

Report of a Working Group on Fibre Crops (Flax and Hemp)

First Meeting, 14-16 June 2006, Wageningen, The Netherlands
N. Bas, M. Pavelek, L. Maggioni and E. Lipman





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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 Maccarese, 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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Competitive trials of linseed varieties; hemp inflorescences; hemp seeds. Courtesy of © Z. Jankauskienė, Upytė Experimental Station of the Lithuanian Research Centre for Agriculture and Forest, Lithuania.

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Contents

| | |
|---|-----------|
| SUMMARY OF THE MEETING | 1 |
| Introduction..... | 1 |
| <i>Opening of the meeting</i> | 1 |
| <i>General briefing on ECP/GR and EURISCO</i> | 1 |
| Section I. Flax..... | 3 |
| <i>National collections – status reports</i> | 3 |
| <i>The International Flax Database (IFDB)</i> | 5 |
| <i>Information on GENOTYPDATA – Linum</i> | 6 |
| <i>Arranging safety-duplication and discussion</i> | 6 |
| <i>Information about the IFDB ECP/GR project</i> | 7 |
| Section II. Hemp..... | 8 |
| <i>National collections – status reports</i> | 8 |
| <i>The International Hemp Database (IHDB)</i> | 10 |
| <i>Excursion to Van de Bilt zaden en vlas bv in Sluiskil</i> | 11 |
| Conclusion | 12 |
| <i>Approval of workplans and recommendations</i> | 12 |
| <i>Election of the Working Group Chair and Vice-Chair</i> | 12 |
| <i>Closing remarks</i> | 12 |
| APPENDICES | 13 |
| Appendix I. Workplan of the ECP/GR Working Group on Fibre Crops..... | 15 |
| Appendix II. Survey on the safety-duplication status of flax accessions | 17 |
| Appendix III. Acronyms and abbreviations | 18 |
| Appendix IV. Agenda..... | 19 |
| Appendix V. List of participants..... | 21 |

SUMMARY OF THE MEETING

Introduction

Opening of the meeting

Martin Pavelek, interim Chair of the Working Group on Fibre Crops of the European Cooperative Programme for Crop Genetic Resources Networks (ECP/GR)¹, opened the meeting and expressed his gratitude to the participating Working Group members and also the self-funded participants for coming to Wageningen for this first meeting of the Working Group (WG). He apologized for the absence of the ECP/GR Coordinator, Lorenzo Maggioni, who was unable to attend. He asked for active participation from all those present, in order to achieve constructive conclusions and recommendations. He also pointed out that at the end of the meeting an election was to take place for the appointment of a Chair and a Vice-Chair, and that during the meeting each WG member should form an opinion in order to make a final choice.

Theo van Hintum, Head of the Documentation Section of the Centre for Genetic Resources, The Netherlands (CGN), then welcomed all participants on behalf of CGN, the Dutch organizing institute.

The participants briefly introduced themselves. The draft agenda was adopted with some modifications.

General briefing on ECP/GR and EURISCO

(Noortje Bas, on behalf of Lorenzo Maggioni)

(Presentation available online at http://www.ecpgr.cgiar.org/Workgroups/Flax_Hemp/Flax_Hemp.htm)

The ECP/GR entered its VIIth Phase (2004-2008) with some modifications made to the structure and mode of operation by the Steering Committee at its last meeting in Izmir, Turkey, in October 2003. The former Industrial Crops Network changed its name to the "Sugar, Starch and Fibre Crops Networks", which includes three Working Groups (*Beta*, Potato and the newly accepted Working Group on Fibre Crops (Flax and Hemp)). The nominations of the Working Group members for this Group were made by the National Coordinators in the subsequent period and the list of designated representatives is available at http://www2.bioversityinternational.org/networks/ecpgr/contacts/ecpgr_wgfc.asp.

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 and information. 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, carried out during 2004, the Working Group on Fibre Crops (Flax and Hemp) was included among the priority Working Groups for Phase VII, together with *Beta*. The following use of funds relevant for Fibre Crops (Flax and Hemp) was eventually approved:

- June 2005: Network database managers meeting (3600 €);

¹ Following the decision of the Tenth Meeting of the ECPGR Steering Committee in September 2006, the name of the Programme was simplified to "European Cooperative Programme for Plant Genetic Resources" and the acronym was also modified to "ECPGR", removing the traditional slash of "ECP/GR". The old acronym is used throughout this report, since the meeting was held before the change became effective.

- March 2006: Meeting of all Networks' Coordinating Groups (NCGs) (on a different budget line);
- June 2006: First Meeting of the Working Group on Fibre Crops (Flax and Hemp) (16 500 €);
- Publication of meeting report (4000 €).

For further information on ECP/GR, the ECP/GR Web site can be consulted, where several reference documents are available, including the Networks' budget and the Terms of Reference for the ECP/GR operational bodies. A specific Web page is also dedicated to the Working Group on Fibre Crops (Flax and Hemp); this page can be improved with the help of WG members, according to the needs of the WG (http://www.ecpgr.cgiar.org/Workgroups/Flax_Hemp/Flax_Hemp.htm).

The above-mentioned meeting of the NCGs in Bonn, March 2006, was concluded with the following relevant decisions:

- Updating of the Central Crop Databases (CCDBs), in particular characterization and evaluation data, as a major need;
- AGRITEC agreed to provide considerable input in kind to the proposed Flax Database project;
- Suggestion to invite the Flax and *Beta* CCDB managers to attend the Potato meeting in late 2006.

Relevant Network suggestions for Phase VIII of ECP/GR (2009-2013) were made as follows:

- Give equal priority to all WGs and share the budget according to needs;
- Older WGs with detailed workplans would prefer to spend a significant part of the budget for actions rather than for just another meeting;
- The Flax and Hemp meeting should take place combined with the NCG meeting (18 000 €);
- One small Fibre Crops ad hoc meeting should take place on relevant issues (2000 €).

The recent developments of the EURISCO catalogue (<http://eurisco.ecpgr.org>), including the incorporation of 976 000 accessions' passport data from 33 European countries, and the overall mechanism of data flow in Europe were described. This online catalogue of passport data on *ex situ* collections maintained in Europe meets the Convention on Biological Diversity (CBD) 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 (now Bioversity International) on behalf of ECP/GR, is increasingly offering the possibility to the managers of the CCDBs to directly download all the relevant crops' passport data in one single operation, rather than having to request data from several curators. To be able to benefit from this opportunity, it is essential that the CCDBs harmonize the codes and states of their passport descriptors with those used by EURISCO, (which are largely based on the FAO/IPGRI *Multi-crop Passport Descriptors - MCPDs*). This does not mean that each CCDB cannot make the specific choice of adopting only some of the EURISCO descriptors and/or adding more descriptors of interest. 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 Fibre Crops national data be channelled to EURISCO, would be to contact their respective National Focal Points and collaborate on data gathering from all

available collections within their country. The full list of National Inventory Focal Points is available from http://www2.bioversityinternational.org/networks/ecpgr/Contacts/ecpgr_epgris_NP.asp.

The recommendation made by the Documentation and Information Network that the CCDBs should harmonize their structure with EURISCO was also reported. Although for the moment it is recommended that the specific CCDBs should continue to be developed in the traditional way (i.e. by gathering all the available data from any available sources), in the medium term it should become possible to download all the necessary passport data from EURISCO and to focus the attention of the CCDBs on characterization and evaluation data and on the analysis of the database in order to offer other services to the users of the specific crop genetic resources. Currently, the EURISCO catalogue contains 17 176 flax accessions data from 22 countries and 1305 hemp accessions data from 14 countries.

In the following discussion, Giuseppe Mandolino asked if it would not be advisable that the CCDBs be developed and maintained by the Documentation and Information Network. Th. van Hintum replied that this Network develops tools for the databases and offers help to the CCDB managers. Apart from this, CCDBs are crop-specific, requiring crop experts as managers.

Section I. Flax

National collections – status reports

Members from the countries who were not represented at the ad hoc meeting (December 2001, Prague) described the status of their national flax collections.

(* Corresponding papers and/or presentations provided by the authors are available online at http://www.ecpgr.cgiar.org/Workgroups/Flax_Hemp/Flax_Hemp.htm).

Italy*

G. Mandolino told the Group that the Italian flax collection is maintained by the Consiglio per la Ricerca e la Sperimentazione in Agricoltura – Istituto Sperimentale per le Colture Industriali (CRA-ISCI).² Recently there have been some changes at CRA-ISCI and at present Material Transfer Agreements (MTAs) are needed for seed exchange. Free exchange of information is possible. From 1998 to 2001, the Italian Ministry of Agriculture funded a wide-spectrum, systematic survey of Italian germplasm stored in the Agricultural Research and Experimental Institutes (IRSA), which are now part of CRA. The results have been published.

The Italian flax collection comprises 380 accessions, mainly originating from European countries. A database (MS Access) for both passport and descriptive data of the collection, compiled according to the International Flax Database (IFDB) structure, is available for internal use. Seeds are stored in jars at room temperature and each accession is regenerated every six years. The Italian *Linum* acreage comprises 3500 ha of oilseed and 3000 ha of fibre flax.

G. Mandolino asked for information on how to make the passport data available to EURISCO. It was answered that the data flow goes via the National Inventory Focal Points.

² Now the CRA-Centro di ricerca per le Colture Industriali (CRA-CIN, Bologna Italy).

Latvia*

Dace Grauda explained that between 1970 and 1990 no flax breeding took place in Latvia and that as a consequence no flax genetic resources were present in 1992 when flax breeding started again. Part of the present Latvian flax collection has been built by repatriation of Latvian material from Russian and German institutes. Latvian flax genetic resources are maintained by two institutes: the Latvian Gene Bank of Cultivated Plants and the Latgale Agricultural Science Centre. The former maintains 26 accessions of Latvian origin in both base and active collections. The present acreage in Latvia of oilseed and fibre flax comprises 2000 ha.

Lithuania*

Zofija Jankauskienė explained that the collection and storage of flax genetic resources in Lithuania was started in 1994. The collection of *Linum usitatissimum* L. in Lithuania consists of 922 accessions in the active collection. Of these, 51 accessions are stored under long-term storage conditions at the Field Crops Coordinating Centre of the Lithuanian Institute of Agriculture³ in Akademija, Kėdainiai district. The active flax and linseed collection is stored and investigated at the Upytė Research Station of the Lithuanian Institute of Agriculture. All the varieties investigated and the local accessions were compared to the standard varieties registered in Lithuania at the time of the investigations, such as 'Belinka', 'Baltučiai' (1995-1997), 'Ariane' (1998-2000 and 2001-2002) and 'Hermes' (2003-2004).

The Plant Gene Bank manages the central database of national plant genetic resources.

Discussion

The flax and linseed acreage in Lithuania were reported to be 1200 ha for fibre flax and 900 ha for linseed in 2006.

Portugal*

Manuel Tavares de Sousa reported that the flax collection maintained by the Banco Português de Germoplasma Vegetal/Direcção Regional de Agricultura de Entre Douro e Minho (BPGV/DREM) consists of 147 accessions. The Gene Bank of the Estação Agronómica Nacional (EAN) maintains 8 accessions. All accessions originate from Portugal. He explained that in Portugal flax growing is not important. Linseed is regarded as a promising crop, and the total acreage in Portugal is at present 200-300 ha.

Romania

Vasile Ilea described a study on the performance of 16 cultivars, run by the Agricultural Research Station Livada on seven different experimental fields, representing different climatic zones. Different characters have been observed and the best cultivars for each growing area have been established.

Slovakia*

Janka Nôžková told the Group that the Slovakian genetic resources of flax are stored at the Slovak Republic Gene Bank, which is part of the Research Institute of Plant Production (RIPP) in Piešťany. It consists of 170 accessions, of which 145 accessions are in both base and active collections and are safety-duplicated at the Research Institute of Crop Production (RICP)⁴, Prague-Ruzyne. The passport data of 136 accessions are computerized and ready to be submitted for inclusion into the IFDB.

³ Now the Lithuanian Research Centre for Agriculture and Forest

⁴ Now the Crop Research Institute (CRI)

Discussion

M. Pavelek asked about the acreage of flax in Slovakia. J. Nôžková answered that in 2005 the harvested area of linseed was 2850 ha and that this is decreasing. The acreage of fibre flax was around 500 ha in 2002.

The International Flax Database (IFDB)

(Full paper available online at http://www.ecpgr.cgiar.org/Workgroups/Flax_Hemp/Flax_Hemp.htm)

Overview of current status

M. Pavelek gave a detailed overview of the current status of the IFDB, managed and coordinated by the AGRITEC Company since 1994. It currently includes passport data of 8385 accessions, representing 11 collections from 10 countries, in an Access structure. From an analysis of the data delivered it can be concluded that approximately 37% of the accessions are unique. It also revealed large differences among the collections in the percentage of descriptors filled in.

The total European genepool is estimated at 27 437 accessions, maintained at 16 genebanks. The majority of these accessions are maintained in the Russian Federation, Romania, Germany, the Czech Republic and France. In EURISCO 17 175 *Linum* spp. accessions are recorded from 31 institutes from 21 countries. Approximately 20 000 accession data need to be submitted to the IFDB in order to cover the whole of the flax genepool in Europe.

Discussion on further development

- **Inclusion of further passport data according to the MCPDs**

From the overview of the current status of the IFDB, the issue was raised that the field "Accession number" was filled in for only 40% of the IFDB accessions. The FAO/IPGRI *Multi-crop Passport Descriptors* (MCPDs), which have been used for the IFDB since this database was included into the ECP/GR Sugar, Starch and Fibre Crop Network structure in 1999, were not always clear to the participants. The Working Group agreed that the MCPDs, as used in EURISCO, will be used for inclusion of passport data into the IFDB.

It was decided that the IFDB manager, M. Pavelek, in cooperation with Frank Menting (CGN, Wageningen), will produce a format in Excel, according to the FAO/IPGRI MCPDs, complemented with passport descriptors relevant for flax (ploidy, type of use, character of material, ancestral data, growth habit, plant life cycle, availability of material) which will be distributed to the collection holders in October 2006. All participants agreed to send the requested information for their accessions, as so far available to them, to M. Pavelek within the deadlines specified in the agreed workplan (see Appendix I, pp. 15-16). It was observed that information for each of the requested MCPD fields is not available for many collections, but it is not necessary to fill in all the fields, before sending the requested information.

The Working Group also expressed their gratitude to M. Pavelek and AGRITEC Šumperk, for their hard work in hosting the IFDB.

- **Inclusion of characterization data**

In the ad hoc meeting (December 2001, Prague) it was decided that data for six characters would be sent to the IFDB by the end of 2003. Some data sets were provided by several genebanks, for example from Bulgaria, Hungary, Romania and Ukraine.

The proposal by the database manager to add one more descriptor, "Stem length" to the six descriptors already defined, was agreed by the participants. The definition below integrates the comments received from IPGRI after this meeting.

| Stem length | Standard variety |
|--------------------|-------------------------|
| 1. Very short | |
| 3. Short | Amazon (linseed) |
| 5. Intermediate | |
| 7. Long | Ariane (fibre flax) |
| 9. Very long | |

A discussion on subjectivity and the influence of the environment on the scoring of the different descriptors was concluded in a pragmatic way. From the information on the holding institute, it should be clear that data are scored under the environmental conditions of this institute.

A different system of scoring of stem length for oil- and fibre-flax was discussed. J. Nôžková informed the meeting about the method used in her institute.⁵

It was concluded that, as this is a database for *Linum usitatissimum* with both uses, the same scoring should be used for both.

Workplan

The database manager will distribute a format, to allow the filling in of the seven flax characterization descriptors, to all participants in October 2006. Participants agreed to provide the requested information according to the workplan (see Appendix I, pp. 15-16).

The use of standard varieties was not discussed and these will be suggested by the database manager.

- **Adapting the ESCORENA characterization and evaluation descriptors**

This issue was not discussed.

Information on GENOTYP DATA – Linum

(Presentation available online at http://www.ecpgr.cgiar.org/Workgroups/Flax_Hemp/Flax_Hemp.htm)

J. Nôžková gave a presentation on GENOTYP DATA – *Linum*, an information system developed by the Slovak University of Agriculture in Nitra, using a program language of Visual Basic 6.0. In this system, specialized databases and descriptor sets are incorporated, enabling evaluation and characterization of traits on both qualitative and quantitative levels. It is adaptable to different plant species. This system is not (yet) available for other users.

Discussion

The Group regarded the information given by J. Nôžková as very interesting.

Arranging safety-duplication and discussion

Noortje Bas gave a short presentation on genebank standards to ensure the safety and security of the germplasm in collections and mentioned the existing bibliographic references.⁶

⁵ Published in: Nozkova J, Brindza J, Stehlikova B, Pavelek M. 2006. Importance of collected flax germplasm (*Linum usitatissimum* L.) characterization. *Journal of Natural Fibers* 3(1):1-16.

⁶ FAO/IPGRI. 1994. *Genebank Standards*. Food and Agriculture Organization of the United Nations, Rome, International Plant Genetic Resources Institute, Rome.
Engels JMM, Visser L, editors. 2003. *A guide to effective management of germplasm collections*. Handbooks for Genebanks No. 6. International Plant Genetic Resources Institute, Rome, Italy.

Discussion

The Group acknowledged the importance of safety-duplication in case of catastrophes. It was noted that many collection holders will not be able to safety-duplicate their flax collections due to low seed quantity. Nevertheless, it was decided that a start should be made in arranging safety-duplication.

Workplan

- N. Bas will distribute a format for an overview of present and future needs for safety-duplication and a Memorandum of Understanding (MOU) to the participants in June 2006. The overview form will be completed in August 2006 by the collection holders of the countries of the participating WG members. A compilation will be distributed in October 2006 and included in this report (Appendix II, p. 17).

Other matters raised by the participants

Z. Jankauskienė addressed the problem of how to transcribe the names of Russian accessions received in Cyrillic. This problem has been acknowledged by all participants, and in European collections Russian, Chinese, Japanese etc. names have often been transcribed differently. Adopting a uniform method to transliterate all information into the Latin alphabet was recommended (see Workplan, Appendix I, pp. 15-16).

After the meeting, Helmut Knüpfper (Leibniz Institute of Plant Genetics and Crop Plant Research (IPK), Germany) was consulted on this issue and the following information was received:

There is no generally agreed transcription system. However in 1988, the former COMECON group on PGR Documentation had suggested using the British Library Transliteration System (Rogalewicz *et al.*⁷). This system is available via Internet (<http://www.bl.uk/collections/easteuropean/translit.html#lctranslit>).

This recommendation can still be considered valid, since there is no generally agreed system.

H. Knüpfper also recommended keeping the original labels in Cyrillic script for future reference.

Information about the IFDB ECP/GR project

M. Pavelek presented an outline of the project proposal: "Development of a reference implementation for access to and management of a Central Crop Database (*Linum* spp.) based on open source Internet technology".

Partners in this project are

1. AGRITEC, Research, Breeding and Services Ltd. Šumperk (Czech Republic);
2. Institute of Biodiversity Conservation and Biosafety (IBCB), Slovak Agricultural University, Nitra, Slovakia; and
3. Federal Centre of Breeding Research on Cultivated Plants (BAZ), Quedlinburg, Germany.⁸

⁷ Rogalewicz V, editor, Knüpfper H, Korneychuk VA, Lozanov IG, Plotnikov DB, Serwinski J, Shvytov IA. 1988. Paspportnye deskriptory mezhdunarodnoj bazy dannykh geneticheskikh resursov stran-chlenov SEV [Passport descriptors of the COMECON International Database of Genetic Resources]. Výzkumný ústav rostlinné výroby, Praha-Ruzyne. 26pp. (in Russian and English).

⁸ The former BAZ Genebank staff in Braunschweig moved to Quedlinburg in December 2006. Now the former BAZ is part of the Julius-Kuehn Institute (JKI).

The major aim of the suggested project is to implement a data model, making use of Open Source Internet technology, for the management of passport data and characterization and evaluation (C&E) data, to be applied to the European Flax Database. In the project the current IFDB will be redesigned and an online version developed. Passport and C&E data already received and newly obtained will be added to the new IFDB. The project period is 13 months and the financial support requested from ECP/GR is € 38 800.⁹

Section II. Hemp

National collections – status reports

Representatives from each country described the status of their national hemp collections.

(* Corresponding papers and/or presentations provided by the authors are available online at http://www.ecpgr.cgiar.org/Workgroups/Flax_Hemp/Flax_Hemp.htm).

Czech Republic*

Martin Pavelek told the Group that the hemp collection at AGRITEC Ltd. is very recent. It comprises 13 accessions, of which 11 are modern varieties with low THC (tetrahydrocannabinol). There are no breeding activities in the Czech Republic and only the basic passport data and some characterization descriptors are included in the national information system EVIGEZ. Seed of the hemp collection is stored at AGRITEC in paper bags at 15°C. Part of the collection is stored at RICP-Prague at -15°C. The seed quantity is documented in the information system and material is available for users free of charge.

Germany*

Frank Höppner explained the organization of the German Genebank at the Leibniz Institute of Plant Genetics and Crop Plant Research (IPK) in Gatersleben. Since 2001, the whole collection of the former BAZ Genebank in Braunschweig was transferred to the IPK Genebank, and the IPK is the major collection holder in Germany. The hemp collection consists of 38 accessions, all of which are kept in long-term storage (-15°C) and are available for distribution. Multiplication takes place in the greenhouse. The current acreage of hemp in Germany is 38 ha and 10 varieties are being used.

Hungary*

Attila Simon explained that after several reorganizations, the Research Centre for Agrobotany (RCA) is now a department of the National Institute for Agricultural Quality Control (NIAQC).¹⁰ The RCA is in charge of the Hungarian national genebank activities. The Hungarian National Cannabis Collection comprises 114 accessions, 77 of which are landraces collected in Hungary. The passport data are computerized in a structure very similar to the MCPD structure, and the passport data can easily be entered into the Hemp Database. The collection has neither been characterized nor evaluated.

The collection is available for distribution and it is maintained in medium-term storage conditions. It is partly stored as base collection in long-term conditions and it is partly safety-

⁹ In September 2006, the proposal was not endorsed by the ECP/GR Steering Committee, which was not prepared to accept that too large a proportion of the budget could be allocated to one single action.

¹⁰ As of January 2007, the Institute has been replaced as legal successor and continuer of all its activities by the Central Agricultural Office, Budapest.

duplicated. During regeneration, an isolation distance of 500 m is used. In viability testing the dormancy is broken by keeping seeds at 5°C for two days.

Germany*

Information on the German flax collections and research activities is included in the paper submitted by Frank Höppner and Helmut Knüpffer.

Italy*

Giuseppe Mandolino told the Group that the Italian hemp collection, stored and maintained at ISCI, comprises 98 accessions. The material is mainly of Italian origin and includes breeding lines and crosses for research. Characterization of accessions has been focused on sex phenotype and chemotype, but other descriptors have also been used. The variation in this collection has been established by molecular markers, resulting in designating approximately 50% of the variation to be within and 50% to be between accessions. CRA-ISCI research on hemp includes the development of DNA markers for the marker-assisted selection for sex and chemotype and for fingerprinting studies. At present CRA-ISCI is officially in charge of the official analysis to determine the cannabinoid content of hemp stands.

Latvia

Dace Grauda explained that hemp is a very minor crop in Latvia and is only used for seed in food. In Latvia only 1 accession of hemp is present in the collection.

Lithuania

Zofija Jankauskienė explained that there are no hemp genetic resources maintained in Lithuania and that there are no hemp breeding activities. In 2006 a few varieties from Poland were used in trials, but at present there is no hemp growing.

The Netherlands*

Noortje Bas reported that the Dutch hemp collection is maintained by Plant Research International, B.V., Wageningen. The collection has been established since 1988 and at present comprises 200 accessions. Passport data of 160 accessions have been entered in an application of Oracle. The data are available on request and will be submitted to the International Hemp Database. A large part of the collection has been evaluated for 20 descriptors. Seeds are stored at -20°C and a survey on the viability of the PRI Hemp collection was carried out from 1995 to 2005. This survey did not find a decrease in viability during this period. The collection is available for users, with a charge of € 450 per accession.

Poland*

Przemysław Baraniecki told the Group that the Institute of Natural Fibres (INF)¹¹ has been maintaining the Polish *Cannabis* collection since 1998. The collection currently consists of 131 accessions originating from 16 countries. Passport data of the accessions are not yet in a database, but can be requested from the curator, Grażyna Mańkowska. Of the hemp collection, 50% of the accessions are stored in long-medium-term storage. Every year, approximately 22 accessions are regenerated under isolators. Fifty-nine accessions have been evaluated for 23 physiological, biochemical, morphological and agricultural traits. In Poland hemp is grown for fibre (1000 ha) and for seeds (300 ha). Permission of the local authorities has to be given for hemp growing. There is no processing technology in Poland.

¹¹ Now the Institute of Natural Fibres and Medicinal Plants (INF&MP)

Portugal

Manuel Tavares de Sousa explained that there are no hemp genetic resources in Portugal. Hemp is not grown and there are no plans for hemp growing in the future.

Romania

Vasile Ilea told the Group that hemp genetic resources are held in two Agricultural Research Stations (ARS): 43 cultivars in ARS-Lovrin and 33 lines in ARS-Secuieni. During regeneration, an isolation distance of 7 km is observed. Before 1989 the acreage of hemp growing in Romania was 6000 ha. The present acreage is 3000 ha for textile and 200 ha for seed production.

The International Hemp Database (IHDB)

Overview of current status

Andrea Carboni discussed the establishment of a Hemp germplasm database in the frame of ECP/GR activities. The database is meant to serve the needs of breeders, genebank managers, policy-makers and other users. A few static Web pages were prepared in advance of this meeting, including some general information on hemp. It was pointed out that *Cannabis* germplasm includes every seed (or propagated clone) that is part of this genus and which can add to the genetic diversity genepool, regardless whether it is from wild or domesticated plants and grown either for fibre, paper, oil or pharmaceutical use.

An outline of the *Cannabis* germplasm data included in the EURISCO catalogue was presented, showing that the larger collections are from the Russian Federation, Ukraine, Romania and Hungary.

A. Carboni proposed to develop the ECP/GR Hemp database by including characterization data for 3 main descriptors (Chemotype, Sex and Use) and also defining some chemical and molecular protocols in order to standardize analysis and results. The preparation of a more detailed list of descriptors for *Cannabis* was also raised for discussion, but this will require identifying a funding source. The adoption of MYSQL software to manage the data would also be ideal, should the necessary funds be available.

Discussion

The Group thanked A. Carboni for hosting the IHDB and explaining his philosophy on the development of the IHDB database and Web site. The members agreed on the inclusion of additional information on the Web site as this would be very useful for both hemp curators and other users. It was suggested that further information to be included would be the following:

- EU legislation on hemp growing;
- Protocols for THC testing;
- Protocols for characterization and molecular markers;
- Varieties grown in different countries;
- Results of research;
- Links to other Web sites.

Discussion on further development

• Inclusion of passport data according to the MCPDs

The Group discussed all EURISCO descriptors and selected most of the descriptors needed for the IHDB structure. It was acknowledged that for many accessions not all the information needed to complete the MCPDs will yet be available, but it was concluded that by using as

many descriptors as possible, all the information available on the collections can be included in the IHDB. A. Carboni offered to make the IHDB structure available via the Hemp Web site.

G. Mandolino suggested including three additional descriptors: plant use, plant sex and plant chemotype. The Group agreed on this and suggested scoring scales. The definitions below integrate the comments received from IPGRI following to the meeting.

Workplan

A. Carboni will make the format for data inclusion into the IHDB available via the IHDB Web site in July 2006. The passport descriptors are according to the EURISCO MCPDs. Participants will send the data of their national hemp collections to the IHDB; deadlines for each country are stated in the workplan (see Appendix I, pp. 15-16). Apart from the EURISCO MCPDs, the following descriptors will also be sent at the same time:

- **Plant use**
 1. Fibre
 2. Seed/oil
 3. Drug/pharmaceutical
 99. Other (please specify)
- **Plant sex**
 1. Monoecious
 2. Dioecious
- **Plant chemotype**
(THC/CBD = tetrahydrocannabinol/cannabidiol)
 1. No drug/chemotype III (THC/CBD < 0.5)
 2. Intermediate/chemotype II (THC/CBD 0.5–1)
 3. Drug/chemotype I (THC/CBD > 1)
 99. Other (please specify)

Recommendations

- To send as much information as possible (passport, plant use, plant sex and plant chemotype data) to the IHDB manager for inclusion on the IHDB Web site.
- To link the IFDB with a Web site with information on flax, similarly to the recommended IHDB Web site.
- That the IHDB manager should use the same software as the IFDB manager and that the two managers keep in contact on the development of the databases.

- **Inclusion of characterization and evaluation data**

The Group decided that at this stage no plans can be made for inclusion of further evaluation and/or characterization descriptors.

Excursion to Van de Bilt zaden en vlas bv in Sluiskil

The Group was invited by Van de Bilt zaden en vlas for an excursion. They were welcomed by Eugenie van de Bilt who gave information on the company. After visiting the flax trials, which were in full bloom rather late this year, Marc van de Bilt reminisced with all participants about the good old times in flax breeding and on growing in the different countries. He also shared his outlook on the future, which in his opinion is promising for flax growers in Europe.

Thereafter on behalf of this Group, M. Pavelek thanked Eugenie and Marc van de Bilt for their hospitality and the pleasant visit to their workplace.

Conclusion

Approval of workplans and recommendations

The workplans and recommendations for both flax and hemp were presented to the participants and were approved with minor modifications.

The procedure of the selection of WG members was questioned and it was answered that the National Coordinators appointed the WG members and in any case when it was desired that another person should be appointed, the National Coordinator should be contacted about this.

Election of the Working Group Chair and Vice-Chair

Unanimously, M. Pavelek was chosen to be Chair of the Working Group. Non-funded participants could not take part in the election, but they all supported the election of M. Pavelek. M. Pavelek proposed G. Mandolino as Vice-Chair, and all participants agreed with this.

Closing remarks

M. Pavelek thanked all the participants for their contributions to the meeting and their active participation. Although the support of the ECP/GR Secretariat was missed, it was agreed by all participants that the meeting was successful and very well organized and arranged by the Dutch organizers. Many thanks were due to N. Bas especially for her willingness, activity, never-ending helpfulness, practical help and work for this meeting.

Generally, it was confirmed that the meeting fulfilled its main aim and that the activities of the Working Group on Fibre Crops have now started.

APPENDICES

| | |
|--|-----------|
| Appendix I. Workplan of the ECP/GR Working Group on Fibre Crops | 15 |
| Appendix II. Survey on the safety-duplication status of flax accessions | 17 |
| Appendix III. Acronyms and abbreviations | 18 |
| Appendix IV. Agenda | 19 |
| Appendix V. List of participants | 21 |

Appendix I. Workplan of the ECP/GR Working Group on Fibre Crops

Discussed at the First Meeting of the WG, June 2006, The Netherlands

Flax

| Action | How? | To be carried out by | Date by when action should be completed | Remarks |
|--|--|--|--|---|
| Prepare new format for sending in passport data and 7 characterization data in Excel | Using a set of MCPD of EURISCO and agreed characterization descriptors according to 1999 descriptor list: nos. 4, 5, 6, 8, 10, 16, 17 | M. Pavelek in cooperation with F. Menting (CGN) | October 2006 | |
| Send the new structure to all flax collection holders, including those who have previously provided data | By email | M. Pavelek | October 2006 | |
| Send in the passport data and characterization data according to the new structure | By email to M. Pavelek | All collection holders | <ul style="list-style-type: none"> - End 2006: NLD, DEU, HUN CSK, ROM, ITA; - End 2007: POL, SVK, LVA (LVA not of all accessions); - Mid-2008: PRT - 2013: LTU | H. Knüpffer: data for Germany will be provided upon direct request of the DB manager to knupffer@ipk-gatersleben.de |
| How to deal with transliteration of Russian names? | Ask colleagues, IPGRI etc. | N. Bas; WG members and self-funded participants will be informed | End 2006 | H. Knüpffer commented on this topic to N. Bas (text included p. 7) |
| Send overview safety-duplication table to all members | Via email | N. Bas | End June 2006 | |
| Send information in table | Via email | All participants | August 2006 | |
| Compile information on safety-duplication and distribute the table | Via email | N. Bas | September 2006 | |

Hemp

| Action | How? | To be carried out by | Date by when action should be completed | Remarks |
|--|--|--|--|---|
| Prepare format for sending passport data, and scores of 3 descriptors, making this available on the Hemp Database Web site and informing hemp collection holders | Via Web site and email | A. Carboni | End June 2006 | |
| Send in passport data and characterization data according to format | Via email to A. Carboni | All participants with hemp collections | <ul style="list-style-type: none"> - Sept 2006: HUN - End 2006: NLD, DEU - Febr 2007: POL - July 2007: ROM | H. Knüpffer: Data for Germany will be provided upon direct request of the DB manager to knupffer@ipk-gatersleben.de |
| Send format for passport data inclusion to other hemp collection holders in each country, asking them to send passport data to A. Carboni | Via email, referring to Web site | All participants | End 2007 | |
| Hemp Database Web site: add information on history of breeding in the different countries, protocols for THC testing, official EU regulations, information on molecular characterization and typing chemo-phenotypes, links to other Web sites, etc. | Collect information and send to A. Carboni | All | Continuously | |

Appendix II. Survey on the safety-duplication status of flax accessions

(status October 2006)

| Institute / Country | No. of accessions | | Long-term storage conditions | | Package material | Institute keeping safety duplicates | Offering to host | Remarks |
|---------------------|-------------------|-----------------------|------------------------------|--------------------|---|--|--------------------------|---|
| | Safety-duplicated | Not safety-duplicated | Temperature | RH | | | | |
| CGN / NLD | 0 | 939 | -20°C | Not controlled | Sealed aluminium foil bags | | YES | |
| RCA / HUN | 0 | 418 | -18 to -20°C | Not controlled | Airtight glass jar | | NO | Lack of long-term commitment |
| ISCI / ITA | 0 | 380 | Room temperature | Not controlled | Sealed plastic bags | | NO | |
| AGRITEC / CZE | 2046 | ca. 50 | Room temperature | Not controlled | Paper bags in plastic boxes | RICP, Prague-Ruzyne, Genebank | NO (no capacity) | Storage in controlled conditions at RICP |
| IPK / DEU | 234 | 2143 | -20°C | 60% in the chamber | Sealed aluminium foil bags (vacuum) | External branch of IPK, Malchow is keeping our duplicates. We have duplicates in Gatersleben from CGN which may contain flax (black box) | YES, to a certain extent | |
| INF / POL | 0 | 705 | +4°C | Not controlled | Sealed aluminium foil bags (temp. +2°C) | | NO | INF is part of the national Gene Bank and is in charge of collecting flax and hemp. After evaluation, INF sends the accessions to IHAR, where they are stored in twist-type glass jars, hermetically closed, under vacuum conditions INF also stores accessions for breeding and research purposes |

Appendix III. Acronyms and abbreviations

| | |
|---------|--|
| BAZ | Bundesanstalt für Züchtungsforschung an Kulturpflanzen (Federal Centre for Breeding Research on Cultivated Plants), Quedlinburg, Germany (<i>now Julius Kuehn Institute (JKI) – Federal Research Centre for Cultivated Plants</i>) |
| BPGV | Banco Português de Germoplasma Vegetal (Portuguese Plant Genebank) |
| C&E | Characterization and evaluation |
| CBD | Convention on Biological Diversity |
| CBD | Cannabidiol |
| CCDB | Central Crop Databases |
| CGN | Centre for Genetic Resources, Wageningen, The Netherlands |
| CRA | Consiglio per la Ricerca e la Sperimentazione in Agricoltura, Italy |
| DREM | Direcção Regional de Agricultura de Entre Douro e Minho, Portugal |
| EAN | Estação Agronómica Nacional, Portugal |
| ECP/GR | European Cooperative Programme for Crop Genetic Resources Networks (<i>now European Cooperative Programme for Plant Genetic Resources, ECPGR</i>) |
| EURISCO | European Internet Search Catalogue |
| IBCB | Institute of Biodiversity Conservation and Biosafety, Slovak Agricultural University, Nitra, Slovakia |
| IFDB | International Flax Database |
| IHAR | Instytut Hodowli i Aklimatyzacji Roślin (Plant Breeding and Acclimatization Institute), Poland |
| IHDB | International Hemp Database |
| INF | Institute of Natural Fibres, Poznań, Poland (<i>now the Institute of Natural Fibres and Medicinal Plants, INF&MP</i>) |
| IPGRI | International Plant Genetic Resources Institute, Rome, Italy (<i>now Bioversity International</i>) |
| IPK | Leibniz-Institut für Pflanzengenetik und Kulturpflanzenforschung (Leibniz Institute of Plant Genetics and Crop Plant Research), Germany |
| IRSA | Istituto di Ricerca e Sperimentazione Agraria (Agricultural Research and Experimental Institute), Italy |
| ISCI | Istituto Sperimentale per le Colture Industriali, Bologna, Italy (<i>now Centro di ricerca per le Colture Industriali, Bologna Italy</i>) |
| MCPDs | Multi-crop passport descriptors (FAO/IPGRI) |
| MOU | Memorandum of Understanding |
| MTA | Material Transfer Agreement |
| NCG | Network Coordinating Group |
| NIAQC | National Institute for Agricultural Quality Control, Hungary |
| RCA | Research Centre for Agrobotany, Tápiószele, Hungary |
| RICP | Research Institute of Crop Production, Prague, Czech Republic (<i>now Crop Research Institute, CRI</i>) |
| RIPP | Research Institute of Plant Production, Piešťany, Slovakia |
| THC | Tetrahydrocannabinol |

Appendix IV. Agenda

**First Meeting of the ECP/GR Working Group on Fibre Crops
(Flax and Hemp)
14-16 June 2006, Wageningen, The Netherlands**

Tuesday 13 June 2006

Arrivals, accommodation

Wednesday 14 June 2006

Venue of the meeting: hotel

- | | |
|----------------------|--|
| 9:00 – 10.30 | Introduction |
| 9:00 – 9:15 | Opening of the meeting, welcome (<i>Noortje Bas and Martin Pavelek</i>) |
| 9:15 – 9:20 | Brief self-introduction by the participants |
| 9:20 – 9:50 | General briefing on ECP/GR and EURISCO (<i>Noortje Bas</i>) |
| 9:50 – 10:30 | Flax national collections status reports (of those not present at 2001 meeting): Italy, Latvia, Portugal, etc. |
| 10:30 - 11:00 | <i>Coffee break</i> |
| 11:00 – 11:30 | The International Flax Database (IFDB) - Overview of current status (<i>Martin Pavelek</i>) |
| 11:30 – 12:30 | The International Flax Database (IFDB) - Discussion on further development (inclusion of further passport data according to the MCPDs) |
| 12:30 – 14.00 | <i>Lunch in hotel</i> |
| 14:00 – 15:00 | Further discussions on IFDB |
| 14:00 – 14:30 | - Inclusion of characterization data |
| 14:30 – 15:00 | - Adapting the ESCORENA characterization and evaluation descriptors |
| 15:00 – 15:30 | <i>Coffee break</i> |
| 15:30 - 17:30 | Arranging safety-duplication and discussion (<i>Noortje Bas</i>) |

Thursday 15 June 2006

Venue of the meeting: CGN/PRI

- | | |
|---------------|---|
| 8:30 | Transport to Plant Research International, Bornsesteeg 65, Wageningen |
| 9:00 - 10:00 | Information about the IFDB ECP/GR project (<i>Martin Pavelek</i>) |
| 10:00 - 10:30 | Hemp national collection status reports: Czech Republic, Germany, Hungary |

- 10:30 - 11:00 *Coffee break*
- 11:00 - 12:40 **Hemp national collection status reports (continued):**
Italy, Latvia, The Netherlands, Poland, Portugal, Romania
- 12:40 – 14:00 *Lunch in canteen of the Institute*
- 14:00 - 15:30 **The International Hemp Data Base (IHDB) - Overview of current status**
(A. Carboni, Italy)
- 15:30 - 16:00 *Coffee break*
- 16:00 -17:00 **Further development of the IHDB – discussion on passport and
characterization/evaluation descriptors**
- Social dinner in Panorama Restaurant De Blaauwe Kamer*

Friday 16 June 2006 – Third day of the meeting

- 8:30 – 16:00 *Excursion to v.d. Bilt Zaden en Vlas in Sluiskil*
- 16:00 – 17:00 Reconvening the meeting at CGN
Approval of Workplan and recommendations
- 17:00 – 17:30 **Election of the Working Group Chair and Vice-Chair**
- 17:30 – 18:00 **Closing remarks**

Saturday 17 June 2006

Departure of participants

Appendix V. List of participants

First Meeting of the ECP/GR Working Group on Fibre Crops (Flax and Hemp) 14–16 June 2006, Wageningen, The Netherlands

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 on the Working Group's Web page (http://www2.bioversityinternational.org/networks/ecpgr/contacts/ecpgr_wgfc.asp).

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