	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 01/03/2012 **to** 31/08/2013

Date of preparation: 30/08/2013

Start date of project: 01/03/2011

Date of submission (SESAM): 30/10/2013

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
Funding Scheme:	FP7-CP-FP
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Period covered - start date:	01/03/2012
Period covered - end date:	31/08/2013
Name of the scientific representative of the project's coordinator and organisation:	Dr. Nigel Maxted THE UNIVERSITY OF BIRMINGHAM
Tel:	+441214145571
Fax:	+441214145925
E-mail:	N.Maxted@bham.ac.uk
Project website address:	http://www.pgrsecure.org

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	30/10/2013

This declaration was visaed electronically byShelagh KELL(ECAS user name nkellksh) on 30/10/2013

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 genetic variation 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 variation, 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, for example 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; and c) ensuring that conserved diversity is made available to users in a manner that facilitates their ease of use.

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 their 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 active *in situ* and *ex situ* CWR and LR conservation; 3) understanding the needs of the user communities and current constraints in the use of CWR and LR in crop improvement programmes; 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.

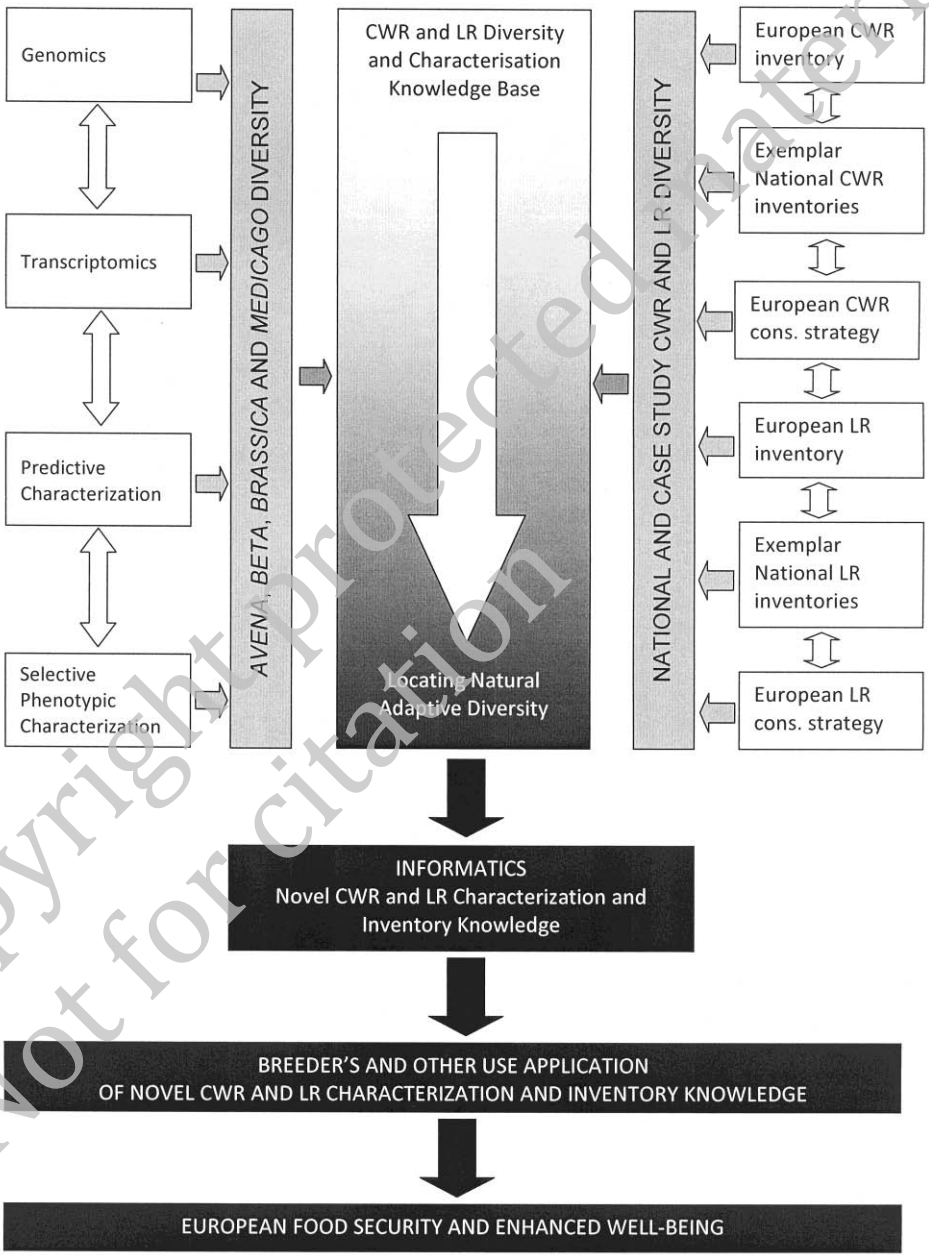

Figure 1. Schematic diagram of interrelated project themes

1.2 Description of work performed and main results

Theme 1: novel characterization techniques

The application of a novel high throughput method for phenotyping genebank accessions of *Brassica* spp. has led to the identification of resistance to the cabbage aphid and the cabbage whitefly in LR and CWR accessions of several different species and some novel sources of whitefly resistance that are interesting for breeding have been identified. Results of metabolomics experiments indicate that the difference between resistant and susceptible genotypes is most likely not due to metabolites. Quantitative trait loci (QTL) mapping has been carried out to identify chromosomal regions involved in whitefly resistance and QTLs for oviposition have been identified. Transcriptional profiling has begun on a subset of material resistant and susceptible to cabbage aphid and whitefly and will provide indications of candidate genes for resistance. Next generation sequencing has been initiated with tests carried out to compare two labelling methods, both yielding good material for sequencing. The least complex and most cost-effective 'Illumina' method was selected to sequence the remaining samples.

Using the predictive characterization method 'Focussed Identification of Germplasm Strategy' (FIGS), environmental profiles of the habitats of CWR and LR that are likely to favour selection for specific abiotic resistance traits have been described and specific variables have been identified as the most appropriate to describe environmental conditions that might favour development of the resistance traits. Data analyses have resulted in the identification of 'best bet' subsets of potentially interesting accessions or occurrences for *Avena*, *Beta* and *Brassica* CWR and LR. The first draft of guidelines for the broader application of FIGS has been prepared.

Theme 2: CWR and LR conservation

CWR conservation strategies are close to completion for the four project case study countries Finland, Italy, Spain and the UK and significant progress has also been made in Albania, Bulgaria, the Czech Republic, Cyprus, Norway and Sweden. LR conservation strategies are under development for the three project case study countries Finland, Italy and the UK. A review of progress in national CWR and LR conservation in each European country is available via the online Helpdesk (www.pgrsecure.org/helpdesk). An integrated European CWR conservation strategy plan has been developed which combines national CWR conservation strategies and a regional CWR conservation strategy for priority taxa at European level. A draft list of priority CWR species native to Europe in more than 30 priority crop gene pools has been produced and data collation in preparation for diversity and gap analyses initiated. The online conservation Helpdesk has been developed and improved with the addition of new resources and regular communication has been maintained with National PGR Programmes. Data standards and a tool for recording LR data have been developed and are available via the Helpdesk.

Theme 3: improved use of CWR and LR by breeders

An online questionnaire was launched to gather information for the completion of a SWOT[1] analysis of European PGR conservation and use community needs to promote CWR and LR use and to generate a web-based map of stakeholders. The web-application PGR-COMNET[2] (www.pgrsecure.org/pgr-comnet) has been developed and currently visualizes c. 400 stakeholders on a map. The application will facilitate stakeholders to establish contacts which in turn will promote

[1] Strengths, Opportunities, Weaknesses and Threats
[2] PGR Stakeholder Community Network

the use of CWR and LR through improved cooperation. Detailed country/regional reports based on semi-structured interviews with PGR stakeholders in Europe have been prepared and combined with the results of the questionnaire form the basis of an input paper for a stakeholder workshop which will take place in November 2013 (www.nordgen.org/index.php/en/content/view/full/2481/).

Online databases have been screened for interesting accessions of *Avena* and *Beta* spp. for breeding/breeding research programmes and results circulated to private breeders and public researchers. At least one *Beta* researcher has ordered accessions from genebanks for further evaluation and another researcher has started to develop new project ideas.

Theme 4: informatics

The ontology and infrastructure of the web-based information system 'Plant Genetic Resources Diversity Gateway for the conservation and use of crop wild relative and landrace traits' (PGR Diversity Gateway) has been further developed and the system has been populated with passport, characterization and evaluation data from other information systems. Initial testing has been carried out and the beta version of the system will be launched at the stakeholder workshop in November 2013 where it will be available for testing by the workshop participants. Standards for the collation of conservation and trait data have been developed and are currently being tested and refined.

1.3 Expected final results and potential impacts

The expected final results of the project are: a) enhanced techniques to identify useful adaptive traits to support 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 these resources 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 conserved CWR and LR resources in plant breeding programmes; b) increased capacity and options for crop improvement to support European farming and back-stop food security; c) systematic national level action on conservation of European CWR and LR resources; and d) 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) genebank and protected area managers, 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; f) the European Commission; and ultimately g) the European farm product consumer. However, it is the improved 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 existing ECPGR[3] *In Situ* and On-farm Conservation Network (www.ecpgr.cgiar.org/networks/in_situ_and_on_farm.html) from 39 European countries who will be actively involved in planning, promoting and implementing national CWR and LR conservation strategies post-PGR Secure. 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 PGRFA[4] conservation and policy, as well as a Breeders' Committee comprising plant breeders and pre-breeders of major European food crops.

[3] European Cooperative Programme for Plant Genetic Resources
[4] Plant genetic resources for food and agriculture

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Section 2: Project objectives, work progress and achievements, and project management

Contents

2.1 Project objectives for the period

2.1.1 Work package 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 assessment of the gene content of CWR/LR using next generation sequencing.
- Preparation for the transcriptomics work.

Specific objectives for the period[1]

- Select plant material for metabolomics and transcriptomics (MS3)
- Select plant material for crosses (MS4)
- Select plant material for sequencing (MS5)
- Produce high throughput phenotyping data of *Brassica* accessions (D1.1)
- Generate GC–MS or LC–MS data on 125 accessions of *Brassica* species (D1.2)

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.

[1] Specific WP objectives are based on the deliverables and milestones due to be delivered/achieved in the period.

Specific objectives for the period

- Produce a European map of ecogeographic regions (MS8)
- Produce environment profiles of the habitats of CWR and LR likely to contain target resistances (MS9)
- Prepare relevant datasets for CWR and LR to feed into the production of guidelines for the broader use of FIGS (MS15)
- Publish a list of *in situ* populations / *ex situ* accessions of *Brassica* and *Medicago* CWR and LR for novel characterization of biotic/abiotic stress resistance/tolerance traits (D2.1)
- Publish guidelines for the broader use of FIGS for trait identification (D2.2)
- Publish a report detailing the TIP conceptualization ontology (MS 10)
- Establish active links with other information systems (MS11)
- Make available characterization data from other relevant information systems to the TIP (MS12)
- Develop and test the Trait Information Portal (TIP) prototype system (D2.4)
- Populate the TIP with inventory, phenomics, genomics and transcriptomics data (MS13)
- Provide access to the beta version of the TIP to breeders for testing (MS14)

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.
- Develop a European priority gene pool CWR conservation strategy that reviews European CWR wealth and conservation status, prioritizes *in situ* and *ex situ* conservation actions, and links to breeder-based exploitation of CWR diversity.
- Formulate a strategic and systematic European CWR conservation strategy that establishes conservation priorities and makes links to breeders' demands.

Specific objectives for the period

- Publish a European crops and CWR inventory (D3.1)
- Publish exemplar national CWR conservation strategies for Finland, Italy and Spain (D3.2)
- Publish a prioritized checklist of European crops and CWR (MS20)
- Produce the Italian CWR conservation strategy interim report (MS23)
- Produce the Spanish CWR conservation strategy interim report (MS24)

WP4: LR conservation

General objective for the period

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

Specific objectives for the period

- Publish a list of agreed descriptors for recording *in situ* extant LR data (D4.6)
- Publish an MS Access database to facilitate the compilation of *in situ* national inventories of extant LR (D4.7)

WP5: Engaging the user community

General objectives for the period

- Identify, visualize and discuss with the European CWR / LR diversity stakeholders concerned (breeders, governments, public research institutes, gene banks and NGOs) in Europe the present needs concerning CWR and LR use.
- Carry out SWOT analyses of the European PGR and use community needs in Europe resulting in clear action points to secure PGR conservation and use networks and to promote the use of CWR and LR.
- Create opportunities to develop new partnerships between the various CWR / LR diversity stakeholders in Europe.
- Facilitate and initiate the flow of material and knowledge from the project to commercial breeding programmes.

Specific objectives for the period

- Send questionnaires (MS41)
- Collate questionnaire responses (MS42)
- Produce a web-based map of PGR stakeholders (MS43)
- Transfer information on selected insect resistant *Brassica* material (from WP1) and at which genebanks this material can be acquired to *Brassica* breeding companies (D5.2)
- Send a list of interesting *Avena* and *Beta* accessions and information at which genebanks this material can be acquired to breeding companies (D5.3)
- Produce a draft report on PGR use constraints in the EU to be used as an input for the 2013 stakeholder workshop (D5.4)

WP6: Dissemination and training

General objectives for the period

- 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.

- 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.

- Attract additional funds in order to sponsor a wide audience to attend the final dissemination conference that will show case PGR Secure project results at the end of the project.

Specific objectives for the period

- Identify TIP potential users and contacts (MS49)

- Publish a list of TIP potential users (D 6.4)

- Produce one issue each of the newsletters, *Crop wild relative* and *Landraces* (D6.3)

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

- Produce the report of the second annual consortium and mid-term review meeting (MS57 and MS58)

- Publish the second periodic report (D7.2)

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; 1.3: Next generation sequencing; 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; 3.3: European priority gene pool CWR conservation strategy; 3.4: European generic CWR conservation strategy

- **WP4: LR conservation** – 4.1: LR inventory; 4.2: Exemplar national LR conservation strategies

- **WP5: Engaging the user community** – 5.1: Identification of and discussions with European stakeholders in the PGR conservation and use community; 5.2: SWOT analysis of European PGR conservation and use community needs to promote CWR and LR use; 5.3: Create opportunities to develop new partnerships between CWR and LR conservationists and breeders in Europe; 5.4: Prebreeding – channelling potential interesting germplasm into breeding programmes

- **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; 6.6: Dissemination conference

- **WP7: Management** – 7.1: Project Management; 7.2: Communication management

2.2 Work package reports: progress during the period

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

Task 1.1: High throughput phenotyping. Task Leader: DLO. Partners involved: UoB, DLO

In the 2011 field experiment we identified accessions showing resistance towards the cabbage whitefly and cabbage aphid (Pelgrom *et al*., 2012). For whitefly, several accessions of *B. oleracea* var. *capitata* were found to be resistant as well as some CWR. For the cabbage aphid, resistance was only found among some CWR in the Wageningen (Partner 2, DLO) field trial. In the Birmingham (Partner 1, UoB) field trial some landraces also showed some degree of resistance.

To confirm the putative whitefly resistant sources, DLO carried out several no-choice greenhouse experiments on 32 selected *Brassica* accessions. Five female whiteflies were place on the underside of the leaf and were scored one week after infestation, including the resistant control 'Riviera' and a susceptible control 'Christmas Drumhead'. The controls are the parents of a segregating population that DLO brought into the project. The resistance present in 'Riviera' is only effective when plants are at least twelve weeks old; six week old plants are susceptible. The new accessions were tested at plant ages of six and twelve weeks to identify material that is resistant also at a young plant age. Results showed that some CWR are a good source of resistance to cabbage whitefly at six weeks, whereas all tested *B. oleracea* var. *capitata* accessions showed no resistance at all at six weeks. The wild relatives that were resistant at six weeks were still resistant at twelve weeks. Among *B. oleracea* var. *capitata* accessions there was a continuous distribution for cabbage whitefly resistance from susceptible to fully resistant.

A similar greenhouse experiment was carried out to test 29 wild relatives and landraces for their resistance against the cabbage aphid *Brevicoryne brassicae*. Ten one-day-old nymphs were placed on the underside of the leaf and were scored one week after infestation. None of the wild relatives or landraces showed resistance. A separate test was carried out for 15 *B. fruticulosa* accessions at three weeks old. Results showed that some *B. fruticulosa* accessions give a reduction in adult survival of at least 60%. Electrical Penetration Graph (EPG) recordings show no obvious explanation for the resistance within these lines.

Further characterization of* B. oleracea *var.* capitata *accessions

The results from 2011 and the greenhouse confirmation experiments showed that there were clear differences in whitefly resistance among *B. oleracea* var. *capitata* landraces and cultivars. In 2012,

we repeated the field experiment by carrying out a more precise phenotyping in which we measured whitefly survival and oviposition. In total, 123 *B. oleracea* var. *capitata* accessions were phenotyped for whitefly resistance in four replications using four clip-cage per plant containing five female whiteflies per clip-cage. Leaf material was collected for DNA and RNA extraction as well as metabolite analysis. One week after infestation the number of living and dead whiteflies in each clip-cage was recorded as well as the number of eggs produced. An ANOVA analysis was carried out on the whole experiment, discarding the clip-cages containing three or less whiteflies. The results show a continuous distribution of survival and oviposition, with highly significant differences between the most resistant and susceptible accessions. This indicates that the resistance is most likely not controlled by a single gene. If we can complement the phenotypic data with marker data (genotypes) we will be able to perform association mapping which may lead to the discovery of quantitative trait loci (QTL) that play a role in the resistance to cabbage whitefly.

Electrical Penetration Graph (EPG) analysis

The data obtained from the field trial conducted in Birmingham during the summer of 2011 were analysed and 30 accessions were selected for the further work at UoB.

Following discussion at the second annual consortium and mid-term review meeting in October 2012, whiteflies were sent from Wageningen to Birmingham to perform EPG analysis of feeding behaviour of whiteflies in addition to that of aphids. However, a healthy population could not be established so no EPG has been performed with whiteflies.

The feeding behaviour of *Brevicoryne brassicae* was studied using the EPG technique. EPG was performed on 22 accessions to check the feeding behaviour of the aphid on different *Brassica* accessions. The plants were grown in a controlled environment growth room until they reached the age of 12 weeks and the feeding behaviour of the aphids was recorded using an eight channel EPG system. Data were acquired and analysed using Stylet+ software. The data have been acquired and analysed for all the 22 accessions (Table 1). Initially, an Anderson Darling test was performed on the data to determine if the data had a normal distribution.

The EPG data for non-penetration, pathway and sap ingestion and time to first E2 (sustained phloem sap ingestion phase) were analysed and found not to have normal distributions, and hence this will affect the analyses that are subsequently chosen. The data were then tested using 2-way ANOVA to determine if actual time of feeding during EPG had an effect on behaviour. Time proved to have no significant effect on behaviour and so a Kruskal-Wallis one way analysis of variance test was used to identify any significant differences in the behaviours observed on the *Brassica* accessions.

Analysis of EPGs of the 22 accessions has been completed and wild relatives *Brassica villosa*, *B. incana* and *B. fruticulosa* show promising results in terms of aphid resistance. Accessions 398 and 24 showed no penetration at all, whereas 401 and 397 showed some indications of penetration. This is in agreement with the resistance tests previously carried out in Wageningen and Birmingham. Also, accessions 24 and 398 have been used as resistant parents in crosses (see below). Aphids on three week old *B. fruticulosa* did show some penetration, whereas on 12 week old plants there was no penetration. The accessions 199 (*B. oleracea* var. *capitata*) and 260 (*B. oleracea*) both showed high levels of susceptibility.

Table 1. List of accessions (genotypes) for which EPG analysis was carried out to study the feeding behaviour of aphids on *Brassica* species

Acc. no.	Species	Subtaxon	CWR/LR
54	*B. oleracea*	var. *acephala*	LR
116	*B. oleracea*	var. *acephala*	LR
37	*B. montana*		CWR
38	*B. montana*		CWR
26	*B. incana*		CWR
24	*B. incana*		CWR
398	*B. villosa*		CWR
401	*B. villosa*		CWR
453	*B. fruticulosa*		CWR
454	*B. fruticulosa*		CWR
321	*B. oleracea*		CWR
325	*B. oleracea*		CWR
466	*B. oleracea*		CWR
199	*B. oleracea*	var. *capitata*	CWR
260	*B. oleracea*	var. *capitata rubra*	LR
229	*B. oleracea*	var. *capitata*	LR
430	*B. oleracea*	var. *capitata*	LR
9	*B. cretica*		CWR
27	*B. incana*		CWR
409	*B. oleracea*	var. *capitata alba*	LR
127	*B. oleracea*	var. *acephala*	LR
272	*B. oleracea*	var. *capitata sabauda*	LR
Control	*B. nigra*		CWR

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

A pilot experiment was performed with phloem sap collected from six and twelve week old 'Riviera' and 'Christmas Drumhead' plants using the EDTA[2] method. Adding EDTA prevents the sieve elements from closing, which makes it possible to collect phloem sap for a longer time. In the first experiments we could not detect any secondary metabolites in the phloem sap using LC–MS[3], probably because the concentration was too low. Therefore, samples were concentrated by speed-vac and SPE (HLB)[4] columns. This column binds metabolites, but EDTA and sugars will be discarded. These samples were measured using LC–MS under negative and positive polarity. Peak patterns were visible above the background noise which made identification of metabolic components in phloem possible. The overall picture was that there is a high variation among the biological replicates. This could be due to the different steps in processing but also to physiological conditions

[2] Ethylenediaminetetraacetic acid
[3] Liquid chromatography–mass spectrometry
[4] Solid Phase Extraction (Hydrophilic/Lipophilic Balanced)

of the different plants of the same accession. Based on these results it was decided not to use phloem sap for the metabolomics experiments, but to collect leaf samples from the four biological replications of 123 *B. oleracea* var. *capitata* landraces and crossing parents from the field experiment in 2012. Samples are stored at -80 C until further research.

GC–MS[5] and LC–MS have been performed on ten resistant (all heading types) and ten susceptible *B. oleracea* var. *capitata* landraces (five heading and five non-heading). In both analyses no significant differences in metabolites content could be identified. Metabolite profiling of the whole set of accessions of *Brassica oleracea* var. *capitata* landraces or F2 population is therefore not useful.

In the past we had already shown that the most resistant and susceptible individuals of an F2 population derived from a cross between the resistant cultivar 'Riviera' and the susceptible cultivar 'Christmas Drumhead' did not show any differences in metabolites, which leads to the conclusion that the difference between resistant and susceptible genotypes is most likely not due to metabolites.

Task 1.3: Next generation sequencing. Task Leader: SXS. Partners involved: DLO, SXS

In this Task we will sequence one or two representative(s) of each *Brassica* species in our study, complemented with parents of the mapping populations (Table 2).

Table 2. Selection of plant material (accessions) for next generation sequencing of *Brassica*

Acc. no.	Type of material	Species	Subtaxon	Crop
3	CWR	*B. bourgeaui*		
16	CWR	*B. cretica*		
451	CWR	*B. fruticulosa*		
453	CWR	*B. fruticulosa*		
21	CWR	*B. hilarionis*		St. Hilarion cabbage
24	CWR	*B. incana*		
26	CWR	*B. incana*		
30	CWR	*B. insularis*		
32	CWR	*B. macrocarpa*		
37	CWR	*B. montana*		
38	CWR	*B. montana*		
111	LR	*B. oleracea*	var. *acephala*	kale
272	LR	*B. oleracea*	var. *capitata sabauda*	Savoy cabbage
393	CWR	*B. rupestris*		
363	CWR	*B. villosa*	subsp. *bivoniana*	

Plant material was grown in the greenhouse at DLO and RNA was isolated after 24 hours of infestation with whiteflies and sent to Partner 9, ServiceXS on 09/01/13, 20/02/13 and 05/09/13. ServiceXS used the first sample (453) to compare two labelling methods (the 'classic' Illumina method and de Ribo-zero rRNA depletion method). Both methods yielded good material for sequencing, with almost identical quality control parameters. As the Illumina method is less complicated and more cost-efficient, this method was selected for the sequencing of the remaining

[5] Gas chromatography–mass spectrometry

samples. Sequence data will be ready during the next reporting period (expected end of September 2013).

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

For the transcriptomics experiments at UoB, a selection of interesting accessions was previously compiled (as reported in the first periodic report) based on the screening results from 2011 and 2012 and from the published literature reporting known resistant and susceptible accessions. A subset of these accessions has now been selected for transcriptomic analysis (Table 3). Concurrent with the transcriptomics, aphid feeding studies on this full set of accessions using the EPG technique have been completed. This allows very precise confirmation of resistance and susceptibility and generates information regarding the actual mechanism of resistance at the physiological or morphological level. The transcriptional profiling has begun and will provide substantial amounts of information about the differing transcription levels between accessions and species and will provide indications of constitutively expressed candidate genes for resistance. Perhaps more importantly, in the context of this project it will enable us to generate predictive models for transcriptomic screening of resistant and susceptible germplasm which we have already achieved with rice. In addition it could be interesting to use a set of materials that contains the ten most resistant and ten most susceptible accessions from the 123 *B. oleracea* var. *capitata* landraces experiment (field 2012) and the ten most resistant and susceptible F2 plants from the 'Christmas Drumhead' x 'Riviera' cross for gene expression studies. From the latter cross we have F3 lines available.

The *Arabidopsis* and *Brassica* arrays were tested at UNOTT (Partner 10). Both worked well. A short report was circulated to the partners involved and based on that a decision to use the *Arabidopsis* array was taken. The *Arabidopsis* annotation is richer and more straightforward to link to other research and downstream network analysis.

The budget covers ~150 *Arabidopsis* arrays and it was agreed during a Skype conference between the involved partners to use four biological replicates in all treatment/accession combinations. The list of selected accessions was circulated within the group for agreement. In August UNOTT received 144 samples from UoB and has purchased the majority of the consumables for the work. During quality control (QC), approximately 36 samples required replacement and reprocessing but subsequent QC, labeling, and hybridizations are currently underway. Data sharing and primary analysis with Partek will be delivered in the next reporting period (expected October 2013).

Materials to be used for transcriptomics

- UoB: 144 samples were sent to UNOTT in August 2013 and replacement samples (aphid induced vs. non induced samples of 18 accessions with four replicates each) are being prepared.

- UNOTT: Ten accessions (430, 260, 229, 454, 401,453, 398, 26, 37, BN) with all replicates are ready to hybridize to the chip. We are waiting for the remaining eight accessions to complete the set (non-induced and induced) to proceed beyond the cDNA stage (good practice in technical handling).

- DLO: Leaf material is available from all accessions of the 123 *B. oleracea* var. *capitata* landraces experiment (field 2012). We will make three bulks of resistant accessions and three of susceptible accessions. Each bulk will consist of four accessions (each represented by two different plants of that accession), so each bulk will consist of equal amounts of RNA of eight

plants. We consider the different bulks as replicates as we expect the same resistance mechanism to be present in all resistant plants.

- DLO: Whitefly resistance is induced in white cabbage plants when they are approximately nine weeks old. We have collected leaf material from a variety that is susceptible at 7–8 weeks and resistant when it is 11–12 weeks. Again, leaf material is available from whitefly induced plants and from non-induced plants (as a control). There are therefore four time points (two prior to resistance development and two after), three replicates (we actually have five replicates available), and induced and non-induced material (24 arrays in total).

Table 3. Plant material selected for transcriptomic analysis of *Brassica*

					Resistance to	
Acc. no.	**Material**	**Species**	**Subtaxon**	**Crop**	**aphid**	**whitefly**
454	CWR	*fruticulosa*			susceptible	
453	CWR	*fruticulosa*			resistant	
26	CWR	*incana*				susceptible
27	CWR	*incana*			resistant	
37	CWR	*montana*				resistant
38	CWR	*montana*				susceptible
54	LR	*oleracea*	var. *acephala*	kale	resistant	
116	LR	*oleracea*	var. *acephala*	kale	resistant	
127	LR	*oleracea*	var. *acephala viridis*		resistant	
199	LR	*oleracea*	var. *capitata*	cabbage	susceptible	
229	LR	*oleracea*	var. *capitata*	white cabbage	resistant	
430	LR	*oleracea*	var. *capitata*	white cabbage	resistant	
260	LR	*oleracea*	var. *capitata rubra*	red cabbage	susceptible	
321	CWR	*oleracea*			resistant	
325	CWR	*oleracea*			resistant	
466	CWR	*oleracea*			susceptible	
398	CWR	*villosa*	var. *drepanensis*		susceptible	
401	CWR				resistant	
Ctrl	control	*nigra*				

Task 1.5: Identification of candidate genes

Crosses produced

Several crosses between whitefly resistant and susceptible wild relatives and landraces were made in 2012 (as the parents were also selected for sequencing, Table 2). For *B. fruticulosa*, two cabbage aphid resistant and two susceptible accessions were selected from the screenings by DLO in 2012. Crossings between these *B. fruticulosa* accessions turned out to be difficult and therefore the resistant accession was crossed with a set of four different susceptible accessions in the beginning of 2013. Germination of F1 seeds only succeeded after treatment with gibberellins. F1 plants of one cross were selected and selfings are being made (see Table 4). F2 seeds will be harvested in October 2013 and used for mapping the cabbage aphid resistance. By October we will also have backcross seeds of the crosses *B. oleracea* var. *acephala* x *B. villosa* and *B. oleracea* var. *acephala* x *B. incana*. Selfings are being made from the F1 of *B. oleracea acephala* x *B. incana* to produce F2 seeds. It is anticipated that one of the *B. incana* will be used for QTL mapping within the project.

Characterization of the 'Christmas Drumhead' x 'Riviera' F2 population

DLO also made an F2 population derived from a cross between the cultivars 'Christmas Drumhead' and 'Riviera' available to the project. With this population we carried out a QTL mapping to identify chromosomal regions involved in whitefly resistance. Using the sequencing data that were also made available by DLO we first developed 150 SNP markers, evenly distributed over the genome. For this, use was made of the available *B. rapa* sequence. The F2 population was genotyped with these markers using the KASPar assay. A molecular map was calculated and a QTL mapping carried out. A QTL for oviposition and QTL for wax layer were identified in the population. A confirmation experiment is currently being carried out using F3 populations under field conditions.

Table 4. Successful crosses within and between *Brassica* species that were made in 2012 and 2013

R-Parent (Acc. no.)	Species	X	S-Parent (Acc. no.)	Species	Seed set	Germination %[1]	F2 seeds or backcross
24	*B. incana*	x	26	*B. incana*	Y	90	
24	*B. incana*	x	111	*B. oleracea*	Y	90	
363	*B. villosa*	x	111	*B. oleracea*	Y	20	
37	*B. montana*	x	111	*B. oleracea*	Y	90	
453	*B. fruticulosa*	x	451	*B. fruticulosa*	Y	70	
453	*B. fruticulosa*	x	455	*B. fruticulosa*	Y	70	

S-Parent (Acc. no.)	Species	X	R-Parent (Acc. no.)	Species	Seed set	Germination %	
26	*B. incana*	x	24	*B. incana*	Y	80	
111	*B. oleracea*	x	24	*B. incana*	Y	60	*
111	*B. oleracea*	x	363	*B. villosa*	Y	90	*
111	*B. oleracea*	x	37	*B. montana*	Y	90	
451	*B. fruticulosa*	x	453	*B. fruticulosa*	Y	70	*
455	*B. fruticulosa*	x	453	*B. fruticulosa*	Y	70	

R-Parent (Acc. no.)	Species	X	R-Parent (Acc. no.)	Species	Seed set	Germination %	
363	*B. villosa*	x	398	*B. villosa*	Y	0	
398	*B. villosa*	x	363	*B. villosa*	Y	20	

[1] Total number of seeds = 25
* F2 and backcrosses are being made

WP1: Deviations from Annex I

Due to a delay in the work programme, Deliverable 1.1 'High throughput phenotyping data of *Brassica* accessions' is expected to be submitted by month 32 instead of month 24.

2.2.2 WP2: Informatics (WP leader: Ehsan Dulloo, BIOVER)

Task 2.1: Trait Information Portal. Partners involved: all partners

Based on a recommendation arising from the PGR Secure second annual consortium and mid-term review meeting held in Cyprus in October 2012, it was decided that the name of the TIP should be changed to better reflect the nature of the information (i.e., both CWR and LR trait and conservation data) contained therein. In consultation with the consortium, the TIP name was changed to 'Plant Genetic Resource Diversity Gateway for the conservation and use of crop wild relative and landrace traits' and shortened to 'Plant Genetic Resource Diversity Gateway' (PGR Diversity Gateway). As a consequence the ex-TIP portal website will also be renamed and all content updated, and from now on any related communications will have the new name.

The development and group testing of the PGR Diversity Gateway was carried out using a test URL (http://test2.tip.grinfo.net). This URL was shared with some IT experts that were attending the meeting 'science week' at the Bioversity headquarters and users attending the same meeting. This was an opportunity to gather face to face feedback from some users. Based on feedback received from these experts and from participants at the second annual consortium and mid-term review meeting (October 2012) where a mock-up was presented, further work was carried out on the construction of the backbone structure to enable the ontology to talk with the search component in an efficient manner.

The entire PGR Diversity Gateway structure underwent refactoring to ensure that the infrastructure worked and performed as expected. The development of the infrastructure and ontology service is now proceeding well, and already includes the passport, LR and other ontologies. This will now be followed by the CWR and QTL ontologies. We have discussed with other project partners and relevant data providers (European Cooperative Programme for Plant Genetic Resources (ECPGR) European Central Crop Databases and Nottingham group) the possibility and feasibility of implementing web services that will allow data to be shared with the PGR Diversity Gateway. Efforts so far have focused on developing the beta version of the PGR Diversity Gateway. The next step will be to integrate other solutions for data sharing (open data). In collaboration with partners involved in WP3, the CWR data types (checklist, inventory and conservation strategies) for the respective ontologies were developed and templates for data capture were distributed to project partners for testing. Discussions were held with WP1 partners to define the QTL data types. These are almost finalized and both the template and ontology will be ready for the beta version of the system in the next reporting period (expected November 2013). There will also be a link to original data repository sources from WP1 once these data are published and respective links provided.

The PGR Diversity Gateway currently holds the following passport, trait, characterization and evaluation, and site data: 2,289,876 total records; 11,207,808 characterization and evaluation data records; 2,284,056 accession records; and 454,080 site records. The data represent contributions from 411 data providers (institutes) in 238 countries. The main data sources are EURISCO, GENESYS, GRIN and EUFGIS.

The PGR Diversity Gateway beta version will be presented to breeders at the upcoming PGR Secure stakeholder workshop, 'On the conservation and sustainable use of plant genetic resources in

Europe: a stakeholder analysis', 26–28 November 2013, by which time we expect to have incorporated some project partners' data and to be able to give breeders the opportunity to test the gateway and provide feedback.

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

During the current reporting period, BIOVER and URJC finalized the description of the environmental profiles of the habitats of CWR and LR that are likely to favour selection for specific abiotic resistance traits. Knowledge of these environmental profiles is required to be able to select a subset of CWR and LR populations most likely to have the desired traits. Based on expert knowledge and consultations with project partners, the abiotic stress factors that have been identified as particularly important for the four project genera are aluminium toxicity for *Avena*, drought for *Beta*, drought and salinity for *Brassica*, and frost for *Medicago*. Environmental conditions that might favour the development of resistance traits to these stress factors need to be described and identified through most appropriate environmental variables and their critical thresholds. Data for those variables need to be available as digital layers at European level to allow their inclusion in the identification process of selected accessions. After careful evaluation of all potential available variables, the following variables have been identified as the most appropriate to describe those environmental conditions that might favour development of resistance traits to the above-mentioned abiotic stress factors:

- *Avena*: soil pH and top soil organic carbon (T_OC) content: habitats with a soil pH < 5.5 and T_OC < 1.2% are taken into consideration for the analysis.
- *Beta*: De Martonne aridity index (De Martonne, 1926), using temperature and precipitation of the three driest months (July, August and September) for its calculation. Areas with an index below 10 are of interest.
- *Brassica*: Top soil salinity (TSS) and temperature of driest months; areas with TSS > 4 and high temperatures during the driest months are of interest. Regarding drought, the same variables as for *Beta* are considered.
- *Medicago*: Frost tolerance (Tc); we consider minimum monthly temperature of the three most coldest months.

The environmental variables identified have been embedded, together with the previously developed crop-specific ecogeographic land characterization (ELC) maps into specifically developed R-scripts. These were then used to generate the 'best bet' FIGS subsets of potentially interesting accessions or occurrences for *Avena*, *Beta* and *Brassica* landraces and wild relatives. Further discussions on how they can be utilized within and outside the project are ongoing. The first draft outline of the guidelines for the broader application of FIGS was elaborated into an advanced draft of guidelines with the preliminary title 'Predictive characterization of crop wild relatives and landraces: guidelines for the identification of populations and accessions with potential adaptive traits useful for plant breeding and global/climate change adaptation'. External experts who already contributed to the development of the FIGS best bet sets are volunteering their contributions to the guidelines. The various sections of the guidelines are being completed and example data, maps, R-scripts etc. are being compiled. The guidelines are planned to be published as a Bioversity International publication.

WP2: Deviations from Annex I

Project partners have agreed that the guidelines on the broader application of FIGS (Deliverable 2.2) will be published as a Bioversity International publication. It will require additional time to prepare the document according the specific publications guidelines. External experts have agreed to contribute to the guideline content and have been given some additional time to provide their contributions. We anticipate that the guidelines will be published in February 2014. This delay does not affect the WP2 work programme or the work programme of any other WPs.

Deliverable 2.4 'TIP developed and tested' was due to be submitted in month 24. However, significant comments were received from experts and breeders requiring more work on the PGR Diversity Gateway development. The beta version will be launched at the PGR Secure stakeholder workshop, 26–28 November 2013. The first draft of the ontology of the PGR Diversity Gateway (Milestone 10) was completed in month 25. However, in view of the changes made to the PGR Diversity Gateway, the ontologies have had to be updated. Further updates will be made following the stakeholder workshop. The final version of MS10 is expected to be achieved by month 35.

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

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 CWR national inventories (NIs) in European countries and to begin the process of creating a European CWR inventory based on the 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. Progress within the first 12 month reporting period can be found in the first periodic report.

During the current 18 month reporting period, the online CWR and LR conservation helpdesk has been developed (www.pgrsecure.org/helpdesk) and includes an introductory page providing background information, including the horizon scanning exercise which involved a review of progress in national CWR and LR conservation in each European country (see www.pgrsecure.bham.ac.uk/sites/default/files/documents/helpdesk/Progress_national_CWR_and_LR_conservation_Europe.pdf), and information on the role of the helpdesk and how to use it. Links to two additional pages are provided which contain a range of resources to aid and inform the national CWR (www.pgrsecure.org/helpdesk_cwr) and LR (www.pgrsecure.org/helpdesk_lr) conservation strategy planning process, as well as links to email addresses for one-to-one support.

Two email communications have been sent to the National Focal Points (NFPs) (members of the ECPGR *In Situ* and On-Farm Conservation Network—for CWR conservation, the Wild Species in Genetic Reserves Working Group and for LR conservation, the On-Farm Conservation and Management Working Group) and PGR National Coordinators (NCs) (some of whom are also members of the ECPGR Network) to remind them about the availability of the helpdesk, to encourage the development of their national CWR and LR conservation strategies, and offer advice and support during the planning stages. These communications were sent jointly by the Chairs of the two ECPGR Network Working Groups.

A further communication was sent only to the members of the Wild Species Conservation in Genetic Reserves WG (those responsible for the development of national CWR conservation strategies) from the Chair of that WG in month 24, to remind them of the support available via the project, to encourage the development of CWR NIs (and subsequent conservation strategies), and to request NFPs to provide updated information for the review of progress in national CWR and LR conservation in each European country (see www.pgrsecure.bham.ac.uk/sites/default/files/documents/helpdesk/Progress_national_CWR_and_LR_conservation_Europe.pdf). The latter document was reorganized and improved during the current reporting period and updated following responses from the NFPs.

In addition to the exemplar national CWR conservation strategies (see Task 3.2), progress has been made in the development of strategies for Albania, Bulgaria, Cyprus and Norway through collaboration between UoB[6] and the PGR National Programmes of those countries. Reports and other publications arising from this work have been published, submitted, are in press or are in preparation (see Appendix 1).

Start-up meetings were convened to discuss the technical, practical and policy aspects of the development of the conservation strategies in these four countries. These meetings were each attended by one of the WP3 leaders, Nigel Maxted (Project Coordinator, UoB) and Shelagh Kell (Project Manager, UoB) and involved staff from relevant national institutes, including the national genebanks and organizations responsible for protected area management. In Bulgaria, staff and students of the agricultural university are involved in the work and also attended the start-up meeting in that country. In Cyprus, additional meetings were arranged during the strategy planning process with plant breeders.

In Norway, a pilot study was undertaken during late 2012/early 2013 with the technical assistance of a volunteer (ex-student) from UoB. This initial study was used to leverage funding for a more detailed follow-up project which will start in September 2013. The project, 'Establishment of PGR *in situ* conservation in protected areas in Norway' will be carried out over three years from 2013 with earmarked funding from the Norwegian Ministry for Agriculture and Food. The project will partly be carried out as PhD research in cooperation with UoB. Other partners and contributors will be GBIF Norway and the Natural History Museum (both located at the University of Oslo), the Directorate for Nature Management, Nordic Genetic Resource Centre (NordGen) and the county authorities in relevant counties as they are the managers of protected areas.

Talks are also ongoing between UoB and the NFPs in Greece and Turkey about initiating the development of national CWR conservation strategies in those countries.

The NC of Sweden has reported good progress in the development of their national CWR conservation strategy, which has included the establishment of a committee consisting of representatives from the Swedish Species Information Centre at the Swedish University of Agricultural Sciences, the Swedish Board of Agriculture, the Swedish Forestry Agency, the Nordic Genetic Resource Centre and the Swedish Botanical Society (J. Weibull, pers. comm., 2012; Weibull, 2013). J. Weibull reports that a list of 84 priority taxa in 62 genera (out of a total CWR checklist of

[6] UoB has provided staff/student expertise and technical support, and in some cases, partial funding (e.g., travel and subsistence costs of researchers).

1478 taxa) has been generated (Weibull, 2013) and an article has been published in the journal of the Swedish Botanical Association (Aronsson *et al.*, 2012). Importantly, J. Weibull highlighted that the development of the strategy in Sweden is formally endorsed by the Board of Agriculture, which is the authority that oversees the national genetic resources programme.

Data from the NIs and national CWR conservation strategies will be uploaded to the TIP during the next reporting period (see report on progress in WP6, Task 6.2).

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

3.2.1 UK national CWR conservation strategy (UoB)

During the current reporting period further progress has been made toward developing conservation strategies for priority CWR across the UK. A bottom up approach was adopted working individually with each national conservation agency in the UK to produce prioritized CWR inventories tailored to each country's CWR. In doing so, conservation agencies are able to be involved in all decision-making processes regarding their own CWR inventories which will increase their support of the end products and so increase the likelihood that conservation actions proposed will be implemented. Natural England, Scottish National Heritage (SNH) and Natural Resources Wales (NRW) each agreed to be involved in developing national CWR conservation strategies.

Checklists of CWR in England, Scotland and Wales have been produced by matching the country's flora checklist extracted from the Vice County Census Catalogue (VCCC) data (Stace *et al*., 2003) to a checklist containing all of the CWR occurring in the UK (Maxted *et al.*, 2007). These country specific CWR checklists formed the basis of the prioritization process to produce inventories of priority CWR.

Natural England, SNH and NRW provided input into the choice of criteria used to prioritize their country's CWR. The criteria chosen to prioritize English CWR (as reported in the first periodic report), which were applied serially were: 1) use of the related crop, 2) native status, 3) economic value of the associated crop, 4) degree of relatedness to the crop, and 5) change in population range. Each of the five criteria selected by Natural England was applied to the English CWR checklist, resulting in a final prioritized inventory of 148 taxa (124 species and 24 subspecies).

NRW decided to apply the same criteria as applied to English CWR, but with two exceptions. Firstly, that native forestry species should also be included alongside CWR related to human food and animal forage/fodder crops due to their high economic values and increasing threats from pests and diseases of native forests. Secondly, that IUCN Red List status should be used to prioritize on the basis of relative level of threat rather than change in population ranges in Britain. The final Welsh inventory contains 122 taxa (103 CWR taxa and 19 tree taxa).

SNH opted to use the same criteria as England but, again, with two exceptions. The IUCN Red List status was used instead of data regarding change in population ranges in Britain. SNH suggested that data from the Joint Nature Conservation Committee (JNCC) 'Species and Designations' database (JNCC, 2011) should also be considered. This database combines a range of different threatened status designations for UK taxa. Scottish CWR were first prioritized according to IUCN Red List status, and then according to the number of conservation designations each taxon has, giving priority to taxa with a higher threatened status and higher number of other conservation designations. Having

applied all selected criteria to the checklist of Scottish CWR, a final prioritized inventory was produced containing 120 taxa (101 species and 19 subspecies).

With all three inventories now completed, ecogeographic data for all priority taxa have been obtained which will be used in gap analyses of CWR for each country. Occurrence data for all taxa in each inventory have been obtained from the Botanical Society of the British Isles (BSBI) distribution database (BSBI, 2013). Access to further data from four biological recording centres in Wales was also granted and these data will be used in the Welsh gap analysis in addition to the BSBI data. Each conservation agency has now provided guidelines as to how the raw occurrence data should be filtered to decide upon which records to include in the analyses. For example, Wales chose to include only occurrence records from 1970 onwards as high levels of habitat change were occurring across the UK until this decade. Access to *ex situ* seed bank accession data for CWR in the UK was also obtained from the UK National Plant Inventory (UKNPI, 2009).

In order to carry out the most appropriate gap analyses for each country, Natural England, NRW and SNH provided an outline of how they wish the analyses to be conducted. All agreed that the analyses should first consider *in situ* occurrence data to show where CWR are located across England, Scotland and Wales. This can then be compared to protected area boundaries to see where they coincide. From this, decisions can be made about where it is best to target conservation actions *in situ*. Secondly, all agencies agreed that *ex situ* accession data should be considered to find out how many accessions exist per priority taxon and how representative of each taxon's full distribution in England, Scotland and Wales this is. This information can then be used to target further collecting to fill these gaps. Taking this a step further, CCW chose to carry out the analyses separately for rare and common CWR taxa. It was suggested that locations on the edges of a common taxon's range may be areas that are of high importance in terms of levels of genetic diversity. Plants in these locations may be exposed to higher levels of stress and so have adapted to these marginal environments, developing additional stress responses that could be beneficial in crop improvement. A preliminary gap analysis was undertaken using Welsh data in order to finalize appropriate analysis methods using the following mapping softwares: DIVA-GIS 7.5.0 (Hijmans *et al*., 2012), ArcMap 10.0 (ESRI, 2011) and MaxEnt 3.3.3 (Phillips *et al*., 2006). A full gap analysis is now underway for Wales with species richness analysis identifying hotspots of species diversity, observation richness analysis identifying areas which have experienced recording bias, complementarity analysis selecting sites appropriate for development of genetic reserves for Welsh CWR, and comparison of species hotspots and potential genetic reserve sites with the existing Welsh protected area network to aid the development of a conservation strategy for Welsh CWR.

Another aspect to developing the English national strategy involves undertaking a genetic study of CWR on the Lizard, Cornwall. This study aims to answer three key questions:

1. What is the level of genetic diversity on the Lizard?

2. How different is the genetic diversity on the Lizard from elsewhere in the southwest of the UK?

3. Does genetic distance correlate with geographic distance?

The first two questions aim to justify the suitability of this location as a CWR genetic reserve and the third question aims to inform where further genetic reserves should be established in the UK. During

May and June 2012, field work was carried out to collect samples from three CWR taxa that occur on the Lizard: *Allium schoenoprasum* L., *Beta vulgaris* subsp. *maritima* (L.) Arcang. and *Daucus carota* subsp. *gummifer* (Syme) Hook. f. A method was developed for surveying sites and populations and for collection of leaf samples which would be easily reproducible to enable future monitoring and sampling. For each taxon, seven sites were selected across the Lizard separated by a distance of at least 1 km to reduce the chance of sampling two populations between which gene flow could be taking place. At each of these sites, 20 leaf samples were taken. At the end of the 2012 field study, an interview was conducted with Ray Lawman from Natural England who manages the Lizard National Nature Reserve (NNR). Information was gained about how each collection site is managed, why it is managed in that way and how management has changed over the years at each site. This information will be used to help plan appropriate management strategies for CWR on the Lizard with a view to maximizing the maintenance of CWR genetic diversity over time.

During May and June 2013, field work was completed with material from a further five CWR taxa being collected from the Lizard peninsula (*Allium ursinum* L., *Asparagus officinalis* L. subsp. *prostratus* (Dumort.) Corb., *Raphanus raphanistrum* subsp. *maritimus* (Sm.) Thell, *Trifolium occidentale* L. and *T. repens* L.). In addition, samples from populations of these same eight taxa were collected across the southwest of the UK to enable the comparison of genetic diversity between these taxa on the Lizard and the rest of the southwest. A total of 1860 samples were collected and genetic diversity within and between populations will be analysed using AFLPs.

3.2.2 Finland national CWR conservation strategy (MTT)

The National CWR Strategy Report for Finland has been completed during the current reporting period. The main parts of the strategy completed during this period were the *in situ* and *ex situ* gap analyses and recommendations for the conservation of CWR in Finland. The methodology of Maxted *et al*. (2008) was followed for the gap analyses: (1) circumscription of target taxon and target area; (2) assessment of natural diversity, (taxonomic, genetic, ecogeographic and threat assessment); (3) assessment of current *in situ* and *ex situ* conservation status; (4) setting priorities for *in situ* and *ex situ* conservation action. Gap analyses were carried out for the 209 priority CWR taxa.

There are no current *in situ* conservation efforts specifically for CWR species in Finland but those CWR species which are threatened are included in existing conservation programmes. The Natural Heritage Services (Metsähallitus) is responsible for conservation, management and monitoring of all the species on its land and 11 of the priority CWR species are under their extended national responsibility. Additionally, the Finnish Forest Research Institute Metla has a programme to conserve the genetic resources of forest trees and two of the priority CWR are conserved in their *in situ* conservation areas.

Identification of the key *in situ* areas containing CWR within and outside of the protected areas was undertaken by complementarity analysis with ArcGIS. Through the complementarity analysis, five most CWR species rich areas were found within Finland. These CWR hotspot sites, if established as genetic reserves, would conserve over 60% of the priority species. The sites are distributed in different parts of the country. Two different analyses were carried out: one including Åland region and mainland Finland together and the other analysing Åland and mainland Finland separately. The present *in situ* conservation status of the priority taxa in the conservation areas in Finland was also investigated.

The *ex situ* gap analysis was carried out by comparing the target taxa already in *ex situ* collections and the target taxa in need of conservation (i.e., the 209 CWR priority taxa for Finland). The current *ex situ* collections of wild native species in Finland are conserved mostly in botanic gardens. The Nordic Genetic Resource Centre (NordGen) has some Finnish CWR in their collections. A seedbank for threatened native species will be established in Finland which will collect and conserve the threatened Finnish vascular plant species, which will include some CWR taxa.

Out of the 209 priority CWR, 56 taxa are found in *ex situ* collections with some provenance data. However, most of these collections have only one accession per taxon. Only seven of the priority CWR taxa (3%) are collected from a minimum of five locations. In all, 75% of the priority CWR are not in any *ex situ* collection. The detailed results of the gap analysis and also the taxa lists such as checklist, priority list, taxa found in the proposed genetic reserves, taxa found in *ex situ* collections and taxa proposed for *ex situ* conservation will be published by MTT in the National CWR Strategy Report for Finland during the final reporting period.

3.2.3 Spain national CWR conservation strategy (URJC)

Tasks set to be accomplished team during the current reporting period were to: 1) gather and compile information about gene pool, endemicity, threat status, chromosome number, and additional data to finish building the database for the complete Spanish draft CWR checklist for the fodder and forage, ornamental and industrial, and other uses CWR categories; 2) apply criteria for prioritizing species within these CWR categories and generate the final Spanish CWR inventory; 3) finish *in situ* gap analysis started for the food CWR category group and carry out *in situ* gap analysis in the fodder and forage, ornamental and industrial CWR categories; and 4) assess the *ex situ* conservation status of all CWR categories. Most of these tasks have been successfully completed.

3.2.3.1 Draft CWR checklist for Spain

The number of species included in the draft CWR checklist for Spain (after the prioritization of crop genera but before the prioritization of the wild species corresponding to these genera) increased to 945 species due to the inclusion of some additional genera suggested by crop breeding researchers that were missing in the list and were considered to be important for crop improvement, as well as some endangered species currently recognized as accepted species by *Flora Iberica* taxonomists. Experts from institutions dealing with crop breeding of the most important food, fodder and forage crops in Spain were contacted to validate the generated prioritized lists, and if necessary, add new species to the list: Dr. Mayor (onion breeding) from the Research Centre for Food and Agriculture of Aragon (CITA, Aragón), Dr. Díez Niclós (horticultural species) from the Centre for Conservation and Improvement of Agro-Biodiversity in Valencia (COMAV, Valencia), Dr. Rubiales Olmedo (legume species) from the Institute for Sustainable Agriculture, CSIC, Dr. Oliveira Prendes (fodder species) from the University of Oviedo, and Dr. Ordás (*Solanum* spp.) and Dr. Cartea González (*Brassica* spp.), from 'Misión Biológica de Galicia'. These contacts resulted in the inclusion of three new genera in the list (*Deschampsia* P. Beauv., *Hedysarum* L. and *Ornithopus* L.) with their corresponding wild species and the validation of the species already included in the list.

The updated checklist is available at: http://pgrsecurespain.weebly.com/crop-wild-relatives-in-spain-ndash-spanish-checklist-of-cwr.html. No further changes are foreseen in this task, so the checklist of Spanish CWR is now completed.

3.2.3.2 Prioritization of the fodder, forage, ornamental and industrial CWR species

Information on the Gene Pool classification (based on the Gene Pool concept of Harlan and de Wet, 1971), Taxon Group classification (based on the Taxon Group concept of Maxted *et al*. (2006), when no information regarding crossability was available), endemicity, threat status, chromosome number, and other data, has been gathered to finish building the database for all species in the draft Spanish CWR checklist. Prioritization was then carried out as follows:

- Applying same prioritization criteria used for the food category (i.e., taxa in Gene Pools 1b and 2 or in Taxon Groups 1b, 2 and 3, or classified as threatened (Critically Endangered – CR, Endangered – EN, or Vulnerable – VU) or Near Threatened (NT) using the IUCN Red List Categories and Criteria (IUCN, 2001), or being endemic to Spain), 184 out of 270 species belonging to the fodder and forage category were prioritized.
- Concerning the criteria for the prioritization of ornamental and industrial CWR, it was decided that species would only be selected according to the Gene Pool and Taxon Group concepts. The criteria of endemicity and threatened status were discarded due to the complex taxonomy of some of the included genera (e.g., *Limonium*) which renders a great number of endemic microtaxa, and the fact that these are not PGRFA groups (i.e., the food security precautionary principle is not applicable). Therefore, species belonging to Gene Pools 1b or 2 or Taxon Groups 1b, 2 or 3 were selected which resulted in 190 out of the original 240 species being prioritized in the ornamental category and 98 out of the 208 species in the industrial category have been selected.

This task has allowed the prioritized CWR checklist to be finalized, which is the basis of the Spanish National Inventory (SNI). The SNI contains 590 species that represent about 62% of the 945 CWR species selected in the first stage of the process. The prioritized checklist is available at http://pgrsecurespain.weebly.com/.

3.2.3.3 *In situ* gap analysis of CWR species in the National Inventory

In situ *gap analysis of food, fodder and forage CWR*

Good quality distribution data were obtained for 128 of the 140 priority food CWR species and for 167 out of the 184 priority fodder and forage CWR species in the SNI. With this information the *in situ* conservation gap analyses were carried out for these groups. Results were expressed as the ratio of population occurrences within protected areas (PAs) over total occurrences. The overall picture is that 37±24% (mean±SD) of the populations of the priority food CWR species occur within PAs. In 12 species no single population occurred within a PA. On the other hand, 47±23% of the populations of the priority fodder and forage CWR species occur within PAs, but in five species no single population occurred in a PA. To evaluate the ecogeographic representation of the populations of priority CWR that occur within PAs and assess the inherent genetic diversity preserved through them, a more precise type of gap analysis was implemented using an ecogeographic map of Peninsular Spain and the Balearic Islands (Parra-Quijano *et al*., 2012a). Results were expressed as the ratio of number of ecogeographic units represented within PAs over the total number of different ecogeographic units included in the distribution of the species. Overall, in the food category 65±27% of the ecogeographic units are represented in the populations that lie within PAs, while in the fodder and forage category this figure is 69±25%. The list of 140 priority food CWR and the results of *in situ* gap analysis are available at http://pgrsecurespain.weebly.com/crop-wild-relatives-in-spain-ndash-

gap-analysis-for-the-in-situ-conservation-assessment.html. These results were presented at the 4th Biodiversity Congress held in Bilbao (Spain), February 6–8 (www.congresobiodiversidad2013.com). The communication was awarded 'Best oral communication in the congress'. The corresponding Powerpoint presentation is available at http://congresobiodiversidad.com/wp-content/uploads/2013/01/S06-01.pdf. For the ecogeographic analysis of the populations in the Canary Islands, a climatic map based on the Köppen-Geiger climatic classification (Köppen and Geiger, 1936) will be used. This map has been requested from the Spanish Meteorological Agency (AEMET – www.aemet.es/es/portada).

In situ *gap analysis of ornamental CWR*

Good quality distribution data were obtained for 137 of the 168 and 95 of the 98 CWR species included in the ornamental and industrial categories respectively. With this information the *in situ* conservation gap analyses were completed for these groups. Results were expressed as the ratio of population occurrences within protected areas (PAs) over total occurrences. The overall picture is that 39.42±25.8% of the populations of the priority ornamental CWR species occur within PAs. In 18 species no single population occurred within a PA. Results of the evaluation of the ecogeographic representation of the populations of priority ornamental CWR that occur within PAs show that 59.95±29.32% of the ecogeographic units are represented in the populations that lie within PAs. All these results, along with those corresponding to the species contained in the industrial category will be presented at the 6th Plant Biology Conservation Congress that will be held in Murcia, Spain, 15 – 18 October (www.congresosebicopmurcia.es/index.aspx).

Hotspot and complementarity analysis

- The identification of the areas with the highest species richness (hotspots) for each CWR group is almost complete. For the food, fodder and forage categories, using 10x10 km grids, six areas have been identified as the richest (with 54–66 species out of 325). The zone with the highest richness (66 species) is located in northern Spain, in Navarra. Although it is not located within a PA, it is found very close to one (about 7 km to the southeast), called Robledales de Ultzama. The next 18 areas selected contain between 41 and 53 species.
- The same grid size was used for the richness analysis in the ornamental category. Ten areas were selected as the richest with 12–14 species. Two 10x10 km areas in northern Spain (in Navarra and Cataluña regions) were highlighted as the richest, with 14 species. Both zones already lie in PAs ('Sierra de Illón y Foz de Burgui' and 'Aigüestortes' respectively). The next 51 selected areas contain between 9 and 11 species.
- The complementarity analysis for the food, fodder and forage categories indicates that only ten locations would be sufficient to preserve the 325 priority species in these categories. Regarding the ornamental group, 61 areas would be needed to preserve the 137 priority species. Selecting the first 17 areas would provide the inclusion of about 61% of the species in the network of PAs—a similar result to that found by Maxted *et al*. (2007).

Gap analysis and complementarity analysis for the industrial category is underway. Finally, an overall gap analysis and complementarity analysis will be carried out with all the CWR species in the SNI with good quality distribution data. Results will be published in the national CWR conservation strategy document for Spain as a contribution to Deliverable 3.2.

3.2.3.4 *Ex situ* gap analysis

Information on seed accessions of the priority food, fodder and forage CWR species collected in Spain and held in major genebanks was obtained. The data managers of GRIN Taxonomy for Plants (www.ars-grin.gov/cgi-bin/npgs/html/index.pl?language=en) and EURISCO (http://eurisco.ecpgr.org/) were contacted for information. The Spanish National Genebank for PGRFA (Centro de Recursos Fitogenéticos) and the genebanks belonging to the Spanish Network of Seed Banks (www.redbag.org), which is associated to the corresponding network of Spanish Botanical Gardens, were also contacted. All the institutions provided the requested information. Overall, data on *ex situ* accessions of priority food, fodder and forage CWR species have been obtained from EURISCO, GRIN, the Spanish National Genebank for PGRFA, and the seedbanks of the Polytechnic University of Madrid (UPM), Royal Botanical Garden of Madrid, Botanical Garden of Alcalá de Henares, Atlantic Botanical Garden, Marimurtra Botanical Garden, Barcelona Botanical Garden, Soller Botanical Garden, Albacete Botanical Garden, Cordoba Botanical Garden, Valencia Botanical Garden, King Juan Carlos University seedbank and Viera y Clavijo Botanical Garden.

In total, 9492 accession records were compiled from these sources. It was observed that 234 out of the 325 (72%) priority species have at least one accession preserved in genebanks. Although this might seem a high percentage, it is important to note that not all of them are guaranteed to be preserved in optimal conditions and that seed availability may be low in some of them. In terms of representation of the genetic diversity of each species, only 98 species (30%) have more than ten accessions preserved in the seed banks. Therefore, in most cases, the few accessions conserved *ex situ* for each species may not be representative of the full range of genetic diversity of the species. It should also be considered that in some cases duplicated accessions shared among genebanks may exist which would account for the presence of less genetic diversity preserved *ex situ* than indicated by the initial results of data analysis.

In addition to the *ex situ* gap analysis described above, we aim to evaluate the geographic distribution of the accessions kept in genebanks and assess the geographic gaps in *ex situ* collections. Further work on this task, following Parra-Quijano *et al*. (2012b), will allow us to conduct an analysis that joins geographical gaps with ecogeographical information and richness areas to propose collecting expeditions to complete the *ex situ* national collection of CWR.

3.2.3.5 Additional activities

Finally, to validate the application of the ecogeographic land characterization maps used in the *in situ* gap analysis as a proxy to estimate genetic diversity with adaptive value, an experiment using *Lupinus angustifolius* L. (one of the prioritized species in the NI) as a reference species, has been started. From November 2012 to July 2013, plants derived from seeds obtained in locations with different water availability have been grown in a common garden for one whole cycle of cultivation to eliminate possible maternal effects. Plants from each population have been grown in separate compartments to avoid among population crosses. Morphological and fitness data have been gathered as start up comparison data for the experiment. A second cycle of cultivation in a common environment is foreseen to start in early December, which will be followed by a drought experiment that will take place in spring 2014.

3.2.4 Italy national CWR conservation strategy (UNIPG)

During the current reporting period, the UNIPG team has concentrated research on two main objectives:

1) To complete the CWR NI and create CWR priority lists.

2) To evaluate the status of the wild relatives of two important crops (*Beta vulgaris* and *Brassica oleracea*).

The CWR NI and the CWR priority lists

Our aim was to construct a solid basis for a CWR and wild harvested plant (WHP) conservation strategy. To this end we: i) created an Italian dataset of spontaneous and cultivated plants, ii) produced full CWR and WHP checklists for Italy, the Italian Peninsula, Sicily and Sardinia, iii) created prioritized CWR/WHP inventories for Italy, the Italian Peninsula, Sicily and Sardinia, and iv) outlined the steps to be taken immediately to preserve the priority taxa and to develop a complementary conservation strategy.

An annotated and synonymized national checklist (a Working Database of the Italian Vascular Flora) which includes a total of 11,706 specific and infra-specific taxa (7806 species) was compiled by consulting several global and national data sources. Out of these, 10,755 are CWR and/or WHP (92% of the taxa occurring in Italy) and form the Italian CWR/WHP checklist (CWR/WHP List). CWR/WHP checklists were also obtained for the Italian Peninsula, Sicily and Sardinia (CWR/WHP Italian Peninsula, Sicily and Sardinia Lists).

Based on a number of prioritization criteria (importance of the related crops, status and need of protection or monitoring), we prioritized the Italian CWR/WHP checklist and obtained the Italian prioritized inventory (CWR/WHP PList) which includes 1115 taxa. Out of the taxa included in the CWR/WHP PList, 125 are of top priority because they are a) related to crops of worldwide importance for food security, b) autochthonous, and c) in considerable need of protection or monitoring. Prioritized inventories were also obtained for the Italian Peninsula, Sicily and Sardinia (CWR/WHP Italian Peninsula, Sicily and Sardinia PLists). The results of this work are available at http://vnr.unipg.it/PGRSecure and will be published in peer-reviewed journals (Landucci *et al*., 2013a, b).

Little is known about relic CWR/WHP Italian populations and whether all of them are adequately protected *in situ* and *ex situ* (see also the information reported below on *Brassica* and *Beta* populations). Information on the distribution, abundance, ecological conditions, census and current conservation status of CWR/WHP populations should be immediately collated for planning their safeguard.

Through the Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA) agency, contact has been made with the Italian Ministry of the Environment (Ministero dell'ambiente, del territorio e del mare) to further develop steps towards the safeguard of the Italian CWR.

Study on the genera *Brassica* and *Beta*

According to the prioritization process already described in the first periodic report, and considering the resources available for this work package, the UNIPG team decided to concentrate the study on two genera with high economic importance: *Brassica* and *Beta*. In particular, the study has been

focussed on the taxa *Beta vulgaris* L. subsp. *maritima* (L.) Arcang., *Brassica montana* Pourr. and *Brassica incana* Ten., three native species of the Mediterranean basin. Actual distribution, conservation status and risk factors for these species were investigated with the aim to plan a suitable conservation strategy.

The study of the two species of the genus *Brassica* was carried out across the Italian peninsula and in particular along the rocky coasts of central Italy. The study on the genus *Beta* was performed exclusively in the Umbria Region, where clay badlands in the southwest part of the Region represent the most internal limit of the distribution area of *Beta vulgaris* subsp. *maritima*. In the first instance, *Beta trigyna* Waldst. et Kit., which originates from southeastern Europe, was also taken into account because it is recorded from some localities of Umbria (Viegi *et al*., 2003); however, no population has been confirmed by the field research. Presently, the occurrence of this species has been confirmed in Sardinia only, where it is considered to have escaped from cultivation (Conti *et al*., 2005; Bacchetta *et al*., 2009).

The adopted methodologies of study were differentiated for the three species, considering their distribution, their particular ecology, the habitat types and the sampling effort, as described below.

Study on *Brassica montana* and *B. incana*

Initially, the exact distribution of these species in Italy was assessed using data available in the literature (Pignatti, 1982; Conti *et al*., 2005) and databases such as 'anArchive' (www.anarchive.it/) and 'The ECPGR Brassica Database'; (http://documents.plant.wur.nl/cgn/pgr/brasedb/default.htm), and personal communications with colleagues. During the summer the occurrence and the current conservation status of some populations were directly investigated in the field, visiting both known and new localities. The remote data were then compared with the current situation and a first estimate of the population parameters was obtained.

The distribution areas of both species are fragmentary due to their particular ecological requirements. Both species grow on limestone cliffs making it difficult to estimate the conservation status of each single population in terms of number of individuals.

B. montana is a Mediterranean-Atlantic species, recorded by Pignatti (1982) and Conti *et al*. (2005) in eight Italian Regions (Liguria, Emilia Romagna, Toscana, Marche, Lazio, Campania, Basilicata and Calabria). For ten localities in Toscana, Marche, Liguria and Campania that were explored by Spanish researchers in 1985, detailed geographic data (GPS coordinates) of populations were available. We visited one of the above mentioned sites (Monte Corchia, Alpi Apuane, Toscana) and other three sites of Marche, Liguria and Toscana where three populations were found. In all cases except one (Porto Baratti, Populonia, Toscana), the populations appeared very small, with between 5 and 30 individuals.

B. incana is a species with a southeast European distribution, recorded in Italy exclusively along the calcareous rocky coast of seven administrative Regions (Toscana, Lazio, Campania, Basilicata, Puglia, Calabria and Sicilia). The study on this species was focused on central Italy that represents the more northern distribution limit. Also in this case we based our explorations on GPS data available for previously sampled populations (by the Spanish researchers in 1984) and available from literature. These data concerned 16 localities (and relative populations) of Toscana, Lazio and Campania Regions. Of these, 11 localities were visited during this summer. In two cases the populations

previously recorded in the literature were not found anymore—at Monte Argentario (Toscana) and at Monte Circeo (Lazio). However, the bibliographic records of occurrence were not detailed enough and consequently the occurrence of the species in these localities cannot completely be excluded.

The size of the extant populations seems to be reduced based on a comparison between field data and data from the literature. In addition, the populations appear to be threatened by invasive human activities. Seed samples were also collected from some of the populations recorded in the field.

Study on *Beta vulgaris* subsp. *maritima*

This subspecies, related to the crop *Beta vulgaris* L. subsp. *vulgaris*, has a Euro-Mediterranean distribution and in Italy is recorded by Conti *et al*. (2005) for almost the whole of the country with the exception of the landlocked Regions. The occurrence of the taxon in the Umbria Region has already been recorded by us a few years ago in a very restricted area in the southwest of the Region (the data are still unpublished). This taxon usually grows along sandy or clay coasts on soil reach in salts. In Umbria, this subspecies grows on badlands formed by Pleistocenic marine clay sediments in a part of the Region characterized by Mediterranean climate. The reasons that make the occurrence of this taxon special in Umbria Region are: (i) the particular localization which is more internal then in other Regions; (ii) the fact that not all Pliocenic or Pleistocenic marine badlands in the same geographical area are characterized by the occurrence of this species, despite the fact that the ecological conditions appear to be the same; and (iii) the morphological variability of the investigated populations compared to coastal ones.

These considerations have led our team to carry out a more detailed study aimed at understanding the ecological requirements of the subspecies and its variability at local scale.

Data from four different localities have been collected following a specific protocol. In each selected area, three plants were randomly collected. These have been prepared for the conservation as exsiccata and have been used for morphological analysis (still in progress). For each sampling locality, about 30 $1m^2$ plots along vertical and horizontal transects within the badland area were sampled with the aim to collect data considering the possible variability of ecological range. The parameters collected for each plot are: slope, exposure, the percentage cover value of *Beta* plants (intended as projection on the ground of aerial parts of the plants), percentage cover value of the other plant species, percentage of flowering individuals, maximum height of *Beta* plants, number of polycormic and monocormic plants, numbers of juveniles and the total number of individuals.

We are presently analysing data collected on the investigated populations of *B. vulgaris* subsp. *maritima*, *Brassica montana* and *B. incana* in more detail in order to draw conclusions that can be used to develop a conservation strategy for them.

3.2.5 Czech Republic national CWR conservation strategy (UoB)

The development of a national CWR conservation strategy for the Czech Republic 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 has utilized 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 the Czech Republic, as well as other national experts (e.g., from herbaria and crop research institutes). Box 1 summarizes progress in the development of a national

CWR conservation strategy for the Czech Republic. An article has been published in Issue 9 of *Crop wild relative* (Taylor *et al*., 2013), a peer-reviewed journal article is in preparation (Taylor *et al.*, in prep.) and the full report will be published on the PGR Secure website during the next reporting period.

Box 1. Summary of progress in the development of a national CWR conservation strategy for the Czech Republic (Taylor *et al*., 2013, in prep.).

Following the development of a CWR checklist and inventory of priority CWR for the Czech Republic in early 2012, *in situ* and *ex situ* conservation gap analysis was carried out using Geographic Information Systems (GIS). In order to conduct GIS analyses on the 238 priority CWR taxa, distribution data were collated, mostly from the online database of the Nature Conservation Agency of the Czech Republic (AOPK ČR, 2012). These data were supplemented with data from collecting databases at the Crop Research Institute, Prague (VURV; V. Holubec pers. comm.), EURISCO (European Internet Search Catalogue of *Ex Situ* PGR Accessions) (EURISCO, 2012) and the Global Biodiversity Information Facility (GBIF, 2012). A number of weeks were spent tidying these data, formatting them into usable, consistent text files, removing very old records, taxa recorded in gardens and outliers, and manually georeferencing records with only descriptive locations. For taxa with fewer than 50 records from other sources, descriptive location data were retrieved from the database of the herbarium records in collections of the Czech Republic (MZM, 2011) and then georeferenced online using Mapy.cz.

PA data were downloaded from the European Environment Agency website (EEA, 2012), data on a range of botanically-relevant environmental variables were gathered, and all the data were analysed using DIVA GIS (www.diva-gis.org) and Maxent (www.cs.princeton.edu/~schapire/maxent/) to provide recommendations for both *in situ* and *ex situ* CWR conservation. The analysis was supported by Mauricio Parra-Quijano (Universidad Politécnica de Madrid) who created a novel generalized ELC map for the Czech Republic which summarizes spatial variation in environmental characteristics that may influence plant distribution and evolution (Parra-Quijano *et al*., 2012c).

DIVA GIS allows the researcher to 'extract values by points' to conduct a gap analysis. For each of the 326,401 recorded priority CWR locations, the presence of that location within or outside a PA was analysed. Results show that 95.4% of the priority CWR taxa occur in PAs; however, such passive protection does not necessarily constitute conservation (Maxted *et al*., 1997). Based on a complementarity analysis (Rebelo, 1994), a network of ten genetic reserves would ensure the conservation of 88.6% of priority species. Hotspot analysis yielded almost equivalent taxonomic coverage but with less extensive geographic and ecogeographic coverage.

In contrast, huge gaps in *ex situ* accessions of the priority CWR were identified. Over 70% of taxa have no known accessions originating from the Czech Republic. Considering their potential importance for the Czech economy and food security, the proactive collection of genetic material from the Czech Republic is essential. Priority CWR diversity is highest across South Moravia, which also contains the most important CWR hotspot in the country (the Pálava Protected Landscape Area, containing 50.4% of priority taxa), so collections here would immediately fill some important taxonomic gaps. Assuming that genetic material varies spatially, further disparate sites for collection of genetic material are suggested that would maximize genetic variation in accessions for as many

taxa as possible. Results of the *ex situ* gap analysis can also aid the design of collecting strategies for individual taxa that would help to maximize genetic diversity in *ex situ* collections.

Task 3.3: European priority gene pool CWR conservation strategy. Partners involved: UoB, BIOVER, UNIPG, MTT, URJC

The starting point for Task 3.3 is the CWR Catalogue for Europe and the Mediterranean (Kell *et al*., 2005) which is a comprehensive list of CWR taxa in the region and their occurrences in geographical units (countries or sub-national units) related to cultivated plants of all types (including food, fodder, forage, industrial plants, ornamentals and medicinal plants)[7].

The CWR Catalogue provides an overview of the breadth of crop and CWR diversity in the European region and the baseline data for conservation planning at regional scale. Further, national CWR checklists have been extracted and provided to each European country for use in the national PGR programmes to form the basis of national checklists, inventories and subsequently, national CWR conservation strategies and action plans. However, for the development of a Europe-wide CWR conservation strategy, it is necessary to select regional priority species out of the 25,000+ in the database—those with the greatest potential to contribute to food and economic security in the region.

A draft list of 339 priority CWR species native to Europe (Milestone 20) has been produced based on three main criteria that are of greatest relevance when assigning priorities to CWR species in the context of conservation planning (Kell *et al.*, in prep. a):

a) The socio-economic value of the crop to which they are related (Ford-Lloyd *et al*., 2008)
b) Their potential ease of use or known value in crop improvement programmes (Maxted and Kell, 2009; Maxted *et al*., 2012)
c) Their relative threatened status (Ford-Lloyd *et al*., 2008; Maxted and Kell, 2009).

Wild relatives of more than 30 priority crop gene pools are included in the priority list. Publications detailing the prioritization process are under preparation (Maxted *et al.*, 2013; Kell *et al.*, in prep. b).

To finalize the priority species list, further data analysis and verification is needed following access to updated Euro+Med PlantBase data and the Harlan and de Wet Crop Wild Relative Inventory (www.cwrdiversity.org/checklist/). Once these checks and updates have been carried out, the list of regional priority species will be published online and notification circulated to the relevant PGR National Programmes who will ultimately be responsible for the conservation of populations of the regional priority species at national level (Maxted *et al*., 2013; Kell *et al.*, in prep. b).

Diversity and gap analyses of the priority species will be undertaken during the next reporting period to identify complementary (*in situ* and *ex situ*) conservation needs. It is anticipated that at regional level for the ± 339 priority species, complementarity analysis at taxon level may be informative for conservation planning, but it is also desirable to undertake infra-taxon diversity analyses (genetic where existing information is available combined with ecogeographic diversity) for all priority

[7] Since this resource was created (as an output of the EC FP5-funded PGR Forum project), the floristic data that form the basis of the Catalogue (Euro+Med PlantBase) have been revised and updated for more than 95% of the records. Further, opportunities for enhancements to the Catalogue have also been identified. Therefore, the CWR Catalogue is being revised using the latest data provided by the Euro+Med PlantBase Secretariat and according to the planned enhancements. This work is currently underway.

species to identify specific locations representing the widest range of diversity of each species with the aim of focusing conservation efforts on populations of target taxa that represent the widest pool of genetic diversity and that are most likely to contain adaptive traits of interest for crop improvement (Kell *et al*., 2012; Maxted *et al*., 2013; Kell *et al.*, in prep. b).

After diversity analyses have been undertaken, *in situ* and *ex situ* conservation gap analyses will be performed using standard techniques. Results will inform the development of a comprehensive complementary regional CWR conservation plan which will include details of a proposed regional network of CWR genetic reserves and germplasm collection and *ex situ* conservation needs.

Task 3.4: European generic CWR conservation strategy. Partners involved: UoB, BIOVER, UNIPG, MTT, URJC

The national (Tasks 3.1 and 3.2) and regional (Task 3.3) approaches to CWR conservation in Europe may be considered as bottom-up and top-down respectively, but what is critical is that the two approaches are not viewed as independent of one another—rather that they are harmonized and implemented in a coordinated way towards an integrated European CWR conservation strategy (Kell *et al.*, in prep. b; Maxted *et al*., in prep.). There is therefore a need to bring together the national and regional approaches into a coherent European approach to maximize the active conservation of priority populations of CWR taxa throughout the region. The technical aspects of the development of the integrated European CWR conservation strategy are being developed and elaborated by Kell *et al*. (in prep. b) and Maxted *et al*. (2013). Box 2 presents a summary of the proposed approach.

Box 2. Proposed approach to the integrated European CWR conservation strategy (extracted from Kell *et al*., in prep. b; Maxted *et al.*, 2013)

a) National CWR conservation strategy – each country should have its own national CWR conservation strategy implemented through *in situ* and *ex situ* activities undertaken by national agencies.
b) Regional CWR conservation strategy – the regional strategy comprises a network of *in situ* conserved priority CWR populations backed up with samples conserved *ex situ*. The regional target populations are identified/endorsed by a regional authority (such as the ECPGR *In situ* and On-farm Conservation Network) without consideration of national borders. Responsibility for *in situ* and *ex situ* conservation actions will be taken by national agencies in the appropriate countries with oversight and support provided by the regional authority.
c) Integrated European CWR conservation strategy – two distinct levels of strategies are married into one coherent integrated whole:

- Bottom-up integration – Priority national CWR populations (Most Appropriate Wild Populations – MAWPs) are nominated by the national PGR coordinator for inclusion in the integrated European CWR conservation strategy for formal recognition as part of the European network of priority *in situ* CWR populations. For a country to designate a MAWP, the population should meet the selection criteria (see section 3.7). Note: a single site may contain more than one MAWP; in fact this would be encouraged where appropriate to maximize the value of the conservation site and to focus conservation resources. A MAWP may occur within an existing protected area but may also occur outside of PAs. In these cases, MAWPs outside of PAs may be designated and the necessary active and sustained *in situ* CWR conservation management commitment made.

- Top-down integration – Priority CWR populations identified in the regional CWR conservation strategy are implemented at national level as detailed in b above.

A critical aspect of the strategy is the integration of national and regional CWR conservation actions. This requires the inclusion of regional priority species in national CWR conservation planning. European nations should have an obligation to monitor/conserve populations of these species, whether nationally threatened or not. This approach will require a regional authoritative body to oversee its implementation; therefore, the practicalities of implementing this integration need to be addressed and incorporated into European policy on agrobiodiversity conservation. As no European legislation with a focus on CWR conservation currently exists, there is at present no means of enforcing this obligation on EU member states or those European countries not within the EU. Emphasis therefore needs to be placed on the development of a clear regional policy on CWR conservation with buy-in from national PGR programmes throughout the region.

In relation to the policy aspects of the integrated European CWR conservation strategy, there are a number of other practical issues to consider, including the creation of a regional network of MAWPs that combines priority populations at regional and national levels, how to ensure the success of conservation actions that depend on cross-border cooperation, and the need for a central coordinating body to collect reports on the conservation of priority CWR resources.

The integrated European CWR conservation strategy will require periodic review and updating according to future developments in CWR conservation and utilization science and practice, as well as regional agrobiodiversity conservation policy. For example, the initial strategy may be developed to include other socio-economically important (non-food/forage/fodder) crops in Europe, particularly when a number of national CWR conservation strategies are available for review and comparison and in which particular non-food/forage/fodder crop gene pools may be highlighted as priorities across the region. The planning and implementation of the initial strategy can act as a blueprint for the inclusion of further crop gene pools. Continual monitoring of the implementation of the strategy will be required to highlight aspects requiring adaptation in the future.

As highlighted in Box 2, the integrated European CWR conservation strategy will have practical and policy implications that will require further development by the relevant players beyond the lifetime of the PGR Secure project. Further discussion on these aspects of the European strategy and details of the strategy itself have been drafted (Kell *et al.*, in prep. b; Maxted *et al.*, 2013) and will be published in the final reporting period.

WP3: Deviations from Annex I

The objective of Task 3.1 is to provide support for the production of CWR NIs in European countries and to begin the process of creating a European CWR inventory based on the NIs. The production of the NI is one essential step in the process of developing a national CWR conservation strategy—we are taking this task further by encouraging and providing support for the development of national CWR conservation strategies. This deviation will strengthen the outputs and add value to the project.

The Consortium is contracted to develop national CWR conservation strategies for Finland, Italy and Spain. In addition, strategies for Albania, Bulgaria, Cyprus, the Czech Republic, Norway 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.

The CWR inventorying work in Italy was extensive and UNIPG used a greater number of person months than initially foreseen.

Deliverable 3.1, 'European crops and CWR inventory' was due to submitted in month 28. This deliverable has been delayed as the responsible partner (UoB) is waiting to receive the most up to date taxonomic data from the Euro+Med PlantBase Secretariat. It is not anticipated that this delay will have a major impact on the WP3 work programme or on any other WP.

Deliverable 3.2, 'Exemplar national CWR conservation strategies' was due to be submitted in month 30. This deliverable has been delayed as the responsible partner (UoB) is waiting for the exemplar strategy documents to be submitted by the relevant partners (UNIPG, URIC and MTT). It is not anticipated that this delay will have a major impact on the WP3 work programme or on any other WP.

MS20, 'Priority European crops and CWR identified' was due to be achieved by month 29. As reported under Task 3.3, a draft list of priority species has been produced but requires some further checks and updates before publication. It is not anticipated that this delay will have a major impact on the WP3 work programme or on any other WP.

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

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

In order to give all European countries standard and agreed guidelines on how to record *in situ* data for LR, and following the recommendations given by ECPGR National Inventory Focal Points (NIFPs) during the Palanga workshop, 'Descriptors for Web-Enabled National *In Situ* Landrace Inventories' were prepared by V. Negri, N. Maxted, R. Torricelli, M. Heinonen, M. Veteläinen and S. Dias, taking advantage of the advice provided by Adriana Alercia (Bioversity International), Theo van Hintum (ECPGR Documentation and Information Network coordinator; Centre for Genetic Resources, the Netherlands), and Lorenzo Maggioni (ECPGR Secretariat, Rome). The descriptors are published on the PGR Secure website: www.pgrsecure.bham.ac.uk/sites/default/files/documents/helpdesk/LRDESCRIPTORS_PGRSECURE.pdf. The document has been submitted as Deliverable 4.6.

To facilitate the compilation of the European inventories, an MS Access database for *in situ* LR data recording was prepared on the basis of the 'Descriptors for Web-Enabled National *In Situ* Landrace Inventories' and is available via the PGR Secure online helpdesk (LR resources), along with a user manual: www.pgrsecure.bham.ac.uk/sites/default/files/documents/helpdesk/PGR_Secure_LR_data_recording_tool.zip. The user manual and link to the database has been submitted as Deliverable 4.7.

Both the 'Descriptors for Web-Enabled National *In Situ* Landrace Inventories' and the related database are tools that will greatly facilitate the construction of the European LR inventory and are major outcomes of the project.

The LR helpdesk has been updated with links to the tools developed by the PGR Secure WP4 team for recording LR *in situ* information ('Descriptors for Web-Enabled National *In Situ* Landrace Inventories' and 'MS Access database for *in situ* data recording') and other relevant information.

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

4.2.1 Italy national LR conservation strategy (UNIPG)

The LR conservation strategy should be based on reliable *in situ* data. Considering that the Italian legislative frame assigns the responsibility for plant genetic resources (PGR) conservation to the Italian Regions and Autonomous Provinces, all of them were asked to provide UNIPG with *in situ* data. During the current reporting period, data were collected from most Regions and Provinces and an official inventory based on information provided was published (Negri *et al*., 2013). This list can eventually be annotated with data retrievable from the literature and other sources.

The inventory includes all of the LR that have been recorded by the Italian Regions and Autonomous Provinces across the last two decades and reports data available as of January 2013. It is structured on the basis of the 'Descriptors for Web-Enabled National *In Situ* Landrace Inventories' (Negri *et al*., 2012a) and includes, for each landrace, the scientific name of the crop, the local name, the accessions recorded, the geographic coordinates and altitude of the site where each accession is maintained *in situ*, and other information. The inventory comprises 4806 accessions belonging to 2365 LR in 329 species and includes fruit trees, vegetables, grain legumes, forages, cereals, ornamentals and other crop types.

On the basis of the data collected, in order to analyse the density and the distribution of the LR cultivation areas, the records were mapped y using an orthophoto map and GIS program. The highest number of LR were recorded in Umbria (378), Calabria (288), Sicily (251), Basilicata (212) and Campania (203) (Fig. 1). These Italian Regions accounted for more of 50% of total LR recorded. The LR most frequently recorded are fruit trees (73%), grain legumes (12%) and vegetables (9%) (Fig. 2).

This is the first inventory of *in situ* maintained LR for Italy and forms the basis for the development of a national LR conservation strategy. If a holistic approach to *in situ* conservation is to be used, the inventory data can be used to identify the 'Most Appropriate Areas' (MAA) (i.e., the areas that have the highest landrace density and diversity of the territory, and that include protected areas). These areas can be proposed to the National or Regional Authorities as areas in which to set up or enhance political and economic actions in favour of priority LR and agrobiodiversity conservation (Negri *et al*., 2012b). Taking a monographic approach, the inventory data can also be used to implement specific conservation strategies for single LR or LR within a specific crop group.

The inventory can also facilitate the registration of LR in the European Common Catalogue of varieties as 'conservation varieties', which was recently suggested as a means to promote *in situ* LR conservation (Spataro and Negri, 2013). Finally, it can facilitate a gap analysis process aimed at identifying those LR that have not yet been collected and that need to be preserved in *ex situ* collections.

The national LR conservation strategy for Italy will be developed further in the final reporting period.

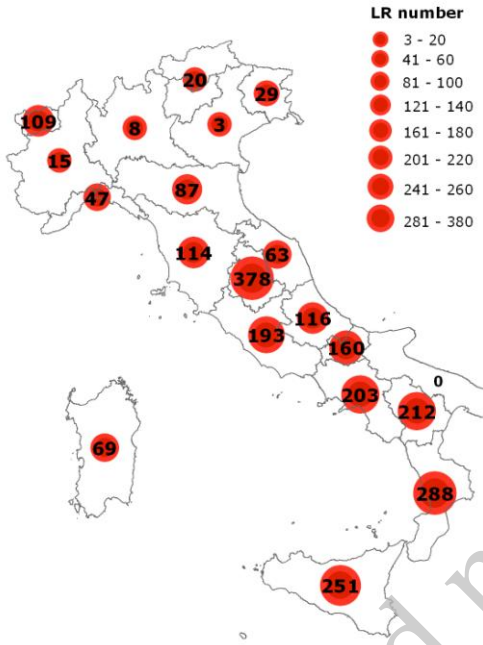

Figure 1. The number of landraces by Region

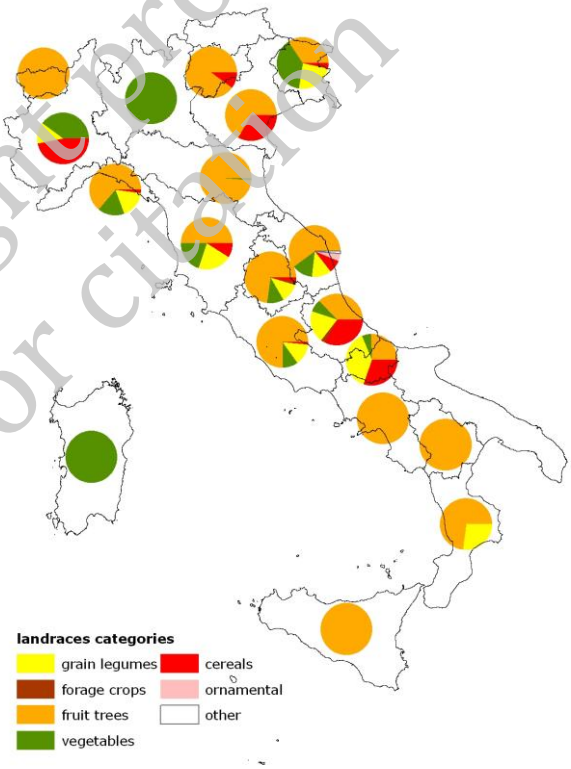

Figure 2. Landrace crop type by Region

4.2.2 Finland national LR conservation strategy (MTT)

National inventory of LR potato onions

During the current reporting period an *ex situ* and *in situ* inventory of LR potato onions (*Allium cepa* Aggregatum-group/*A. cepa* var. *solaniume*) has been initiated in Finland. Twenty-nine accessions of potato onions have been accepted for long-term storage in field collections at MTT Agrifood Research Finland. No identification of accession genotypes has previously been carried out.

In order to contact growers we released a call for potato onions still in cultivation. Local and national media has been essential in spreading the call. A national TV channel broadcasted a programme on potato onion, interviewing one grower as an example. We published articles in trade magazines. Regional and local newspapers published several articles on the basis of our press releases. We were invited to participate in short radio programmes on the topic. In addition, the call was also announced at selected public events (e.g., garden fairs).

We received 45 contacts of potato onion growers from throughout Finland. We collected the preliminary information (contacts, location and estimated growing history) by phone or email. The detailed plant-specific data and grower data will be collected after by the end of 2013. Growers of potato onion LR were asked to send a couple of bulbs as a sample for DNA analysis and 41 samples were received. The bulbs were planted in pots and grown in a glasshouse from two days to two to three weeks to get a couple of centimetres of green shoot for DNA extraction. The CTAB-method was used for DNA extraction. At the same time the 29 accessions of potato onions and six accessions of shallots (*A. cepa* Ascalonium-group) in the national collection were also analysed. Two bulb onions (*A. cepa* Cepa-group) (one yellow and one red) were used as a standard. Altogether, 72 samples were analysed with nine microsatellite DNA markers.

The DNA analysis results of cultivated samples were compared with the results of the accessions in the Finnish national collection in order to estimate the genetic variation within the material and to see if any clones have been distributed to several locations. In total, 22 different genotypes (clones) were found by DNA analysis. Sixteen of them are already in the national field collection (*ex situ*). About half of the accessions of the national collection are overlapping clones (duplicates). Among the cultivated samples there were six genotypes that did not exist in the national field collection but which have now been included. In the spring of 2013, 14 accessions were sent for field tests for Thysanoptera resistance at Stichting Dienst Landbouwkundig Onderzoek (DLO) (PGR Secure Partner 2 leading WP1).

The work was carried out at MTT Agrifood Research Finland by researcher Maarit Heinonen (in charge of the inventory protocol, calls, and contact with growers), principal research scientist Kristiina Antonius (in charge of the DNA protocol, PCR and DNA analysis) and senior laboratory technician Jaana Ala-Kaarre (growing, DNA extraction). This research group has applied for national funding to study the cultivability, resistance (viruses, pests) and quality of LR potato onions in Finland.

National inventory of LR apples and pears

Ex situ and *in situ* inventories of LR apples (*Malus domestica*) and pears (*Pyrus communis)* have also been initiated in the current reporting period. Fifty-one accessions of local apple varieties and 15 accessions of local pear varieties have been accepted for long-term storage in field collections at

MTT Agrifood Research Finland. Identification of accession genotypes has already been carried out. About 20 to 30 local apple varieties described in pomological literature in the early 20th century are missing from the collection. Furthermore, it is unclear whether all the varieties in the pear collection are of Finnish origin. The data on LR apples and pears are limited and scattered. The LR apples and pear varieties have been listed with reference to a range of Finnish pomological literature of the late 19th and early 20th centuries.

In order to contact growers, we released a call for the listed 80 local apple and 16 pear varieties (especially original mother trees and other old trees). Local and national media has been essential in spreading the call. We published articles in trade magazines. Regional and local newspapers published several articles on the basis of our press releases. We were invited to participate in short radio programmes on the topic. According to the media follow-up in MTT, there have been at least 90 news items and articles in the Finnish media. In addition, the call was also announced at selected public events (e.g., garden fairs).

The research group received over 400 contacts via phone and email, mainly about old apple trees (c. 40 about old pear trees) from throughout Finland. We have received information about 79 apple and eight pear varieties on the list. Ten to twelve local apple varieties were found which were not described in old pomological literature but have spread to into local cultivation. Nine local apples listed have not yet been located. Six new local apple varieties were added to the national *ex situ* field collection. We collected the preliminary information (contacts, location and indigenous knowledge) about the possible varieties. These data have mainly been collected by phone or email, but we have also visited 45 old gardens where a LR apple is known to originate or an old tree of that variety exists.

Leaf samples from 235 apple trees and 23 pear trees have been collected for DNA genotype analysis since the beginning of the project. Data analysis of 12 local apple varieties has been completed.

The work was carried out at MTT Agrifood Research Finland by researcher Maarit Heinonen (in charge of the inventory protocol, calls, contacts to growers), principal research scientist Kristiina Antonius (in charge of the DNA-protocol, PCR, DNA-analysis), senior laboratory technician Jaana Ala-Kaarre (DNA extraction), senior research technician Hilma Kinnanen (calls, contacts to growers, morphological identification) with her technician group (four members), senior research technician Ritva Valo (calls, contacts to growers), and researcher Sanna Kauppinen (calls, contacts to growers). Because of insufficient funding awarded to develop the Finnish national LR conservation strategy, this research group has applied for national funding to complete the inventory of LR apples and pears. So far it has been granted €105,000.

In situ inventory of LR cereals

During the current reporting period, plans were made to update the *in situ* LR cereal inventory of Finland created in the early 1990s and 2000s. In order to contact 'new' LR cereal growers, a new call has been launched: a TV call for LR cereals. It was announced for the first time in March 2012 and had several re-runs. The TV call was planned with a famous chef who has their own cooking programme using local and organic foods. Two new LR farmer contacts were established. The detailed plant-specific data and grower data will be collected by the end of 2013. This work was carried out at MTT Agrifood Research Finland by researcher Maarit Heinonen.

4.2.3 UK national LR conservation strategy (UoB)

Initial progress towards producing a UK LR inventory was made prior to the commencement of PGR Secure and completion of the UK inventory and strategy is planned to begin in 2014. A complementary funding application was submitted to the UK government and indications are that it will be successful, although the negotiations with the UK government have been protracted. It is expected that the funds to complete this work will be made available to UoB in 2014. In the meantime, through collaborative projects and student research projects, work has continued on surveys of allotment-holdings in the West Midlands, Gloucestershire and Essex regions of the UK.

Task 4.3: European LR priority gene pool (Avena, Beta Brassica and Medicago) analysis and specific European conservation strategy. Partners involved: UNIPG, MTT, UoB

Discussions among the involved partners were initiated in June 2013 and the work to achieve this task will be carried out in the final project reporting period.

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

Discussions among the involved partners were initiated in June 2013 and the work to achieve this task will be carried out in the final project reporting period.

WP4: Deviations from Annex I

There have been no deviations from Annex I during the current reporting period for the research activities. However, the LR inventorying work in Italy was extensive and UNIPG is possibly going to use a greater number of person months than initially foreseen. Also the LR inventorying work in Finland was extensive and MTT has used a greater number of person months than initially foreseen. These extra person months are covered by national funding awarded.

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, IKI, NordGen

On the advice of a market researcher who was contacted at the start of the project, the collecting of information for the SWOT analysis was divided into two steps: (i) the semi-structured personal interviews with a few experts per country and (ii) the online questionnaire allowing the collection of responses from many PGR experts in a standardized form. As reported in the first periodic report, well-informed country key persons were identified, a questionnaire suited for semi-structured interview was developed and discussed with the Breeders' Committee and used to perform interviews with the various PGR stakeholders (genebanks, public breeding institutes, breeders, agro-NGOs and governments). Not all interviews had been carried out by the end of the first reporting period (end of February 2012); interviews in France, the Netherlands, Finland and Lithuania still had to be carried out. The semi-structured interviews in France and the Netherlands were carried out in June/July 2013 and country reports were written. The interviews in Finland and Lithuania were carried out in May/June 2013. For the northern region, including Finland and Lithuania, country reports have not been written due to the low number of stakeholders per country. The results are instead summarized in two regional reports, one for the Baltic and one for the Nordic countries. For the other European countries a summary on the conservation and utilization of PGR was written per country on the basis of all interviews. The country/regional reports have been circulated to the key persons or consultant in each country and in most cases these persons agreed to be co-authors of the reports. Summaries of the country/region reports, including the list of interviewed stakeholders,

were submitted as Deliverable 5.1 to the EC in August 2012. This report is publicly available via the PGR Secure website (www.pgrsecure.bham.ac.uk/sites/default/files/documents/public/D5.1_report_on_stakeholders.pdf). Deliverable 5.1 can be seen as an intermediate result in the route towards the writing of the final report in 2014 on the constraints of conservation and utilization of PGR in Europe.

Of the 226 persons responding to the online questionnaire (see Task 5.2), 67 provided geo-referenced addresses of their institutions and a description of the crop groups they are working with. After removal of one duplicate entry, the data set was edited to improve the data usability. Partner 3, Bioversity provided a list of EURISCO collection holders (327 entries) which was completed with the help of WIEWS (http://apps3.fao.org/wiews/wiews.jsp), completely geo-referenced and added to the stakeholder group data base hosted by Partner 4, JKI. In July, JKI started to develop the web-application 'PGR Stakeholder Community Network' (PGR-COMNET) to visualize the 393 stakeholders on a map. The application allows the user to search for stakeholders by country and by group (i.e. government, genebank, public breeding research, variety breeding, and agro-NGO) or by their main crop activities. With the help of Partner 1, UoB the application was embedded into the PGR Secure website (www.pgrsecure.org/pgr-comnet). PGR-COMNET has been available online since the end of August 2013. PGR-COMNET guides users to the ECPGR and EURISCO homepages and is linked with Arca-Net, a similar web-application of the NGO sector. PGR-COMNET will facilitate stakeholders to establish contacts which in turn will promote the use of CWR and LR through improved cooperation.

Task 5.2: SWOT analysis of European PGR conservation and use community needs to promote CWR and LR use. Partners involved: DLO, JKI, NordGen

Based on the experiences gained from the semi-structured interviews, an online questionnaire was developed. This needed specific attention as only a few critical questions can be posed in an online questionnaire. Therefore, two rounds of email communication took place between the WP5 partners and a meeting in July 2012 in Braunschweig to formulate the critical questions. Also, the final draft of questions for the online questionnaire was sent to the PGR Secure partners and the EAB, as agreed at the first annual consortium meeting, and feedback provided was taken into account in the final design of the questionnaire. The first version of the online questionnaire created with the SurveyMonkey tool was sent to the Breeders' Committee as well as to consultants of the central European region for pilot testing and it proved that it worked well for our purposes. The questionnaire was divided into five stakeholder group specific sections with 30–40 questions each. The first part of the online survey served to gather information required for the completion of the preliminary SWOT. In the second part, information required to generate the web-based map of stakeholders was collected. The questionnaire was launched on 18 September 2012 and closed on 15 November 2012. The response quota reached around 20% at the closure date (i.e., 226 of the 1160 contacted persons/institutions provided answers). The survey was completed by 131 respondents (ca. 11% of 1160), and 95 stakeholders opted out at various stages of the questionnaire. Seventy respondents provided the addresses and other contact details of their organization and agreed to the publishing of the organization's name and activity profile on a web-based map. The data collected with the online questionnaire are currently being analysed and will be used in combination with the country/region report for the preparation of an input paper for the stakeholder workshop (Deliverable 5.4). The final report entitled 'Constraints in the conservation

and utilization of plant genetic resources in Europe – a stakeholder analysis' (Deliverable 5.5), will be written with feedback from the stakeholders and Breeders´ Committee.

Concerning the planning of the stakeholder workshop, initially it was considered that the workshop would be held in Hungary in cooperation with Zoltán Bedö, Institute of the Hungarian Academy of Sciences, but the logistics of such an arrangement proved to be complicated. Instead the workshop will be held in Wageningen, the Netherlands, 25–29 November 2013. Initial bookings have been made for hotel, venue and catering, and a budget has been allocated to include travel costs for 90 invited participants. To select appropriate participants for the workshop, the country key persons in each country have been contacted and asked for suggestions for participants to represent each country and stakeholder category, and a list of names has been compiled. Participants from this list have been invited from all over Europe and 62 had confirmed participation by the end of August. A draft agenda for the three-day workshop is available on the workshop website (www.nordgen.org/index.php/en/content/view /full/2481/) which was established and is hosted by NordGen. It has been accessible via a link in the navigation menu of the PGR Secure website since the end of August 2013.

Task 5.3: Create opportunities to develop new partnerships between CWR and LR conservationists and breeders in Europe. Partners involved: DLO, JKI, NordGen

During the workshop in Wageningen, November 25–29 2013, part of the time will be devoted to the development of partnerships among PGR stakeholders. The stakeholders will have the opportunity to present their institutions/organizations and areas in which they are particularly interested in cooperating.

JKI has also contacted research institutes and breeding companies to develop new partnerships. This activity started in April 2013. It is intended to submit a COST action to further the genetic reserve conservation concept using the genus *Beta* as a model crop.

Task 5.4: Prebreeding – channelling potential interesting germplasm into breeding programmes. Partners involved: DLO, UoB

The responsible researchers in WP1 were contacted in order to determine if the evaluation data on cabbage whitefly and cabbage aphid could be transferred to the European *Brassica* breeders (Deliverable 5.2). It turned out that this was not yet possible as the data could only be released by the end of 2013. JKI screened online databases provided by national genebanks in Europe as well as GRIN (USA) and GRIN (Canada) for interesting accessions which may be channelled into *Avena* and *Beta* breeding / breeding research programmes (Deliverable 5.3). Many of the European information systems had no evaluation data on *Avena* and *Beta.* The best information sources for *Beta* proved to be GRIN (USA) and the International Database for *Beta* (IDBB), and for *Avena* the GRIN (USA), GRIN (Canada) and the European *Avena* Database (EADB). Some of the data produced by the AVEQ project were requested but proved to be non-public as they still need to be processed by the AVEQ project coordinator. JKI discussed the specific need for *Beta* genetic resources with breeders at the meeting of the Study Group Breeding and Genetics of the International Institute of Beet Research (IIRB) in Switzerland on 21 September 2012. JKI also discussed with them the future role of the IDBB in relation to EURISCO and the TIP. The *Beta* and *Avena* data sets were sent to private breeders and public researchers in December 2012 with the request for feedback concerning the usefulness of the information by the end of January 2013. The data sets were sent to 38 *Beta* and *Avena*

breeders/breeding companies (including members of the Breeder's Committee) and four and three respectively replied. One *Beta* researcher ordered accessions from genebanks for further evaluations and one *Beta* researcher started to develop new project ideas. The full report (Deliverable 5.3) is available for consultation in the PGR Secure intranet (www.pgrsecure.bham.ac.uk/sites/default/files/documents/deliverables/D5.3_List_of_interesting_accessions.pdf).

WP5: Deviations from Annex I

D5.1 was due in February 2012 but because in the first annual consortium meeting it was felt that France should also be included in the countries selected, this caused a delay of several months. D5.1 was subsequently submitted to the EC in August 2012. The additional execution of country interviews in France (Task 5.1) caused an increase in the resources needed.

D5.2 was due in February 2013 but could not be achieved as the necessary information was not yet obtained from the WP1 team. In consultation with the WP1 team, D5.2 has been postponed to February 2014.

2.2.6 WP6: Dissemination and training (WP leader: Ehsan Dulloo, BIOVER)

Task 6.1: Website for PGR Secure. Task leader: UoB. Partners involved: UoB, BIOVER

The project website (www.pgrsecure.org) and partner intranet have been periodically updated by Partner 1, UoB. During the current reporting period, a publications page has been added, the conservation helpdesk pages have been further developed and enhanced (see the WPs 3 and 4 reports), and the collaborators' and contacts pages have been updated as necessary. The work package pages have been updated according to the recent contract amendment and a conference web page has been added (see Task 6.6 for further details). A link to a web page created and managed by Partner 6, NordGen, which provides information about the PGR Secure stakeholder workshop: 'On the conservation and sustainable use of plant genetic resources in Europe: a stakeholder analysis', 26–28 November 2013 has been added, as well as a link to a new embedded page, 'PGR-COMNET' which visualizes the community of PGR stakeholders in Europe, hosted and managed by Partner 5, JKI.

In the partner intranet, information about project meetings has been updated, an associated meetings page has been added (for information about dissemination at non-project meetings), and the contract and reporting and deliverables and milestones pages (and all associated documents) have been updated as required.

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

To facilitate the eventual web-enablement of the Europe-wide inventories of CWR and LR diversity, work is continuing on the development of data types for a CWR ontology to manage the data associated with CWR National Inventories (NIs) and conservation strategies. The LR ontology is completed and is in the system. The development of CWR descriptors is being carried out in collaboration with the WP3 team and a draft document entitled 'Data Standards for Web-enabled National *In Situ* CWR Inventories' has been prepared which contains descriptors for CWR checklists, NIs and conservation strategies. The document requires further review and editing before publication. In addition, templates for data gathering based on the draft standards have been

developed and distributed to the partners undertaking the WP3 national CWR conservation strategy case studies. These templates will facilitate data mobilization and the standardization of information and, with these, the web-enabled inventories of CWR and LR will be achieved.

The development of LR descriptors, which were previously drafted by the ECPGR On-farm Conservation and Management Working Group of the *In Situ* and On-farm Conservation Network, were extensively modified since discussions which took place at the CWR and LR conservation training workshop in Palanga, Lithuania in September 2011. Following the recommendations given by ECPGR National Inventory Focal Points (NIFPs) during the workshop and taking advantage of the advice provided by Adriana Alercia (Bioversity International), Theo van Hintum (ECPGR Documentation and Information Network coordinator, Centre for Genetic Resources, the Netherlands), and Lorenzo Maggioni (ECPGR Secretariat, Rome), the WP4 collaborators (UNIPG, MTT, UoB and BIOVER) produced the 'Descriptors for Web-Enabled National *In Situ* Landrace Inventories'. The final descriptors have now been published on the PGR Secure website at: www.pgrsecure.bham.ac.uk/sites/default/files/documents/helpdesk/LRDESCRIPTORS_PGRSECURE.pdf and are available from links in the publications and conservation helpdesk pages.

To facilitate the compilation of the European inventories and to make the data available to the project, an MS Access database for *in situ* LR data recording was prepared on the basis of the 'Descriptors for Web-Enabled National *In Situ* Landrace Inventories' and is available via the PGR Secure online helpdesk (LR resources), along with a user manual: www.pgrsecure.bham.ac.uk/sites/default/files/documents/helpdesk/PGR_Secure_LR_data_recording_tool.zip.

Both the 'Descriptors for Web-Enabled National *In Situ* Landrace Inventories' and the related database are tools that will greatly facilitate the construction of the European LR inventory.

Task 6.2 activities are also linked to Tasks 6.3 (see below) 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. Partners involved: UoB, DLO, BIOVER, JKI, NordGen

The update on the development of the PGR Diversity Gateway has been described under Task 2.1. For the web-enabling of the PGR Diversity Gateway, trait and global search functionalities were developed, and NI and checklist search forms are under development.

A Data Sharing Agreement (DSA) has been drafted and cleared by the Bioversity Policy Unit and has been circulated to the consortium for their review and approval. A list of potential users and contacts has been compiled (Deliverable 6.4 and Milestone 49) and used to partially inform the development of the web-based map of stakeholders (Deliverable 5.6) available via the PGR Secure website (www.pgrsecure.org/pgr-comnet).

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

Newsletters and introductory brief

Partner 1 (UoB) edited, produced and published *Crop wild relative* Issue 8 in April 2012 (www.pgrsecure.bham.ac.uk/sites/default/files/documents/newsletters/CWR_Issue_8.pdf). This issue provides an overview of the PGR Secure project and individual articles reporting the activities of the project work packages (contributed by the WP lead beneficiaries), as well as additional non-project related articles and items. Notification of the publication of this issue was circulated to the PGR Secure consortium (including partners, researchers, External Advisory Board and Breeders' Committee), as well as to the broader interest community via the CWR Group (a global network using the Yahoo discussion group platform), the ECPGR networks and Crop Wild Relative Specialist Group. Notification was also posted in the Platform for Agrobiodiversity Research (http://agrobiodiversityplatform.org/par/2012/05/09/crop-wild-relative-newsletter-conserving-plant-genetic-resources-for-use-now-and-in-the-future/).

A wide call for contributions to Issue 9 of *Crop wild relative* was circulated in April 2013 and a good response was received with more than 20 articles submitted from both European and non-European contributors. The submissions have been reviewed and edited and the first draft of the newsletter produced. It is expected that the newsletter will be published online in October 2013. This work has been undertaken by UoB.

Issue 1 of the sister newsletter, *Landraces* has been created by Partner 4, UNIPG with assistance from Partner 1, UoB and was published on the project website in October 2012. It includes an overview of the PGR Secure project and individual articles reporting the activities of the project work packages, as well as additional non-project related articles and items for a total of 31 pages. The second issue is in preparation and is expected to be published in October 2013.

Partner 1, UoB, and Partner 3, BIOVER, (with contributions from Partner 2, DLO, Partner 4, UNIPG, and Partner 5, JKI) further developed the introductory brief for the project, which is targeted towards different audiences (plant breeders, agrobiodiversity conservationists, policymakers, general public). The document was published in English on the project website in March 2013. The brief has also been translated by project partners and collaborators (the latter as in-kind contributions) into French (Audrey Chaunac and Sara Hutchinson), German (Lothar Frese), Spanish (José Iriondo and Maria Luisa Rubio Teso), Portuguese (Ana Maria Barata and Eliseu Bettencourt), Finnish (Heli Fitzgerald) and Swedish (Anna Palmé and Lena Ansebo). These versions were published on the project website in July and August 2013. A limited number of printed copies of the translated introductory briefs have been sent by BIOVER to the relevant partners for circulation in their countries. URJC distributed colour-printed hard copies among interest groups in Spain, and published the pdf document at http://pgrsecurespain.weebly.com/.

Other publications

Publications which are direct products of the work undertaken in the PGR Secure project are listed in Appendix 1. Publications that are closely related and therefore of relevance to the project are listed in Appendix 2.

Task 6.6: Dissemination conference. Task leader: BIOVER. Involved partners: UoB and BIOVER

Following discussions on the venue for the Final Dissemination Conference held during and after the second annual consortium and mid-term review meeting in October 2012, a decision was made to convene the conference at NIAB (National Institute of Agricultural Botany) Innovation Farm in Cambridge, UK, 17–20 June 2014. NIAB Innovation Farm is providing staff support and conference facilities at no cost to the project. However, due to limited capacity at NIAB Innovation Farm, the main conference plenary sessions will be held at Churchill College in Cambridge.

In order to maximize the involvement of the user community (particularly with regard to the plant breeding industry) and increase visibility of the PGR Secure project products, the PGR Secure Project Coordinator approached the Chair of the Genetic Resources section of EUCARPIA (Associate Partner 11) with the proposal to convene a joint PGR Secure/EUCARPIA conference. The proposal was received positively and approved by the PGR Secure Consortium Committee.

A conference Organizing Committee (OC) was established which includes members from BIOVER, UoB, NIAB Innovation Farm and EUCARPIA. A flyer announcing the conference was prepared and presented at the EUCARPIA Genetic Resources section meeting: 'Pre-breeding – fishing in the gene pool' in June 2013 in Alnarp, Sweden. A dedicated web page for the conference has been set up on the PGR Secure website (www.pgrsecure.org/conference), where detailed information about the conference can be found, including the flyer announcing the conference which is available for download. A dedicated email account has been set up for interested parties to contact the Conference Secretariat (conference@pgrsecure.org). A conference announcement was distributed through a listserver managed by BIOVER to 350 contacts and via a global online discussion group for CWR conservation and use with a membership of over 300.

A 15 member Scientific Programme Committee (SPC) has been established which is co-chaired by the WP6 leader (Dr. Ehsan Dulloo) and the PGR Secure Project Coordinator (Dr. Nigel Maxted) and includes the project WP leaders and additional invited members with expertise relevant to the conference themes who were selected from the project's External Advisory Board and Breeders' Committee or were experts external to the project. The SPC includes members from a range of countries representing regions outside of Europe in order to increase conference visibility outside the region and expand the potential audience. The lists of members of the OC and SPC are available in the conference web page.

A draft conference programme has been developed by the OC and has been shared with members of the SPC for their comments.

A call for abstracts as well as sponsorship and exhibition opportunities are under preparation and expected to be available in November 2013.

The OC is working on the conference budget to decide the conference fees. Sponsorship from EUCARPIA has been received and with the help of Bioversity's Resource Mobilization Unit, the OC is actively seeking external funds to support the conference. A list of potential sponsors has been identified.

During the conference, NIAB Innovation Farm will display field demonstration plots featuring crop wild relatives and landraces that will be visited by conference delegates during dedicated sessions. PGR Secure project partners have contributed to the identification and provision of accessions for display and material is being propagated and planted out by staff of NIAB Innovation Farm.

WP6: Deviations from Annex I

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

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[8];

b) Ensured that all the appropriate payments due in the current period have been made to the other beneficiaries;

c) 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;

d) 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;

e) 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:

- Updated attachment 5 of the Consortium Agreement (list of members and other contact persons) as required;
- Carried out the overall legal, ethical, financial and administrative management of the project;
- Carried out other general project management activities; including:
  - Coordinating the production of the first periodic report (to month 12, D7.1), second interim/mid-term technical review report (to month 18) and third interim report (to month 24);

[8] 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.

- Organizing the second annual consortium and mid-term technical review meeting (including the meeting of the Consortium Committee, External Advisory Board (EAB) and independent expert);
- Preparing documentation for the mid-term technical review and liaising with the Chair of the EAB on responsibilities and expectations of the Board regarding the mid-term technical review;
- Writing/collating/editing the report of the second annual consortium and mid-term technical review meeting;
- Liaising with the Chair of the EAB on the production of the EAB's technical mid-term review report;
- Updating the project's dissemination, capacity building and exit strategies;
- Collating and making amendments to Annex I of the GA and preparing a contract amendment;
- 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 the second annual consortium and mid-term technical review meeting;
- Communicating with the EC Project Officer, Financial Officer and Legal Officer on behalf of the Consortium on matters related to reporting, reimbursement of costs and a contract amendment.

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:

- Assisted in the preparation of a contract amendment;
- Contributed to the preparation of the agenda for the second annual consortium and mid-term technical review meeting;
- Attended the second annual Consortium Committee meeting (integral to the second annual consortium and mid-term review meeting) to discuss and agree on managerial and financial operation of the project;
- Contributed to the report of the second annual consortium and mid-term technical review meeting;
- Contributed to the project's dissemination, capacity building and exit strategies;

- Prepared financial reports for the first period and explanations of use of resources for the second (to month 18) and third (to month 24) internal interim reports;

- Informed the Coordinator of changes to members of the Consortium Committee representing their respective beneficiary organizations.

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

- In the first periodic report, it was reported that the accession of the new beneficiary, EUCARPIA (European Association for Research on Plant Breeding) to the Consortium had not gone as smoothly as anticipated but that it was expected that the request for the contract amendment would be sent to the Commission by the end of May 2012. Further delays arose during the current reporting period; namely, the handover of presidency from Dr. Zoltán Bedö to Dr. Beat Boller in May 2012 and subsequent change of responsibility for completion of the accession process. This matter was discussed at the second annual Consortium Committee meeting (at which neither Zoltán Bedö or Beat Boller were present, but EUCARPIA was represented by Dr. Eva Thörn) at which it was decided to invite EUCARPIA to join the Consortium as an Associate Partner and to offer to pay their expenses for the attendance of a EUCARPIA representative at the first and second annual consortium meetings. Subsequently, the EUCARPIA president, Dr. Beat Boller was contacted by email and he accepted this offer.

- At the kick-off meeting it was noted that Annex I, Description of Work is not in line with the final agreed WP descriptions. This has now been resolved and the necessary amendments were made as part of a contract amendment submitted in April 2013. Since the kick-off meeting, further amendments were requested by the lead beneficiaries of WPs 1, 2, 4 and 5, most of which were informally agreed with the EC Project Officer. However, some more major amendments related to WP5 required discussion at the second annual consortium meeting. Since the meeting, the final requested amendments were agreed with the EC Project Officer and the contract amendment was submitted in April 2013.

- 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.

2.3.3 Changes in the Consortium

- EUCARPIA joined the Consortium as an Associate Partner.

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

  – Dr. Richard Bruskiewich took over leadership of WPs 2 and 6 from Dr. Carlo Fadda during the period 01 January 2013 to 28 February 2013;

  – Dr. Ehsan Dulloo took over leadership of WPs 2 and 6 from Dr. Richard Bruskiewich as of 01 March 2013.

2.3.4 List of project meetings, dates and venues

Meetings convened during the period

- WP5 team meeting, 10–11 July 2012, JKI, Braunschweig, Germany (to discuss progress and in particular the structure and content of the online questionnaire)
- Second annual consortium and mid-term review meeting, 23–25 October 2012, Larnaca, Cyprus
- PGR Secure second Breeders' Committee meeting, 06 November 2012, Bonn, Germany
- *Ad hoc* meeting of PGR Secure partners attending the EUCARPIA Genetic Resources section meeting: 'Pre-breeding – fishing in the gene pool', 10–13 June 2013, Alnarp, Sweden

Meetings planned during the period

- PGR Secure third Breeders' Committee meeting, 05 November 2013, Bonn, Germany
- PGR Secure Consortium Committee meeting, 25 November 2013, Wageningen, the Netherlands
- PGR Secure stakeholder workshop: 'On the conservation and sustainable use of plant genetic resources in Europe: a stakeholder analysis', 26–28 November 2013, Wageningen, the Netherlands
- Joint PGR Secure/EUCARPIA conference, 'Enhanced Genepool Utilization – Capturing wild relative and landrace diversity for crop improvement', 17–20 June 2014, Cambridge, UK

Further information about project meetings, including reports and presentations, can be found in the partner intranet: www.pgrsecure.org/project_meetings. Information on PGR Secure dissemination at non-project meetings is also available: www.pgrsecure.org/associated_meetings.

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 4.6).

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

2.4 Person-months used per WP and per partner

The person-months (PMs) planned[9], actual[10] and remaining[11] per WP and per partner from the project start date to the end of the current reporting period are shown in Table 5.

Table 5. PMs planned (grey shaded), actual (no shading) and remaining (black) per WP and per partner from the project start date to the end of the current 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**	
	30.60	42.84	0.16	0.00	0.00	0.00	0.00	0.00	0.91	8.38	**82.89**	
	7.40	15.16	-0.16	0.00	0.00	0.00	0.00	0.00	11.09	-3.38	**30.11**	
WP 2	1.10	0.40	20.00	1.00	0.50	1.00	1.00	1.60	1.20	0.50	**28.30**	
	0.22	0.70	21.88	0.00	0.00	0.00	0.00	3.43	0.00	0.00	**26.23**	[12]
	0.88	-0.30	-1.88	1.00	0.50	1.00	1.00	-1.83	1.20	0.50	**2.07**	
WP3	14.00	0.00	2.00	12.00	0.00	0.00	8.00	24.00	0.00	0.00	**60.00**	
	31.15	0.00	0.59	16.10	0.00	0.00	9.01	27.50	0.00	0.00	**84.35**	[13, 14]
	-17.15	0.00	1.41	-4.10	0.00	0.00	-1.01	-3.50	0.00	0.00	**-24.35**	
WP4	1.10	0.00	2.00	21.50	0.00	0.00	8.00	0.00	0.00	0.00	**32.60**	
	0.03	0.00	0.80	16.58	0.00	0.00	17.59	0.00	0.00	0.00	**35.00**	[15]
	1.07	0.00	1.20	4.92	0.00	0.00	-9.59	0.00	0.00	0.00	**-2.40**	
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	8.85	0.11	0.00	32.44	7.04	0.00	0.00	0.00	0.00	**48.44**	
	0.00	-1.85	-0.11	0.00	-11.44	-1.04	0.00	0.00	0.00	0.00	**-14.44**	

[9] The number of PMs planned per WP as stated in Annex I.
[10] The actual number of PMs spent on the WP from the start date of the project to the end of the current reporting period.
[11] The number of PMs remaining per partner and per WP.
[12] Due to an administrative error, UoB PMs were miscalculated in period 1.
[13] MTT PMs include work undertaken by a subcontractor.
[14] UoB staff time has been part-financed from other sources.
[15] MTT has received additional funding from national sources for the inventory of LR apples and pears. Total PMs includes PMs funded by these sources.

Table 5 cont'd. PMs planned (grey shaded), actual (no shading) and remaining (black) per WP and per partner from the project start date to the end of the current 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 6	6.00	0.50	17.00	6.00	7.00	1.00	0.00	0.00	0.00	0.00	**37.50**	16, 17
	5.58	0.00	10.31	5.06	0.39	0.46	0.50	0.48	0.00	0.00	**22.78**	
	0.42	0.50	6.69	0.94	6.61	0.54	-0.50	-0.48	0.00	0.00	**14.72**	
WP 7	14.00	2.00	1.00	0.50	1.00	1.00	0.50	1.00	1.00	0.50	**22.50**	18
	4.66	1.38	0.98	1.09	0.40	1.01	0.78	0.96	0.76	0.29	**12.31**	
	9.34	0.62	0.02	-0.59	0.60	-0.01	-0.28	0.04	0.24	0.21	**10.19**	
Partner totals	**74.20**	**67.90**	**42.00**	**41.00**	**29.50**	**9.00**	**17.50**	**26.60**	**14.20**	**6.00**		19,20, 21
	72.24	**53.77**	**34.83**	**38.83**	**33.23**	**8.51**	**27.88**	**32.37**	**1.67**	**8.67**		
	1.96	**14.13**	**7.17**	**2.17**	**-3.73**	**0.49**	**-10.38**	**-5.77**	**12.53**	**-2.67**		

[16] BIOVER: Less PMs will be required than planned for.
[17] Due to an administrative error, UoB PMs were miscalculated in period 1.
[18] Due to an administrative error, UoB PMs were miscalculated in period 1.
[19] UoB staff time has been part-financed from other sources. Total PMs includes PMs funded by these sources.
[20] MTT has received additional funding from national sources for the inventory of LR apples and pears. Total PMs includes PMs funded by these sources.
[21] In RP1, Bioversity did not report PMs with two digit accuracy. The 17 PM reported in RP1 should have been reported as 16.74 PM. The personnel costs claimed in RP1 were for 16.74 PM, not 17 PM; therefore no cost claim adjustment is required.

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Negri, V., Pacicco, L., Bodesmo, M. and Torricelli, R. (2013) *The First Italian Inventory of In Situ Maintained Landraces*. On CD ROM. Morlacchi Editrice, Perugia.

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Appendix 1. Publications arising from the research

This list includes publications involving project partners which are direct products of the work undertaken in the PGR Secure project. Publications are listed by work package and are cumulative from the start date of the project. 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: www.pgrsecure.org/palanga_presentations.

WP1: Phenomics and genomics

Broekgaarden, C., Riviere, P., Steenhuis, G., Del sol Cuenca, M., Kos, M., Pelgrom, K., Voorrips, R. and Vosman, B. (2013) *Phloem-specific Resistance in* Brassica oleracea *Against the Whitefly* Aleyrodes proletella*.* Oral communication, 6th meeting of the IOBC-WPRS Working Group 'Induced resistance in plants against insects and diseases', June 10–13 2013, Avignon, France.

Pelgrom, K. (2012) Host plant resistance to cabbage whitefly in *Brassica oleracea* and wild relatives. Oral communication, NWO-ALW meeting 'Experimental Plant Sciences', Lunteren, The Netherlands, 03 April 2012.

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, 12–14. www.pgrsecure.bham.ac.uk/sites/default/files/documents/newsletters/CWR_Issue_8.pdf

Vosman, B. (2012) A phenomics and genomics approach to the use of landraces and crop wild relatives for crop improvement. *Crop Wild Relative* 8, 11–12. www.pgrsecure.bham.ac.uk/sites/default/files/documents/newsletters/CWR_Issue_8.pdf

Vosman, B., Pelgrom, K., Voorrips, R. and Broekgaarden, C. (2013) *Breeding for Cabbage Whitefly Resistance in* Brassica oleracea*.* Poster presented at the conference 'Future IPM in Europe', 19–21 March 2013, Riva del Garda, Italy.

WP2: Informatics

Dias, S. (2012) Pieces of the puzzle—Trait Information Portal. *Crop Wild Relative* 8, 28–30. www.pgrsecure.bham.ac.uk/sites/default/files/documents/newsletters/CWR_Issue_8.pdf

Dias, S. (2013) *EURISCO, GENESYS and the TIP: an update*. Oral communication, UK PGR Group meeting, 13 March 2013. Available at: http://ukpgrg.org/01-SDias_UKPGR_13March2013.pdf.

Iriondo, J.M., Parra-Quijano, M., Rubio-Teso, M.L., Torres, E. and García, R. (2013) *Ecogeographical Approaches to Characterize CWR Adaptive Traits Useful for Crop Adaptation*. Oral communication, Pre-breeding – fishing in the gene pool, EUCARPIA Genetic Resources section meeting. June 10–13 2013, Alnarp, Sweden.

Rubio-Teso, M.L., Parra-Quijano, M. and Iriondo, J.M. (2013) *Finding the Most Drought-Resistant Plant Populations. Evaluation of the FIGS methodology.* Oral communication, Congreso Nacional de la Asociación Española de Ecología Terrestre. Pamplona/Iruña 6–10 May 2013.

Thormann, I. (2012) Applying FIGS to crop wild relatives and landraces in Europe. *Crop Wild Relative* 8, 14–16. www.pgrsecure.bham.ac.uk/sites/default/files/documents/newsletters/CWR_Issue_8.pdf

WP3: CWR conservation

Asdal, Å., Phillips, J. and Maxted, N. (2013) Boost for crop wild relative conservation in Norway. *Crop Wild Relative* 9, 20–21. www.pgrsecure.bham.ac.uk/sites/default/files/documents/newsletters/CWR_Issue_9.pdf

De la Rosa, L., Aguiriano, E., Mallor, C., Rubio-Teso, M.L., Parra-Quijano, M., Torres, E. and Iriondo, J.M. (2013) Prioritized CWR in Spain: status on the National Inventory of Plant Genetic Resources for Agriculture and Food. *Crop Wild Relative* 9, 23–26. www.pgrsecure.bham.ac.uk/sites/default/files/documents/newsletters/CWR_Issue_9.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, 24–27. www.pgrsecure.bham.ac.uk/sites/default/files/documents/newsletters/CWR_Issue_8.pdf

Fitzgerald, H., Korpelainen, H. and Veteläinen, M. (2013) Prioritization of crop wild relatives in Finland. *Crop Wild Relative* 9, 10–13. www.pgrsecure.bham.ac.uk/sites/default/files/documents/newsletters/CWR_Issue_9.pdf

Kell, S., Maxted, N., Ford-Lloyd, B.V. *et al*. (in prep.). A methodological approach to complementary conservation of priority European CWR. *Journal to be decided.*

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, 22–23. www.pgrsecure.bham.ac.uk/sites/default/files/documents/newsletters/CWR_Issue_8.pdf

Landucci, F., Panella, L., Lucarini, D., Gigante, D., Donnini, D., Kell, S., Maxted, N., Venanzoni, R. and Negri, V. (2013a) The first prioritized inventory of crop wild relatives and wild harvested plants of Italy. *Crop Science*, submitted.

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Maxted, N. and Kell, S. (2012) CWR horizon scanning: what are we doing and what should we be doing? *Crop Wild Relative* 8, 8–9. www.pgrsecure.bham.ac.uk/sites/default/files/documents/newsletters/CWR_Issue_8.pdf

Negri, V., Gigante, D., Donnini, D., Torricelli, R., Landucci, F., Panella, L. and Venanzoni, R. (2013) *Attività del DBA_UNIPG per la Salvaguardia dei Progenitori Selvatici delle Piante Coltivate Nell'ambito del Progetto EC FPVII PGR Secure*. Oral communication, Banche di germoplasma e conservazione *in situ* scientific meeting, Orto Botanico, Rome, 23 April 2013.

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. and Negri, V. (2012) Progenitori selvatici e forme coltivate di Apiaceae, Chenopodiaceae, Poaceae e Rosaceae: primi risultati per il territorio dell'Umbria (Italia Centrale). *Quaderni Botanica Ambientale ed Applicata* 23, 3–13.

Phillips, J., Kyratzis, A., Christoudoulou, C., Kell, S. and Maxted, N. (2013) Development of a national crop wild relative conservation strategy for Cyprus. *Crop Wild Relative* 9, 16–19. www.pgrsecure.bham.ac.uk/sites/default/files/documents/newsletters/CWR_Issue_9.pdf

Phillips, J., Kyratzis, A., Christoudoulou, C., Kell, S.P. and Maxted, N. (2013) Development of a national crop wild relative conservation strategy for Cyprus. *Biodiversity and Conservation*, submitted.

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Rubio-Teso, M.L., Ronquillo Ferrero, C., Torres Lamas, E., Parra Quijano, M. and Iriondo Alegría, J.M. (2013) *Evaluación del Estado de Conservación* in situ *y Diversidad de Parientes Silvestres de Cultivos para la Alimentación y Forraje*. Oral communication, IV Congress of Biodiversity, Bilbao, Spain, 6–8 February 2013. http://congresobiodiversidad.com/comunicaciones-orales/

Taylor, N.G., Kell, S., Holubec, V., Parra-Quijano, M., Chobot, K. and Maxted, N. (2013) Systematic conservation planning for the Czech Republic. *Crop Wild Relative* 9, 5–9. www.pgrsecure.bham.ac.uk/sites/default/files/documents/newsletters/CWR_Issue_9.pdf

Taylor, N.G., Kell, S., Holubec, V., Parra-Quijano, M., Chobot, K. and Maxted, N. (in prep.) A crop wild relative conservation strategy for the Czech Republic. *Journal to be decided.*

WP4: Landrace conservation

Fitzgerald, H., Heinonen, M., Korpelainen, H. and Veteläinen, M. (2013) *Towards the Finnish LR and CWR Conservation Strategies.* Poster and abstract at the EUCARPIA Genetic Resources section meeting, 'Pre-breeding – fishing in the gene pool', 10–13 June 2013, Alnarp, Sweden.

Garkava-Gustavssona, L., Mujajub, C., Sehic, J., Zborowska, A., Backes, G.M., Hietaranta, T. and Antonius, K. (2013) Genetic diversity in Swedish and Finnish heirloom apple cultivars revealed with SSR markers. *Scientia Horticulturae* 162, 43–48.

Heinonen, M. (2013) Ryvässipuli on vanha suomalainen sipuli. *Maatiainen* 3, 15–16.

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

Heinonen, M. and Antonius, K., (2012) Ongoing inventory on landrace potato onions in Finland. *Landraces* 1, 18.

Heinonen, M. and Kinnanen, H. (2012) MTT etsii pitkään viljeltyjen maatiaiskasvien tarinoita + faktaruutu: Huvitus löytyi muistitiedon avulla. *Maaseudun Tiede* 69(2), 5.

Heinonen, M. and Kinnanen, H. (2012) Etsitään tietoja omenan ja päärynän paikallislajikkeista. *Maatiainen* 3, 14–15.

Heinonen, M. and Timonen, A. (2012) Maatiaisohran tie tuoteperheeksi vaati vuosien työn. *Maaseudun Tiede* 69(3), 2.

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Heinonen, M. and Kinnanen, H. (2013) Kansallista hedelmäpuiden kokoelmaa täydennetään. *Geenivarat* (Newsletter for the Finnish National Genetic Resources Programmes))2013, 23.

Heinonen, M., Antonius, K., Ala-Kaarre, J. and Rihtilä, J. (2012) Suomessa 22 erilaista ryvässipulia. *Maaseudun Tiede* 69(4), 13.

Heinonen, M., Hartikainen, M. and Laamanen, J. (2012) Arvokkaat kasvit löytyvät tietokannoista. *Maaseudun Tiede* 69(2), 8.

Heinonen, M., Fitzgerald, H., Veteläinen, M. and Korpelainen, H. (2013) *Suomalaisten Maatiaiskasvien ja Viljelykasvien Luonnonvaraisten Sukulaisten in situ Suojelustrategioiden Valmisteleminen*. Poster and abstract at Finnish national plant genetic programme's 10th anniversary seminar, 29 August 2013, Jokioinen, Finland. www.mtt.fi/kasvigeenivarat

Heinonen, M., Kinnanen, H., Valo, R., Antonius, K. and Ala-Kaarre, J. (2013) *Nurkkapuut Kansan Sydämessä*. Key note speech at Finnish national plant genetic programme's 10th anniversary seminar, 29 August 2013, Jokioinen, Finland. www.mtt.fi/kasvigeenivarat

Kinnanen, H. and Heinonen, M. (2012) Mistä on kestävät hedelmäpuut tehty? + faktaruutu: Etsintäkuulutus: omenat ja päärynät. *Puutarha&kauppa* 16(11), 12–13.

Maxted, N. and Kell, S. (2012) Towards a UK inventory of landrace diversity. *Landraces* 1, 16–17. www.pgrsecure.bham.ac.uk/sites/default/files/documents/newsletters/Landraces_Issue_1.pdf

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Negri, V. and Maxted, N. (2012) PGR Secure Work package 4 'Landrace conservation': introduction and present achievements. *Landraces* 1, 8–9. www.pgrsecure.bham.ac.uk/sites/default/files/documents/newsletters/Landraces_Issue_1.pdf

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Negri, V., Heinonen, M., Mendes Moreira, P., Torricelli, R. and Maxted, N. (2013) *Developing a European On Farm Conservation Strategy for Landraces.* EUCARPIA Genetic Resources section meeting, 'Pre-breeding – fishing in the gene pool', 10–13 June 2013, Alnarp, Sweden. www.nordgen.org/ngdoc/nordgen/Eucarpia/oral_presentations/Valeria_Negri.pdf

Pacicco, L., Bodesmo, M., Torricelli, R. and Negri, V. (2013) *The First Italian Inventory of In Situ Maintained Landraces.* Poster presented at the 57th Annual Congress of Societa' Italiana di Genetica Agraria, Foggia, 16–19 September 2013.

Spataro, G. and Negri, V. (2013) The European seed legislation on conservation varieties: focus, implementation, present and future impact on landrace on farm conservation. *Genetic Resources and Crop Evolution* DOI:10.1007/s10722-013-0009-x.

Suojala-Ahlfors, T., Heinonen, M., Antonius, A., Heinonen, A., Mattila P. and Pihlava, J-M. (2013) *Ryvässipuli – Perinnekasvi Takaisin Viljelyyn ja Käyttöön*. Poster at Finnish national plant genetic programme's 10th anniversary seminar, 29 August 2013, Jokioinen, Finland. www.mtt.fi/kasvigeenivarat

Calls for LRs: Posters and other material (in Finnish and Swedish)

Heinonen, M. (2012) Valtavan rakas / Hugely loved / Högt älskade fruktträd. MTT elo-blog 14 January 2012, mttelo.mtt.fi

Heinonen, M. and Kinnanen, H. (2012) Paikalliset hedelmälajikkeet. [Call for LR apples and pears in Finland]

Heinonen, M. and Kinnanen, H. (2012) Missä kasvaa hämäläisiä vanhoja omenalajikkeita? [Call for LR apples in southern Finland]

Heinonen, M. and Kinnanen, H. (2012) Missä kasvaa savolaisia vanhoja omenalajikkeita? [Call for LR apples in central Finland]

Heinonen, M. and Kinnanen, H. (2012) Missä kasvaa lounaissuomalaisia vanhoja omenalajikkeita? [Call for LR apples in southwest Finland]

Heinonen, M. and Kinnanen, H. (2012) Missä kasvaa lounaissuomalaisia vanhoja päärynälajikkeita? [Call for LR pears in southwest Finland]

Heinonen, M. and Kinnanen, H. (2012) Inhemska äpplen och päron vid Finska viken [Call for LR apples and pears in coastal Finland]

Heinonen, M. and Kinnanen, H. (2013) Missä kasvaa uusmaalaisia vanhoja omenalajikkeita? [Call for LR apples in south Finland]

Kinnanen H. and Mäkinen K. (2013) Omenakalenteri 2013. Suomalaisia maatiaislajikkeita [Native Apple Annual Calendar 2013]

WP5: Engaging the user community

Frese, L. (2011) *Conservation and Use of Crop Wild Relatives*. Oral communication, IIRB Study Group meeting 'Genetics and Breeding', AIMCRA, Valladolid, Spain, 22–23 September, 2011.

Kik, C., Poulsen, G., Neuhaus, G. and Frese, L. (2012) PGR Secure: Engaging the user community. *Crop Wild Relative* 8, 10. www.pgrsecure.bham.ac.uk/sites/default/files/documents/newsletters/CWR_Issue_8.pdf

Palmé, A. (2012) *Utilizing Crop Wild Relatives in the Baltic Sea Region: Some Initial Findings in the EU-Project PGR Secure*. Oral communication, 'Diversity I plant breeding and agriculture: strategies for healthy lifestyle', State Stende Cereals Breeding Institute, Latvia, May 30–June 01 2012.

Palmé, A., Solberg, S.Ø., Ottosson, F., Poulsen, G., Frese, L. and Kik, C. (2013) *Constraints in the Utilization of Plant Genetic Resources in the Nordic Countries*. Poster presented at the EUCARPIA Genetic Resources section meeting: 'Pre-breeding – fishing in the gene pool', 10–13 June 2013, Alnarp, Sweden.

WP6: Dissemination and training

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, 17–18. www.pgrsecure.bham.ac.uk/sites/default/files/documents/newsletters/CWR_Issue_8.pdf

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*. www.pgrsecure.bham.ac.uk/sites/default/files/meetings/palanga/CWR_and_LR_Workshop_Report_FINAL.pdf

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, 4–7. www.pgrsecure.bham.ac.uk/sites/default/files/documents/newsletters/CWR_Issue_8.pdf

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. and Kell, S.P. (2012) Joint PGR Secure/ECPGR Workshop: Conservation strategies for European crop wild relative and landrace diversity. *Bioversity Newsletter for Europe* 44, 3.

Maxted, N. and Kell, S. (eds.) (2013) *Crop wild relative Issue 9, October 2013.* 44 pp. www.pgrsecure.bham.ac.uk/sites/default/files/documents/newsletters/CWR_Issue_9.pdf

Maxted, N., Kell, S., Fielder, H. and Ford-Lloyd, B.V. (2011) *PGR Secure: Project Context, Overview and Links with the UK*. Oral communication, UK PGR Group meeting, 06 October 2011. http://ukpgrg.org/PGR_Secure_Kell_UKPGRG_Meeting_Oct_11.pdf

Maxted, N., Kell, S. and Fielder, H. (eds.) (2012) *Crop wild relative Issue 8, April 2012.* 44 pp. www.pgrsecure.bham.ac.uk/sites/default/files/documents/newsletters/CWR_Issue_8.pdf

Negri, V. and Torricelli, R. (2012) Conservation strategies for European crop wild relative and landrace diversity: a joint PGR Secure/ECPGR workshop. *Landraces* 1, 10–13.

Appendix 2. Related publications and oral communications

This list includes publications and oral communications involving project partners which have not directly arisen from the project research activities but whose subject matter is closely related and therefore of relevance to the project. Publications and oral communications arising directly from research undertaken in the project are listed in Appendix 1.

The publications are listed by the project partner who is lead author and is cumulative since the start date of the project. Oral communications given at conferences are included, apart from those presented at PGR Secure consortium meetings and at the CWR and LR conservation training workshop, the latter which are published in the public domain at: 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

Castañeda Álvarez, N.P., Vincent, H.A., Kell, S.P., Eastwood, R.J. and Maxted, N. (2012) Ecogeographic surveys. In Guarino, L., Ramanatha Rao, V., Goldberg, E. (eds.), *Collecting Plant Genetic Diversity: Technical Guidelines. 2011 Update.* Bioversity International, Rome. http://cropgenebank.sgrp.cgiar.org/index.php?option=com_content&view=article&id=679

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.

Hunter, D., Maxted, N., Heywood, V.H, Kell, S. and Borelli, T. (2012) Protected areas and the challenge of conserving crop wild relatives. *Parks* 18(1), 87–98.

Idohou, R., Assogbadjo, A.E., Fandohan, B., Gouwakinnou, G.N., Kakai, R.L.G., Sinsin, B. and Maxted, N. (2012) National inventory and prioritization of crop wild relatives: case study for Benin. *Genetic Resources and Crop Evolution*, DOI: 10.1007/s10722-012-9923-6.

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., Maxted, N., Magos-Brehm, J. and Ford-Lloyd, B.V. (in prep.). Broadening the base, narrowing the task: setting priorities for the conservation of crop wild relative diversity. *Journal to be decided.*

Khoury, C.K., Greene, S., Wiersema, J., Maxted, N., Jarvis, A. and Struik, P.C. (2013) An inventory of crop wild relatives of the United States. *Crop Science*, DOI: 10.2135/cropsci2012.10.0585.

Magos Brehm, J., Ford-Lloyd, B.V., Maxted, N. and Martins-Loução, M.A. (2012) Using neutral genetic diversity to prioritize 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, 44. www.pgrsecure.bham.ac.uk/sites/default/files/documents/newsletters/CWR_Issue_8.pdf

Maxted, N**.** (2013) *In Situ*, *Ex Situ* Conservation. In: Levin S.A. (ed.) *Encyclopedia of Biodiversity, Second Edition, Volume 4*. Waltham, MA: Academic Press. Pp. 313–323.

Maxted, N. and Kell, S. (2012) *A role for botanic gardens in crop wild relative conservation. Report of a workshop convened at EUROGARD VI: European Botanic Gardens in a Changing World, 28 May–June 02, 2012, Chios, Greece*. www.pgrsecure.bham.ac.uk/sites/default/files/meetings/others/EuroGard_VI_CWR_workshop_summary.pdf

Maxted, N. and Kell, S. (2012) *Greece: cradle of European plant genetic diversity and hotspot for conservation action*. Oral communication, AGRIC 2012 – Phytogenetic Wealth and Agricultural Heritage of the Aegean Islands, 06-07 July 2012, Santorini, Greece. http://www.pgrsecure.bham.ac.uk/sites/default/files/meetings/others/Greek_Agrobiodiversity_FINAL.pdf

Maxted, N. and Kell, S.P. (2013) A role for botanic gardens in CWR conservation for food security. *BGjournal* 10(2), 32–35.

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., Castañeda Álvarez, N.P., Vincent, H.A. and Magos Brehm, J. (2012) Gap analysis: a tool for genetic conservation. In Guarino, L., Ramanatha Rao, V., Goldberg, E. (eds.), *Collecting Plant Genetic Diversity: Technical Guidelines. 2011 Update.* Bioversity International, Rome. http://cropgenebank.sgrp.cgiar.org/index.php?option=com_content&view=article&id=678

Maxted, N., Magos Brehm, J. and Kell, S. (2013) *Conservation and Sustainable Use of PGRFA: A Toolkit for National Strategy Development – DRAFT*. Food and Agriculture Organization of the UN, Rome Italy. 398 pp.

Maxted, N., Kell, S.P. and Magos Brehm, J. (2013) Crop wild relatives and climate change. In: Jackson, M., Ford-Lloyd, B.V. and Parry M. (eds.), *Plant Genetic Resources and Climate Change – a 21st Century Perspective*. CAB International, Wallingford, UK. Pp. 114–136.

Maxted, N., Avagyan, A. Frese, L., Iriondo, J.M., Magos Brehm, J., Singer, A. and Kell, S.P. (2013) *Preserving Diversity: A Concept for* In Situ *Conservation of Crop Wild Relatives in Europe – the Background Document*. *In Situ* and On-farm Conservation Network, European Cooperative Programme for Plant Genetic Resources, Rome, Italy.

Maxted, N., Ford-Lloyd, B.V., Kell, S.P., Pooni, H.S. and Lawrence, M.J. (2014) *Plant Genetic Conservation*. Cambridge University Press, Cambridge. In prep.

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.

Shehadeh, A., Amri, A. and Maxted, N. (2013) Ecogeographic survey and gap analysis of *Lathyrus* L. species. *Genetic Resources and Crop Evolution* 60(7), 2101–2113.

Shehadeh, A., Amri, A. and Maxted, N. (2014) *Conservation Field Guide to Grasspea and Chicklings*. International Centre for Agricultural Research in the Dry Areas (ICARDA), Aleppo, Syria. In prep.

Smýkal, P., Coyne, C., Redden, R. and Maxted, N. (2013) Peas. In: Singh, M., Upadhyaya, H.D. and Singh Bisht, I. (eds.), *Genetic and Genomic Resources of Grain Legume Improvement*. Elsevier, London. Pp. 41–80.

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.

Underwood, E., Poláková, J., Berman, S., Dooley, E., Frelih-Larsen, A., Kretschmer, B., Maxted, N., McConville, A.J., Naumann, S., Sarteel, M. and Tostivint, C. (2013) *Options for Feeding 10 Billion People. Sustainable Intensification of Crop Production: Climate Change and Cgriculture; Biodiversity and Agriculture.* Report prepared for the STOA Panel of the European Parliament. Contract IP/A/STOA/FWC/2008-096/LOT3/C1/SC5, European Parliament Science and Technology Options Assessment STOA. www.europarl.europa.eu/stoa/cms/studies

Vincent, H., von Bothmer, R., Knùpffer, H., Amri, A., Konopka, J. and Maxted, N. (2012) Genetic gap analysis of wild *Hordeum* taxa. *Plant Genetic Resources: Characterization and Utilization* 10(3), 242–253.

Vincent, H., Wiersema, J., Kell, S.P., Dobbie, S., Fielder, H., Castañeda Alvarez, N.P., Guarino, L., Eastwood, R., León, B. and Maxted, N. (2013) A prioritized crop wild relative inventory as a first step to help underpin global food security. *Biological Conservation* 167, 265–275.

Partner 3, BIOVER

Dulloo, M.E., Thormann, I., Fiorino, E., De Felice, S., Rao, V.R. and Snook, L. (2013) Trends in research using plant genetic resources from germplasm collections: from 1996 to 2006. *Crop Science* 53, 1–11. DOI: 10.2135/cropsci2012.04.0219.

Thormann, I., Alercia, A. and Dulloo, M.E. (2013) *Core Descriptors for In Situ Conservation of Crop Wild Relatives v.1.* Bioversity International, Rome, Italy. www.bioversityinternational.org/uploads/tx_news/Core_descriptors_for_in_situ_conservation_of_crop_wild_relatives_v.1._1619.pdf

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.

Ciancaleoni, S., Chiarenza, G.L., Raggi, L., Branca, F. and Negri, V. (2013) Diversity characterization of broccoli landraces for their on-farm (*in situ*) safeguard and use in breeding programs. *Genetic Resources and Crop Evolution*, in press. DOI: 10.1007/s10722-013-0049-2.

Gioia, T., Logozzo, G., Attene, G., Bellucci, E., Benedettelli, S., Negri, V., Papa, R. and Spagnoletti Zeuli, P. (2013) Evidence for introduction bottleneck and extensive inter-gene pool (Mesoamerica x Ande) hybridization in the European common bean (*Phaseolus vulgaris* L.) germplasm. *PLoS ONE*, in press.

Negri, V. (2012) Policies supportive of on-farm conservation and their impact on custodian farmers in Italy. In: Padulosi, S., Bergamini, N. and Lawrence, T. (eds.) *On-farm conservation of neglected and underutilized species: status, trends and novel approaches to cope with climate change*. *Proceedings of the International Conference, Frankfurt, 14–16 June 2011*. Bioversity International, Rome. Pp. 211–216.

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,

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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.

Padulosi, S., Bala Ravi, P., Rojas, W., Sthapit, S., Subedi, A., Dulloo, E., Hammer, K., Vögel, R., Antofie, M.M., Negri, V., Bergamini, N., Galluzzi, G., Jäger, M., Sthapit, B., Rana R., Oliver King, I. and Warthmann, N. (2012) *Red Lists for Cultivated Species: why we need it and suggestions for the way forward.* Poster presented at IUCN World Conservation Congress, Jeju, Korea, 6–15 September 2012.

Raggi, L., Tiranti, B. and Negri, V. (2013) Genetic diversity and structure of a collection of common bean (*Phaseolus vulgaris* L.) Italian landraces. *Genetic Resources and Crop Evolution* 60, 1515–1530. DOI: 10.1007/s10722-012-9939-y.

Rodriguez, M., Rau, D., Angioi, S., Bellucci, E., Bitocchi, E., Nanni, L., Knüpffer, H., Negri, V., Papa, R. and Attene, G. (2013) The European *Phaseolus coccineus* L. landraces: diversity, population structure and adaptation, as revealed by integration of cpSSRs, nuSSRs and phenotypic analyses. *PLOS ONE* 8(2): e57337. DOI:10.1371/journal.pone.0057337.

Torricelli, R., Pauselli, M., Cestola, E. and Falcinelli, M. (2012) Phenotypic and qualitative evaluation of faba bean landraces in central Italy. *Landraces* 1, 21–22. www.pgrsecure.bham.ac.uk/sites/default/files/documents/newsletters/Landraces_Issue_1.pdf

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Torricelli, R., Tiranti, B., Spataro, G., Castellini, G., Albertini, E., Falcinelli, M. and Negri, V. (2012) Differentiation and structure of an Italian landrace of celery (*Apium graveolens* L.): inferences for on farm conservation. *Genetic Resources and Crop Evolution* DOI: 10.1007/s10722-012-9896-5.

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

Antonius, K., Veteläinen, M., Heinonen, M., Hartikainen, M., Juhanoja, S. and Uosukainen, M. (2011) Finnish PGR utilization: cases of breeding and branding. In: van Hintum, T.J.L. (ed.) *To Serve and Conserve: European Plant Genetic Resources Conference 2011.* Abstracts of Oral Presentations and Posters, p. 46.

Hartikainen, M. and Heinonen, M. (2012) *Jokioinen Park Route and the Concept of Heritage Plant*. Oral communication, Devepark final conference, Alatskivi Castle, Estonia, 29 June 2012, www.keskkonnaamet.ee/organistatsioon/rahvusvahelised-projektid/asdasdasd/ (Abstract)

Hartikainen, M., Antonius, K. and Veteläinen, M. (2011) Heritage plants in historic gardens: case Jokioinen manor park, Finland. In: *NJF Seminar 436: Biodiversity in Agriculture: Lessons Learned and Future Directions*. Ulvik in Hardanger, Norway, 24–26 May 2011. NJF Report vol. 7 no. 1/2011: 56–59.

Hartikainen, M., Heinonen, M. and Roht, U. (2013) Selvitys historiallisten puutarhojen inventoinneista Suomessa ja Virossa. / Ajalooliste parkide inventuur Soomes ja Eestis. *MTT Report* 88, 90.

Heinonen, M. and Pihlman, S. (2011) Heritage plants in museum environment. In: T. Myllyntaus, P. Herttua, T.Manni and J. Piilola (eds.), *Encounters of Sea and Land. The 6th ESEH Conference, Turku, Finland, 28 June –2 July 2011*. Programme and abstracts, p. 52.

Heinonen, M. and Hartikainen, M. (2012) *The Announcement: The Heritage Plant of the Annala Garden*. Oral communication, seminar on mapping methods for the historic gardens flora, Helsinki, Finland, 13 June 2012.

Heinonen, M., Hartikainen, M., Antonius, K., Kinnanen, H. and Pihlman, S. (2011) Heritage plants in museum environment: three museum gardens in southwestern Finland. In: *NJF Seminar 436: Biodiversity in Agriculture: Lessons Learned and Future Directions*. Ulvik in Hardanger, Norway, 24–26 May 2011. NJF Report vol. 7 no. 1/2011: 16–19.

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).

García-Fernandez, A., Iriondo, J.M., Bartels, D. and Escudero, A. (2013) Water stress response in a high-mountain plant across an altitudinal gradient. *Plant Biology* 15(1), 93–100.

Iriondo, J.M. and Robledo-Arnuncio, J.J. (2013) *Límites de la Adaptación de las Plantas en un Plazo Menguante.* Oral communication, XI Congreso Nacional de la Asociación Española de Ecología Terrestre. Pamplona/Iruña 6–10 May 2013.

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, 31–33. www.pgrsecure.bham.ac.uk/sites/default/files/documents/newsletters/CWR_Issue_8.pdf

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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*. Oral communication, VII Simposio Internacional de Recursos Genéticos para América Latina y el Caribe. Quito, 21–23 Noviembre 2011.

Parra-Quijano, M., Iriondo, J.M. and Torres, E. (2012) Improving representativeness of genebank collections through species distribution models, gap analysis and ecogeographical maps. *Biodiversity and Conservation* 21, 79–96.

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Parra-Quijano, M., Maxted, N., Frese, L. and Iriondo, J.M. (2012) Spatial and ecogeographic approaches for selecting genetic reserves 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. 20–28.

Parra-Quijano, M., Iriondo, J.M. and Torres, M.E. (2012) A review of applications of ecogeography and geographic information systems in plant genetic resources. *Spanish Journal of Agricultural Research* 10(2), 419–429.

Torres, E., Parra-Quijano, M. and Iriondo, J.M. (2011) *Conservación de las Especies Silvestres Emparentadas con Cultivadas en España: Presente y Futuro*. V Congreso de la Sociedad de Biología de la Conservación de Plantas. Es Mercadal, Menorca, 28 septiembre–1 octubre 2011 (congress poster presentation).

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 phenotyping data of Brassica accessions	1.0	1	STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK	Report	RE	24	25/10/2013	Submitted	
2	Metabolomic data of Brassica accessions	0.0	1	STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK	Report	RE	30	31/12/2013	Not submitted	
3	Sequencing data of Brassica accessions	0.0	1	ServiceXS BV	Report	RE	36	28/02/2014	Not submitted	
4	Transcriptomics of Brassica accessions	0.0	1	THE UNIVERSITY OF BIRMINGHAM	Other	RE	36	28/02/2014	Not submitted	
5	Identification of candidate genes and markers for insect resistance in Brassica	0.0	1	STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK	Report	RE	42	31/08/2014	Not submitted	
1	Case study database	1.0	2	INTERNATIONAL PLANT GENETIC RESOURCES INSTITUTE*IPGRI	Other	PU	18	08/05/2013	Submitted	
2	FIGS usage Guidelines	0.0	2	INTERNATIONAL PLANT GENETIC RESOURCES INSTITUTE*IPGRI	Report	PU	30	31/08/2013	Not submitted	
3	TIP conceptualization framework	1.0	2	INTERNATIONAL PLANT GENETIC RESOURCES INSTITUTE*IPGRI	Report	PU	12	22/03/2012	Submitted	
4	TIP developed and tested	0.0	2	INTERNATIO	Prototype	RE	24	30/11/2013	Not submitted	

				NAL PLANT GENETIC RE SOURCES IN STITUTE*IPGRI						
5	TIP on-line publicati on	0.0	2	INTERNATIO NAL PLANT GENETIC RE SOURCES IN STITUTE*IPGRI	Other	PU	34	31/12/2013	Not submitted	
1	European crops and CW R inventory	0.0	3	THE UNIVER SITY OF BI RMINGHAM	Report	PU	28	30/11/2013	Not submitted	
2	Exemplar national CWR conservation strateg ies	0.0	3	THE UNIVER SITY OF BI RMINGHAM	Report	PU	30	30/11/2013	Not submitted	
3	European priority gen e pool CWR conservati on strategy	0.0	3	THE UNIVER SITY OF BI RMINGHAM	Report	PU	37	31/03/2014	Not submitted	
4	European generic CWR c onservation strategy	0.0	3	THE UNIVER SITY OF BI RMINGHAM	Report	PU	40	31/05/2014	Not submitted	
1	Finnish LR conservatio n strategy for target crops	0.0	4	MAA JA ELI NTARVIKETA LOUDEN TUT KIMUSKESKUS	Report	PU	38	30/04/2014	Not submitted	
2	Italian LR conservatio n s trategy for target crops	0.0	4	UNIVERSITA DEGLI STUDI DI PERUGIA	Report	PU	38	30/04/2014	Not submitted	
3	UK LR conservation str ategy for target crop s	0.0	4	THE UNIVER SITY OF BI RMINGHAM	Report	PU	38	30/04/2014	Not submitted	
4	European Specific LR c onservation Strategy for target crops	0.0	4	UNIVERSITA DEGLI STUDI DI PERUGIA	Report	PU	40	30/06/2014	Not submitted	
5	European generic LR c onservation strategy	0.0	4	UNIVERSITA DEGLI STUDI DI PERUGIA	Report	PU	40	30/06/2014	Not submitted	
6	Descriptors for Web-En abled National In Sit u Landrace Inventorie s	1.0	4	UNIVERSITA DEGLI STUDI DI PERUGIA	Other	PU	24	28/02/2013	Submitted	

7	MS Access database fo r in situ LR data recor ding	1.0	4	UNIVERSITA DEGLI STUDI DI PERUGIA	Other	PU	27	29/08/2013	Submitted	
1	Report on identificat ion and discussions wi th stak eholders	1.0	5	STICHTING DIENST LAN DBOUWKUNDI G ONDERZOEK	Report	PU	12	15/08/2012	Submitted	
2	Transfer of knowledge on insect resistant Brassica material (fro m WP1) and knowledge w here to o btain it to br eeders	0.0	5	STICHTING DIENST LAN DBOUWKUNDI G ONDERZOEK	Other	RE	30	28/02/2014	Not submitted	
3	List of interesting A vena and Beta accessio ns sent to breeders	1.0	5	STICHTING DIENST LAN DBOUWKUNDI G ONDERZOEK	Report	RE	26	16/04/2013	Submitted	
4	Draft report as input f or 2013 workshop	0.0	5	STICHTING DIENST LAN DBOUWKUNDI G ONDERZOEK	Report	PU	28	23/11/2013	Not submitted	
5	Final report on trends CW R/LR use in breedin g in Europe	0.0	5	STICHTING DIENST LAN DBOUWKUNDI G ONDERZOEK	Report	PU	37	31/03/2014	Not submitted	
6	Web-based map of stak eholders	1.0	5	STICHTING DIENST LAN DBOUWKUNDI G ONDERZOEK	Prototype	PU	39	24/10/2013	Submitted	
7	List of new partnersh ips	0.0	5	STICHTING DIENST LAN DBOUWKUNDI G ONDERZOEK	Report	RE	40	30/06/2014	Not submitted	
8	Transfer information o f l inked markers to Br a ssica pests (from WP1) to breeders	0.0	5	STICHTING DIENST LAN DBOUWKUNDI G ONDERZOEK	Report	RE	40	30/06/2014	Not submitted	
1	Project website	1.0	6	INTERNATIO NAL PLANT GENETIC RE SOURCES IN STITUTE*IPGRI	Other	PU	6	28/09/2011	Submitted	

2	CWR and LR conservation workshop reports	1.0	6	THE UNIVERSITY OF BIRMINGHAM	Report	PU	6	13/01/2012	Submitted	
3	Project newsletters	0.0	6	THE UNIVERSITY OF BIRMINGHAM	Other	PU	39	31/05/2014	Not submitted	
4	TIP potential user list	1.0	6	INTERNATIONAL PLANT GENETIC RESOURCES INSTITUTE*IPGRI	Report	PU	24	25/10/2013	Submitted	
5	Web-enabled CWR and LR inventories	0.0	6	INTERNATIONAL PLANT GENETIC RESOURCES INSTITUTE*IPGRI	Other	PU	34	31/12/2013	Not submitted	
6	Dissemination conference proceedings	0.0	6	INTERNATIONAL PLANT GENETIC RESOURCES INSTITUTE*IPGRI	Other	PU	42	31/08/2014	Not submitted	
1	First periodic report	1.0	7	THE UNIVERSITY OF BIRMINGHAM	Report	PU	12	04/05/2012	Submitted	
2	Second periodic report	0.0	7	THE UNIVERSITY OF BIRMINGHAM	Report	PU	30	30/10/2013	Not submitted	
3	Final Report	0.0	7	THE UNIVERSITY OF BIRMINGHAM	Report	PU	42	30/10/2014	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 established	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
3	Metabolomics and transcriptomics material selected	1	9	31/05/2012	Yes	30/04/2012	Selection of plant material for metabolomics and transcriptomics and list of accessions available
4	Material selected for crosses	1	1	31/05/2012	Yes	30/04/2012	Selection of plant material for crosses and list of accessions available
5	Plant material for sequencing selected	1	2	30/11/2012	Yes	31/08/2012	Selection of plant material for sequencing and list of accessions available
6	Datasets on biotic/abiotic stress resistance/tolerance traits	2	3	29/02/2012	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 CWR and LR produced	2	3	29/02/2012	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	31/05/2012	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 resistance/tolerance produced	2	3	31/08/2012	Yes	30/08/2012	Environmental profiles of the habitats of CWR and LR likely to contain abiotic resistance traits have been described and documentation is available in the partner intranet
10	Trait Information Portal conceptualization ontology	2	3	31/10/2012	No	31/01/2014	Conceptualization of the TIP ontology has been implemented. The report

							detailing the ontology is yet to be finalized and published.
11	Links established with other information systems	2	3	28/02/2013	Yes	16/10/2013	List of links available in the partner intranet
12	Characterization data from other relevant information systems made available to TIP	2	3	28/02/2013	Yes	16/10/2013	List of characterization data sources available in the partner intranet
13	TIP populated with the inventory, phenomics, genomics and transcriptomics data	2	3	31/08/2013	No	31/12/2013	
14	Beta version of the TIP available for testing by breeders	2	3	31/08/2013	No	27/11/2013	
15	Guidelines for the broader use of FIGS for trait identification developed	2	3	31/05/2012	Yes	30/08/2012	Relevant datasets compiled and tested for trait identification with FIGS for the CWR and LR of the four target genera
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 help desk 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)
20	Priority European crops and CWR identified	3	1	31/07/2013	Yes	31/08/2013	Draft list of priority crops and CWR produced and available by contacting lead partner.
21	Completion of priority European CWR ecogeographic data collation	3	1	31/10/2013	No	30/11/2013	
23	Italian CWR conservation strategy interim report	3	4	31/12/2012	Yes	07/03/2013	Report produced and available in partner intranet
24	Spanish CWR conservation strategy interim report	3	8	31/12/2012	Yes	18/02/2013	Report produced and available in partner intranet
25	Conservation gap analysis of priority European CWR completed	3	1	31/12/2013	No	31/12/2013	
26	European CWR conservation strategy draft 1 circulated	3	1	31/01/2014	No	31/01/2014	

27	European CWR conservation strategy draft 2 circulated	3	1	30/04/2014	No	30/04/2014	
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
31	National inventories of extant LR and relative ecogeographic data complete	4	4	28/02/2014	No	28/02/2014	
32	European Avena, Beta, Brassica and Medicago LR data complete for all European countries	4	4	28/02/2014	No	28/02/2014	
33	European LR conservation strategy draft 1 circulated to PGR Secure partners and NFPs for comments	4	4	28/02/2014	No	28/02/2014	
34	Finnish LR conservation strategy completed	4	7	31/03/2014	No	31/03/2014	
35	Italian LR conservation	4	4	31/03/2014	No	31/03/2014	

	strategy completed						
36	UK LR conservation s trategy completed	4	1	31/03/2014	No	31/08/2014	
37	LR case study strategy published	4	4	31/05/2014	No	31/05/2014	
38	LR generic strategy published	4	4	31/05/2014	No	31/05/2014	
39	Country key-persons identified	5	2	31/05/2011	Yes	31/05/2011	Key persons identified an d list available (see App endix 1, Section 2 of the 1st periodic report)
40	Identification of stakeho lders	5	2	31/08/2011	Yes	29/02/2012	Stakeholders identified a nd lists per region avail able (see Tables 3, 4 and 5 of Section 2 of the 1st periodic report)
41	Questionnaires sent	5	2	31/08/2012	Yes	30/09/2012	The questionnaire was made available online u sing the SurveyMonkey tool
42	Questionnaires replies	5	2	31/10/2012	Yes	15/11/2012	Responses to the que stionnaire received and d ata downloaded from SurveyMonkey for ana lysis
43	Proof of concept sta keholders locations mapping	5	2	30/06/2013	Yes	29/08/2013	Web-based map of sta keholders ('PGR-COMN ET') available at: w ww.pgrsecure.org/pgr -comnet
44	Feedback breeding co mpanies on usefulness material/knowledge tran sfer	5	2	30/06/2014	No	30/06/2014	
45	European stakeholder workshop on CWR/LR diversity use and co nservation held	5	2	31/10/2013	No	30/11/2013	
46	Meeting to strengthen partnerships in the CWR	5	2	31/03/2014	No	30/11/2013	

	/ LR diversity use and c onservation community						
47	CWR and LR conservat ion workshops	6	1	30/06/2011	Yes	30/06/2011	Workshop held and at tended by NFPs from 38 European countries; wo rkshop report published i n website
49	Identification of TIP pot ential users and contacts	6	3	28/02/2013	Yes	30/07/2013	List compiled and av ailable in the partner in tranet
50	Web-enabled Europe-w ide inventories of CWR and LR diversity	6	3	31/12/2013	No	31/12/2013	
52	Dissemination of the TIP among potential users	6	3	31/01/2014	No	31/01/2014	
53	Dissemination confer ence	6	3	31/08/2014	No	31/08/2014	
54	Consortium Agreement	7	1	31/05/2011	Yes	28/11/2011	Consortium Agreement signed by beneficiaries; CA available in partner intranet, including attac hment 5 updated in line with changes to the C onsortium 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 07/06/20 11; report available in p artner intranet
56	1st annual consortium meeting	7	1	31/12/2011	Yes	15/12/2012	1st annual consortium meeting held 14-15/12/2 011; meeting report available 07/06/2012
57	2nd Annual Consortium meeting	7	1	31/10/2012	Yes	03/12/2012	Second annual consor tium meeting held 23 #25/10/2012; meeting report available 03/12/2 012; report available in partner intranet
58	Mid-term review	7	1	31/10/2012	Yes	03/12/2012	Mid-term review meeting held 23#25/10/2012; m

							eeting report available 0 3/12/2012; report availab le in partner intranet
59	3rd annual consortium meeting	7	1	30/06/2014	No	30/06/2014	

Use of Resources **Overview Activity Report** Project no. **266394** Period: **01/03/2012 - 31/08/2013**

Acronym: **PGR Secure**

Beneficiary No. 1	Legal Name: THE UNIVERSITY OF BIRMINGHAM	FORM C TOTAL(€)	213,002.45
PIC: 999907526	Short Name: UOB	Status: Submitted to EU	Version: 1

RTD/INNOVATION				
Cost Type	**Work Package**	**Explanation**		**Cost**
PERSONNEL	1,2,3,4	Salaries of Project Coordinator (PC) (WP2: 0.04 PM, WP3: 0.84 PM); two senior researchers (WP1: 1.15 PM); one Project Manager (PM)/researcher (WP2: 0.18 PM, WP3: 0.93 PM, WP4: 0.03); two junior researchers (WP1: 17.84 PM, WP3: 19.04 PM); and one casual researcher (WP3: 2.17 PM).		€ 66,538.98
		RTD/INNOVATION - PERSONNEL	**total (€)**	66,538.98
OTHER DIRECT	1,3,4	CONSUMABLES: Ziplock bags for sample collection (related to fieldwork on the Lizard, 06 May–28 June 2012) (WP3); lab consumables (WPs 1 and 3); catering costs (WP4 meeting, Birmingham, UK); research texts (WPs 1, 3 and 4); casual pay (WP3 – development of the CWR conservation strategy of the Czech Republic); computer software and consumables (WPs 3 and 4); and stationary (WP3). 1TB hard drive		€ 10,039.48
	1,2,3,4,5	TRAVELING: Participation of PC in PGRFA indicators workshops at the World Conservation Monitoring Centre, 12–13 March and 13–14 August 2012 (WPs 3 and 4). Participation of PC at meeting to discuss UK LR NI funding, Defra, London, 21 April 2012 (WP4). Travel costs for one staff member of Natural England to participate in a UK national CWR conservation strategy planning meeting, the Lizard, Cornwall, 21 May 2012 (WP3). Participation of PC and junior researcher at a CWR conservation strategy of Wales planning meeting, Countryside Council for Wales, Bangor, 07–08 August 2012 (WP3). Participation of one senior researcher (WP1) and two junior researchers (WPs 1 and 3) at the PGR Secure second annual consortium and mid-term review meeting, Larnaca, Cyprus, 23–25 October 2012. Flight for junior researcher to visit Grimstad, Norway, 27 October–23 November 2012 to undertake research for the development of the CWR conservation strategy of Norway (WP3). Participation of PC and junior researcher at CWR conservation strategy of Norway development and PGR Secure dissemination meetings, Oslo, Norway, 21–23 November 2012 (WP3). Participation of PC and junior researcher at the UK PGR Group technical visit to John Innes Centre, Norwich, UK, 12–13 December 2012 (WP5). Travel costs of junior researcher to carry out fieldwork on the Lizard Peninsula, Cornwall, and across southwest England and south Wales 12 May to 07 July 2013 (WP3). Travel costs of three field assistants for fieldwork covering the Lizard Peninsula, Cornwall, southwest England and south Wales 03–14 June 2013 (WP3). Travel costs of PC to supervise fieldwork on the Lizard Peninsula, Cornwall, 16/05/13 to 10/06/13 (WP3). Travel costs of PC to advise on the development of the CWR conservation strategy of Bulgaria, Sofia, Bulgaria, 13–16 May 2013 (WP3).		€ 9,228.79
	1,2,3,4,5	DURABLE EQUIPMENT: 2 PCs and 1 laptop (depreciation for the period).		€ 1,551.75
		RTD/INNOVATION - OTHER DIRECT	**total (€)**	20,820.02
INDIRECT	N/A	N/A		€ 52,415.40
			RTD/INNOVATION total (€)	139,774.40

MANAGEMENT			
Cost Type	**Work Package**	**Explanation**	**Cost**
PERSONNEL	7	Salaries of PC (0.68 PM) and PM (2.74 PM).	€ 17,249.91

		MANAGEMENT - PERSONNEL	**total (€)**	17,249.91
OTHER DIRECT	7	CONSUMABLES: Computer software; telephone charges (use of personal telephones only).	**€**	2,544.29
	7	TRAVELING: Participation of representative of Associate Partner, EUCARPIA at the PGR Secure first annual consortium meeting, 14–15 December 2011, Perugia, Italy. This meeting included activities listed in the Article II.16.5 of the GA and under the heading 'Examples of Management activities' in the Guide to Financial Issues relating to FP7 Indirect Actions. Examples of such management activities were the development of the dissemination and exploitation plan, discussion of IPR issues, and preparations for the technical review. Participation of PC, PM and five members of the External Advisory Board at the PGR Secure second annual consortium and mid-term review meeting, Larnaca, Cyprus, 23–25 October 2012. These costs relate to the technical review as stipulated under Article II.16.5 of the GA. Participation of representative of Associate Partner, EUCARPIA at the PGR Secure second annual consortium and mid-term review meeting, Larnaca, Cyprus, 23–25 October 2012. These costs relate to the technical review as stipulated under Article II.16.5 of the GA.	**€**	4,260.23
		MANAGEMENT - OTHER DIRECT	**total (€)**	6,804.52
INDIRECT	N/A	N/A	**€**	14,432.66
		MANAGEMENT	**total (€)**	38,487.09

OTHER				
Cost Type	**Work Package**	**Explanation**		**Cost**
PERSONNEL	6	Salaries of PC (0.20 PM) and PM/researcher (3.54 PM).	**€**	16,438.86
		OTHER - PERSONNEL	**total (€)**	16,438.86
OTHER DIRECT	6	CONSUMABLES: Computer consumables; website domain renewal.	**€**	2,016.18
	6	TRAVELING: Participation of PC and PM/researcher at EuroGard VI, 28–29 May 2012 to organize and facilitate CWR national conservation strategy planning training workshop and for training in national CWR conservation strategy planning at the Aegean Agricultural Research Institute, Menemen, Turkey, 31 May–01 June 2012. Participation of Project Coordinator at the conference, 'Phytogenetic Wealth and Agricultural Heritage of the Aegean Islands', 6–7 July 2012, Santorini Island, Greece to present PGR Secure and to provide training on the development of the CWR conservation strategy for Greece. Participation of PC to present PGR Secure methodologies at FAO Global CWR Conservation Strategy workshop, Rome, Italy, 12–13 November 2012. Travel costs of PC and junior researcher to present a paper and poster at the EUCARPIA Genetic Resources section meeting: 'Pre-breeding – fishing in the gene pool', 10–13 June 2013, Alnarp, Sweden.	**€**	3,258.06
		OTHER - OTHER DIRECT	**total (€)**	5,274.24
INDIRECT	N/A	N/A	**€**	13,027.86
		OTHER	**total (€)**	34,740.96

Beneficiary No. 1	**Legal Name:**	**THE UNIVERSITY OF BIRMINGHAM**		**FORM C TOTAL(€)**	**35.60**
PIC: 999907526	**Short Name:**	**UOB**	**Status: Submitted to EU**	**Version: 1**	**Adjustment**

RTD/INNOVATION				
Cost Type	**Work Package**	**Explanation**		**Cost**
OTHER DIRECT	1,2,3,4,	OTHER: Equipment depreciation which was incorrectly charged under "other" in period 1. Travel costs incorrectly charged under "other" in period 1.	**€**	-7,881.76
		RTD/INNOVATION - OTHER DIRECT	**total (€)**	-7,881.76

INDIRECT	N/A	N/A	€ -4,729.06
		RTD/INNOVATION total (€)	-12,610.82

MANAGEMENT			
Cost Type	**Work Package**	**Explanation**	**Cost**
PERSONNEL	7	Hours for project manager incorrectly charged to "other" in period 1.	€ 1,695.44
		MANAGEMENT - PERSONNEL total (€)	1,695.44
OTHER DIRECT	7	OTHER: Costs for Project Coordinator, Project Manager and members of the External Advisory Board to attend the kick- off and first annual consortium meetings. These meetings included activities listed in the Article II.16.5 of the GA and under the heading `Examples of Management activities` in the Guide to Financial Issues relating to FP7 Indirect Actions. Examples of such management activities were the development of the dissemination and exploitation plan, discussion of IPR issues, and preparations for the technical review.	€ 9,018.37
		MANAGEMENT - OTHER DIRECT total (€)	9,018.37
INDIRECT	N/A	N/A	€ 6,428.29
		MANAGEMENT total (€)	17,142.10

OTHER			
Cost Type	**Work Package**	**Explanation**	**Cost**
PERSONNEL	6	Hours for project manager incorrectly charged as "other" in period 1.	€ -1,673.18
		OTHER - PERSONNEL total (€)	-1,673.18
OTHER DIRECT	6	OTHER: Equipment depreciation incorrectly charged in period 1. Consumables costs incorrectly charged in period 1. Travel costs incorrectly charged to other in period 1.	€ -1,136.62
		OTHER - OTHER DIRECT total (€)	-1,136.62
INDIRECT	N/A	N/A	€ -1,685.88
		OTHER total (€)	-4,495.68

Beneficiary No. 2	**Legal Name: STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK**		**FORM C TOTAL(€) 360,433.41**
PIC: 999547365	**Short Name: DLO**	**Status: Submitted to EU**	**Version: 1**

RTD/INNOVATION			
Cost Type	**Work Package**	**Explanation**	**Cost**
PERSONNEL	1	0.51 PM Henken (technician)	€ 2,418.79
	1	2.25 PM van Kaauwen (technician)	€ 10,730.69
	1	16.87 PM Pelgrom (technician)	€ 79,908.38
	1	0.05 PM Schipper (technician)	€ 223.78

	1	0.40 PM van de Schoot (technician)		€ 1,860.79
	1	0.26 PM Steenhuizen-Broers (technician)		€ 1,243.03
	1	1.51 PM Voorrips (researcher)		€ 11,671.81
	1	4.45 PM Vosman (sr. researcher)		€ 45,189.47
	2	0.05 PM Bas (technician)		€ 282.79
	5	5.85 PM Kik (researcher)		€ 44,692.03
		RTD/INNOVATION - PERSONNEL	**total (€)**	198,221.56
SUBCONTRACTING	5	Subcontract payment key person Italy		€ 6,000.00
		RTD/INNOVATION - SUBCONTRACTING	**total (€)**	6,000.00
OTHER DIRECT	1	OTHER: lab usage		€ 10,052.00
	1	OTHER: greenhouse costs		€ 17,887.40
	1	CONSUMABLES: several consumables		€ 15,258.62
	1	TRAVELING: several small trips		€ 195.00
	1	TRAVELING: ticket and costs stay Broekgaarden 22-10-2012 till 26-10-2012 Cyprus midterm review		€ 788.19
	1	TRAVELING: ticket and costs stay Vosman 22-10-2012 till 26-10-2012 Cyprus midterm review		€ 889.12
	1	TRAVELING: ticket and costs stay Voorrips 22-10-2012 till 26-10-2012 Cyprus midterm review		€ 800.94
	1	TRAVELING: ticket and costs stay Pelgrom 22-10-2012 till 26-10-2012 Cyprus midterm review		€ 705.72
	5	TRAVELING: several semi structured interviews seed companies		€ 2,892.04
		RTD/INNOVATION - OTHER DIRECT	**total (€)**	49,469.03
INDIRECT	N/A	N/A		€ 97,128.56
		RTD/INNOVATION	**total (€)**	350,819.15

MANAGEMENT			
Cost Type	**Work Package**	**Explanation**	**Cost**
PERSONNEL	7	0.36 PM Vosman (sr. researcher)	€ 3,681.61
	7	0.36 PM Kik (researcher)	€ 2,770.91
		MANAGEMENT - PERSONNEL **total (€)**	6,452.52
INDIRECT	N/A	N/A	€ 3,161.74
		MANAGEMENT **total (€)**	9,614.26

Beneficiary No. 2	**Legal Name: STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK**	**FORM C TOTAL(€)**	**-1,029.66**
PIC: 999547365	**Short Name: DLO**	**Status: Submitted to EU**	**Version: 1** **Adjustment**

RTD/INNOVATION			
Cost Type	**Work Package**	**Explanation**	**Cost**
PERSONNEL	1	adjustment Pelgrom (technician)	€ 504.95

	1	adjustment Steenhuizen-Broers (technician)		€ 45.12
	1	adjustment Vosman (sr. researcher)		€ 112.13
	1	greenhouse costs to other		€ -7,303.95
	2	adjustment Bas (technician)		€ 1.93
	2	adjustment Keizer (jr. researcher)		€ 6.25
	5	adjustment Kik (researcher)		€ 110.61
	1	correction rejected costs		€ -5,486.05
		RTD/INNOVATION - PERSONNEL	**total (€)**	-12,009.01
OTHER DIRECT	1	OTHER: extra labusage CS1		€ 201.00
	5	TRAVELING: correction VAT kick off meeting Univ.Birmingham Kik		€ -7.13
	1	OTHER: greenhouse costs 2011		€ 10,664.97
		RTD/INNOVATION - OTHER DIRECT	**total (€)**	10,858.84
INDIRECT	N/A	N/A		€ -8,053.71
		RTD/INNOVATION	**total (€)**	-9,203.88

MANAGEMENT				
Cost Type	**Work Package**	**Explanation**		**Cost**
PERSONNEL	7	correction rejected costs		€ 5,486.05
		MANAGEMENT - PERSONNEL	**total (€)**	5,486.05
INDIRECT	N/A	N/A		€ 2,688.17
		MANAGEMENT	**total (€)**	8,174.22

Beneficiary No. 3	**Legal Name: INTERNATIONAL PLANT GENETIC RESOURCES INSTITUTE*IPGRI**	**FORM C TOTAL(€)**	**231,742.44**
PIC: 998025241	**Short Name: BIOVER**	**Status: Submitted to EU**	**Version: 1**

RTD/INNOVATION				
Cost Type	**Work Package**	**Explanation**		**Cost**
PERSONNEL	1,2,3,4,5	(RTD) Project Leader 0.74 PM, (RTD) Scientist 3.19 PM, (RTD) System analyst and developer 4.54 PM, (RTD) Scientist 4.74 PM		€ 101,193.98
		RTD/INNOVATION - PERSONNEL	**total (€)**	101,193.98
SUBCONTRACTING	2	- Consultancy Mr. Parra Quijano to to organize workshop for WP2-task 2.1 development of FIGS methodology using classical approach, including environmental profiles.		€ 2,852.00
	2	- Consultancy Mr. Dag Endresen to organize workshop for WP2-task 2.1 developement of FIGS methodology through modelling using R.		€ 2,443.31
	2	- Internship Chiara Mancini to support the data collection for workshop.		€ 660.07
	2	-Consultancy Antonio Carella to do the infrastructure refactoring and development of search forms.		€ 7,788.08
	2	- Internship Anna Hausmann to support trait information compilation.		€ 1,307.48
		RTD/INNOVATION - SUBCONTRACTING	**total (€)**	15,050.94

OTHER DIRECT	2	TRAVELING: - Ms Imke Thormann, from Rome (Italy) to Madrid (Spain) 8-13.1.2012, to attend the FIGS workshop	€ 974.16
	2	TRAVELING: - Ms Sonia Dias from Rome (Italy) to Madrid (Spain) 8-13.1.2012, to attend the FIGS workshop	€ 963.11
	2	TRAVELING: - Mr. Dag Endresen from Copenhagen (Denmark) to Madrid (Spain) 8-13.1.2012, to attend the FIGS workshop	€ 909.98
	2	TRAVELING: Mr. Abdallah Bari, from Montreal (Canada) to Madrid (Spain) 7-13.1.2012, to attend the FIGS workshop	€ 1,227.66
	2	TRAVELING: Ms Sonia Dias, from Rome (Italy) to Corvallis (USA) 12-17.9.2012, to attend the Crop Plant Trait Ontology workshop	€ 1,311.12
	2	TRAVELING: Ms Imke Thormann, from Rome (Italy) to Lamaca (Cyprus) 22-27.10.2012, to attend the PGR Secure 2nd annual consortium and mid term review meeting	€ 1,302.93
	2	TRAVELING: Ms Sonia Dias, from Rome (Italy) to Lamaca (Cyprus) 22-26.10.2012, to attend the PGR Secure 2nd annual consortium and mid term review meeting	€ 1,172.27
	2	TRAVELING: Mr. Carlo Fadda, from Nairobi (Kenya) to Lamaca (Cyprus) 21-26.10.2012, to attend the PGR Secure 2nd annual consortium and mid term review meeting	€ 1,734.35
	2	TRAVELING: Ms Sonia Dias, from Rome (Italy) to Bonn (Germany) 5-7.11.2012, to attend the Breeder's Committee (BC) meeting	€ 852.21
	2	CONSUMABLES: Chronicle/Oxygen, Oxygen XML Editor v14 Academic with 1 year Support and Maintenance Pack (SMP)	€ 58.93
		RTD/INNOVATION - OTHER DIRECT **total (€)**	10,506.72
INDIRECT	N/A	N/A	€ 22,340.14
		RTD/INNOVATION **total (€)**	149,091.78

MANAGEMENT			
Cost Type	**Work Package**	**Explanation**	**Cost**
PERSONNEL	7	(Management) Project Leader 0.12 PM	€ 1,084.18
		MANAGEMENT - PERSONNEL **total (€)**	1,084.18
INDIRECT	N/A	N/A	€ 216.84
		MANAGEMENT **total (€)**	1,301.02

OTHER			
Cost Type	**Work Package**	**Explanation**	**Cost**
PERSONNEL	6	(Other) Project Leader 0.38 PM, (Other) Scientist 0.30 PM, (Other) System analyst and developer 2.10 PM, (Other) Scientist 1.98 PM	€ 38,377.54
		OTHER - PERSONNEL **total (€)**	38,377.54
SUBCONTRACTING	6	Consultancy Antonio Carella for the startup of web-enabling infrastructure for WP3 and WP4 data	€ 22,702.18
		OTHER - SUBCONTRACTING **total (€)**	22,702.18
OTHER DIRECT	6	CONSUMABLES: Project factsheet, design and layout - design of factsheet and layout of original English version	€ 1,023.65
	6	CONSUMABLES: Layout of six language translations - translation of the project factsheet into other six languages	€ 499.87
	6	CONSUMABLES: Setup of a listserver - list server set for dissemination of the end of project conference	€ 56.53
	6	CONSUMABLES: OS X Mountain Lion&OS X Server - memory for the servers where development is done	€ 35.37

	6	CONSUMABLES: Production of Issues 9 and 10 of the Crop wild relative newsletter		€ 8,879.92
		OTHER - OTHER DIRECT	**total (€)**	10,495.34
INDIRECT	N/A	N/A		€ 9,774.58
			OTHER total (€)	81,349.64

Beneficiary No. 4	**Legal Name: UNIVERSITA DEGLI STUDI DI PERUGIA**	**FORM C TOTAL(€)**	**186,215.45**
PIC: 999846319	**Short Name: UNIPG**	**Status: Submitted to EU**	**Version: 1**

RTD/INNOVATION			
Cost Type	**Work Package**	**Explanation**	**Cost**
PERSONNEL	3,4	salary for 1 permanent staff professor:0.5PM WP3 (planning field research on Brassica and Beta CWR Italian populations, planning Italian CWR inventorying; Italian CWR conservation strategy working out) + 1.22 PM WP4 (planning Italian landrace inventorying and information recording, working out data and result checking; Italian landrace strategy working out)	€ 12,331.79
	3	salary for 1 permanent staff professor: 3.60PM WP3 (planning field research on Brassica and Beta CWR Italian populations; carrying out field research on Brassica CWR Italian populations; planning Italian CWR inventorying and information recording, checking results; web implementation of the Italian Inventory; Italian CWR conservation strategy working out)	€ 34,125.96
	3,4	salary for 1permanent staff technician:0.50PM WP4 (Italian landrace data working out and conservation strategy), 0.22PM WP3 (Brassica data working out)	€ 3,220.97
	3	salary for 1 permanent staff researcher: 0.48 PM WP3 (Italian CWR conservation strategy working out)	€ 1,898.26
	4	salary for 1 hired staff reseacher: 10.56 PM WP4 (Italian landrace data recording, related CD rom preparation)	€ 18,614.52
	3	salary for 1 hired staff reseacher: 10.00PM WP3 (Italian CWR inventory preparation)	€ 21,034.09
	4	salary for 1 hired staff reseacher:1.27 PM WP4 (Italian landrace data recording)	€ 4,148.40
		RTD/INNOVATION - PERSONNEL	**total (€)** 95,373.99
OTHER DIRECT	3	TRAVELING: 1 permanent staff professor travelling for . Brassica population data recording (Gaeta 24 June 2012, 287 euro; Alpi Apuane_ costa Ligure 3-4 July 2012, 762.45 euro; Costa campana_Lazio 8 July 2012, 340.05 euro; Penisola Sorrentina_Ischia_Capri 14-17 June 2012, 552.50 euro) and . partecipation to '2nd annual consortium and midterm review meeting' in Cyprus 22-26 October 2012, 783.85 euro	€ 2,725.85
	3,4	TRAVELING: 1 permanent staff technician travelling for .partecipation to the 'Native seed banks as providers of crop wild relatives for agrofood uses...'Congress in Pisa 27 -28 April 2012, 296.67 euro .partecipation to '2nd annual consortium and midterm review meeting' in Cyprus 22-26 October 2012, 805.37 euro .partecipation to the 'Pre-breeding-fishing in the gene pool'_EUCARPIA Congress (co_author of a presentation) in Alnarp_Sweden 10-14 June 2013, 1061.91 euro	€ 2,163.95
	3	TRAVELING: 1 hired staff travelling for . Brassica&Beta population data recording (Monte Circeo_Gaeta 22 June 2012, 299.08 euro; Monte Argentario_Populonia 27 June 2012, 249.28 euro; Monte Argentario_Giglio 30 June 2012, 172.36 euro; Orvieto_oasi Alviano 13 June 2012, 66.60 euro; 2 July 2012, 66.60 euro; 17 July 2012, 66.60 euro) and . partecipation to '2nd annual consortium and midterm review meeting' in Cyprus 22-26 October 2012, 777.86 euro	€ 1,698.38
		RTD/INNOVATION - OTHER DIRECT	**total (€)** 6,588.18

INDIRECT	N/A	N/A	**€** 61,177.30
		RTD/INNOVATION **total (€)**	163,139.47

MANAGEMENT			
Cost Type	**Work Package**	**Explanation**	**Cost**
PERSONNEL	7	personnel cost 1 permanent staff professor: 0.08 PM WP7 (time dedicated to prepare, attend and follow outcomes of the 2nd annual consortium meeting in Cyprus, 23-25 October 2012)	**€** 588.00
		MANAGEMENT - PERSONNEL **total (€)**	588.00
OTHER DIRECT	7	TRAVELING: WP4 leader travelling to the '2nd annual consortium and midterm review meeting' in Cyprus, 22-26 October 2012	**€** 845.29
		MANAGEMENT - OTHER DIRECT **total (€)**	845.29
INDIRECT	N/A	N/A	**€** 859.97
		MANAGEMENT **total (€)**	2,293.26

OTHER			
Cost Type	**Work Package**	**Explanation**	**Cost**
PERSONNEL	6	personnel cost for 1 permanent staff professor: 0.86PM WP6 (landrace helpdesk updates; 'Descriptors for web-enabled National in situ landrace inventories' and 'MS Access database for in situ landrace data recording' preparation and writing; 'CWR and landrace paper and poster preparation; PGR secure leaflet preparation; 'Landrace Issue1' on-line journal publication, attendance to the 'Banche di Germoplasma e conservazione in situ_RIBES' Congress, Rome April 23rd 2013 to present the Italian CWR inventory and conservation strategy; attendance to the 'Pre-breeding -fishing in the gene pool _EUCARPIA congress, Alnarp Sweeden 11-13 June 2013, to present the oral communication 'Developing a European in situ (on farm) conservation strategy for landraces',	**€** 5,750.44
	6	personnel cost for 1 permanent staff technician: 1.40PM WP6 ('Descriptors for web-enabled National in situ landrace inventories' and 'MS Access database for in situ landrace data recording' preparation and writing; landrace paper and poster preparation, 'Landrace Issue1' on-line Journal editing and publication, attendance to the 'Native seed banks as provider of CWR..._RIBES' Congress, Pisa April 27-28 2012, attendance to the 'Pre-breeding - fishing in the gene pool _EUCARPIA congress, Alnarp Sweeden 11-13 June 2013, to present the oral communication 'Developing a European in situ (on farm) conservation strategy for landraces' as coauthor	**€** 6,186.59
		OTHER - PERSONNEL **total (€)**	11,937.03
OTHER DIRECT	6	TRAVELING: WP4 leader travelling to to present an oral communication on 'the Italian CWR inventory' activities to the RIBES Congress 'Banche di germoplasma e conservazione in situ' in Rome, 23 April 2013, 69.5 euro . to present an oral communication on 'Developing a European in situ (on farm) conservation strategy for landraces' at the 'Pre-breeding_fishing into the gene pool_ EUCARPIA Congress in Alnarp, Sweden 10-14 June 2013, 982.67 euro	**€** 1,052.17
		OTHER - OTHER DIRECT **total (€)**	1,052.17
INDIRECT	N/A	N/A	**€** 7,793.52
		OTHER **total (€)**	20,782.72

Beneficiary No. 4	Legal Name: UNIVERSITA DEGLI STUDI DI PERUGIA	FORM C TOTAL(€)	-423.68
PIC: 999846319	Short Name: UNIPG	Status: Submitted to EU	Version: 1 Adjustment

RTD/INNOVATION				
Cost Type	**Work Package**	**Explanation**		**Cost**
PERSONNEL	3	mere error in productive time calculationt of one permanent staff researcher		€ 37.57
	4	mere error in gross salary calculation of one hired staff person		€ -302.37
		RTD/INNOVATION - PERSONNEL	total (€)	-264.80
INDIRECT	N/A	N/A		€ -158.88
		RTD/INNOVATION	total (€)	-423.68

Beneficiary No. 5	Legal Name: JULIUS KUHN INSTITUT BUNDESFORSCHUNGSINSTITUT FUR KULTURPFLANZEN	FORM C TOTAL(€)	172,612.83
PIC: 998890578	Short Name: JKI	Status: Submitted to EU	Version: 1

RTD/INNOVATION				
Cost Type	**Work Package**	**Explanation**		**Cost**
PERSONNEL	5	Scientist (Neuhaus 12,50 PM,Bülow 1,50 PM)		€ 65,172.64
	5	Permanent staff (Frese 4,94 PM)		€ 29,792.65
		RTD/INNOVATION - PERSONNEL	total (€)	94,965.29
SUBCONTRACTING	5	Five work contracts between JKI and consultants in Austria, Poland, Bulgaria, Romania, Czech Republic (assistance in preparation and implemention of interviews as well as reports).		€ 15,084.00
		RTD/INNOVATION - SUBCONTRACTING	total (€)	15,084.00
OTHER DIRECT	5	TRAVELING: Frese, L., Perugia, 13-171211 - PGR Secure first annual consortium meeting, Perugia, Italy (reimbursed 03/2012)		€ 554.50
	5	TRAVELING: Germeier, C., Palanga 05-090911 - participation of at the PGR Secure CWR and LR training workshop, Palanga, Lithuania (reimbursed 03/2012)		€ 268.66
	5	TRAVELING: Frese, L., Bern, 200912 258,14 Euro; - IIRB (Beta stakeholder) meeting, Murten, Switzerland, travel via Bern to Murten		€ 258.14
	5	TRAVELING: Frese, L., Murten 20-210912 241,88 Euro - IIRB (Beta stakeholder) meeting, Murten, Switzerland, travel via Bern to Murten		€ 241.88
	5	TRAVELING: Frese, L., Bonn 06-081112 - PGR Secure second Breeders' Committee meeting		€ 374.99
	5	TRAVELING: Neuhaus, G., Bonn 06-081112 - PGR Secure second Breeders' Committee meeting		€ 302.86
	5	TRAVELING: Frese, L., Larnaca, 23-251012 - PGRSecure mid-term review meeting.		€ 242.15
	5	OTHER: DHL and FedEx costs, Survey Monkey annual license, year 2012, 2013		€ 695.33
		RTD/INNOVATION - OTHER DIRECT	total (€)	2,938.51
INDIRECT	N/A	N/A		€ 58,742.28
		RTD/INNOVATION	total (€)	171,730.08

OTHER			
Cost Type	**Work Package**	**Explanation**	**Cost**
PERSONNEL	6	Permanent staff (Frese 0,09 PM) (translation of project flyer; preparation of demonstration materials for dissemination conference in 2014)	€ 551.72

		OTHER - PERSONNEL	total (€)	551.72
INDIRECT	N/A	N/A	€	331.03
		OTHER	total (€)	882.75

Beneficiary No. 6	Legal Name: NORDISKT GENRESURSCENTER	FORM C TOTAL(€)	57,949.53
PIC: 986317147	Short Name: NORDGEN	Status: Submitted to EU	Version: 1

RTD/INNOVATION

Cost Type	Work Package	Explanation		Cost
PERSONNEL	5	Salary for 2 senior scientist, PMs 4,33	€	30,360.43
		RTD/INNOVATION - PERSONNEL	total (€)	30,360.43
SUBCONTRACTING			€	0.00
		RTD/INNOVATION - SUBCONTRACTING	total (€)	0.00
OTHER DIRECT	5	TRAVELING: Travel and hotel expenses for 1 senior scientist attending: WP5-workshop in Braunschweig, Germany, 9-12 July 2012. 2nd meeting of the PGR Secure Breeder´s Committe, Bonn, Germany, 6 November 2012.	€	833.94
		RTD/INNOVATION - OTHER DIRECT	total (€)	833.94
INDIRECT	N/A	N/A	€	18,716.62
		RTD/INNOVATION	total (€)	49,910.99

MANAGEMENT

Cost Type	Work Package	Explanation		Cost
PERSONNEL	7	Salary for 1 senior scientist, PMs 0,36	€	2,466.98
		MANAGEMENT - PERSONNEL	total (€)	2,466.98
OTHER DIRECT	7	TRAVELING: Travel and hotel expenses for 1 senior scientist attending: 2nd annual consortium and mid-term review meeting, Larnaca, Cyprus, 23-25 October 2012.	€	792.64
	7	OTHER: Documents sent by DHL	€	79.80
		MANAGEMENT - OTHER DIRECT	total (€)	872.44
INDIRECT	N/A	N/A	€	2,003.65
		MANAGEMENT	total (€)	5,343.07

OTHER

Cost Type	Work Package	Explanation		Cost
PERSONNEL	6	Salary for 2 senior scientist, PMs 0,23	€	1,684.67
		OTHER - PERSONNEL	total (€)	1,684.67

INDIRECT	N/A	N/A	€	1,010.80
		OTHER	total (€)	2,695.47

Beneficiary No. 7	Legal Name:	MAA JA ELINTARVIKETALOUDEN TUTKIMUSKESKUS	FORM C TOTAL(€)	42,934.71
PIC: 999467825	Short Name:	MTT	Status: Submitted to EU	Version: 1

RTD/INNOVATION

Cost Type	Work Package	Explanation		Cost
PERSONNEL	3	Salary of 1 senior researcher 0,53 PM	€	3,091.24
	4	Salary of 1 senior researcher 1,6 PM	€	9,023.43
		RTD/INNOVATION - PERSONNEL	total (€)	12,114.67
SUBCONTRACTING	3	Salary and travel costs of subcontractor University of Helsinki Heli Fitzgerald	€	16,764.17
		RTD/INNOVATION - SUBCONTRACTING	total (€)	16,764.17
OTHER DIRECT	4	TRAVELING: Project meeting in Helsinki	€	106.17
		RTD/INNOVATION - OTHER DIRECT	total (€)	106.17
INDIRECT	N/A	N/A	€	9,667.20
		RTD/INNOVATION	total (€)	38,652.21

MANAGEMENT

Cost Type	Work Package	Explanation		Cost
PERSONNEL	7	Salary of 1 senior researcher 0,28 PM	€	1,556.41
		MANAGEMENT - PERSONNEL	total (€)	1,556.41
OTHER DIRECT	7	TRAVELING: Travel and hotel expenses for 1 researcher attending mid-term meeting, Larnaca, Cypros 21-26 Oct 2012	€	1,449.29
		MANAGEMENT - OTHER DIRECT	total (€)	1,449.29
INDIRECT	N/A	N/A	€	1,276.80
		MANAGEMENT	total (€)	4,282.50

Beneficiary No. 7	Legal Name:	MAA JA ELINTARVIKETALOUDEN TUTKIMUSKESKUS	FORM C TOTAL(€)	-1,059.70
PIC: 999467825	Short Name:	MTT	Status: Submitted to EU	Version: 1 Adjustment

RTD/INNOVATION

Cost Type	Work Package	Explanation		Cost
OTHER DIRECT		OTHER:	€	0.00
		RTD/INNOVATION - OTHER DIRECT	total (€)	0.00
INDIRECT	N/A	N/A	€	-591.60
		RTD/INNOVATION	total (€)	-591.60

OTHER			
Cost Type	**Work Package**	**Explanation**	**Cost**
SUBCONTRACTING			€ 0.00
		OTHER - SUBCONTRACTING	**total (€)** 0.00
INDIRECT	N/A	N/A	€ -214.20
		OTHER	**total (€)** -214.20

Beneficiary No. 8	**Legal Name:**	**UNIVERSIDAD REY JUAN CARLOS**	**FORM C TOTAL(€)**	**95,792.93**
PIC: 999886283	**Short Name:**	**URJC**	**Status: Submitted to EU**	**Version: 1**

RTD/INNOVATION			
Cost Type	**Work Package**	**Explanation**	**Cost**
PERSONNEL	2	Researcher (Maria Luisa Rubio Teso) Personnel Costs 1,29 PM	€ 3,010.33
	3	Researcher (Maria Luisa Rubio Teso) Personnel Costs 16,71PM	€ 38,994.29
	2	Senior Researcher (José Mª Iriondo) Personnel Costs 0,25 PM	€ 1,213.00
	3	Senior Researcher (José Mª Iriondo) Personnel Costs 3 PM	€ 14,556.02
		RTD/INNOVATION - PERSONNEL	**total (€)** 57,773.64
OTHER DIRECT	3	TRAVELING: José Mª Iriondo Travel Second annual consortium and mid-term review meeting, 23–25 October 2012, Larnaca, Cyprus	€ 1,103.76
	3	TRAVELING: Mª Luisa Rubio Teso Travel Second annual consortium and mid-term review meeting, 23–25 October 2012, Larnaca, Cyprus	€ 993.18
		RTD/INNOVATION - OTHER DIRECT	**total (€)** 2,096.94
INDIRECT	N/A	N/A	€ 35,922.35
		RTD/INNOVATION	**total (€)** 95,792.93

Beneficiary No. 9	**Legal Name:**	**ServiceXS BV**	**FORM C TOTAL(€)**	**2,568.00**
PIC: 996183987	**Short Name:**	**SXS**	**Status: Submitted to EU**	**Version: 1** **Adjustment**

RTD/INNOVATION			
Cost Type	**Work Package**	**Explanation**	**Cost**
PERSONNEL	1	Adjustment is necessary because the calculation of the personnel costs in YEAR1 (0,76 PM of project leader) is done incorrectly.	€ 1,605.00
		RTD/INNOVATION - PERSONNEL	**total (€)** 1,605.00
INDIRECT	N/A	N/A	€ 963.00
		RTD/INNOVATION	**total (€)** 2,568.00

Beneficiary No. 9	Legal Name: ServiceXS BV	FORM C TOTAL(€)	15,091.74
PIC: 996183987	Short Name: SXS	Status: Submitted to EU	Version: 1

RTD/INNOVATION				
Cost Type	**Work Package**	**Explanation**		**Cost**
PERSONNEL	1	0,91 PM		€ 6,547.00
		RTD/INNOVATION - PERSONNEL	total (€)	6,547.00
OTHER DIRECT	1	CONSUMABLES: Experimental work (reagents, etc.)		€ 1,340.28
	1	TRAVELING: Project Leaer (1 person) to Cyprus for meeting PGR Secure October 2012		€ 1,545.06
		RTD/INNOVATION - OTHER DIRECT	total (€)	2,885.34
INDIRECT	N/A	N/A		€ 5,659.40
		RTD/INNOVATION	total (€)	15,091.74

Beneficiary No. 10	Legal Name: THE UNIVERSITY OF NOTTINGHAM	FORM C TOTAL(€)	104,950.96
PIC: 999976978	Short Name: UNOT	Status: Submitted to EU	Version: 1

RTD/INNOVATION				
Cost Type	**Work Package**	**Explanation**		**Cost**
PERSONNEL	1	Salary costs for S Adobor, researcher, 8.38PMs		€ 21,235.45
		RTD/INNOVATION - PERSONNEL	total (€)	21,235.45
OTHER DIRECT	1	TRAVELING: Travel costs S May and Castellanos, meeting 23-25 October 2012, Larnaca, Cyprus		€ 1,886.40
	1	CONSUMABLES: €363.23 ALPHA LABORATORIES LTD €51.97 SARSTEDT LTD €576.70 AGILENT TECHNOLOGIES UK LIMITED €4,379.66 FISHER SCIENTIFIC UK LTD (3xWT Ambion expression kit) €3,356.30 AFFYMETRIX UK LTD €77.53 AFFYMETRIX UK LTD €351.43 ANACHEM LTD €85.12 SCIENTIFIC LABORATORY SUPPLIES LTD €230.02 ALPHA LABORATORIES LTD €3,617.41 FISHER SCIENTIFIC UK LTD €1,183.74 AFFYMETRIX UK LTD €52.72 AFFYMETRIX UK LTD €29,672.63 AFFYMETRIX UK LTD (arrays - Aragene)		€ 42,136.50
		RTD/INNOVATION - OTHER DIRECT	total (€)	44,022.90
INDIRECT	N/A	N/A		€ 39,155.01
		RTD/INNOVATION	total (€)	104,413.36

MANAGEMENT				
Cost Type	**Work Package**	**Explanation**		**Cost**
PERSONNEL	7	Salary costs for J Causton, Projects Coordinator, 0.12PMs and T Hammond, Projects Administrator, 0.04PMs		€ 336.00
		MANAGEMENT - PERSONNEL	total (€)	336.00

INDIRECT	N/A	N/A	€ 201.60
		MANAGEMENT total (€)	537.60

Beneficiary No. 10	Legal Name: THE UNIVERSITY OF NOTTINGHAM		FORM C TOTAL(€) 127.09
PIC: 999976978	Short Name: UNOT	Status: Submitted to EU	Version: 1 Adjustment

RTD/INNOVATION

Cost Type	Work Package	Explanation	Cost
PERSONNEL	1	Salary adjustment S May, March 2011	€ 79.43
		RTD/INNOVATION - PERSONNEL total (€)	79.43
INDIRECT	N/A	N/A	€ 47.66
		RTD/INNOVATION total (€)	127.09

Costs details' TOTAL for this period (€) 1,480,944.10

FP7 - Grant Agreement - Annex VI - Collaborative project

Summary Financial Report - Collaborative project

Project acronym	PGR Secure	Project nr.	266394	Reporting period from	01/03/2012	to	31/08/2013	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	139,774.40	104,830.80	0.00	0.00	38,487.09	38,487.09	34,740.96	34,740.96	213,002.45	178,058.85	0.00	0.00
1		Yes	UOB	-12,610.82	-9,458.12	0.00	0.00	17,142.10	17,142.10	-4,495.68	-4,495.68	35.60	3,188.30	0.00	0.00
2		No	DLO	350,819.15	263,114.36	0.00	0.00	9,614.26	9,614.26	0.00	0.00	360,433.41	272,728.62	0.00	0.00
2		Yes	DLO	-9,203.88	-6,902.91	0.00	0.00	8,174.22	8,174.22	0.00	0.00	-1,029.66	1,271.31	0.00	0.00
3		No	BIOVER	149,091.78	111,818.84	0.00	0.00	1,301.02	1,301.02	81,349.64	81,349.64	231,742.44	194,469.50	0.00	0.00
4		No	UNIPG	163,139.47	122,354.60	0.00	0.00	2,293.26	2,293.26	20,782.72	20,782.72	186,215.45	145,430.58	0.00	0.00
4		Yes	UNIPG	-423.68	-317.76	0.00	0.00	0.00	0.00	0.00	0.00	-423.68	-317.76	0.00	0.00
5		No	JKI	171,730.08	128,797.56	0.00	0.00	0.00	0.00	882.75	882.75	172,612.83	129,680.31	0.00	0.00
6		No	NORDGEN	49,910.99	37,433.24	0.00	0.00	5,343.07	5,343.07	2,695.47	2,695.47	57,949.53	45,471.78	0.00	0.00
7		No	MTT	38,652.21	28,989.16	0.00	0.00	4,282.50	4,282.50	0.00	0.00	42,934.71	33,271.66	0.00	0.00
7		Yes	MTT	-591.60	-443.70	0.00	0.00	-253.90	-253.90	-214.20	-214.20	-1,059.70	-911.80	0.00	0.00
8		No	URJC	95,792.93	71,844.70	0.00	0.00	0.00	0.00	0.00	0.00	95,792.93	71,844.70	0.00	0.00
9		Yes	SXS	2,568.00	1,926.00	0.00	0.00	0.00	0.00	0.00	0.00	2,568.00	1,926.00	0.00	0.00
9		No	SXS	15,091.74	11,318.81	0.00	0.00	0.00	0.00	0.00	0.00	15,091.74	11,318.81	0.00	0.00
10		No	UNOT	104,413.36	78,310.02	0.00	0.00	537.60	537.60	0.00	0.00	104,950.96	78,847.62	0.00	0.00
10		Yes	UNOT	127.09	95.32	0.00	0.00	0.00	0.00	0.00	0.00	127.09	95.32	0.00	0.00
TOTAL				1,258,281.22	943,710.92	0.00	0.00	86,921.22	86,921.22	135,741.66	135,741.66	1,480,944.10	1,166,373.80	0.00	0.00

Requested EU contribution for the reporting period (in €)	1,166,373.80

Attachments	PGR_Secure_266394_Periodic_Report_2_Section_1.pdf, PGR_Secure_266394_Periodic_Report_2_Section_2.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:	31/08/2014
Name of the scientific representative of the project's coordinator and organisation:	Dr. Nigel Maxted THE UNIVERSITY OF BIRMINGHAM
Period covered - start date:	01/03/2012
Period covered - end date:	31/08/2013
Name	
Date	30/10/2013

This declaration was visaed electronically by Shelagh KELL (ECAS user name nkellksh) on 30/10/2013