

# Report of a Working Group on *Malus/Pyrus*

Third Meeting, 25-27 October 2006, Tbilisi, Georgia  
M. Lateur, L. Maggioni and E. Lipman





European  
Cooperative  
Programme  
for Plant  
Genetic  
Resources



**ECP/GR**

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**Bioversity International** is an independent international scientific organization that seeks to improve the well-being of present and future generations of people by enhancing conservation and the deployment of agricultural biodiversity on farms and in forests. It is one of 15 centres supported by the Consultative Group on International Agricultural Research (CGIAR), an association of public and private members who support efforts to mobilize cutting-edge science to reduce hunger and poverty, improve human nutrition and health, and protect the environment. Bioversity has its headquarters in Maccaresse, near Rome, Italy, with offices in more than 20 other countries worldwide. The organization operates through four programmes: Diversity for Livelihoods, Understanding and Managing Biodiversity, Global Partnerships, and Commodities for Livelihoods.

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

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Local apple variety 'Zheji' growing in Kumardha, Kruje, Albania, courtesy of © E. Kullaj, Agricultural University of Tirana, Albania.

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Related presentations and papers available online can be downloaded at  
[http://www.ecpgr.cgiar.org/workgroups/malus\\_pyrus/Presents\\_Georgia/Presents\\_Georgia.htm](http://www.ecpgr.cgiar.org/workgroups/malus_pyrus/Presents_Georgia/Presents_Georgia.htm)

## SUMMARY OF THE MEETING

### Introduction

The Third Meeting of the Working Group on *Malus/Pyrus* of the European Cooperative Programme for Plant Genetic Resources (ECPGR) was hosted by the Institute of Horticulture, Viticulture and Oenology (IHVO) in Tbilisi, Georgia. The meeting brought together 25 participants from 21 countries (see details in Appendix IV, pp. 42-44).

### **Welcome addresses and opening remarks**

The meeting was opened with an introductory welcoming address from Academician Nodar Chkhartishvili, Major Consultant of the IHVO:

*Dear Ladies and Gentlemen,  
Dear Guests,*

*On behalf of the Directorate of the host institute, our scientific society and researchers in fruit growing, I would like to welcome the organizers, the participants and the official representatives, and thank them all for their noble mission for the protection of biodiversity. I would especially like to thank the ECPGR Coordinator, Mr Lorenzo Maggioni, for including Georgia in this Programme and for organizing this meeting in Georgia. You can be assured that Georgia will play an important role and will give a new impulse to the activities of the Programme.*

*Indeed, results of Georgian and foreign researches, based on archaeological, paleontological, linguistic and other findings, show that the South Caucasus area including Georgia, is recognized as the motherland of several species and subspecies of cultivated crops such as grapevines, wheat and fruits (pear and apple).*

*You will speak about this in detail during your meeting and so I shall not continue here. I would only like to quote Academician P. Zhukovski, who stated that "the Caucasus in general and Georgia in particular, with its natural conditions and historical background, must be mentioned as the most important hearth in plant evolution... Many different endemic fruit species are described here".*

*I would like to mention that in the recent past, since the 1930s, Georgian researchers have carried out very important activities in the investigation, collection and preservation in field collections of more than 420 grapevine varieties (from the 525 existing in the past) and of several hundred varieties, forms, species and subspecies of apple, pear, peach, plum and cherry.*

*But these orchard collections were greatly damaged during the recent revolution. Pomological plantations are no more. One of the richest Georgian native grapevine germplasm collections was rescued, thanks to the efforts of the international IPGRI<sup>1</sup> project on grapevine, for which we are very thankful to the director of the Regional Office for Europe of this institute, Dr Jozef Turok.*

*Small projects have been carried out by FAO and other organizations in the fruit-growing sector, but they have not been sufficient to resolve all the problems which are on a very wide scale.*

*We think that this meeting of the Working Group on *Malus/Pyrus* is a very good beginning and I wish you success in your work and also the time to enjoy Georgian hospitality.*

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<sup>1</sup> With effect from 1 December 2006, IPGRI and INIBAP operate under the name "Bioversity International", Bioversity for short. This new name echoes their new strategy, which focuses on improving people's lives through biodiversity research.

Other speeches followed:

David Maghradze communicated the following message from Dr Temur Dekanosidze, Director of the IHVO, who was currently attending to other commitments in Canada:

*Ladies and Gentlemen, dear Guests,*

*I would like to say many thanks for your presence here, and for your respect and support. This is very important for the Institute and its staff.*

*These walls have witnessed many important events: the Xth World Congress of Viticulture and Wine-Making, visits of international delegations, symposiums, special days to celebrate our famous researchers and other noteworthy occasions.*

*This meeting will also be one of the most important pages in the history of our Institute. I wish that all of you after the meeting will take back with you the best possible impressions of Georgia, our Institute and its staff.*

*I am really sorry to be unable to take part in this meeting, but I believe that the organizing committee and the staff of the Institute will do their best to make your stay productive and enjoyable.*

*I wish you successful days, happiness and peace!*

Acad. Guram Aleksidze (Plant Genetic Resources National Coordinator of Georgia, Vice-President of the Agrarian Academy of Georgia):

*Dear colleagues, Mr Maggioni, Dr Lateur,*

*We are very glad that at last this meeting, of one of the most important groups for Georgia, is being organized in our country. This is very important for us for several reasons.*

*Horticulture is one of the most important branches of agriculture in Georgia and its history dates back many centuries. The famous Greek writers Xenophon (IVth century BC) and Strabo (Ist century BC) described Georgia as being very famous for its fruit orchards and emphasized their high quality.*

*In the course of the centuries, in spite of the often difficult historical situations, the Georgian people managed to maintain a high level of orchard production in Georgia.*

*The great Georgian geographer and scientist Vakhushti Bagrationi, in his famous book "Description of the Georgian State" in the 17th century, pointed out that many fruits, such as apple, pear, plum, peach, quince, apricot, grape, etc. are found all over Georgia.*

*According to Georgian scientists, about 115 varieties of apple and 65 varieties of pear are currently recorded in Georgia. This includes local and introduced varieties.*

*Unfortunately, today we have no special collection of these varieties such as we have for grapevine, thanks to IPGRI. I think that it would be very helpful to have a project aimed at organizing this field collection, and your meeting may accelerate this process.*

*Again, welcome to Georgia and best wishes for very fruitful work.*

Dr Darejan Kapanadze, Task Manager for Georgia Agricultural Research, Extension and Training Project (ARET), Sustainable Development Department for the East Europe and Central Asia, The World Bank, made the following speech:

*Ladies and Gentlemen, dear Guests,*

*It is a pleasure to see you all on the occasion of the Third Meeting of the ECPGR Working Group on Malus/Pyrus, hosted by the Scientific Research Institute of Horticulture, Viticulture and Oenology (IHVO) of Georgia. This Institute is a beneficiary of the World Bank-financed "Georgia Agricultural Research, Extension and Training Project", ongoing since 2001. This project was intended to help Georgia with the improvement of the national agricultural knowledge system*

*through piloting comprehensive reforms in one or two high priority institutions. A great number of stakeholders were involved in the decision-making process to pick the research facilities that would become project beneficiaries. The IHVO was named as the national choice for delivering the technical assistance and investments offered by the World Bank. This has been a well-grounded decision and it speaks a lot about the appreciation given to and the importance attached to this Institute.*

*During several years of our cooperation with the IHVO, the Institute has made impressive progress in building up its capacity. Recovering from more than a decade of hardship during the period of transition from Soviet rule to independence and a free market economy has been a tremendous challenge for the Institute. Actually this implied rebuilding of the IHVO in all aspects, ranging from physical refurbishment of premises and re-equipment all the way through to reformulating its mission statement and setting up a completely new pattern of relations with clients, partners, sponsors and supervisors. Although the process of restructuring is not entirely complete, the World Bank team working with the IHVO is happy with the progress made to date and is confident of the Institute's sustainability.*

*One important objective for the IHVO has been to rebuild partnership with other research facilities in related fields outside Georgia and to reintegrate with the international scientific community. A good proof of the IHVO's success in building good working relations with foreign partners and international research centres is the fact that it is hosting this meeting of the ECPGR Working Group today.*

*I am delighted with this opportunity to be present at the opening session of the meeting and to wish you very fruitful work as well as a pleasant stay in Georgia.*

Mr Lorenzo Maggioni, Coordinator of ECPGR, thanked the meeting's Georgian hosts and welcomed the Group on behalf of IPGRI. He was pleased that an ECPGR meeting had been organized in Georgia, for the first time since this country had joined the Programme in 2004. He reiterated the great importance of Georgia and other Caucasus countries in the early stages of agriculture and commended the increasing efforts being made to preserve the local heritage, by conserving local genetic resources of agricultural crops, with grapes and other fruits offering an outstanding richness of varieties. He therefore expressed his hopes for continuing support from the government to maintain a well-structured and functional national programme on PGR. IPGRI will be happy to fruitfully collaborate with Georgia in the future, as it has in the recent past, and will help in establishing contacts with other scientists and with initiatives in Europe, and in facilitating the approval and undertaking of international collaborative projects.

Dr Marc Lateur, Chair of the Working Group on *Malus/Pyrus*, was very pleased to see the ECPGR group with so many fruit scientists gathering for the first time in the Caucasus. He thanked the Georgian authorities for their warm welcome and encouraged the participants to contribute to the preservation and best use of European fruit genetic resources in the most collaborative way.

Mr Murman Kuridze, Representative from the Agrarian Committee of the Parliament of Georgia, addressed the meeting as follows:

*We are glad that our country was given a chance to host such an important scientific forum as the meeting of the ECPGR Working Group on Malus/Pyrus. The Parliament of Georgia and its Agrarian Committee always support the organization of such meetings in Georgia. We think that such relationships – joint conferences, working meetings and communication between researchers – will enhance the integration process of our country in the European Union's political, economic and scientific space.*

*I would like to underline that the IHVO always was one of the principal leading institutions in the field of agrarian research in Georgia; this tradition is being continued, as confirmed by the fact that a recognized international organization such as IPGRI asked the Institute to host today's meeting. I wish you scientific success and hope that other similar research meetings will be organized in our country in future.*

Mr Mirian Dekanoidze, Deputy Minister, Ministry of Agriculture, concluded with the following words:

*Georgia is an ancient agrarian country with rich traditions of fruit- and grape-growing and wine-making. Apple and pear are important crops for the economy of Georgia and their cultivation represents the main source of income for many local farmers. It is important to mention that the rehabilitation of the fruit-growing sector in Georgia is one of the main priorities of the general strategy developed by the Ministry of Agriculture. At the same time, improvement of this field of activity is very difficult without involving the country's full scientific potential in it.*

*In order to carry this out, our Ministry will welcome and maintain every initiative aiming to increase the scientific potential of our local fruit crop researchers and their collaboration with research centres abroad. It is important to mention that this is the first time, after a 25-year pause, that such a significant scientific conference, organized by IPGRI with financial support from the World Bank, is being held in Georgia, with the participation of such a strong group of researchers from the leading European countries. We are sure that the Malus/Pyrus meeting will be productive and that the aim of this meeting will be achieved. I would like to welcome you one more time and wish you success in your scientific work.*

The participants then introduced themselves briefly.

### **Briefing on ECPGR Phase VII**

L. Maggioni gave an introduction to describe the current status of the ECPGR programme. He explained that the ECPGR had entered its VIIth Phase (2004–2008) with some modifications made to the structure and mode of operation by the Steering Committee in its last meeting in Izmir, Turkey, October 2003.<sup>2</sup>

The Steering Committee endorsed four priority areas for Phase VII: 1) Characterization and evaluation, 2) Task sharing, 3) *In situ* and on-farm conservation and 4) Documentation. The Steering Committee also requested a Network Coordinating Group (NCG) to define two priority groups within the Network and to make proposals, in consultation with the Working Groups, for actions on the basis of a budget of about 83 000 € allocated to the Network. As a result of this exercise, which went on during 2004, the Working Group on *Malus/Pyrus* was included among the priority Working Groups for Phase VII, together with *Prunus*. The following activities and use of funds relevant for *Malus/Pyrus* were eventually approved:

- Ad hoc meeting for European Union proposal (Belgium, February 2005) – 4200 €
- Third meeting of the *Malus/Pyrus* Working Group – (Tbilisi, Georgia, October 2006) – 18 000 €
- Fruit Network: Ad hoc meeting on fingerprinting of *Malus*, *Pyrus*, *Prunus* and *Vitis* (East Malling, UK, December 2006) – 9600 €
- Technical leaflet showing how to score 15 useful characters in *Malus/Pyrus* (2006) – 1125 €
- Newsletter (2006 and 2007) – no budget

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<sup>2</sup> See Report of the Ninth Steering Committee Meeting, also available on Internet at <http://www.ecpgr.cgiar.org/SteeringCommittee/SC9.htm>

- Electronic publication on details of 10 microsatellites for *Malus/Pyrus/Cydonia* – (2006-2007) – no budget
- Ad hoc meeting to resolve synonymy in *Malus, Pyrus, Prunus* and *Vitis* (Gembloux, Belgium, 2007) – 9600 €
- Meeting of the four Database Managers (*Malus, Pyrus, Prunus* and *Vitis*) (2007) – 3200 €
- Fruit Network ad hoc meeting on *in situ* and on-farm conservation of *Malus, Pyrus, Prunus* and *Vitis* (Dresden, Germany 2008, to be confirmed) – 10 400 €
- Laboratory production of microsatellite fingerprints (to be confirmed) – 3000 €

The above-mentioned activities were also reconfirmed by the ECPGR Steering Committee (SC) during its Mid-term Meeting in Riga, Latvia, September 2006. In this occasion, the progress reported by the Fruit Network in all four priority areas was noted, as well as the dissatisfaction expressed by the Working Groups about the problems in obtaining data from curators. Two budget items previously proposed by the Fruit Network were not accepted (printed catalogues of various crops – 4000 €; and technical leaflets with protocols for *in situ*/on-farm conservation – 2000 €). The Steering Committee suggested that they should prepare electronic documents instead and re-allocated the corresponding funds to activities related to AEGIS.

During the meeting in Riga, the SC reconfirmed the current ECPGR four priority areas as also being relevant for the coming Phase VIII, but made “Task sharing and capacity building” the top priority for the next Phase.

The suggestions for action submitted by the Fruit Network for Phase VIII were noted. However, the SC decided that the Network Coordinating Groups will have to provide a new list of proposed actions, after inclusion of measurable targets and the proposed budgets should correspond to three possible financial scenarios (100%, same budget level as in Phase VII; 115%, inflationary adjustment; and 125%). The proposed actions will have to be submitted three months before the next SC meeting, which is expected to be held in June/July 2008.

Among the various decisions taken by the SC in Riga, 150 000 € were re-allocated towards AEGIS activities; recommendations were made to countries to ratify the International Treaty and to implement it; and the name and acronym of ECP/GR was changed into: European Cooperative Programme for Plant Genetic Resources (ECPGR).

For further information on ECPGR, its Web site was recommended, where several reference documents are available, including the Networks’ budget and the Terms of Reference for the ECPGR operational bodies. A specific Web page is also dedicated to the Working Group on *Malus/Pyrus* and this can be further improved with the help of Working Group members and in accordance with the needs of the Working Group.

### **Chairperson’s report for the period 2003-2006**

*M. Lateur*

With the onset of Phase VII of ECPGR, a new mode of operation of the Working Group (WG) needed to be developed, since fewer funds for WG meetings were made available. A budget to use the funds dedicated to the Fruit Network was worked out by the Fruit Network Coordinating Group, which was established at the beginning of Phase VII and comprises the following members: Kenneth Tobutt (Chair), Emma-Jane Allen (*Malus* DB), Emilie Balsemin (*Prunus* DB), Jesus Ortiz (Chair, *Vitis* WG), Erika Maul (*Vitis* DB), Stein Harald Hjeltnes (*Malus/Pyrus* WG - Secretariat), and Marc Lateur (Chair of the *Malus/Pyrus* WG and manager of the *Pyrus* DB, jointly with Robert Oger). Under the existing plan, a number of ad hoc meetings were planned in order to develop specific topics. This system seems to work well.

However, the general feeling is that having 4-year intervals between two WG meetings is much too long for maintaining a good level of activity inside the whole group. We need to find a good compromise between ad hoc meetings and the whole WG meeting. Also expressed was the intention to develop closer collaboration with the *Prunus* WG and, subsequently, with the *Vitis* WG. This horizontal approach is very efficient and has given good results in terms of better sharing of experiences and better harmonization of the work (e.g. European Central Crop Databases (ECCDBs); initiative for "A European Genebank Integrated System" (AEGIS)). In preparation for the 10th Steering Committee meeting, the workplan defined during the second meeting of the *Malus/Pyrus* WG in Dresden (May 2002) was compared with the results obtained. For this purpose, the following milestones were defined and evaluated:

### **Milestone 1**

Hold ad hoc meetings together with representatives of the ECPGR *Prunus* WG and of the EUFORGEN Noble Hardwoods Network to develop links and collaborations.

### **Results**

1. An extraordinary meeting of the *Malus/Pyrus* WG was held during the EUCARPIA symposium (2 September 2003, Angers, France).

Results of the meeting were the following:

- Agreement on a new version of the document "Establishment of a European *Malus/Pyrus* collection" which is in line with the *Prunus* WG;
- Actions for incorporation of new passport data into the *Pyrus* DB were decided;
- Preliminary agreement was reached on a common set of molecular markers for the characterization of apple accessions (Institut National de la Recherche Agronomique (INRA), Angers, France – F. Laurens);
- Exchange of information concerning the possibility of submitting a project to the European Commission (EC) Regulation 870/2004 call, in collaboration with the *Prunus* WG and EUFORGEN.

2. An ad hoc fruit meeting was organized for the preparation of a project proposal under the EC Regulation 870/2004. An attempt was made to connect the activities of the *Prunus* WG and the EUFORGEN Noble Hardwoods Network, with the aim of linking actions on cultivated and wild relative accessions (18 February 2005, Gembloux, Belgium).

It was very interesting to try to combine the three WGs but it was noted how difficult it really is to combine the wild relatives *in situ* approach and *ex situ* conservation of cultivated accessions in a common project and with limited amounts of funds, such as those available from an EC GEN RES project.

### **Milestone 2**

Develop software for the definition of synonyms of pear accessions included in the *Pyrus* ECCDB, with the aim of developing a better tool for sorting out unique material already included in the Database (DB).

### **Results**

The "Synopyrus" software was developed by the Walloon Agricultural Research Centre (Centre wallon de Recherches Agronomiques, CRA-W) and 5000 referenced synonyms were included in the DB. Implementation of the system in the DB was achieved and a simplified version is already available online.

So far, the “Synopyrus” software is not yet available on the Web. New sources of synonyms can be included and need to be validated by experts.

### **Milestone 3**

Include fruit pictures in the *Pyrus* and *Malus* ECCDBs.

### **Results**

A first set of fruit photos (about 300 accessions) were included in the *Pyrus* DB and are linked to the accessions, while work has not yet started for apple.

### **Milestone 4**

Update data included in the European *Malus* and *Pyrus* DBs.

### **Results**

The update was planned by the *Malus* DB manager, and requests for passport data were made for the *Pyrus* accessions. It was found rather difficult to get answers from collections' curators (for *Pyrus*, <5% passport data were received by the DB manager).

### **Milestone 5**

Apply for extra funding under the AGRI GEN RES 870 call, in collaboration with the *Prunus* Working Group to allow, e.g. development of the Database; encouraging the use of fruit tree genetic resources; and further characterization of the material.

### **Results**

The proposal BIODIFRUIT (Sustainable management of European Fruit Tree Biodiversity and Enhancement of its Utilization), focusing on cherry and pear, was submitted by CRA, Gembloux, with support from East Malling Research (EMR) and INRA Bordeaux in June 2006; this project envisages the harmonization of the various Fruit Tree Databases among themselves and with the European Plant Genetic Resources Catalogue (or European Internet Search Catalogue, EURISCO), the incorporation of molecular and photographic data, the adoption of the AEGIS concept and the promotion of the utilization of EU fruit tree genetic resources. Another aim was to develop better links between formal and informal sectors. There are 24 partners involved from 16 countries.

### **Milestone 6**

The idea of producing a *Malus/Pyrus* Genetic Resources Newsletter to help maintain the momentum of the Group between meetings was not a success, since the newsletter was not produced.

The possibility of combining our efforts with those of the other Fruit WGs to prepare one “Newsletter” is an option for the future.

### **Milestone 7**

Interact with the Global Crop Diversity Trust.

The ECPGR secretariat made the link between the *Malus/Pyrus* WG and the Trust for developing collaboration. Further actions will perhaps be planned in the future.

### **Milestone 8**

Decide how to harmonize the use of molecular markers as a complementary characterization tool and how to incorporate them into the DBs.

### **Result**

Decision to organize an ad hoc meeting at EMR, UK on the harmonization of the use of molecular markers. This issue will be discussed during our present WG meeting in Tbilisi.

### **Milestone 9**

Check the meaning of the term “patronym” for possible use as an additional descriptor.

### **Result**

“Patronym” was found to be an inappropriate term for the consensus name of a cultivar to be used for cross-referencing purposes in the Database. Instead, the term “euonym” was proposed and adopted by the *Prunus* Working Group.

An ad hoc fruit expert group meeting is planned with the aim of setting up a methodology for comparing synonyms and for proposing a consensus “euonym” for the most important accessions.

## **Updates on national activities**

The following presentations were given:

### ***Status of Malus/Pyrus germplasm in Albania***

*Endrit Kullaj*

*Malus* germplasm in Albania is represented by 35 accessions. Apple in Albania grows well in the continental climate of north-east and south-east. Important apple native cultivars are ‘Gjyle’, ‘Molla e Kolosjanit’, ‘Tetovka’, ‘Mice’, ‘Faqekuqja’ and ‘Xibri’, adapted to the northern part of the country, mainly ‘Kukës’ and ‘Burrel’; ‘Molla e Hoçishtit’ and ‘Kulaçe’ in the Korça plain; ‘Zhei’, ‘Bardhe’ and ‘Diku’ in Kruje; ‘Kallmet’, ‘Agai’ and ‘Shëngjergji’, in Tirana (in the villages of Zall Bastar, Zall Dajt, Shëngjergj). Crab apples are mostly found in the uplands of Burrel, Kruje, Tirana, Elbasan, Librazhd, etc.

Since the 1990s, due to the lack of control by the state authorities, many seedlings of unknown origin and phytosanitary status have entered the country, mostly from Macedonia FYR, Greece and (rather fewer) from Italy, making it difficult to obtain accurate statistics regarding the structure of plantings. The ‘Starking’ group still predominates in the new entries, followed by ‘Idared’, ‘Redchief’ and ‘Golden Delicious’.

*Pyrus* germplasm in Albania is represented by 74 accessions. The germplasm of pear in Albania is even richer than that of the apple and is more widely distributed in the territory. It is mostly found in the north-eastern part of the territory, in Mid-Albania and partly in the lower plain along the sea coast. The group of “*elbores*” (= barley-coloured in Albanian) is mostly found in the central and coastal districts of Albania, and is represented by ‘Stambollije’, ‘Gushtje’, ‘Vjeshtore’ and ‘Dimërore’, while ‘Gomarja’, ‘Sherbetlija’, ‘Bishtje’ and ‘Sefa’ pears are mostly found in the uplands of Kruje and Tirana. ‘Kosh Pule’ and ‘Dimërore’ are located in Dibra whilst ‘Vneshte’ and ‘Zime’ are found in Kuksi. In Mid-Albania (Durrës, Elbasan, Librazhd) interesting local cultivars like ‘Luqëza’, ‘Vonëta e Shijakut’, ‘Ziqele’, ‘Kajkushka’, ‘Hiqmeti’ pear, etc. are located. In the southern, coastal part of the territory (Berat, Lushnje), the cultivars ‘Veteriku’, ‘Karkanjozi’, ‘Starova’, etc. are found. Cultivars’ names refer to their particular fruit characteristics, or more frequently, to their geographical origin.

Many of the native cultivars present in Albania (geographically distributed in all the *Malus/Pyrus* areas of the country) require conservation because they constitute an essential genetic resource which is very precious for hybridization work and for breeding.

### **Update on the French Malus and Pyrus collections**

*Laurence Feugey and François Laurens*

In France, the management of genetic resources for all crops is coordinated by the Bureau des Ressources Génétiques (BRG), a government-funded organization. INRA-Angers has the responsibility of the management of *Malus* and *Pyrus* genetic resources. Various participants are involved in *Malus* and *Pyrus* germplasm conservation in France: non-governmental organizations (NGOs), regional and national repositories, botanical gardens, nurseries, experimental centres and research institutes. In 2001, a first survey funded by the "Association Danone pour les fruits" asked all the curators to provide the numbers of maintained cultivars: 19 883 accessions of apples and 6905 of pears were recorded. They are distributed in 179 and 124 sites respectively all over the country. A new survey is in progress which is asking the curators not only for the numbers but also for lists of the accessions they maintain: so far, 12 759 different accessions of apple and 4338 of pear have been listed, which represent respectively 6302 and 2225 different names (E. Leterme and S. Mouche, personal communication). These totals should increase in the next few months.

Beside this, a new project aimed at developing a Biological Genetic Resources Centre ("Centre de Ressources Biologiques", CRB) for *Malus* and *Pyrus* was set up and funded by the French Ministry of Research from 2002 to 2006. It aims to develop i) a National List of French *Malus* and *Pyrus* cultivars maintained in France, ii) a National Database, iii) a "rescue" policy for endangered cultivars and iv) to manage the exchange of data and materials.

So far, progress is being made on the first three points. The last point is still under discussion, since the potential exchange of materials has highlighted some complex issues (i.e. sanitary status). The most advanced work has been done on the development of the database. It is a MySQL database with a PHP MyAdmin administrator tool. It is based on an Apache Web server and a Linux workstation. It is accessible through the Internet with different levels of access depending of the user: administrator, partner or public access.

At present, the database contains 5083 apple accessions with their passport data from 11 different repositories across France, including 2167 accessions with passport and primary characterization data. From the information present in the database, 2561 cultivars with different names have been identified and 2024 cultivars present at only one site have been detected; for the latter, a special programme to duplicate them will be carried out. For pear, 1742 accessions from 6 repositories are listed in the database.

### **Status of Malus and Pyrus collections in Georgia**

*David Maghradze*

The list of *Malus/Pyrus* collections in Georgia includes the IHVO Gori collection of modern apple and pear cultivars and rootstocks, established in the framework of the FAO project; the IHVO Gori orchard of breeding apple forms; the IHVO Vashlijvari collection of hybrid apple and pear; the NGO "Elkana" collection of indigenous varieties of apple in Akhaltsikhe; and the Gori Fruit Producers Association's collection in Kareli district, Bebnisi village. In total, 96 accessions of apple and 115 of pear are maintained. These are mainly advanced cultivars or selected hybrids, however there are also 22 local apple varieties, but no wild species are conserved in the collections (11 *Pyrus* and 1 *Malus* species are known to exist in the wild in Georgia).

In August 2005 the Department of Grapevine and Fruit Crop Germplasm Research, Genetics and Breeding and Skra Testing Station of Horticulture of the IHVO organized expeditions for investigating local varieties of fruit in Gori district (Inner Kartli). A total of 113 genotypes were discovered, including 80 of apple and pear. These local varieties have been propagated in a nursery and a new orchard will be established in spring 2007.

Very few local varieties are protected in collections in spite of their wide presence in farms and gardens in Georgia. Wild species of *Malus* and *Pyrus* are also absent from the collections. Not all Georgian local varieties have yet been described using their pomological and agronomic traits. They also still need to be included in the European Databases. In conclusion, there is an urgent need to secure governmental funding for better protection of the biodiversity of fruit crops.

### **Update on the Malus and Pyrus collection at the Fruit Genebank of the Institute of Fruit Breeding Dresden, Germany**

*Viola Hanke and Monika Höfer*

In 2003 the Fruit Genebank in Dresden was integrated into the Institute of Fruit Breeding of the Federal Centre for Breeding Research on Cultivated Plants. The collection of fruit genetic resources is focused on fruit species which are adapted to climatic conditions in Central Europe and which are important for commercial fruit production in Germany. The genebank will consist of cultivars of the domesticated species within *Malus*, *Pyrus*, *Prunus*, *Fragaria*, etc., such as cultivars particular to Germany, cultivars with a sociocultural, local or historical background for Germany and donors of desirable pomological traits. Wild relatives which may form an important part of the genetic resources of the domesticated species will also be included in the repository. At present, the *Malus* and *Pyrus* collection totals 722 apple cultivars, among them 348 German cultivars; 130 pear cultivars, among them 37 German cultivars; 372 accessions of *Malus* which belong to 18 species and 12 hybrids; and 56 accessions of *Pyrus* belonging to 36 species. Furthermore, the genebank holds 2260 hybrids of *Malus sieversii* from expeditions to Kazakhstan and of diverse other species from China. The genetic resources are maintained as a field collection which is regularly monitored by the State Agency for plant protection. The replanting of the material will be carried out according to a planned schedule during the coming years. Selective testing of the plant material for pathogens (virus infection, apple proliferation) is carried out prior to replanting. Special attention is also given to material obtained from other sources which has an unknown phytosanitary status and needs to be kept in a greenhouse for quarantine. The fruit tree collection is maintained as two trees per accession on dwarfing or semi-dwarfing rootstock. Beside maintenance of the trees in the field, we are working on duplicating the material using cryopreservation of dormant apple buds at -196°C as the method of choice. This method is still under evaluation; however the first buds, stored for almost one year, were grafted this year to check their ability to regenerate.

An important part of the work on genetic resources is characterization and evaluation, aimed at the utilization of the material in breeding. In the last few years, evaluation was focused on resistance of the apple material to scab, mildew and fire blight. Phenotypic evaluation in the field based on natural infection was accompanied by artificial infection in the greenhouse, evaluation using *in vitro* leaf assays or marker-assisted determination of the resistance genes. Fire blight resistance was also recorded in the *Malus* wild species collection using artificial shoot inoculation. Evaluation was also focused on fruit characteristics like flavour, vitamin C content, firmness of the fruit and others. Molecular research on cultivars and species is being carried out to determine the genetic diversity among cultivars of the domesticated apple and between *M. domestica* and other *Malus* species, and to develop DNA fingerprints for the collected material.

The data on characterization and evaluation in apple will be available in the database of the German Fruit Genebank ([www.Deutsche-genebank-Obst.de](http://www.Deutsche-genebank-Obst.de)) in the future. The work which has been done since 2003 on the evaluation of genetic resources in *Malus* is not yet included in this database.

A new project was initiated in 2005 by the Federal Ministry of Food, Agriculture and Consumer Protection to develop a decentralized German national genebank for fruit. It aims to collect information on collections of fruit tree species maintained in Germany by governmental and non-governmental institutions and persons, to establish a common database, and to develop a strategy for a decentralized rescue network for endangered cultivars and species.

### **Malus/Pyrus genetic resources in Latvia**

*Laila Ikase*

*Malus* and *Pyrus ex situ* collections in Latvia are maintained at two locations: the Latvia State Institute of Fruit-Growing (LIFG, formerly Dobeles Horticultural Plant Research Experimental Station); and the Pure Horticulture Research Station (Pure HRS; private). At each location, 2 trees are grown on a semi-dwarfing rootstock B118 (apple) or on vigorous seedling rootstocks (apple, pear). One group of accessions includes cultivars of Latvian origin or cultivars of unknown origin long grown in Latvia; a second group is composed of advanced selections of Latvian origin, important cultivars of foreign origin, reference varieties and donors of certain valuable genes for breeding (*Vf*, *Co*, etc.). In total, 351 *Malus* and 137 *Pyrus* accessions are conserved. The Latvian National Inventory of fruit crop genetic resources is maintained within the Nordic Gene Bank genetic resources information system SESTO; it includes 117 apple and 59 pear accessions from Latvia. The passport descriptors used are FAO/IPGRI *Multi-crop Passport Descriptors*, modified and adapted for the needs of EURISCO.

Characterization of *Malus* genetic resources using molecular markers was started in the framework of the project "Molecular-genetic passport documentation of Latvian cultivated plant genetic resources" (period of project 2006). Markers of choice are simple sequence repeats (SSRs), due to their high informative value and repetitiveness. At the same time, some gene-specific markers are used – for example, *Vf* gene markers.

Traditional characterization and evaluation are also going on. At the moment locally adapted *Pyrus* descriptor lists are being developed, using IPGRI and UPOV descriptor lists as a basis. These characterizations are carried out in the framework of the project "Development of descriptor lists for Latvian cultivated plant and forest genetic resources" (period of project 2006).

In 2003, new expeditions funded by the Ministry of Agriculture were carried out, including visits to farms, amateur breeders and people who are well acquainted with fruit trees in their region. Abandoned farms and chance seedlings growing in the wild were also explored. About 200 new accessions were planted for further evaluation.

The total area of modern orchards has increased in 1998-2005 in Latvia and there is a risk of loss through the grubbing of older plantations and a need to prevent the loss of old cultivars. The Latvian climate is not well-suited for most introduced commercial cultivars, so there is a constant demand for better-adapted ones. Five apple cultivars and one pear cultivar of Latvian origin are important in commercial orchards.

The Latvian fruit breeding programme is aimed at the development of winter-hardy, scab- and *Nectria*-tolerant cultivars which will mature rather early. Apple breeding is going on at the LIFG and at Pure HRS. Amateur breeders' activities in Latvia have also been significant in the past. Use of local genetic resources in breeding is somewhat limited by the inferior fruit quality of older cultivars. However, there are still several notable varieties, e.g. 'White Transparent' ('Baltais Dzidrais'), 'Nitschners Erdbeerapfel', 'Sipolins' (a donor of *Nectria* tolerance), the pear cultivar 'Talsu Skaistule', etc.

*Malus sylvestris* is a rather common species growing in the wild, while *Pyrus pyraeaster* is rare and beyond the northern border of its growth area. Both are protected species in Latvia.

Their distribution maps and descriptions have been prepared by the researchers of The Latvian University.

### ***Update on Malus and Pyrus collections in Portugal***

*Alberto Santos*

Two national and several regional collections include a total of over 500 apple and over 300 pear landrace accessions. Since 2002, the Botanical Garden of the Universidade de Trás-os-Montes e Alto Douro (UTAD) was enlarged to include apple and pear regional varieties and various standard reference cultivars. In the case of *Malus*, several standard reference cultivars have been included in the national collection of regional varieties. Studies were made of the fruit properties as nutraceuticals and functional foods. In recent years, several municipalities have been locally growing more collections of regional varieties, to provide consumers with a wider diversity of flavours and aromas, and to alert the growers to the importance of adopting ecological procedures and practices in fruit production.

In the case of *Pyrus*, the national collection of regional varieties was duplicated in a site that is less susceptible to spring frosts. Several regional collections of local landraces have been set up, and gardeners have given more attention to them; their use has increased, either for fruit growing or both for fruit and ornamental purposes. Several varieties are being characterized through molecular markers, as a complement to the phenological descriptions.

### ***Collections of Malus and Pyrus genetic resources in the Slovak Republic***

*Daniela Benediková*

All plant genetic resources conservation activities in the Slovak Republic are coordinated by the Research Institute for Plant Production (RIPP) Piešťany within the framework of the National Programme for Conservation of Plant Genetic Resources for Food and Agriculture. This Programme was implemented in 2005 and is fully funded by the Ministry of Agriculture of the Slovak Republic.

The Slovak fruit tree collections contain 6431 accessions, including 2883 accessions registered in the National Programme and 3548 accessions that are planted in 7 repositories. These repositories result from a research project of the Slovak Agriculture University in Nitra; accessions are not yet documented for passport data and description data.

The Research Institute of Fruit and Ornamental Plants (RIFOP) Bojnice maintains 2049 accessions, mainly small fruit species, in a 14.21-ha field collection. The Research Breeding Station (RBS) Vesele maintains 646 accessions, mainly stone fruits (apricot, peaches, almond and walnuts) on a 10-ha field collection. A small safety-duplication collection of apricot and peaches (188 accessions) included in the European *Prunus* Databases was planted on the experimental field at the RIPP Piešťany in a 1.5-ha orchard.

The apple collection currently contains 1570 accessions and the pear collection 467 accessions. These accessions will be evaluated according to IPGRI Descriptors.

### ***Malus/Pyrus genetic resources in Switzerland***

Markus Kellerhals (Agroscope Changins-Wädenswil, ACW) reported that in Switzerland, work on plant genetic resources is coordinated by a national commission ([www.cpc-skek.ch](http://www.cpc-skek.ch)) which has also nominated a fruit coordinator. A country-wide inventory on fruit genetic resources was performed between 2000 and 2005 by the NGO Fructus in collaboration with the Research Station Agroscope Changins-Wädenswil. Two thousand newly located accessions were subsequently included in the decentralized collections. Currently the standardized description of the fruit accessions is under way.

The COST Action 864 (Pome Fruit Health, 2006-2011) is, among other topics, dealing with fruit genetic resources and breeding.

The above presentations given at the meeting and additional papers provided by representatives from Azerbaijan (S. Mammadov), Ireland (J. Choiseul), The Netherlands (R. van Treuren) and Romania (S. Budan) are available from the Working Group's Web page ([http://www.ecpgr.cgiar.org/workgroups/malus\\_pyrus/Presents\\_Georgia/Presents\\_Georgia.htm](http://www.ecpgr.cgiar.org/workgroups/malus_pyrus/Presents_Georgia/Presents_Georgia.htm)).

### **European pomology bibliography**

The Group agreed that it would be useful to compile a list of all pomologies available in each country and to have this list made available on the Internet and ultimately published in the report of the meeting. This activity will be started by a Task Force, with the aim of sending a first version to the ECPGR Secretariat by March 2007 for uploading onto the Internet.

Composition of the Task Force: *E.-J. Allen* and *I. Hjalmarsson* (leaders), *A. Õunmaa*, *D. Benediková*, *E. Kullaj*, *J. Choiseul*, *J. Blažek*, *L. Ikase*, *M. Lateur*, *M. Kellerhals*, *S. Budan*, *S. Mammadov*, *S. Mader* and *V. Hanke*.

The same Task Force also agreed to undertake a feasibility study on the scanning of reference descriptions of the most important European Malus and Pyrus cultivars to be included in the DBs.

## **Documentation**

### **Status of the National Fruit Database in Georgia**

*T. Jinjikhadze*, PGR database manager of Georgia

The National Database at the Institute of Horticulture, Viticulture and Oenology currently contains only the data of the grape collections.

Data are currently in Excel format, and will be transferred into DBF format by the end of 2006.

The Database is divided into three parts: passport data, collecting data, and characterization and evaluation data.

Data of the fruit collections of the Institute of Botany and of the NGO "Elkana" will also be included.

### **Progress of the ECPGR Malus Database**

*E.-J. Allen*

#### **Summary of current contents**

There are 21 013 accessions listed from 34 institutes in 12 countries (as detailed in Table 1 below). The number of accessions in this Central Crop Database is substantially more than the 13 535 *Malus* accessions listed in the EURISCO database. Some countries have supplied information to the Central Crop Database and not to EURISCO and vice versa.

The data from Ireland and from Serbia and Montenegro have been added since the last meeting of the *Malus/Pyrus* Working Group. Bulgaria and The Netherlands have provided paper lists of accessions to the Database Manager in the past, but these are not yet included in the Database.

At the last meeting of the *Malus/Pyrus* Working Group it was requested that countries nominate accessions to be considered for inclusion in a proposed European apple collection. Nominations were received from Germany and the UK: in total 747 accessions were nominated.

**Table 1.** The numbers of accessions listed in the ECPGR *Malus* Database and the numbers of *Malus* accessions listed in EURISCO (figures downloaded from EURISCO 1 November 2006)

Country	ECPGR	EURISCO
Austria	542	701
Azerbaijan	-	259
Belgium	1247	-
Bulgaria	-	20
Czech Republic	976	1125
France	6330	-
Germany	952	991
Hungary	672	-
Ireland	117	-
Italy	3198	460
Latvia		117
Poland	926	-
Romania	740	1455
Russian Federation	-	3743
Serbia and Montenegro	790	-
Slovakia	-	225
Switzerland	2365	76
Ukraine	-	2015
United Kingdom	2158	2348
<b>Total</b>	<b>21013</b>	<b>13535</b>

### Issues

- Some of the data are rather old and may require updating
- Some member countries are missing from the database
- Currently the Database contains only variety names and the institute in which they are maintained, with no further passport or characterization data.

### Possible actions

- Increase coverage, especially from countries that have supplied data to EURISCO
- Make the database more accessible (currently it is only available as a download rather than being viewable on the Web)
- Update accession lists
- Add more passport/characterization data
- Add suggested euonyms.

### Discussion

The Group discussed what would be the best way to make progress with the completion of data entry into the European *Malus* Database.

A form was prepared and circulated in order to investigate the reasons why little response was given to the request of the Database Manager to provide national *Malus* data to the Central Database.

*It was agreed that all available passport and characterization/evaluation data will be sent to the Database Managers of the Malus and Pyrus Databases **by June 2007**. When evaluation data are sent, the descriptors used should be clearly specified.*

*Additional data, corresponding to all the agreed priority passport data (listed below), will also be sent **by June 2007**. The Malus and Pyrus DB Managers will send a request with a list of the expected data **before the end of February 2007**, to be followed by one or more reminders, as necessary.*

The **agreed priority passport data** are the following (for the full description, please refer to the list of EURISCO descriptors, [http://eurisco.ecpgr.org/contact\\_menu/documents.php](http://eurisco.ecpgr.org/contact_menu/documents.php)).

*Institute Code*  
*Accession number*  
*Genus*  
*Species*  
*Subtaxa*  
*Common crop name*  
*Accession name*  
*Acquisition date*  
*Country of origin*  
*Latitude of collecting site*  
*Longitude of collecting site*  
*Breeding institute code*  
*Biological status of accession*  
*Ancestral data*  
*Donor institute code*  
*Donor accession number (if available)*  
*Type of germplasm storage*

It was also specified that the descriptor "Country of origin" should be intended as indicating the historical origin of the accession and not necessarily the country where the propagating material was grown. In this context, it was reiterated that some of these descriptors may generate ambiguous interpretations and that experts in vegetatively propagated crops should be involved in the next revisions of the FAO/IPGRI Multi-crop Passport Descriptors.

Regarding latitude and longitude data, it was specified that these are important for wild species and landraces collected on-farm, while they are not applicable in the case of bred cultivars.

**The following Malus-specific additional descriptors are also included among the priority passport data:**

- A. Plant use
- B. Ploidy level
- C. Donor Accession Name
- D. Synonym (description to be defined)

### **Experience with some IPGRI and ECPGR apple descriptors and suggestions for new ones**

After taking into consideration the characterization and evaluation descriptors agreed by the *Malus/Pyrus* WG in previous meetings, J. Blažek commented that rather complicated assessment scales were proposed for evaluation of scab infection on leaves and fruits. Experience with these scales in Holovousy during 2004-2006 had shown that they are difficult to use and some errors occur. Moreover, the most commonly grown cultivars become more susceptible to scab after some years, therefore it was not considered necessary to be very precise in the rating of susceptibility. A new proposal for scab evaluation was presented.

Regarding fruit taste, it was suggested that a descriptor on bitterness should be added, since it is a common factor influencing taste, especially in wild species and crabs.

Remarks were also made about the current fruit shape descriptor, since it is a difficult trait to score, especially when two or more different fruit shapes are found on the same tree. A less precise evaluation system was proposed.

In the discussion, it was observed that it is very inconvenient to modify descriptors at each meeting and the suggestion was made to keep the existing lists, even though there is always potential for improvement. The scales used so far are still acceptable. Moreover, it becomes difficult to refer to published data if the descriptors are changed periodically.

*It was concluded that the existing descriptors' scale would not be changed, but new descriptors could be added to the minimum list.*

### **Proposal for a new classification of apple general shape based on biometrics criteria**

A proposal for a new classification of the apple general shape, based on biometrics criteria, was presented by E. Dapena. This objective classification of the apple general shape is based on two quantitative characters, the ratio between height and diameter and the ratio between the widths of the eye basin and the stalk cavity. The performance of this new classification was studied with measurements of more than 350 cultivars from the Spanish National Germplasm Bank. These were made with the application of Digital Image Technologies. The method is highly reproducible and accurate and can be applied in research on the heritability of fruit shape traits.

In the discussion, it was observed that the suggested methodology is very precise, but perhaps too accurate for the purpose of general germplasm characterization that is needed by the Group.

*It was concluded that so far the existing shape descriptor would be maintained as it is.*

### **Characterization and evaluation descriptors for Malus**

*The Group reviewed the list of minimum characterization and evaluation descriptors to be used for the completion of the European Malus Database. The descriptors that were agreed during the second meeting of the WG were all reconfirmed and the following were included in addition:*

*Bitterness*

*Regularity of shape*

It was suggested that the WG should compile in one document the entire list of agreed characterization/evaluation descriptors for *Malus*. It was then agreed that a plastic-coated sheet to be used in the field should be prepared, including all the above-mentioned descriptors.

*IPGRI offered to compile this list of agreed descriptors and to provide this document **by the end of November 2006** to M. Kellerhals and M. Lateur.*

*A Task Force will revise the already defined descriptors for Malus and propose reasonable adaptations. The Task Force is composed of M. Kellerhals (Coordinator), J. Blažek, S. Budan, E. Dapena, B. Gelvonauskis, E.-J. Allen, V. Hanke, I. Hjalmarsson, L. Ikase, M. Lateur and F. Laurens. The descriptor sheet will be finalized **by the end of January 2007**.*

*M. Kellerhals and M. Lateur will then propose a technical leaflet with the most important descriptors for **apple** for making a waterproof document for field work and, after acceptance, will send the standardized document to all WG members (**by the end of February 2007**).*

*It was also agreed that descriptors for rootstocks and for wild species need to be developed in the near future.*

### **Progress of the ECPGR Pyrus Database and progress of the “Synopyrus” software**

M. Lateur described the progress made by the European *Pyrus* Database (EPDB), which currently includes 9862 accessions, although the collection of complete sets of passport data was considered not very successful so far.

The available data were transferred from MS Access to MS SQL. The Web site was updated and developed with a PHP interface. The “synonym” search tool was adopted and incorporation of pictures was started.

The current Web site interface allows for name searches and it is possible to get lists of all accessions, with the respective accession data. A list of synonyms is also available. These were developed from the initial list of synonyms. It is now proposed to validate what was entered into the Database, including the need to resolve errors and misspellings and transliteration problems.

The frequency distribution of cultivars in different collections was recorded as well as the most frequent accessions held in collections by each country.

Future tasks include the collection of sets of photos.

M. Lateur also gave a presentation jointly prepared with A. Antofie and R. Oger, describing the “Synopyrus” software. By helping in the identification of synonyms of *Pyrus* species, this software has the objective of helping in identifying gaps and to locate unique material and duplicates within and between collections.

Some problems to be solved with the identification of synonyms include: name misspellings; names translated in different languages; problem of transliteration and use of different alphabets; clarification on the divergences between authors on synonyms and on the total number of synonyms and groups of synonyms identified so far. For every group of synonyms identified by the software, one “euonym” is selected. The euonym is a convenient name chosen from various synonyms and variant spellings to aid cross-referencing of these in the EPDB – e.g. ‘Burlat’ is the euonym of ‘Bigarreau Burlat’, ‘Burla’, ‘Burlat’ and ‘Burlat Bigarreau’.

### **Characterization and evaluation descriptors for Pyrus**

*IPGRI offered to compile this list of agreed descriptors for Pyrus and to provide this document **by the end of November 2006** to M. Lateur and L Rivalta.*

*A Task Force will revise the already defined descriptors for Pyrus and propose reasonable adaptations. The Task Force is composed of M. Lateur and L. Rivalta (Coordinators), E.-J. Allen, J. Blažek, S. Budan, E. Dapena, B. Gelvonauskis, V. Hanke, I. Hjalmarsson, L. Ikase, M. Kellerhals and F. Laurens . The descriptor sheet will be finalized **by the end of February 2007**.*

*M. Lateur and L. Rivalta will then propose a technical leaflet with the most important descriptors for **pear** for making a waterproof document for field work and, after acceptance, will send the standardized document to all WG members (**by the end of March 2007**).*

### **Exchange of views on standardized methods for inclusion of fruit pictures in the databases**

M. Lateur presented the work carried out together with A. Rondia on the France/Belgium example of fruit picture standards.

Fruit pictures represent a simple way to ensure a preliminary characterization and identification tool. Moreover, they are very attractive to the user and to the larger public and therefore increase the usefulness of the DBs.

Pictures should be taken of representative fruits, in order to record evidence of the pomological traits that are specific to each cultivar. A standardized procedure is recommended in order to facilitate inclusion into the DBs. Validation procedures are also necessary to make sure that the pictures correspond to the given accessions, otherwise important consequences derive for the proper management and use of the data. Photos should be taken on two occasions, during two independent years, then compared and validated before storing them in the DB. In order to be as close as possible to the true colours of the fruit, it is necessary to use "natural" diffused light as much as possible. Simple "light cages" can be prepared. Simple ways to label the pictures should be adopted. Information that should accompany the photo includes the number of the tree, the date and year of the photo and perhaps the harvesting date.

*In the subsequent discussion it was agreed that standardized pictures should be provided to the DB Managers via an FTP address that they will provide. The pictures should be in Jpeg format. They can be of any size, we consider 3 million pixels an average size.*

*A detailed standard for the preparation of fruit pictures will be prepared by a Task Force composed of E. Dapena and M. Kellerhals (Coordinators), J. Blažek, Z. Bobokashvili, B. Gelvonauskis, V. Hanke, I. Hjalmarsson and M. Lateur. The final standard, after circulation to the whole Group for comments, will be provided in final form to the WG and the ECPGR Secretariat **by the end of December 2006**.*

*It was agreed that already available pictures of the accessions should be sent to the Malus and Pyrus DB Managers **by the end of June 2007**.*

*New pictures following the standardized procedures should be taken during the next season 2007 and sent to the Malus and Pyrus Database Managers **by February 2008**. The aim is to send pictures of at least 30% of each national collection.*

### **Principles and planning of the harmonization between Malus, Prunus and Pyrus Databases**

M. Lateur

Harmonization of the Databases' interfaces: the idea is to create a common interface, to be defined by the DB Managers. This will be the topic of discussion for the meeting of the Fruit Database Managers, planned to take place in 2007.

### **Progress of EURISCO**

L. Maggioni

The recent developments of the EURISCO catalogue ([http://eurisco.ecpgr.org/home\\_page/home.php](http://eurisco.ecpgr.org/home_page/home.php)), including the incorporation of over 970 000 accession passport data from 34 European countries, and the overall mechanism of data flow in Europe were described. This online catalogue of passport data on the *ex situ* collections maintained in Europe meets the Convention of Biodiversity obligations to facilitate the exchange of information relevant to the conservation and sustainable use of biological diversity. Moreover, this central catalogue, which is maintained by IPGRI on behalf of ECPGR, offers

the possibility to the Central Crop Database Managers to directly download all the relevant crops' passport data in one single operation, rather than requesting data from several curators.

Since EURISCO is made up of data provided by the National Inventory Focal Points, the completeness of the data available from EURISCO depends on the efficiency of data collection within each individual country. A role for the Working Group members, in order to make sure that all *Malus/Pyrus* national data will be channelled to EURISCO, would be to contact their respective National Focal Point and collaborate on data gathering from all available collections within their country. The full list of National Inventory Focal Points is available from [http://eurisco.ecpgr.org/about/national\\_focal\\_points.php](http://eurisco.ecpgr.org/about/national_focal_points.php).

*The DB Managers agreed to check the EURISCO DB in order to compare existing Malus and Pyrus data with those already included in the ECCDBs and to inform the WG members of the situation.*

## **AEGIS (A European Genebank Integrated System) and other alternatives for long-term safe conservation of *Malus* and *Pyrus* European genetic resources**

### ***Introduction and practical strategies planned by the Prunus WG***

*L. Maggioni and M. Lateur*

A short account was given of the ECPGR-funded project AEGIS (A European Genebank Integrated System), which carried out a feasibility study (2004-2006) to promote the creation of a rational European plant genetic resources genebank system of genetically unique and important accessions, in order to conserve them safely in the long term, at the same time ensuring their genetic integrity, viability and availability to users.

Principal benefits of an integrated system for the operation of AEGIS would be the following:

- Improved collaboration among European countries and a stronger unified Europe;
- Cost-efficient conservation activities;
- Reduced redundancy in European collections;
- Improvement of quality standards across Europe;
- More effective regeneration;
- Facilitated access to germplasm;
- Improved security of germplasm through safety-duplication; and
- Improved linkages to *in situ* conservation and users.

During the feasibility study, four model crop groups took into consideration organizational, technical, legal, political and financial aspects involved in the development of such a system.

According to the preliminary conclusions of the *Prunus* model crop group (which is close to the situation of *Malus* and *Pyrus*), AEGIS would enhance the conservation of *ex situ Prunus* accessions via collaborations and agreements to minimize barriers to exchange material, encourage adequate documentation and standards and reduce duplication. A decentralized system would be encouraged, whereby germplasm would continue to be conserved in the same location where it is currently maintained. A list of Most Appropriate Accessions would be identified by the Database Manager, in consultation with the Working Group, and these accessions would be conserved according to realistic, adequate and acceptable guidelines. New accessions should be documented, with phytosanitary certificates, and would be

carefully propagated and characterized. Maintenance guidelines would include type of rootstock, number of trees, eradication of pests and diseases, characterization and availability for distribution.

The 10th Steering Committee meeting decided that the AEGIS work should be followed up by further consideration of the practical aspects of implementation of the AEGIS project, as follows:

1. More details on the European collections of the four model crops were considered necessary, i.e. the identification of Most Appropriate Accessions and the criteria for such identification, and the development of quality management systems.
2. The overview of (estimated) operational costs for collection maintenance before or after the introduction of AEGIS.
3. Development of a draft model institutional contract covering operational issues related to the implementation of AEGIS.
4. Survey of (potential) capacity and availability amongst European institutions to develop European task-sharing in the context of AEGIS.

The ECPGR Secretariat was asked by the Steering Committee to start as soon as possible the process of further preparation of draft decisions and possible implementation mechanisms for the AEGIS concept. About 150 000 € were re-allocated for this purpose from the existing Networks' budgets.

More information on AEGIS is available from <http://www.aegis.cgiar.org/>.

### ***Towards a German National Fruit Genebank***

*V. Hanke*

Various collections of fruit species and cultivars are held in Germany by Federal and State governmental institutions. Besides this, there are also non-governmental and private organizations focusing on conservation of old, local fruit cultivars. Until recently, there was no national coordination of the existing activities in the field of collection and conservation of fruit genetic resources in Germany. However, keeping going several conservation systems without any coordination is cost-intensive and it may risk irrecoverably losing valuable genetic material.

The German Fruit Genebank is a decentralized network, which is aimed at the coordination of different germplasm collections in Germany including Federal and State institutions, NGOs and private ownership collections. The work will be organized in crop-specific networks (e.g. apple network). The Institute for Breeding Research on Horticultural and Fruit Crops is the coordinator of the German Fruit Genebank and is partner in the networks with its own collections. The Information and Coordination Centre for Biological Diversity (IBV) is as partner responsible for international affairs and integrates the data of the German Fruit Genebank in international databases (<http://pgrdeu.genres.de/>).

A project for the acquisition and documentation of fruit genetic resources in Germany was funded by the Federal Agency for Agriculture and Food (Bundesanstalt für Landwirtschaft und Ernährung, BLE), Bonn in 2005-06, with the aim to register as part of a national collection all collections and stocks of fruit genetic resources *ex situ* and *in situ* in Germany, to assess their status of conservation, to define any need for action and to document this information in a database. Overall, 9441 *Malus* and 2723 *Pyrus* accessions were acquired.

### **Strategies for safe conservation of Malus/Pyrus genetic resources**

M. Lateur described the strategy to conserve in Belgium the largest diversity of characters of *M. domestica* genetic resources for the future generations. As a first step, priorities and criteria need to be defined to select unique material for future potential use. The criteria include the following:

- Available minimum documentation
- Guaranteed identity of the material, screened as unique and original
- A set of criteria for inclusion in the national collection:
  - a. Old cultivars raised in Belgium either as landraces, as chance seedlings or selected by a breeder
  - b. Old cultivars formerly grown and adapted to Belgium and that had a socio-economic importance and therefore a historic link with the country
  - c. Cultivars that extend the diversity of characters already known
  - d. Cultivars of interest for scientific, breeding or economic purpose
  - e. Cultivars not present and not conserved in other European collections.

The next steps are:

- *Ex situ* conservation: minimum 2 trees per genotype in 2 different blocks, with 2 different rootstocks; hedges between blocks for limiting pest and disease
- Bilateral or multilateral agreement for sharing responsibilities
- On-farm conservation for selected material
- Development of the AEGIS concept.

A case study of on-farm conservation of fruit tree genetic resources in Belgium was presented, showing the development of an orchard network in the Walloon Region.

The objectives include the following: duplicating *ex situ* collections in order to ensure their long-term safeguarding; returning genetic material to the regional landscape to rebuild the local genetic diversity; evaluating cultivars in their original soil and climatic conditions; responding to a demand coming from the people; making a link between genetic resources and people; coordinating various genetic resources actions and avoiding redundancy and duplication of efforts.

Non-profit associations, schools, local public administrations, individual people and farmers are involved in the initiative. Contracts are established between the partners, including definition of responsibilities, objectives, place and owner of the land, cultivars planted, growing advice and duration of the contract. Small amounts of funding for vole prevention and extra costs for "piece-work" grafting are provided.

The results between 2000 and 2005 consisted in the plantation of 30 standard tree orchards on a total area of about 67 ha. The objective is to reach in this way the duplication of about 30% of the *ex situ* collection.

### **Discussion on the Malus/Pyrus approach to AEGIS and other alternatives (e.g. regional collaboration between collections, "on-farm" conservation, budwood cryopreservation, etc.)**

(Chaired by L. Maggioni and M. Lateur)

In the discussion, it was clarified that agreements at the European level to establish an operating framework along the lines of the AEGIS initiative are expected to be discussed in the next ECPGR Steering Committee meeting (September 2008).

It was therefore proposed to encourage each country to develop in the meantime the concept of the "national collection" and then to select sets of accessions that could be

identified as part of a “European Collection”. These would then be considered by the *Malus/Pyrus* Working Group as candidate “Most Appropriate Accessions”, to be maintained for the long term by the holding institutions, in agreement with the criteria and standards to be established by the *Malus/Pyrus* Working Group.

*The Group agreed on the above principles and decided to include the following passport descriptors in the Central Databases, to record the accessions that are (or will be) identified as part of the national collection, those accessions that will be subsequently offered for inclusion in the European Collection, and those that will eventually be accepted:*

**NATIONAL/COLL**

*Accession belonging to the national collection*

1. Yes
2. No

**EUROPEAN/COLL/OFFER**

*Accession offered to the European Collection*

1. Yes
2. No

**EUROPEAN/COLL/VALIDATED**

*Accession accepted in the European Collection*

1. Yes
2. No

The following statements were made on the status of progress of national collections in the individual countries:

**Albania:** The national collection and national strategy have not been established yet, but efforts to do this are ongoing (see presentation).

**Austria:** The national collection is distributed in different places around the country and is organized by the formal sector. NGOs are also developing collections for participating in conserving national material but a better link between those two approaches is needed. The national database is being compiled.

**Azerbaijan:** National PGR activity started work 10 years ago. There are collections in several different places, but no national programme or research project is currently going on. Funds from the Academy of Science are only sufficient for salaries, not for projects. Each year collecting missions are organized, including the collecting of wild species (*M. caucasica*, etc.).

**Belgium:** Thanks to the framework of a Federal Research Scientific Policy funded project on *Malus* biodiversity, the concept of a “national collection” started with the definition of criteria for inclusion of material in such a decentralized but coordinated approach, and a lot of work was done for the identification of unique and true-to-type cultivars by using both phenotypic and genetic characterization tools.

**Czech Republic:** The definition of a national collection is in progress.

**Estonia:** The national PGR programme is established and is in progress.

**France:** (see presentation)

**Georgia:** The national collection has not been established yet, due to financial reasons, but there are plans to establish it in the near future. A small NGO collection exists (see presentation).

**Germany:** (see presentation)

**Ireland:** There is only one *Malus* collection in Ireland, which is *de facto* the national collection. It is a cultural heritage collection. There is no *Pyrus* collection.

**Italy:** The national fruit collection was inaugurated in October 2006 in Rome. It includes old fruit varieties from all over Italy. 800 accessions of *Malus* and 1000 of *Pyrus* are currently present and it is planned to further expand the collection in the next few years.

**Latvia:** The national collection is established but long-term funding for its maintenance still needs to be secured (see presentation).

**Lithuania:** The national collection is established and in progress. It includes 15 fruit cultivars.

**The Netherlands:** The national genebank conserves its own collection and collaboration with NGOs has recently started with the establishment of a network. All the material conserved by the network is part of the national collection.

**Portugal:** There are two national collections of landraces (one of *Malus* and one of *Pyrus*) in Portugal, and several regional collections. The main concern is currently to start collaboration, within the national network, between the formal sector and NGOs. This can be inspired by the examples presented by some WG members. Varietal descriptions are being completed for both national collections, but some additional effort should be made for the preparation of bilingual characterization leaflets. Passport data are being prepared to be sent to the European Central Crop Databases.

**Romania:** Many genotypes were lost during the political transition in the 1990s. It is a priority to reorganize the national collection, but no funds are currently available to do it, since no governmental department is taking on this commitment. The existing collections are maintained by research institutions.

**Slovakia:** The national programme is established, including 19 participants, 3 of which are interested in fruit trees. The national crop collections include only Slovak varieties. However, the national *Malus* and *Pyrus* accessions have not been identified yet. This will take place in the near future (see presentation).

**Spain:** There is a national programme coordinated by the Instituto Nacional de Investigación y Tecnología Agroalimentaria (INIA). The management of genetic resources is decentralized: apple genetic resources are conserved in five Regional Collections and pear genetic resources are maintained in two Regional Collections. The conservation of these genetic resources is financially supported and included in the National Network. Several small collections are also maintained by NGOs. Morphological and molecular characterization of the cultivars is in progress.

**Sweden:** The national programme is established. The national collection includes 250 apple and 50 pear mandate varieties, mostly from Sweden, either collected on-farm or bred. Some foreign varieties are also included. Several clonal archives, established by the Nordic Gene Bank (NGB), are spread around the country. Two trees of each of the mandate varieties are maintained in two places. Contracts are made with the archive curators, including payments for the conservation work. All the people responsible for the conservation meet every year.

**Switzerland:** The national concept is established. Several collections are maintained by NGOs, however no long-term commitment has been secured yet by the government for financial support in the framework of the National Plan of Action. Some NGOs do not like the idea of a European Collection, since they fear that such a concept might reduce governmental subsidies for the conservation of material that is not included in the European Collection (see presentation).

**United Kingdom:** The national fruit collection is established and it is centralized at Brogdale. Close relationships are maintained with NGOs and material is exchanged with them as required. On the other hand, nothing that is maintained by NGOs would be part of the national collection, owing to insecurity of long-term maintenance. The national collection contains approximately 50% material of foreign origin.

## **Integration of phenotypic and molecular characterization of *Malus/Pyrus* collections**

*(Chaired by B. Gelvonauskis and F. Laurens)*

### ***Experiences in applying molecular markers as a tool for the identification of apple and pear accessions in collections***

#### **France: Molecular characterization (SSRs) of some European cultivars**

*F. Laurens and L. Feugey*

At the last ECPGR meeting in Dresden (2002), a proposal was made to fingerprint a part of the European collections with SSRs. The main two aims were i) to get an idea of the structure of the diversity, and ii) to find out duplicates or related cultivars.

A preliminary study was performed on 142 French local cultivars in 2000 (Laurens et al. 2004) using 9 SSRs markers. It allowed us to select 4 markers which are easy to use and with the highest level of discrimination: CH02c06, CH02c09, CH02c11 and CH04c06.

In 2003, leaf samples from Lithuania, Russia, Greece, Norway, Poland, Finland, Sweden and France were sent to INRA-Angers (France) where DNA extraction and SSR analysis were performed. The analysis was performed on a capillary sequencer ABI3130 (16 capillaries).

On the 441 samples received, we have, so far, the complete set of SSR data for 331 accessions. Some Factorial Component Analysis and Clustering have been performed. Results do not show a very clear structure in the population. Nevertheless, we could find some evidence of clustering, i.e. Russian accessions seem to be grouped and quite separated from the rest, but this has yet to be confirmed.

This study allows us to detect synonyms in the Russian and Polish populations and also to find a lot of related cultivars.

The short-term perspectives are to fill in the SSR data to be able to make the analysis on the whole set of 441 cultivars.

### **The Netherlands: CGN-NGO cooperation project on apple**

*R. van Treuren*

The Centre for Genetic Resources, the Netherlands (CGN) maintains an *in vivo* apple collection of 151 accessions. In addition, several NGOs are actively involved in the conservation of apple genetic resources in the Netherlands. In 2005, a project was started to characterize about 700 Dutch apple accessions with 16 microsatellite markers. Objectives of the study were: 1) to improve the insight into the diversity of genetic resources of apple in the Netherlands; 2) to determine the degree of representation of CGN's collection; 3) to investigate possibilities for more efficient conservation; and 4) to increase the interest of genetic resources to the user community. The project results obtained so far indicated that 1) considerable overlap in diversity occurs both within and between the investigated collections; 2) the passport data of the accessions need serious improvement; 3) no single collection covers the total diversity well; and 4) the efficiency of conservation can be substantially improved through cooperation between the collections. In cooperation with the NGOs, follow-up activities include detailed examination of the observed duplication groups and passport data and the development of a common database. In addition, the data are currently being investigated to identify potentially interesting material for the user community.

### **Belgium: Case study of the utilization of 10 SSRs for the characterization of *Malus* genetic resources' collections**

M. Lateur presented the results of a Belgian experience on the use of SSRs as characterization and identification complementary tools, which was carried out by E. Coart, L. Vanwynsberghe and M. Lateur. This case study was developed under the framework of the National Scientific Policy Office. The objective was testing and validating the usefulness of the molecular marker approach, compared and combined with the reference approach. A part of the CRA material was chosen as reference and used as "certified identity" material. 669 cultivars (old, modern and cider) were screened. Preliminary results were presented with percentages of errors, identifications and validations. It was concluded that the SSR methodology still needs some improvements in order to ensure full validation of the data.

### ***Discussion on molecular characterization and issues to be taken into account at the fingerprinting ad hoc meeting in East Malling, UK, December 2006***

The Group discussed a few points that are recommended for attention and further development during the fingerprinting ad hoc meeting that will take place in East Malling in December 2006.

The main aim of this meeting is to agree on which markers to use to carry on fingerprinting studies in the future. The choice of a common set of standard markers, to be used by everybody, would allow comparison of results.

After the meeting, each country will be invited to select a short list of cultivars to be analysed, in order to start a fingerprinting analysis of the entire European collections. The number of cultivars/country should be discussed in East Malling. Each ECPGR member will be informed of the decisions. Whenever countries are not able to analyse their accessions by themselves, INRA, France, could perform this fingerprinting, if costs for labour and consumables are provided. A budget of 3000 € is available from the Fruit Network for fingerprinting.

Bronislovas Gelvonauskis (Plant Gene Bank, Lithuania), François Laurens (INRA, France) and Henryk Flachowsky (BAZ, Germany) will be the representatives of the *Malus/Pyrus* ECPGR WG in East Malling. It was decided to invite Eric van der Weg, Plant Research International (PRI), The Netherlands (or Andrea Patocchi), to the fingerprinting meeting on

behalf of the *Malus/Pyrus* group, in replacement for Els Coart who will not be able to attend. M. Lateur will contact and inform Eric. IPGRI will send an invitation as soon as possible.

Fingerprinting activities going on in institutes that are not represented in the WG should be taken into consideration. Each WG member is invited to collect information on all ongoing activities in her/his country and to communicate relevant information to and from the WG.

Some other points linked to the management of the database were discussed:

- It is important to be able to trace back where the analysed material came from and to ensure that the same material will remain accessible in the future.
- It is important to ensure the link between phenotypic data and the photo of the fruit and the molecular markers' data. This link should be eventually established in the Central Database.
- It will be important to define how the data should be included in the DB. The example of the European *Vitis* Database should be taken into account.

### **Update on project proposal BIODIFRUIT (AGRI GEN RES 870/2004)**

M. Lateur presented the outline of the project BIODIFRUIT, which was submitted under the second call of EC Regulation AGRI GEN RES. The project is focused on cherry and pear genetic resources, with the following objectives:

- To harmonize existing database structures to link with the EURISCO initiative and to improve their content, and thus usefulness, for better management and utilization of fruit tree genetic resources in the European collections.
- To incorporate available "new" data – especially molecular, photographic, characterization and genetic – from national projects.
- To implement the AEGIS concept with respect to a network-integrated collection of fruit trees with a long-term conservation strategy based on the sharing of responsibilities between countries.
- To develop documents and strategies, for the better utilization of fruit genetic resources in Europe.
- To develop added value in the management and the practical use of fruit tree genetic resources by stimulating collaboration and synergies between research institutions, horticulturists and NGOs and disseminating results to stakeholders.

The project includes 24 partners from 16 countries and is structured in the following work packages (WP leaders between brackets):

WP1	Harmonization and increase added value of Fruit ECCDBs (INRA Bordeaux, France)
WP2	Harmonization of characterization and evaluation work (EMR, East Malling, UK)
WP3	Incorporation of new data in EURISCO and ECCDBs (INRA Bordeaux, France)
WP4	Implementation of strategies for safe conservation (BAZ, Dresden-Pillnitz, Germany)
WP5	Improvement of the use of fruit tree genetic resources (RBIP Holovousy, Czech Republic)
WP6	Increase interaction between formal and informal sectors and dissemination of results (ISF, Roma, Italy)

## Wild relatives

### **Study of the *Malus sylvestris* diversity in Belgium**

*M. Lateur*

A national project funded by the Belgian Science Policy Office was developed during the 2003-2006 period with the aim of studying Belgian apple biodiversity. The project was coordinated by the Institute for Agricultural and Fisheries Research (ILVO), Melle and involves several complementary partners: the Walloon Agricultural Research Centre (CRA-W), the Catholic University of Leuven (KUL), the Forest and Nature Research Centre of Gembloux (CRNFB), the Research Institute for Nature and Forest of Dendergem (INBO) and the National Orchards Foundation (NBS).

The genetic resources of *Malus sylvestris*, the apple tree native to western and central Europe, are endangered. Forest decline and forest fragmentation have caused a reduction in suitable habitats and today only isolated individuals and small populations are known in Belgium. Moreover, the biodiversity and genetic identity of *M. sylvestris*, the wild apple, is threatened because of possible hybridization with the omnipresent cultivated apple (*Malus x domestica*). The overall objectives of the project can be summarized as follows:

1. To organize an extensive survey over the whole Belgian territory in order to update information on the distribution of the remaining wild apples;
2. To study the genetic diversity present in wild apple populations and collections of old regional varieties and modern cultivars at different levels of organization: neutral and functional nuclear diversity and cytoplasmic diversity;
3. To analyse past hybridization processes between wild and cultivated apple gene pools and determine the present degree of distinctness between wild apples and cultivated varieties;
4. To assess the viability of wild apple populations through the analysis of demographic parameters and fertility-related traits;
5. To organize and summarize all the above results in order to develop conservation guidelines for wild apples in Belgium (*in situ* where possible, *ex situ* where necessary);
6. To develop an efficient management plan to conserve the biodiversity present in existing collections of old regional varieties in Belgium;
7. To disseminate these conservation strategies to a wide audience, including forestry and nature conservation agencies, and non-governmental organizations involved in conservation of wild species;
8. To determine the value of wild apple trees and regional varieties to expand the genetic base of current apple breeding programmes (i.e. introgression of new sources of stress and disease resistance).

A total of 977 putative *M. sylvestris* trees were located in the wild, their positions were noted on 1/25 000 maps, and their geographical coordinates were determined with GPS. Of this total, 764 trees are located in Wallonia and 213 in Flanders. From the NBS and the CRA-W collections of old *M. x domestica* varieties, selections of 256 and 248 old cultivars respectively, were chosen for phenotypic and genetic diversity studies. Cultivars were chosen based on their Belgian origins or tradition of cultivation in Belgium. A total of 64 descriptors were defined and used to characterize the *M. sylvestris* trees selected throughout Belgium. All trees were described *in situ* and some of them were grafted and cultivated in nurseries for *ex situ* evaluation. Characterization data were subsequently used to evaluate their intraspecific variability and to assist in preparing a conservation programme to be applied in Belgium.

Microsatellite (SSR) markers represent a well-established tool in conservation genetics studies and had previously been successfully applied to characterize apple diversity by the partners in this project. The availability of a large set of mapped SSRs allowed us to select a subset of 10 SSR loci, spread over the apple genome, to fingerprint the 1498 *Malus* genotypes collected for this project. The analyses of the SSR dataset with a Bayesian clustering approach confirmed that *M. sylvestris* and *M. domestica* represent clearly differentiated gene pools that can be separated based on allele frequencies at 10 SSR loci. However, 7% of the sampled *M. sylvestris* trees were identified as hybrid, indicating ongoing gene flow between the two species.

Strategies for *in situ* conservation have been defined and are specifically adapted to local situations. For example, in Flanders the only possibility for preserving wild *M. sylvestris* is to restock with plant material originating from the provenance region North of Sambre and Meuse; in Wallonia where *M. sylvestris* is still present in many forests, the forest rangers will favour their growth and fruiting by an adapted thinning regime. It is also absolutely necessary to cut down hybrids and cultivated apple trees in the immediate surroundings of the chosen wild apple trees.

For the construction of a core collection of *M. sylvestris* it was of the utmost importance to discriminate between wild, hybrid and cultivated apple trees. Phenotypic (based on leaf hairiness and fruit size) and SSR classifications have been combined where possible, otherwise only SSR classification was used. A total of 201 genotypes were selected for the "Belgian *M. sylvestris* Core Collection", based on various selection criteria. As some degree of structuring in the *M. sylvestris* gene pool was expected, the core collection was stratified into four regions of provenance. The conservation and study orchard is planted at Philippeville in collaboration with the Regional Forest Administration and is organized as completely randomized blocks with five repetitions per genotype. Such an orchard, isolated from cultivated apple trees, favours intensive cross-pollination and panmixity. As a practical result, the seeds obtained will express the maximal genetic diversity which can be used in the future by foresters in order to reintroduce apple biodiversity into the wild.

### **Conservation of *Malus sieversii* in Kazakhstan**

*F. Laurens*

Kazakhstan is the centre of origin of the domesticated apple. From 26 August to 3 September 2006, I had the opportunity to visit the region of Alma Ata thanks to Catherine Peix, a French film director who is preparing a documentary on "The Origin of Apple". Our host was Prof. Aymac Djangaliev who spent all his life working on *Malus sieversii*. He has been very active in collecting, characterizing and selecting some elite individuals in the *M. sieversii* forests. He is now 94 years old but still fighting to preserve this heritage against many threats caused by human activities.

Prof. Aymac Djangaliev organized for us visits in three different regions in the surroundings of Alma Ata (within 100 km around): Kournetsov Chel, Chornaya Retchka, Talgar. In these different environmental conditions, we saw a large range of fruit types and sizes. Some fruits were very close to commercial apple cultivars: good size, good tasting. One of the aims of my trip was also to collect some scab-infected leaves to give to my colleague B. Lecam at the Plant Pathology Research Unit (UMR PAVé), INRA-Angers for him to perform diversity analysis on scab.

I keep in contact with Prof. Djangaliev and his wife, who is now in charge of the lab, to develop further collaborations. He would like to get some help to publish in English the descriptions of 26 elite lines of apple and 17 of apricot which he selected from the forests. This winter, we plan to introduce some of these selections into France.

## Technical or scientific contributions

### **Methodology for the evaluation of the resistance of apple genetic resources to rosy apple aphid and woolly aphid in controlled conditions**

*E. Dapena*

This study aimed to compare the susceptibility level among cultivars (e.g. local cultivars) and to identify and select cultivars with resistance to the rosy apple aphid (RAA) *Dysaphis plantaginea* (e.g. hybrids of crossings between local cultivars and Florina). The methodology was based on that of Elizabeth Rat-Morris from the Ecole Nationale des Ingénieurs des Techniques Horticoles et du Paysage (ENITH), Angers, France.

This methodology was used since 1998 and the susceptibility of numerous local cultivars has been compared, with detection of differences in susceptibility, but no completely resistant cultivars were found. Infestation and damage were found to be positively correlated. Some Vf-cultivars were found to be tolerant to RAA. Tolerant hybrids from crossings between local cultivars and Florina were identified and selected. Field surveys confirmed greenhouse results. This work was also the basis for a search of molecular markers linked to RAA resistance (in collaboration with C.E. Durel and W.E. Van der Weg).

A similar study was carried out on the woolly apple aphid (WAA) *Eriosoma lanigerum*, with a methodology based on that of Lemoine and Huberdeau.<sup>3</sup>

This methodology has been used since 2005 and the susceptibility of local cultivars has been compared, including the evaluation of the susceptibility of some Vf-cultivars.

### **EU INTERREG trans-border project between France and Belgium on the conservation, evaluation and valorization of Malus and Pyrus genetic resources**

*M. Lateur*

An INTERREG III project was carried out in collaboration between CRA-Gembloux, Belgium and ENR-CRRG (Espace Naturel Régional – Centre Regional de Ressources Génétiques), Nord-Pas de Calais, France.

The project was developed with two types of actions, as follows:

#### **Action 1: Cross-border fruit biodiversity management and valorization**

- Creation of a common database to optimize the management and the valorization of fruit tree collections of the partners
- Standardization of the assessment and development methods
- Identification and joint study of fruit trees in two core orchards
- Rationalization of collections
- Creation of two trial orchards to study and add value to the most interesting varieties
- Creation and marketing of new pear varieties

#### **Action 2: Economic and educational valorization of fruit tree genetic resources**

- Diversifying the supply on the market
- Offering consumers fruit of a better organoleptic quality, with fewer phytosanitary treatments

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<sup>3</sup> Lemoine J, Huberdeau D. 1999. Le puceron lanigère (*Eriosoma lanigerum* Hausmann), un parasite en recrudescence dans les vergers de pommiers [The woolly apple aphid (*Eriosoma lanigerum* Hausmann), an upsurging parasite in apple orchards]. *L'Arboriculture Fruitière* 532:19-26.

- Support for the creation of a certified quality fruit tree production sector (professional nurseries)
- Involving local people in the cross-border area in the issues connected with conserving their rural resources and developing sustainable agriculture.

During characterization activities, fruit trees and fruits were assessed for scab, *Nectria* canker, powdery mildew, flowering, taste and conservation. The assessment scales were harmonized. CRRG made photos of 900 apple, pear and plum fruits, and CRA-W took 255 pear photos. An increased sharing of responsibilities was realized, with the creation of one common database, the identification of gaps, duplicates and redundant cultivars and with a practical merging of the two collections through shared management.

The trial orchards were also an example of division of tasks. They were set up with the objective to test interesting old cultivars and new apple varieties previously created by the two institutions. Organoleptic quality, disease resistance, and adaptation to local conditions and to sustainable agriculture were investigated. A pear breeding programme was also set up, based on the fabulous heritage of biodiversity collected in Gembloux and in Villeneuve d'Ascq. The objectives were to offer original alternatives to the monoculture of the 'Conference' variety and to permit genetic progress enabling growers to reduce phytosanitary treatments. Preliminary results include examples of interesting crosses for scab resistance.

## **Updating the workplan of the *Malus/Pyrus* Working Group**

An updated workplan proposed by the Chair was discussed in detail by the Group. The Workplan includes additional activities that were not discussed previously during the meeting (implementation of case studies of characterization and evaluation descriptors on apple and pear; setting up of Task Forces on "traditional knowledge" and on "wild species", etc.).

The composition of the Task Forces is based on the information provided by all participants during the meeting regarding their level of expertise in the different crops or topics of interest to the Working Group.

The approved workplan, including all the details, is included in Appendix I (pp. 33-36).

## **Closing session**

### ***Presentation of the report and adoption of recommendations***

The report was discussed and approved by the Group with a few modifications.

### ***Selection of the Working Group Chair and Vice-Chair***

The Group asked M. Lateur to continue in its role of WG Chair and he kindly accepted. A decision on the role of Vice-Chair will be taken after the meeting.

### ***Closing remarks***

The Group expressed thanks and satisfaction for the very warm and kind hospitality of the Georgian hosts and was happy to taste a number of local products brought from home by several WG members.

M. Kellerhals suggested that the next meeting of the WG might be held in Switzerland. The Group thanked him for the kind offer and agreed to take it into consideration when the next meeting is being planned.

## APPENDICES

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## Appendix I. Workplan of the ECPGR Working Group on *Malus/Pyrus* for 2007–2008

(Discussed and approved at the Third Meeting of the Working Group on *Malus/Pyrus*, 24-27 October 2006, Tbilisi, Georgia)

Planned activities	Carried out by	Date by when action should be initiated	Date by when action should be completed
<b>Updating of the <i>Malus</i> and <i>Pyrus</i> Databases</b>			
- Prepare standardized templates (Excel worksheet) with passport data according to the list of "priority descriptors" selected during the third meeting of the WG in Tbilisi, with identification data from the curators and their collections, with methodologies used and all characterization and evaluation descriptors already available and send it to all curators	Database Managers		End February 2007
- Check the EURISCO DB for collecting <i>Malus</i> and <i>Pyrus</i> data; compare them with those already included in the ECCDB and inform the WG members of the situation	Database Managers	Early November 2006	Early December 2006
- Make the link between Descriptors Task Forces and DB Managers in order to give clear information to the curators on which data need to be provided and how	Chairman	Early December 2006	End January 2007
- All Working Group members to contact their curators, asking them to send their data and encourage provision of minimum passport data and all available data from all collections in their country	All WG members	End February 2007	
- Send data in the requested format to the DB manager: - all currently available data even if not all descriptors are documented (minimum data = accession name + accession number + holding institute) - all agreed priority passport descriptors - all characterization and evaluation data already available - "National collections accessions" - if available	All WG members All WG members All WG members		June 2007 June 2007 June 2007 June 2007
<b>Molecular marker workshop (with <i>Prunus</i> and <i>Vitis</i> people) at EMR East-Malling, 7-8 December 2006</b>	<i>Malus/Pyrus</i> : E. van der Weg (or A. Patocchi), B. Gelvonauskis, <u>F. Laurens /</u> <u>L. Feugey</u> , M. Hofer (or F. Dunneman), M. Lateur (observer)		
- Coordination and compilation of ongoing initiatives carried out by different partners or colleagues in link with the HiDRAS project	F. Laurens and E. van der Weg	Early November 2006	End November 2006

Planned activities	Carried out by	Date by when action should be initiated	Date by when action should be completed
<b>Update and improvement of characterization and evaluation descriptors for <i>Malus</i> and <i>Pyrus</i> and their inclusion in the DBs</b>			
- Record all available and already adopted descriptors for <i>Malus</i> and send this compilation to M. Kellerhals and M. Lateur	ECPGR Secretariat	November 2006	End November 2006
- Compile all descriptors lists already developed for <i>Malus</i> and propose reasonable adjustments	Task Force: <u>M. Kellerhals</u> (leader), J. Blažek, E. Dapena, B. Gelvonauskis, E.-J. Allen, I. Hjalmarsson, F. Laurens, L. Ikase, S. Budan, V. Hanke, M. Lateur	End November 2006	End January 2007
- Develop and submit a proposal for a technical leaflet with the most important descriptors for apple to produce a waterproof document for field work; after acceptance, send the standardized document to all WG members	<u>M. Kellerhals and M. Lateur</u>	End November 2006	End February 2007
- Record all available and already adopted descriptors for <i>Pyrus</i> and send this compilation to M. Lateur and L. Rivalta	ECPGR Secretariat	End October 2006	End November 2007
- Compile all descriptors lists already developed for <i>Pyrus</i> and propose reasonable adjustments	Task Force: <u>M. Lateur and L. Rivalta</u> (leaders), M. Kellerhals, J. Blažek, E. Dapena, B. Gelvonauskis, E.-J. Allen, I. Hjalmarsson, F. Laurens, L. Ikase, S. Budan, V. Hanke	End November 2006	End February 2007
- Develop and submit a proposal for a technical leaflet with the most important descriptors for pear to produce a waterproof document for field work; after acceptance, send the standardized document to all WG members	<u>M. Lateur</u> and L. Rivalta	End February 2007	End March 2007
<b>Definition of standard guidelines for the inclusion of photographs in the <i>Malus</i> and <i>Pyrus</i> databases</b>	Task Force: <u>E. Dapena and M. Kellerhals</u> (leaders), V. Hanke, B. Gelvonauskis, I. Hjalmarsson, J. Blažek, Z. Bobokashvili, M. Lateur	25 October 2006 (meeting Tbilisi)	End November 2006
- Send a report of the meeting held on 25 October 2006 to Task Forces' members for last comments; compile comments and send the adopted document to all WG members	<u>E. Dapena and M. Kellerhals</u> (leaders)		End December 2006

Planned activities	Carried out by	Date by when action should be initiated	Date by when action should be completed
<b>Inclusion of pictures in the DB: two steps</b>			
- All currently available pictures labelled with their accession number to be sent to DB manager	All WG members		End June 2007
- Standardized pictures will be taken in the next season with the aim to have around 30% of accessions documented according to the guidelines	All WG members		End February 2008
<b>Implementation of case studies of characterization and evaluation descriptors on apple and pear</b>			
- Implementation of case studies on the practical utilization of adapted or new descriptors for <b>apple</b> and compilation of the conclusions	<u>E. Dapena and M. Kellerhals</u> (leaders), M. Hoefler, L. Feugey, J. Blažek, M. Bergamaschi, E.-J. Allen, A. Santos	February 2007	December 2007
- Implementation of case studies on the practical utilization of adapted or new descriptors for <b>pear</b> and compilation of the conclusions	<u>M. Lateur</u> , L. Rivalta (leaders), L. Feugey, M. Hoefler, J. Blažek, A. Santos	February 2007	December 2007
<b>Workshop on synonymy of <i>Malus/Pyrus</i>, <i>Prunus</i> and <i>Vitis</i> organized at Gembloux in 2007</b>			
	<u>M. Lateur</u> , <u>DB Managers (leaders) and invited experts from different regions of Europe</u>		
<b>Workshop on <i>in situ</i> and on-farm conservation of <i>Malus/Pyrus</i> (and <i>Prunus</i> and <i>Vitis</i>) at Dresden in 2008</b>			
	Sub-task group: <u>S. Mader and V. Hanke</u> (leaders) D. Benediková, J. Blažek, M. Lateur, E. Dapena		
<b>Informal meeting of Working Group at Eucarpia meeting Zaragoza (end September 2007)</b>			
	<u>Chairman</u>		
Present posters on ECPGR <i>Malus/Pyrus</i> Working Group at, e.g. Eucarpia Fruit Section Meeting	M. Lateur and B. Gelvonauskis	June 2007	Early September 2007
<b>Harmonization of the <i>Pyrus</i> and the <i>Malus</i> ECCDBs in accordance with the Cherry DB structure. The first step will be to organize an ad hoc meeting with all Fruit DB Managers and the WG Chair</b>			
	<u>WG Chairman</u> and DB Managers		

Planned activities	Carried out by	Date by when action should be initiated	Date by when action should be completed
<p><b>“European pomology bibliography”:</b>  <b>Compilation of a list of all local pomology books / catalogues available in each country, to be made available on the Internet and ultimately published in the report of the Tbilisi meeting</b></p>	<p>Task Force:  <u>E.-J. Allen</u> and <u>I. Hjalmarsson</u> (leaders),  A. Öunmaa,  D. Benediková,  E. Kullaj,  J. Choiseul,  J. Blažek,  L. Ikase,  M. Lateur,  M. Kellerhals,  S. Budan,  S. Mammadov,  S. Mader,  V. Hanke</p>	<p>November 2006</p>	<p>First version on the Internet = March 2007</p>
<p><b>Feasibility study on the scanning of reference descriptions of the most important European <i>Malus</i> and <i>Pyrus</i> cultivars to be included in the DBs</b></p>	<p>(id. above)</p>		
<p><b>Set up a “traditional knowledge Task Force” to start compiling traditional uses, historical contexts, etc.</b></p>	<p>Task Force:  <u>L. Ikase</u> and <u>J. Blažek</u> (leaders),  A. Öunmaa,  B. Gelvonauskis,  D. Benediková,  E. Dapena,  I. Hjalmarsson,  M. Lateur,  M. Kellerhals,  V. Hanke</p>	<p>November 2006</p>	
<p><b>Set up a Task Force devoted to <i>Malus</i> and <i>Pyrus</i> species, e.g. developing specific descriptors, link between wild relatives and cultivated species, etc.</b></p>	<p>Task Force:  <u>E. Kullaj</u> (leader),  V. Hanke,  F. Laurens,  S. Mammadov,  M. Lateur,  E. Dapena (wild spp.)</p>	<p>November 2006</p>	

## Appendix II. Acronyms and abbreviations

ACW	Agroscope Changins-Wädenswil, Switzerland
AEGIS	A European Genebank Integrated System
BAZ	Bundesanstalt für Züchtungsforschung an Kulturpflanzen (Federal Centre for Breeding Research on Cultivated Plants), Germany
IOZ	Institut für Obstzüchtung (Institute for Fruit Breeding), Dresden-Pillnitz, Germany
BLE	Bundesanstalt für Landwirtschaft und Ernährung (Federal Agency for Agriculture and Food), Germany
BRG	Bureau des Ressources Génétiques, Paris, France
CGIAR	Consultative Group on International Agricultural Research
CGN	Centre for Genetic Resources, Wageningen, The Netherlands
CRA-W	Centre wallon de Recherches Agronomiques (Walloon Agricultural Research Centre), Gembloux, Belgium
CRNFB	Centre de Recherche de la Nature, des Forêts et du Bois (Nature, Forests and Wood Research Centre), Gembloux, Belgium
DB	Database
ECCDB	European Central Crop Database
ECPGR	European Cooperative Programme for Plant Genetic Resources
EU	European Union
EUCARPIA	European Association for Research on Plant Breeding
EUFORGEN	European Forest Genetic Resources Programme
EURISCO	European Internet Search Catalogue
FAO	Food and Agriculture Organization of the United Nations, Rome, Italy
IBV	Information and Coordination Centre for Biological Diversity, Germany
IHVO	Institute of Horticulture, Viticulture and Oenology, Tbilisi, Georgia
ILVO	Instituut voor Landbouw- en Visserijonderzoek (Institute for Agricultural and Fisheries Research), Belgium
INBO	Instituut voor Natuur- en Bosonderzoek (Research Institute for Nature and Forest), Belgium
INIA	Instituto Nacional de Investigación y Tecnología Agroalimentaria (National Institute for Agriculture and Food Research and Technology), Spain
INRA	Institut national de la recherche agronomique (National Agronomic Research Institute), France
IPGRI	International Plant Genetic Resources Institute ( <i>now Bioversity International</i> )
ISF	Istituto Sperimentale per la Frutticoltura (Experimental Institute for Fruitgrowing), Rome, Italy
KUL	Katholieke Universiteit Leuven (Catholic University of Leuven), Belgium

LIFG	Latvia State Institute of Fruit-Growing ( <i>formerly Dobeles Horticultural Plant Research Experimental Station</i> )
NBS	Nationale Boomgaarden Stichting (National Orchard Foundation), Belgium
NCG	Network Coordinating Group
NGB	Nordic Gene Bank, Alnarp, Sweden
NGO	Non-governmental organization
PRI	Plant Research International, Wageningen, the Netherlands
RBIP	Research and Breeding Institute of Pomology, Holovousy, Czech Republic
RBS	Research Breeding Station, Vesele, Slovakia
RIFOP	Research Institute of Fruit and Ornamental Plants, Bojnice, Slovakia
RIPP	Research Institute for Plant Production, Piešťany, Slovakia
SSR	Simple sequence repeat
UPOV	Union internationale pour la protection des obtentions végétales (International Union for the Protection of New Varieties of Plants), Geneva, Switzerland
UTAD	Universidade de Trás-os-Montes e Alto Douro, Portugal
WG	Working Group

## Appendix III. Agenda

### *Third Meeting of the ECPGR Working Group on Malus/Pyrus 25-27 October 2006, Tbilisi, Georgia*

#### **Tuesday 24 October 2006**

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Arrival of participants

#### **Wednesday 25 October 2006**

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8:00            **Transfer from hotel to Institute of Horticulture, Viticulture and Oenology**

8:30 – 8:45    **Registration**

8:45 – 9:50    **Opening session (Conference Hall)**

Introductory welcome

- N. Chkhaartishvili (*Major Consultant of the Institute of Horticulture, Viticulture and Oenology*)
- D. Maghradze, on behalf of T. Dekanosidze (*Director of the Institute of Horticulture and Viticulture*)
- G. Aleksidze (*Plant Genetic Resources National Coordinator of Georgia*)
- D. Kapanadze (*Representative of the ARET project of the World Bank*)
- L. Maggioni (*ECPGR Coordinator*)
- M. Lateur (*Chair of the Working Group on Malus/Pyrus*)
- O. Zkhvatsabaia (*Representative from the Agrarian Committee, Georgian Parliament*)
- M. Dekanoidze (*Deputy Minister, Ministry of Agriculture*)

Self-introduction of the participants

Presentation of the agenda and adjustments

9:50 – 10:40    **ECPGR**

- Briefing on ECPGR Phase VII (*L. Maggioni*)
- Chairperson's report (*M. Lateur*)

Discussion

10:40 – 11:10    *Coffee break – Transfer to Working room*

11:10 – 13:00    **Updates on national activities**

- Albania (*Endrit Kullaj*)
- France (*François Laurens*)
- Georgia (*David Maghradze*)
- Germany (*Viola Hanke*)
- Latvia (*Laila Ikase*)
- Portugal (*Alberto Santos*)
- Slovak Republic (*Daniela Benediková*)
- Switzerland (*Markus Kellerhals*)

13:00 – 14:30 *Lunch*

**14:30 – 18:00 Documentation**

- National Fruit Database in Georgia (*T. Jinjikhadze*)
- Progress of the ECPGR *Malus* Database (*E.-J. Allen*)
- Progress of the ECPGR *Pyrus* Database + progress of the “Synopyrus” software (*M. Lateur*)
- Principles and planning of the harmonization between *Malus*, *Prunus* and *Pyrus* Databases (*M. Lateur*)
- Exchange on standardized methods for inclusion of fruit pictures in the DBs (*introduced by M. Lateur*)

**Discussion**

*Social dinner*

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**Thursday 26 October 2006**

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**8:30 Transfer from hotel to Institute of Horticulture, Viticulture and Oenology**

**9:00 – 10:00 Documentation (cont.)**

- Experience with some IPGRI apple descriptors and suggestions for new ones (*J. Blazek*)
- Proposal of a new classification of apple general shape based on biometrics criteria (*E. Dapena*)
- Progress of EURISCO (*L. Maggioni*)
- Discussion on further improvement of the Databases, additional descriptors related to specific topics like phytosanitary status of accessions (virus, phytoplasma, etc.) and workplan

10:30 – 11:00 *Coffee break*

**11:00- 13:00 AEGIS (A European Genebank Integrated System) + other alternatives for long-term safe conservation of *Malus* and *Pyrus* European GR**

- Introduction and practical strategies planned by the *Prunus* WG (*L. Maggioni and M. Lateur*)
- Towards a German national genebank for fruit (*V. Hanke*)
- Different case studies projects toward the establishment of strategies for durable conservation of *Malus* and *Pyrus* GR (*M. Lateur*)
- Discussion on the *Malus/Pyrus* approach to AEGIS and other alternatives (e.g. regional collaboration between collections, “on-farm” conservation, budwood cryopreservation, etc. (*chaired by L. Maggioni and M. Lateur*))

13:00 – 14:00 *Lunch*

**14:00 – 15:30 Integration of phenotypic and molecular characterization of *Malus/Pyrus* collections** (chaired by *B. Gelvonauskis* and *F. Laurens*)

- Some presentations of experiences that applied molecular markers as a tool for the identification of apple and pear accessions in collections
  1. Experiences in France (*F. Laurens*)
  2. Experiences in the Netherlands : CGN-NGO cooperation project on apple (*R. van Treuren*)

3. Experiences in Belgium: Case study of the utilization of 10 SSRs for the characterization of *Malus* GR collections (*M. Lateur*)

- Briefing on fingerprinting workshop (*B. Gelvonauskis and F. Laurens*)
- Discussion on combining incorporation of phenotypic and molecular data into the databases

16:00 – 16:30 *Coffee break*

16:30 – 17:00 **Update on project proposal BIODIFRUIT (AGRI GEN RES 870/2004)**  
(*M. Lateur*)

17:00 – 17:50 **Wild relatives**

- Study of the *Malus sylvestris* diversity in Belgium (*M. Lateur*)
- Conservation of *Malus sieversii* in Kazakhstan (*F. Laurens*)

17:50 – 18:30 **Technical or scientific contributions**

- Methodology for the evaluation of the resistance of apple genetic resources to rosy apple aphid and woolly aphid in controlled conditions (*E. Dapena*)
- EU INTERREG trans-border project between France and Belgium on the conservation, evaluation and valorization of *Malus* and *Pyrus* genetic resources (*M. Lateur*)

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**Friday 27 October 2006**

9:00 – 10:30 **Sub-group discussions (guidelines for inclusion of pictures, etc.)**

10:30 – 11:00 *Coffee break*

11:00 – 15:00 **Drafting of the report**

*Field excursion for delegates not involved in drafting: excursion to the old town Mtskheta, near Tbilisi*

15:00 – 17:30 *Lunch, fruit and wine-tasting, visit to the IHVO wine cellars*

17:30 – 20:00 **Closing session**

- Presentation of the report and adoption of the updated workplan and recommendations
- Selection of the Working Group Chair and Vice-Chair
- Closing remarks

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**Saturday 28 October 2006**

Departure of participants

## Appendix IV. List of participants

### *Third Meeting of the ECPGR Working Group on Malus/Pyrus 25-27 October 2006, Tbilisi, Georgia*

*N.B. Contact details of participants updated at time of publication. However, the composition of the Working Group is subject to changes. The full list, constantly updated, is available from the Malus/Pyrus Working Group's Web page ([http://www.ecpgr.cgiar.org/workgroups/malus\\_pyrus/malus\\_pyrus.htm](http://www.ecpgr.cgiar.org/workgroups/malus_pyrus/malus_pyrus.htm)).*

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