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EUROPEAN COOPERATIVE PROGRAMME
FOR THE CONSERVATION AND EXCHANGE OF CROP GENETIC RESOURCES

REPORT

of a Workshop on Beta Genetic Resources

held at the
Centre for Genetic Resources, The Netherlands,
Wageningen, The Netherlands
18–19 November 1987

ECP/GR IBPGR
Rome, 1987

The International Board for Plant Genetic Resources (IBPGR) is an autonomous international scientific organization under the aegis of the Consultative Group on International Agricultural Research (CGIAR). IBPGR was established by the CGIAR in 1974. The basic function of IBPGR is to promote and coordinate an international network of genetic resources centres to further the collection, conservation, documentation, evaluation and use of plant germplasm and thereby contribute to raising the standard of living and welfare of people throughout the world. Financial support for the core programme is provided by the Governments of Australia, Austria, Belgium, Canada, China, Denmark, France, Federal Republic of Germany, India, Italy, Japan, the Netherlands, Norway, Spain, Sweden, Switzerland, United Kingdom, and the USA as well as the World Bank. The Food and Agriculture Organization of the United Nations provides the Headquarters.

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INTRODUCTION

The third meeting of the Technical Consultative Committee of the European Cooperative Programme for the Conservation and Exchange of Crop Genetic Resources, ECP/GR, (Reykjavik, Iceland, December 1985) had recommended that the ECP/GR in its Phase III (1987-89) enhances collaborative activities for Beta, Brassica, Pisum and Vitis. In early 1987 the Centre for Genetic Resources the Netherlands which, in the framework of the Dutch-German programme on genetic resources, has special responsibilities for Beta genetic resources, agreed to act as a European Beta Data Base.

The Workshop was convened at the CGN in order to develop a collaborative programme on Beta genetic resources. The N.I. Vavilov Institute of Plant Industry (VIR) had been invited to participate to the meeting delegating a scientist; VIR sent its regrets in being unable to accept this invitation due to the 100 year Vavilov birth commemoration. In addition, the Director of IBPGR, Dr. J.T. Williams, who had intended to be present, had sent his apologies for absence.

IBPGR supported the participation of the Chairman of the Beet Crop Advisory Committee, NPGS, USDA, in order to ensure from the beginning an effective collaboration between ECP/GR and USDA.

Dr. J. Hardon, Director of the CGN, welcomed the participants and advocated a strategy orientated towards better use of Beta genetic resources.

Mr. P.M. Perret, ECP/GR Officer, outlined the task of the Workshop.

Dr. L. Frese was elected as Chairman and the Agenda shown in Appendix I was adopted. A list of participants is provided in Appendix II.

REPORT

A. DATE BASE FOR BETA

1. Ir. Th. van Hintum gave information on the general structure of the European Data Base for Beta. (Detailed information is provided in Appendix III). The system is run on an Olivetti M 28, which is IBM compatible and with DBMS ORACLE. The recommendations of the ECP/GR Workshop on the Exchange of Information (Radzikow, Poland 1984) have been followed with some slight modifications. It was outlined that the system was flexible and that the structure of the data base could be modified following the wishes of the Workshop or future needs which would emerge.

2. All available passport data had been requested in March 1987 for all European beet collections as well as the USDA/ARS beet collection. It was specified that MS DOS floppy disks were preferred but that any transfer medium would be accepted. Data were received in different forms (from printouts to magnetic tapes) and the most important constraints of data acquisition had been receipt of coded data without code explanations.

3. Dr. L. Frese gave a short report on the status of the European data base and this was accompanied by a demonstration of different analysis and retrieval possibilities of the registered data. The list of contributors of data and a summary table of the status of the data base is given in Appendix IV. Data from ZIGUK, Gatersleben (250 accessions) and from the USDA (700 accessions) had just been received and will be included in the very near future. Genebank and institute acronyms agreed by the ECP/GR will be used by the data base in future.

4. In reviewing the situation, the Workshop noticed that the following European collections will have to be included: Bulgaria, Italy (Bari), France (Dijon), UK (Wellesbourne), Turkey, Yugoslavia and USSR. Considering the effective collaboration already achieved with NPGS (USDA) members agreed that the European Beta Data Base should assume an international role and therefore be named International Data Base for Beta (IDBB). It was recommended that collections outside Europe, e.g. Japan, India, Canada, China should be requested by the CGN and IBPGR to send available passport data.

5. A lengthy discussion was held on duplicate samples. It appeared that safety duplicates held in IBPGR designated base collections (Institut für Pflanzenbau und Pflanzenzuchtung, Braunschweig and Greek Gene Bank (GGB), Greece) had also been included in the IDBB. The meeting recognized that although duplication for safety in IBPGR base collection is of great value for conservation of genetic resources, it is not of direct interest to users. It was therefore agreed that the safety duplicates should be specifically marked as such in the IDBB.

6. The meeting considered procedures to identify real duplicates (due to exchange of material between collections). It was recommended that the data base continues with the identification of these duplicates by selecting among a set of duplicates the most "original" accession (this will be located in most cases in the country in which the accession was collected or bred) and by identifying other collections in which these duplicates are held.

7. Designation of an "original" accession in a particular collection among a set of duplicates held in different collections should guarantee that seeds from such unique accessions are available for distribution. The meeting recommended that data on seed availability be sent as early as possible to the IDBB (see also para 16).

8. Further rationalization of collections by the identification of similar populations was discussed. It was felt that the use of biochemical methods, in addition to morphological observation, would not guarantee the grouping of similar populations and as a result the members agreed that further search for duplicates (other than those identified as exchanges) was cost ineffective.

9. Lengthy discussions were held on hybrid varieties and on the problem of their maintenance in genebanks as well as on their free availability for exchange. It was finally decided that these matters were not to be dealt with, at least for the time being, by a Beta collaborative network. The meeting stressed that the primary responsability of a beet curator is to maintain and characterize wild and primitive forms and also open pollinated varieties.

10. In view of the above, it was agreed that all information, already existing in the data base, on hybrid varieties should remain but that this would not imply any commitments on future availability of these hybrids. The commitment in this case is to make the wide diversity available, note the breeding lines.

11. Members stressed that the full content of the IDBB could be obtained on request by any institution/organization. Considering that the data base is at a very preliminary stage, that there is also the need to identify original accesions (see para. 6) and to obtain further information, it was agreed that the promotion of the data base (in articles, IBPGR Newsletter, among potential users) should start only after more progress has been achieved.

B. TAXONOMY OF THE GENUS BETA

12. Dr. Ford-Lloyd gave an introduction on the taxonomy of the genus Beta. Concern was expressed on the different taxonomic treatments and on the lack of consistent characters. (A summary is given in Appendix V). Different members underlined the problems of a proper taxonomic treatment by giving several examples. Members were also informed on the plans of the University of Wageningen to recruit a scientist for a Ph.D. on taxonomy of the genus Beta and its implications with genetic variability. The meeting agreed that for cultivated crops such as beet, a simple classification system related to use of the crop should be adopted by the data base. Four cultivar groups have been distinguished: garden beets, fodder beets (including mangels), sugar beets and leaf beets (spinach beets and chards). Beta vulgaris "wild" will be used for wild forms of the section Beta.

C. IBPGR DESCRIPTOR LIST

13. An IBPGR descriptor list for Beta had been published in 1979. The USDA/ARS had already accepted this list. The meeting agreed that a minimal revision of this list had to be done and that the COMECON Gene Bank Committee should be consulted during this revision.

D. REGENERATION OF ACCESSIONS

14. Dr. Frese informed the meeting on ongoing collaboration of the Dutch-German cooperation on beet genetic resources with private breeders from Belgium, Federal Republic of Germany and the Netherlands in which sugarbeet breeders each multiply about 10 accessions. An extension of this collaboration was proposed to the Institut International de Recherches Betteraves (IIRB) in September 1987, which had requested Dr. Frese to provide a list of priority accessions to be regenerated. Appreciation was given by the Workshop for this type of cooperation and its extension should be encouraged.

15. A technical discussion followed on regeneration methods. There was a general agreement that at least 50 plants fairly represent the diversity of the original population as long as precautions are taken to avoid strong inequalities in seed production of each plant.

16. Yearly capacities for regeneration of Dutch-German cooperative programme, USDA, GGB and Poland total about 400 accessions. Adding the regeneration capacities of other European genebanks holding beets, the Workshop considered that the acute need for regeneration could be solved within a USDA - European (including commercial companies) cooperation network through the sharing of seeds and responsibilities for the work. Only wild forms, landraces and open pollinated varieties will be regenerated in agreement with para 9 above. The following procedures were recommended:

    a) Curators of beet collection will send to the IDBB information on seed availability (seeds are available if there is more than 50 g of seeds in the cold storage) and on age of each accession. When possible, data on seed quantity and germination capacity should also be provided;

    b) The IDBB will compare its list of unique accessions and of duplicates of these "original" accessions with data on seed availability and age of seed. After comparisons, the CGN will propose a list of priority accessions for regeneration and also suggest locations for regeneration;

    c) The list in b) will be circulated to all Beta collections for comments, eventual modifications and final approval.

17. The Workshop strongly recommended that observations on the following characteristics be recorded during seed multiplication: Annuality, Bolting tendency, Expression of male sterility and Multigermicity. The definitions of these descriptors and the descriptor states are given in Appendix VI. It is also recommended that these data be systematically sent to the IDBB for registration and distribution.

E. EVALUATION OF BEETS

18. The meeting agreed on the need for full evaluation of Beta genetic resources for their better use by breeders. In due regard to different breeders needs in diverse regions and in view of the differing arrangments made by Beta collections with institutes for evaluation of their germplasm, the Workshop felt that it should not recommend specific priorities. However, it was stressed that for the development of a meaningful exchange of evaluation data between users, it was necessary to follow an internationally agreed list for descriptors. The meeting agreed that the revised IBPGR descriptors for Beta will be this international reference.

19. For promoting the exchange of evaluation data the IDBB is willing to register and distribute evaluation data at an international level. However, in order to avoid unnecessary work, it was agreed that data will be registered and sorted out by the data base on the sine qua non condition that they would strictly follow the definitions and descriptor states of the revised IBPGR descriptors for Beta. Requests for evaluation data will be made by the IDBB.

F. GERMPLASM COLLECTING

20. The Workshop reviewed the priorities for collecting of wild form and landraces which were agreed by the joint IIRB/IBPGR meeting held on 13 September 1979. For wild forms the meeting recognized that nearly all priority countries had been successfully collected in recent years with IBPGR /USDA support. However, it was noted that more information is needed from Bulgaria and Romania. After reviewing priorities and recent actions the Workshop recommended the collection of wild forms and landraces in Caucasus (southern USSR). Collecting missions in the Southwest Asia should be considered as a second priority. India and China may have interesting variability and more information is needed before the implementation of collecting missions in these countries.

It was also agreed that a specific collecting mission for wild forms (subs. patula and subs. maritima var. atriplicifolia) should be organized in the Southern Atlantic Coast.

Cultivated germplasm has been obtained in Greece, Italy and Spain through requests to small seed producers or by collecting. The so called "railway gardens" in France identified in the 1979 report have totally disappeared. However, primitive landraces and wild forms have still to be collected in Europe. In this context the continuation of the USDA missions in Northern Europe is supported.

Yugoslavia remains a priority country for wild forms and landraces but the meeting could not issue precise recommendations as the results of ongoing IBPGR missions for Allium, Beta and Brassica need to be assessed first.

G. SAFETY DUPLICATION IN BASE COLLECTIONS

21. It was recognized that, compared to other crops, a fairly good duplicate conservation of accessions for safety has already been made in IBPGR designated base collections (Braunschweig and Greek Gene Bank). It was recommended that the process be strengthened and safety duplicates should be sent to the base collections every time that regeneration of accessions provides sufficient seed quantities.

H. OTHER MATTERS

22. The Workshop agreed that another meeting should be convened at the end of 1989 or in early 1990 to review the programme and to issue further guidelines. It was recommended that, as far as possible, representative of major Beta collections all over the world should participate.

The Workshop expressed its appreciation of the work achieved by the International Beta Data Base in so short time. The results would not have been achieved without the active and early response of all contributors of data. The thanks of the members of the Workshop will be sent to them. Members also wished to thank the CGN for the excellent facilities which were provided and for their very kind hospitality.

APPENDIX I

AGENDA

1. Opening Addresses

2. Election of Chairman

3. Adoption of Agenda

4. European Beta Data Base

   4.1 Presentation of progress in the compilation of a European Beta Data Base (Draft of European Beta list)
   4.2 Identification of those collections not yet included in the data base and completion of passport data
   4.3 Identification of duplicates and needs for rationalization of collections
   4.4 Further registration of characterization/evaluation data

5. Taxonomy of the section Beta

   5.1 Introduction to problems in the taxonomy of Beta
   5.2 Discussion

6. Revision of the IBPGR Beta Descriptor list

7. Regeneration of accessions

   7.1 Report on the progress of a cooperative regeneration programme
   7.2 Determination of priorities for regeneration and coordination
   7.3 Selection of characters for minimal description during regeneration

8. Safety duplication in base collections

9. Needs and priorities for further collecting

10. Other matters

11. Writing of report

12. Consideration of report and approval by the Workshop

APPENDIX II

EUROPEAN DATA BASE FOR BETA

LIST OF PARTICIPANTS

Chairman:

Lothar Frese, Centre for Genetic Resources the Netherlands (CGN), P.O. Box 224, 6700 AE Wageningen, Netherlands

Members:

William Brandenburg, Government Institute for the Research on Varieties of Cultivated Plants (RIVRO), 6700 AC Wageningen, Netherlands

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Leonarda Dalke, IHAR, Pl. Wayssenhoffa 11, 85-071 Bydgoszcz, Poland

Devon L. Doney, Chairman Sugar Beet Crop Advisory Committee USDA-ARS, North Dakota State University, Walster Hall, Fargo, North Dakota 58105, USA

Brian V. Ford-Lloyd, Department of Plant Biology, University of Birmingham, P.O. Box 363, Birmingham B15 2TT, UK

Wouter Lange, Foundation for Agricultural Plant Breeding, P.O. Box 117, 6700 AC Wageningen, Netherlands

Mannes Mesken, Foundation for Agricultural Plant Breeding, P.O. Box 117, 6700 AC Wageningen, Netherlands

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Louis J.M. van Soest, Centre for Genetic Resources the Netherlands (CGN), P.O. Box 224, Wageningen, Netherlands

ECP/GR Secretariat:

Pierre M. Perret, ECP/GR-IBPGR, c/o FAO, Via delle Terme di Caracalla, 00100 Rome, Italy

APPENDIX III

THE GENERAL STRUCTURE OF THE BETA DATA BASE

A manual is available which explains the general structure of the "International Data Base for Beta (IDBB)". The notes below summarize the major points.

The IDBB uses the database management system ORACLE. This DBMS is relational which means that two dimensional tables are used, tables with rows and columns. The IDBB has the following tables: ADDRESS, COUNTRY, O_TYPE, OK, PARALLEL, PASSPORT, POP_STAT. Those are listed below, first giving the table name, followed by the columns (between brackets), and a short description. For the use of the tables PASSPORT and PARALLEL other manuals are available.

ADDRESS (ADDR, NAME, ADDRESS, PLACE, PCODE, COUNTR): The address table decodes the address codes used in the PASSPORT table (in the columns D ADDR and O_ADDR) and the PARALLEL table (in the column ADDR).

COUNTRY (COUNTRY, N_COUNTRY): The country table decodes the country codes used in the PASSPORT table (in the column COUNTRY).

O_TYPE (O_TYPE, N_O_TYPE): The origin type table decodes the origin type codes used in the PASSPORT table (in the column O_type).

OK (OK): A process table, only used to make certain processes possible.

PARALLEL (IDBBNR, ADDR, PNG): The parallel table stores parallel numbers, numbers given by other institutions to the EDBB accessions.

PASSPORT (IDBBNR, R_DATE, D_ADDR, D_COUNTRY, D_PNR, G_NAME, S NAME, SS_NAME, V_NAME, ANCEST, O_ADDR, O_TYPE, COLLNR, COLLDATE, O COUNTRY, DISTRICT, LOCATION, LONGI, LAT, ALT, POP_STAT, REMARK): The passport table stores the passport information on the EDBB accessions. Passport information is information on the classification, origin and background of the material.

POP_STAT (POP_STAT, N_POP_STAT): The population status table decodes the population status codes used in the PASSPORT table (in the column POP_STAT).

THE PARALLEL TABLE

The PARALLEL table is used for storing parallel numbers. Parallel numbers are the numbers given by others to the accessions in the IDBB. The PARALLEL table has the following columns: EDBBNR, ADDR, PNG.

Appendix III
(Continued)

IDBB number (IDBBNR, a number): The IDBB number is the unique number given to each description of a population that is received by the "International Data Base for Beta". e.g.: '2113'

Parallel address (ADDR, existing code): The IDBB code for the institution that gave the parallel number. e.g.: 'NEDBEG'

Parallel number (PNR, up to 12 characters, upper and lower case): The number given to the population by the institution, coded in the column parallel address. e.g.: 'Bm 45/1182'

THE PASSPORT TABLE

The PASSPORT table is used for storing passport information. Passport information is information on the classification, origin and background of the genetic material that is to be documented.

The IDBB works with the English language. All information should as far as possible, be translated into this language. The PASSPORT table has the following columns:

IDBBNR, R_DATE, D_ADDR, D_COUNTRY, D_PNGR, G_NAME, S_NAME, SS NAME, V_NAME, ANCEST, O_ADDR, O_TYPE, COLLNR, COLLDATE, O COUNTRY, DISTRICT, LOCATION, LONGI, LAT, ALT, POP_STAT, REMARK.

IDBB number (IDBBNR, a number): The IDBB number is the unique number given to each description of a population that is received by the "International Database for Beta". e.g.: '2113'

Name (V_NAME, up to 25 characters, upper and lower case): The original name given to a population. This can be a variety name, but also a local name or the name used as a identification code of reseach material. e.g.: 'Monohill'

Entry date (R_DATE, 9 characters: DD-MM-YY): The date, generated by the system, the data were added to the IDBB. e.g: '19-OCT-87'

Donor number (D_PNR, up to 12 characters, upper and lower case): The identification number given to the population by the institution donating the data. e.g.: 'BV332-3a'

Donor address (D_ADDR, existing code): The IDBB code for the institution that donated the data. e.g.: 'GBB'

Donor country (D_COUNTRY, existing code): The IDBB code for the country where the institute donating the data is located. e.g.: 'GRC'

Genus (G_NAME, up to 25 leters, upper and lower case): The genus of the population. e.g.: 'Beta'

Appendix III
(Continued)

Species (S_NAME, up to 25 letters, upper and lower case): The species of the population. e.g.: 'vulgaris'

Subspecific name (SS_NAME, up to 30 letters, upper and lower case): A subspecific taxonomical name of the population. e.g.: 'maritima'

Ancestors (ANCEST, up to 40 characters, upper case): The most important ancestors of the population. The first position must always be one of the following:

I	Inbred line
M	Mutant
P	Pedigree
S	Selection
X	Other information

This code must be followed by ':' and the additional information. The notation of the pedigree is according to Purdy et al., 1976.
e.g.: 'P: AR650/MULTIC/FERROBEET'

Status (POP_STAT, existing code): The IDBB code for status of the population. There are the following codes:

1	Wild
2	Weedy
3	Breeders' line, research material
4	Landrace
5	Advanced cultivar
6	Other

e.g.: '5'

Origin address (O_ADDR, existing code): The IDBB code for the most original institution of expedition working with the population, if possible the one breeding or collecting it.
e.g.: 'BLOBAI'

Origin type (O_TYPE, existing code): The IDBB code for the type o the origin of the population. There are the following codes:

1	Wild habitat
2	Ruderal
3	Farm field
4	Farm store, threshing place
5	Backyard
6	Local market
7	Commerical market, seed trade
8	Institute, university, genebank, breeding company
9	Other

e.g.: '8'

Origin country (O_COUNTRY, existing code): The IDBB code for the country where the population originated.
e.g.: 'GRC'

District (DISTRICT, up to 25 charactes, upper case): The district, province, island (etc.) of the collection site.

Appendix III
(Continued)

Location (LOCATION, up to 40 characters, upper case): The exact location of the collection site.
e.g.: 'KARFOS'

Origin date (COLLDATE, 4 digits: MMYY): The month and year the population was collected (wild material and landraces) or introduced (breeding material). If only the year is known, '00' must be inserted for the month number.
e.g.: '0784'
'0078'

Collection number (COLLNR, up to 10 characters, upper and lower case): The number given to the population during the collection.
e.g.: 'EC 13/45'

Longitude (LONGI, six characters: DDDMMH): The longitude of the collection site. The first three positions for the degrees, the next two for the minutes and the last ('E' or 'W') for the hemisphere. For unknown parts blanks can be inserted.
e.g.: '02610E'
'034 W'

Latitude (LAT, six characters: DDDMMH): The latitude of the collection site. The first three positions for the degrees, the next two for the minutes and the last ('N' or 'S') for the hemisphere. For unknown parts blanks can be inserted.
e.g.: '03819N'
'003 S'

Altitude (LAT, number): The altitude of the collection site in metres.
e.g.: '50'

Remark (REMARK, up to 120 characters, upper and lower case): Additional information on the population, always preceded by a three letter code and ':'. Starting codes that have been used till now are:

BRE	Breeder
DNO	Secondary donor number
NPL	Number of collected plants
SDO	Secondary donor, the institution giving the material to the EDBB donor institution
ONR	Other number
OPL	Origin place
PED	End use code
PLO	Ploidy level
RSN	Rest of species name
RVN	Rest of variety name
UCI	Uncoded collection institution
UDO	Uncoded donor name

Remark is also used by the IDBB to store information that could not be interpreted yet (like BRE, OPL, PED, UCI and UDO).

If there are more than one 'remark' to be made, they should be separated by ':'.
e.g.: 'NPL: 45 ;PLO: 2x'

APPENDIX IV

INTERNATIONAL DATA BASE FOR BETA

NUMBER OF DOCUMENTED ACCESSIONS AND TAXA IN THE INTERNATIONAL DATA BASE FOR BETA, NOVEMBER 1987

SP. NAME	SUBSP. NAME	NUMBER OF ACC.
Section Beta		
vulgaris		849
vulgaris	maritima	720
vulgaris	maritima var. maritima	4
vulgaris	maritima var. macrocarpa	31
vulgaris	maritima var. atriplicifolia	7
vulgaris	maritima var. trojana	6
vulgaris	cicla	107
vulgaris	cicla var. cicla	13
vulgaris	cicla var. flavescens	61
vulgaris	vulgaris	269
vulgaris	vulgaris var. conditiva	211
vulgaris	vulgaris var. crassa	377
vulgaris	vulgaris var. altissima	562
vulgaris	adanensis	29
vulgaris	patula	2
vulgaris	orientalis	8
Section Corollinae		
corolliflora		91
macrorhiza		54
lomatogona		128
trigyna		59
intermedia		273
Section Nanae		
nana		58
Section Procumbentes		
procumbens		53
patellaris		74
webbiana		24
Total number of accessions		4119

Appendix IV
(Continued)

INTERNATIONAL DATA BASE FOR BETA

LIST OF CONTRIBUTORS, NOVEMBER 1987

Rijksproefstation voor Plantenveredeling
Burg. van Gansberghelaan 109
Merelbeke B- 9220
BELGIUM

Research and Breeding Institute of Vegetable Crops
Holice
Olomouc 770 00
CZECHOSLOVAKIA

Research Institute of Plant Production
Division of Genetics and Plant Breeding Methods, Genebank
Dept. of Genetic Resources and Taxonomy
Ruzyne 507
Praha 6 161 06
CZECHOSLOVAKIA

The Agricultural Institute
Sugar Beet Research Centre
Thurles
Co. Tipperary
EIRE

Station d'Amelioration des Plantes (INRA)
Domaine de la Motte-au-Vicomte
Boite Postale 29
Le Rheu F-35650
FRANCE

Greek Gene Bank
North Greek Agricultural Research Centre
P.O. 105 14
Thessaloniki 541 10
GREECE

Research Centre for Agrobotany I.P.P.Q.
Section for Plant Introduction and Gene Bank
Taploszele H-2766
HUNGARY

Dutch German Cooperation on Beet Genetic Resources
CGN/SVP/BGRC
Postbox 224
Wageningen 6700 AE
NETHERLANDS

Appendix IV
(Continued)

Plant Breeding and Acclimatization Institute
Hadzikow near Warsaw
Blonie P-05-870
POLAND

Estacion Experimental "Aula Dei"
(Aula Dei Experimental Station)
Apartado 202
Zaragoza
SPAIN

Nordic Gene Bank
P.O. 41
Alnarp S-23083
SWEDEN

Station Federale de Recherches Agronomiques
de Changins
Route de Duillier
Nyon CH-1260
SWITZERLAND

Department of Plant Biology
University of Birmingham
P.O. 363
Birmingham B15 2TT
UNITED KINGDOM

APPENDIX V

TAXONOMY OF THE GENUS BETA

It is agreed that wild forms of beet within the section Beta are not easily classified. A consensus of opinion amongst those concerned with taxonomy has not been achieved. Various authors have described between one and three species within the section Beta, from zero to 6 subspecies, and zero to 16 convarieties, provarieties, varieties and forms.

Confusion has undoubtedly arisen because of the lack of any strong barriers to crossing between the wild forms and the cultivated types, which has resulted in a continuum of variation for many characters. In addition, a lack of coherence between groups of characters used by some authors to describe new taxa, and the occurrence of combinations of these characters in other existing taxa within the Section, has added to the confusion.

An appreciation of this situation existed even in 1931 and was highlighted in a paper by Rubashevskaia, the relevant conclusions of which were that:

1. The wild beet (maritima) shows a very high degreee of polymorphism. Variation is found in a great number of characters. There exists a great range of variation.

2. The wild beet fall into a series of geographical types, which may be climatypes.

3. Wild beets are so polymorphic as to be of considerable value for genecological studies.

For the sake of clarity in passport data of beet genetic resources, it is therefore proposed that all cultivated beets (B. vulgaris sensu lato, section Beta) be assigned to one of 4 cultivar groups, namely leaf beets (including Swiss chards and spinach beets), garden beets (red beets, beetroots, golden beets etc.), fodder beets (including mangolds, mangel wurzels) and sugar beets.

When dealing with wild germplasm within the section Beta, it will be an impossible task to re-assign existing germplasm to one agreed taxonomic system at the present time. It is therefore proposed that all wild forms within the section Beta be regarded as B. vulgaris, and designated as "wild". Scientists should then feel free to use whichever infra-specific categories they wish, the essential point being that information of importance to genetic resources work will be available from the descriptor list.

APPENDIX VI

MINIMAL LIST OF CHARACTERS TO BE OBSERVED DURING REGENERATION

1.	Annuality	Formation of bolters and ripe seeds in the first or second year	1 = annual, 2 = biennial
2.	Bolting tendency	Total number of bolters relative to total number of plants	%
3.	Expression of male sterility	Phenotype	1 = fertile, 5 = semifertile, 9 = complete sterile
4.	Multigermicity	Number of seeds per seedball	1 = monogerm, 3 = monogerm & bigerm, 5 = multigerm (3-4) 7 = highly multigerm (5-7)