Beta, Brassica and Medicago produced and available in partner intranet
9	Environment profiles of the habitats of CWR and LR likely to contain target insect resistance produced	2	3	30/07/2011	No	30/08/2012	
10	Trait Information Portal conceptualization ontology	2	3	29/02/2012	No	31/10/2012	
16	CWR NFPs nominated	3	1	31/03/2011	Yes	30/06/2011	36 CWR NFPs and 21 In Situ NFPs nominated from 38 countries; list of

							nominees available in CWR and LR conservation workshop report and/or by contacting the lead beneficiary
17	Draft national CWR checklists sent to CWR NFPs	3	1	30/04/2011	Yes	07/09/2011	Draft national CWR checklists generated from PGR Forum European CWR Catalogue made available to NFPs at the CWR and LR conservation training workshop; national checklists available in online helpdesk and/or by contacting the lead beneficiary
18	Outline of implementation plan agreed by CWR NFPs	3	1	31/07/2011	Yes	08/09/2011	Outline of implementation plan for revision of national CWR checklists and generation of national CWR conservation strategies debated and agreed by NFPs at the CWR and LR conservation training workshop; implementation plan available in the CWR and LR conservation training workshop report
19	Helpdesk facility established	3	1	31/07/2011	Yes	08/09/2011	NFPs informed of the availability of the helpdesk during the CWR and LR conservation training workshop; helpdesk facility available online and/or by contacting the lead beneficiary (for CWR) and partner 4 (for LR)
28	LR NFPs nominated	4	4	30/06/2011	Yes	30/06/2011	34 LR NFPs and 30

							On-Farm NFPs nominated from 38 countries; list of nominees available in CWR and LR conservation workshop report and/or by contacting the lead beneficiary
29	Outline of agreed implementation plan for national LR inventories by NFPs	4	4	31/08/2011	Yes	08/09/2011	Outline of implementation plan for national LR inventories debated and agreed by NFPs at the CWR and LR conservation training workshop; implementation plan available in the CWR and LR conservation training workshop report
30	LR conservation workshop	4	4	31/10/2011	Yes	09/09/2011	Workshop held and attended by 31 LR NFPs and 20 On-Farm NFPs; workshop report published in website
39	Country key-persons identified	5	2	31/05/2011	Yes	31/05/2011	Key persons identified and list available (see Appendix 1, Section 2 of the 1st periodic report)
40	Identification of stakeholders	5	2	31/08/2011	Yes	29/02/2012	Stakeholders identified and lists per region available (see Tables 3, 4 and 5 of Section 2 of the 1st periodic report)
47	CWR and LR conservation workshops	6	1	30/06/2011	Yes	09/09/2011	Workshop held and attended by NFPs from 38 European countries; workshop report published in website
54	Consortium Agreement	7	1	31/05/2011	Yes	28/11/2011	Consortium Agreement signed by beneficiaries; CA available in partner intranet, including attachment 5 updated in

							line with changes to the Consortium Committee
55	Kick-off consortium meeting	7	1	31/03/2011	Yes	07/06/2011	Kick-off meeting held 15-16/03/2011; meeting report available 07/06/2011; report available in partner intranet
56	1st annual consortium meeting	7	1	31/12/2011	Yes	15/12/2012	1st annual consortium meeting held 14-15/12/2011; report pending

4. Explanation of the use of the resources

THE UNIVERSITY OF BIRMINGHAM

Work Package	Item description	Amount	Explanations
1,2,3,6,7	Personnel	50199.03	Salaries of Project Coordinator (PC) (WP3: 0.31 PM, WP6: 0.36 PM, WP7: 0.77 PM), two Principle Investigators (PIs) (WP1: 1.04 PM), one Project Manager (PM)/researcher (WP2: 0.25 PM, WP3: 0.93 PM, WP6: 6.22 PM, WP7: 4.20 PM), two junior researchers (JRs) (WP1: 9.98 PM, WP3: 7.86 PM), and one research assistant (RA) (WP1: 0.58 PM, WP6: 1.17 PM).
1,3,6,7	Travel	51557.99	Travel and subsistence costs of 35 participants at the CWR and LR conservation training workshop, Palanga, Lithuania, 7#9 September 2011 (includes CWR NFPs, workshop organizers/facilitators and one member of the External Advisory Board (EAB)) (WP6). Attendance of PC, two PIs, one PM/researcher and one JR at kick-off meeting, Lyme Regis, UK, 15–16 March 2011 (WP7). Attendance of PC, one PI, one PM/researcher, one JR and three members of the EAB at first annual consortium meeting, Perugia, Italy, 14–15 December 2011 (WP7). Attendance of PM at first Breeders' Committee meeting, Bonn, Germany, 8 November 2011 (WP7). Attendance of PM/researcher at EIGS workshop 2, Madrid, Spain, 9–12 January 2012 (WP7). Attendance of PM/researcher at WP3 meeting, Prague, Czech Republic, 22-25 January 2012 (WP3). Attendance of one volunteer researcher at WP3 meeting and to collect data, Prague, Czech Republic, 22 January to 16 February 2012 (WP3). Meetings, fieldwork and training related to the development of the UK CWR conservation strategy: PC, one JR and staff member of Natural England, The Lizard, Cornwall, 29 June to 02 July 2011, University of Birmingham, 23 August 2011 and JNCC, Peterborough, 19 December 2011; one JR and staff member of Natural England, The Lizard, Cornwall, 16-20 October 2011; one JR, Marxan GIS training course, University of Kent, 05-06 July 2011 (WP3).
1,3,6,7	Consumables	7550.78	106 memory sticks for participants at the CWR and LR training workshop (WP6); 1 QIAGEN RNeasy Plant Mini Kit (WP1); research texts (WPs 1 and 3); website domain registration, stationary, computer consumables, FedEx services and telephone charges (use of personal telephones only) (WPs 1,3,6 and 7).
7	Equipment	842.62	2 PCs and 1 portable computer (depreciation for the period).
	Total:	110150.42	

STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK

Work Package	Item description	Amount	Explanations
1,2,5,7	Personnel	108465.12	WP1: 13.49 PM technician, 0.36 PM researcher, 0.64 PM senior researcher, 2.05 PM greenhouse personnel; WP2: 0.57 PM technician, 0.08 PM junior researcher; WP5: 3.00 PM researcher; WP7: 0.29 PM senior researcher, 0.36 PM researcher.
5	Subcontracting	7800.00	Country key persons (Greece and Spain).
1,2,5,7	Travel	12284.60	Attendance of four staff at kick-off meeting and five staff at the first annual consortium meeting (WP7); travel of researcher to meetings with key persons in Greece, Italy and Spain (WP5); other travel costs (WPs 1 and 2).

1,2,5,7	Consumables	985.72	Postage costs; lab consumables.
1	Other direct costs	5608.03	Greenhouse facilities.
	Total:	135143.47	

INTERNATIONAL PLANT GENETIC RESOURCES INSTITUTE*IPGRI

Work Package	Item description	Amount	Explanations
2,6,7	Personnel	117333.00	One senior scientist and two scientists for a total of 17.00 PM.
2	Subcontracting	9246.00	Two interns and two consultants hired for data collecting, data quality checking, georeferencing, and for organizing and facilitating the FIGS workshops.
2,6,7	Travel	14855.00	Attendance of two staff at kick-off meeting and first annual consortium meeting (WP7); attendance of four staff at the CWR and LR conservation training workshop (WP6); attendance of three staff at FIGS planning meeting and two staff at FIGS workshop 2 (WP2).
2	Consumables	596.00	Costs related to the organization of the FIGS workshop hosted by Bioversity in Rome, December 2011.
	Total:	142030.00	

UNIVERSITA DEGLI STUDI DI PERUGIA

Work Package	Item description	Amount	Explanations
3,4,6,7	Personnel	42924.94	WP3: 1.00 PM hired staff, 0.29 PM permanent staff; WP4: 1.00 PM hired staff, 2.03 PM permanent staff; WP6: 2.80 PM permanent staff; WP7: 1.01 PM permanent staff.
6,7	Travel	33471.57	Travel and subsistence expenses for CWR and LR conservation training workshop participants (UNIPG staff and national delegates) (WP6), and kick-off meeting (UNIPG staff) (WP7); subsistence expenses for first annual consortium meeting (hosted by UNIPG) (WP7).
6	Consumables	25.00	Poster printing for Società Italiana Genetica Agraria Congress meeting.
	Total:	76421.51	

JULIUS KUHN INSTITUT BUNDESFORSCHUNGSINSTITUT FUR KULTURPFLANZEN

Work Package	Item description	Amount	Explanations
5,6,7	Personnel	57735.83	Salary of a researcher (temporary, 12.00 PM) for planning and implementation of work related to M39, M40 and D5.1. Senior scientists (permanent, 1.5 PM) for planning, support and supervision of work related to M39,

			M40 and D5.1. Participation of a senior scientist (permanent, 0.3 PM) in the CWR and LR conservation training workshop (WP6). Participation of a senior scientist (permanent, 0.4 PM) in the first annual consortium meeting and contributions to project reports (WP7). NB: Personnel costs for WP7 (Management) were not foreseen before the start of the project.
5,7	Travel	8148.86	One person: trips to Poland, Czech Republic, Romania, Slovenia, Austria, Bulgaria, Spain (stakeholder interviews, WP5) and the UK (kick-off meeting, WP7); two persons: first annual consortium meeting (WP7); three persons: Breeders' Committee meeting (WP5) (costs include those of the Italian member of the Breeders' Committee).
	Total:	65884.69	

NORDISKT GENRESURSCENTER

Work Package	Item description	Amount	Explanations
5,6,7	Personnel	26203.49	Three senior scientists (3.33 PM) and one curator (0.26 PM). NB: It was planned for country key persons to be paid using funds allocated for subcontracting; however, three country key persons were internal NordGen staff. Therefore, funds have been vired from 'subcontracting' to 'personnel'. Also, personnel costs for WP7 (Management) were not foreseen before the start of the project.
5,6,7	Travel	4640.25	Stakeholder interviews in Sweden and Norway (two persons), and in Denmark, Latvia and Estonia (one person) (WP5). Attendance of senior scientist at the CWR and LR conservation training workshop (WP6), kick-off meeting and first annual consrotium meeting (WP7). NB: Travel costs for WP6 were not foreseen before the start of the project.
7	Other direct costs	170.53	Documents sent by DHL-freight.
	Total:	31014.27	

MAA JA ELINTARVIKETALOUDEN TUTKIMUSKESKUS

Work Package	Item description	Amount	Explanations
3,4,6,7	Personnel	13089.99	Salaries of one senior researcher and one researcher (2.13 PM).
3,6	Subcontracting	10393.25	Subcontracting of researcher to undertake work on the development of the CWR conservation strategy for Finland (3 PM). Includes travel and subsistence costs for attendance of researcher at kick-off meeting, CWR and LR conservation training workshop and project meeting in Finland.
3,4,6,7	Travel	6875.47	Attendance of two senior researchers and one researcher at kick-off and first annual consortium meetings (WPs 3,4 and 7). Attendance of one senior researcher and one research at the CWR and LR conservation training workshop (WP6). Travel of researcher in Finland related to WP4.
	Total:	30358.71	

UNIVERSIDAD REY JUAN CARLOS

Work Package	Item description	Amount	Explanations
2,3,6,7	Personnel	33723.47	Salaries of one senior researcher and one junior researcher. NB: Personnel costs for WP6 (participation in the CWR and LR conservation training workshop) were not originally foreseen in the project.
2,6,7	Travel	5392.59	Attendance of one person at the kick-off meeting and two persons at the first annual consortium meeting (WP7); attendance of two people at the CWR and LR conservation training workshop (WP6); attendance of one person at the Focused Identification of Germplasm Strategy (FIGS) workshop 1 (WP2). NB: Concerning WP6, participation in the CWR and LR conservation training workshop was not foreseen before the start of the project. Concerning WP2, the travel costs of one researcher to the FIGS workshop were not foreseen before the start of the project.
	Total:	39116.06	

ServiceXS BV

Work Package	Item description	Amount	Explanations
7	Personnel	4378.00	Salary of senior researcher (0.76 PM).
7	Travel	1132.00	Attendance of senior researcher at kick-off meeting and first annual consortium meeting. NB: Travel costs were not originally included in the budget so have been vired from the 'other' cost heading.
	Total:	5510.00	

THE UNIVERSITY OF NOTTINGHAM

Work Package	Item description	Amount	Explanations
7	Personnel	1061.00	Salary of senior researcher (0.13 PM).
7	Travel	565.28	Attendance of senior researcher at the kick-off meeting. NB: Travel costs were not originally included in the budget so have been vired from the consumables cost heading.
	Total:	1626.28	

FP7 - Grant Agreement - Annex VI - Collaborative project

Summary Financial Report - Collaborative project

Project acronym	PGR Secure	Project nr.	266394	Reporting period from	01/03/2011	to	29/02/2012	Page	1/1

Funding scheme	CP

Beneficiary nr.	If 3rd Party, linked to beneficiary	Adjustment (Yes/No)	Organization Short Name	Type of activity								Total (A)+(B)+(C)+(D)		Receipts	Interest
				RTD (A)		Demonstration (B)		Management (C)		Other (D)					
				Total	Max EU Contribution	Total	Max EU Contribution	Total	Max EU Contribution	Total	Max EU Contribution	Total	Max EU Contribution		
1		No	UOB	70,302.22	52,726.67	0.00	0.00	32,074.27	32,074.27	73,864.18	73,864.18	176,240.67	158,665.12	0.00	0.00
2		No	DLO	182,176.75	136,632.56	0.00	0.00	8,283.94	8,283.94	0.00	0.00	190,460.69	144,916.50	0.00	0.00
3		No	BIOVER	150,620.40	112,965.30	0.00	0.00	8,004.00	8,004.00	9,962.40	9,962.40	168,586.80	130,931.70	0.00	0.00
4		No	UNIPG	24,894.37	18,670.78	0.00	0.00	13,712.86	13,712.86	83,667.18	83,667.18	122,274.41	116,050.82	0.00	0.00
5		No	JKI	97,544.06	73,158.05	0.00	0.00	4,199.04	4,199.04	3,672.40	3,672.40	105,415.50	81,029.49	0.00	0.00
6		No	NORDGEN	35,900.26	26,925.20	0.00	0.00	10,416.64	10,416.64	3,305.94	3,305.94	49,622.84	40,647.78	0.00	0.00
7		No	MTT	23,789.61	17,842.21	0.00	0.00	8,529.38	8,529.38	9,368.72	9,368.72	41,687.71	35,740.31	0.00	0.00
8		No	URJC	45,762.48	34,321.86	0.00	0.00	10,232.56	10,232.56	6,590.66	6,590.66	62,585.70	51,145.08	0.00	0.00
9		No	SXS	0.00	0.00	0.00	0.00	8,816.00	8,816.00	0.00	0.00	8,816.00	8,816.00	0.00	0.00
10		No	UNOT	0.00	0.00	0.00	0.00	2,602.05	2,602.05	0.00	0.00	2,602.05	2,602.05	0.00	0.00
TOTAL				630,990.15	473,242.63	0.00	0.00	106,870.74	106,870.74	190,431.48	190,431.48	928,292.37	770,544.85	0.00	0.00

Requested EU contribution for the reporting period (in €)	770,544.85

Attachments	PGR_Secure_266394_Periodic_Report_1_Section_2.pdf, PGR_Secure_266394_Periodic_Report_1_Section_1.pdf
Grant Agreement number:	266394
Project acronym:	PGR Secure
Project title:	Novel characterization of crop wild relative and landrace resources as a basis for improved crop breeding
Funding Scheme:	FP7-CP-FP
Project starting date:	01/03/2011
Project end date:	
Name of the scientific representative of the project's coordinator and organisation:	Dr. Nigel Maxted THE UNIVERSITY OF BIRMINGHAM
Period covered - start date:	01/03/2011
Period covered - end date:	29/02/2012
Name	
Date	04/05/2012

This declaration was visaed electronically by Shelagh KELL (ECAS user name nkellksh) on 04/05/2012