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**FORAGES FOR
MEDITERRANEAN
AND ADJACENT
ARID/SEMI-ARID AREAS**

*Report of a
Working Group
24-26 April 1985*

International Board for Plant Genetic Resources

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INTERNATIONAL BOARD FOR PLANT GENETIC RESOURCES

IBPGR WORKING GROUP ON FORAGES FOR
MEDITERRANEAN AND ADJACENT SEMI-ARID/ARID TYPE AREAS

held at LIMASSOL, CYPRUS

24-26 April 1985

REPORT

IBPGR Secretariat

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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). The IBPGR was established by the CGIAR in 1974 and its Executive Secretariat is provided by the Food and Agriculture Organization of the United Nations. The basic function of the 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. The Consultative Group mobilizes financial support from its members to meet the budgetary requirements of the Board.

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Executive Summary

- i) A Specialist Working Group on Forages for Mediterranean and adjacent semi-arid/arid areas was convened in Limassol, Cyprus on 24-26 April 1985.
- ii) The Group reviewed holdings in forage germplasm collections. There were three large collections, viz. Adelaide, South Australia; Perth, Western Australia and ICARDA, Syria and a number of smaller ones (para. 6-12).
- iii) Progress with storage facilities was monitored (para.13) and recommendations made on the location of base (para. 14) and active collections (para. 15).
- iv) Priority taxa were listed (Table 1) on the basis of the extent of genetic erosion and their potential values (para. 20-24). The legume list included 13 annual and 3 perennial Medicago spp., 16 annual and 3 perennial Trifolium and eight other genera plus eleven grass genera.
- v) The Group endorsed a report on the importance of appropriate Rhizobium collection and welcomed a proposal from ICARDA to build up a collection of R. meliloti (para. 25-26).
- vi) The importance of unified descriptors was emphasized and specimens of the IBPGR/CEC Grass and Forage Legume lists served as the basis for discussions. Passport data as outlined should have a general application and it was desirable to have detailed information on environmental parameters to provide a sound scientific basis for eco-geographic studies (para. 27).
- vii) Information needs to be stored in data bases and although progress was being made; it was uneven. There was no urgent need to develop central data bases but workers with common interests were to be encouraged to exchange data (para. 28).
- viii) More information was needed on the biology, distribution, etc. of priority species and this could be linked with IBPGR's data files on wild relatives of crop plants (para. 31).
- ix) An action programme to collect priority species was drawn up (Table 2. para. 32-33).
- x) The importance of hands-on training in genetic resources work was stressed and a list made of institutes likely to provide such training (para. 35-37).

INTRODUCTION

1. A Working Group on Forages for Mediterranean and adjacent semi-arid/arid type areas was convened in Cyprus as part of a forages plan of action, which was approved by the International Board for Plant Genetic Resources (IBPGR) in February 1983. A list of participants is shown in Appendix I. A representative of the Arab Centre for the Study of Arid Zones and Dry Lands (Syria) and the Food and Agriculture Organization of the United Nations (FAO Grasslands Group) were expected to attend but unfortunately could not.
2. The participants were warmly welcomed by the Director of the Agricultural Research Institute (ARI), Dr. C.S. Serghiou who apologized for the unavoidable absence of the Minister of Agriculture and National Resources, His Excellency Dr. A. Pappasolomontos. He indicated support of the ARI for the work of the IBPGR, and staff were collecting economic species which were endangered. The Institute was grateful to receive assistance from the IBPGR in setting up a cold store for seed storage, providing a microcomputer and were happy to provide resident facilities for the IBPGR Coordinator for North Africa and the Near East.
3. Dr. J. T. Williams outlined the work of the IBPGR and stressed the need for collection of forage germplasm to be closely linked to breeding and use of the materials. Collecting programmes need to be well thought out in view of the wide range of potential species and the difficulties in maintaining some of them in active programmes. It was significant that there were few comprehensive collections of forages of the region except for subterranean clover and annual medics following the immense stimulus from Australian scientists. The IBPGR is also looking to a number of southern European national programmes to initiate a large part of the action which the Working Group might propose.

4. A Special Project of the IBPGR, funded by UNDP; the European Cooperative Programme/Genetic Resources (ECP/GR) has already looked at forages and initiated projects to sort out and document existing collections as well as identifying priority species. On the whole ECP/GR is more interested in temperate species.
5. Dr. J. T. Williams agreed to act as Chairman and the agreed agenda is shown in Appendix II.

REPORTREVIEW OF EXISTING COLLECTIONS

6. Brief reports were given on the current forage genetic resources programmes in the participants' countries. The Australian programme is aimed at establishing eight centres based on particular crops: medics being allocated to Adelaide, South Australia and Trifolium to Perth, Western Australia. The latter centre now has over 9000 samples, mostly from 30 intensive collection expeditions to the Mediterranean basin over the last 35 years. Six thousand of the samples are subterranean clover (T. subterraneum) and two-thirds of these have been evaluated. The Adelaide collection has over 16,000 samples, which includes 11,000 annual medics (Medicago spp.). Most of the medic collection has been evaluated. The collection also includes 1600 Trifolium samples spread over 90 species, Astragalus spp. (315 samples), Ornithopus spp. (136), Scorpiurus spp. (159), Trigonella spp. (209), perennial Medicago spp. (1650) and Onobrychis (286) as well as smaller numbers of other species (Appendix IIIa).
7. At INIA, Badajoz, Spain there are 2200 samples of subterranean clover, 90% of which originate in the country. This collection also includes other Trifolium spp. (100), and medics (400). The view was expressed that there was no immediate danger of genetic erosion and it would be possible to return to collect in the original sites.
8. The Sardinian programme has been involved with annual self-reseeding legumes (subterranean clover - 1260 samples, annual medics) and some perennial grasses (110). Some of these collections have resulted from active cooperation with Western Australia, and have included collections of Rhizobium samples. The grass collection includes 50 ecotypes of indigenous Festuca arundinacea, and 40 Dactylis (Appendix IIIc).

9. The ARI in Cyprus began collecting Hordeum in 1978 which is being evaluated for forage and hay. In 1984 genera collected included Vicia, Lathyrus, Pisum and Medicago (Appendix IIIb). In Morocco the Station Centrale des Plantes Fourrageres has a collection of grasses (319) and legumes (1065) some of which were the result of collecting missions from ICARDA and USA. No evaluation of this material had taken place yet (Appendix IIIId).
10. The International Center for Agricultural Research in the Dry Areas (ICARDA) has a collection of 17,000 samples made up of 4400 grasses and 13,440 legumes. This collection has been built up mainly by acquisition from other genebanks and latterly by collection in the mandate area. The major species include annual Medicago spp. (3490), Pisum (3230), Vicia (2860), perennial Medicago (850), Hordeum (1710), Triticale (1560) and other grasses (622) (Appendix IIIe).
11. In addition to an FAO project, four main missions had collected forages in association with the Research Institute of Forests and Rangelands, Iran. A mission from USA collected 2300 samples of grasses of which 600 were now available. A Japanese group collected 40 Dactylis populations and the Australians and ICARDA have collected annual medics. Collection is continuing and cold storage facilities are now working.
12. Of the countries not represented at the Working Group the Fodder Crops Institute in Larissa, Greece is in the middle of a systematic five-year programme aimed at collecting indigenous forages. Details of the holdings are published in the "Directory of Germplasm Collections - 7 Forages". Collections of Turkish forages are in the Aegean Regional Agricultural Research Institute in Izmir. The IBPGR has sponsored collections of wild legumes in Israel which are maintained at the Hebrew University of Jerusalem. Collections have also been assisted in Libya, Tunisia, Egypt and Algeria.

REVIEW OF STORAGE FACILITIES

13. The Working Group noted with pleasure that long term seed storage facilities were now available in the following genebanks in the area : Greece, Israel, Italy, Spain and Turkey, but not all material was safely secured yet. In addition Tunisia and Morocco have deep-freeze chests. Medium term storage facilities were available in ICARDA, but there were prospects of having long term facilities in the near future. Both South and Western Australia have been offered space in the long term (-20°C) facility at the Division of Plant Industry, CSIRO, Canberra and the latter has accepted this offer. It is understood that comprehensive seed storage facilities are at various stages of completion in Algeria, Egypt, Iran and Libya. Details of storage facilities currently in use are already published in "Institutes Conserving Germplasm" (IBPGR 1984) and the "Directory of Germplasm Collections - 7 Forages" (IBPGR 1984).

DESIGNATION OF BASE COLLECTIONS

14. For security and long-term storage the Group recommends that the IBPGR designate the following institutes to hold material.

- Annual *Medicago* (i) The Australian Commonwealth
Germplasm System's genebank network.
- (ii) back-up store at ICARDA when long-term
facilities are functional.
- Trifolium (i) INIA, Spain
- (ii) The Australian Commonwealth
Germplasm System's genebank network
- (iii) Bari, Italy

- | | | |
|---------------------|-------|---|
| <u>Other forage</u> | (i) | INIA, Spain (already agreed by Spain) |
| <u>legumes</u> | (ii) | Bari, Italy |
| | (iii) | Greek Genebank, Thessaloniki |
| | (iv) | ICARDA, Syria. (<u>Viceae</u> , <u>Lathyrus</u> , <u>Pisum</u>) |
| <u>Grasses</u> | (i) | Bari, Italy |
| | (ii) | back-up store at ICARDA when long-term facilities are functional. |

These security deposits will also be complemented by national seed stores (when adequate facilities are available) which will, of course, hold national material.

ACTIVE COLLECTIONS AND AVAILABILITY OF SAMPLES

15. Until such time as there are adequate national programmes the following serve as active collections.

ICARDA	<u>Medicago</u> , <u>Trifolium</u> (except subterranean clover), <u>Vicia</u> , <u>Lathyrus</u>
South Australia	<u>Trifolium</u> , <u>Medicago</u>
Western Australia	Subterranean clover and other <u>Trifolium</u> spp., <u>Medicago</u> , <u>Ornithopus</u>

16. Other materials are available from institutes listed in the IBPGR "Directory of Germplasm Collections - 7 Forages" (1984).

IN SITU RESERVES

17. The possible contribution of in situ reserves to genetic conservation of forage resources was discussed. It was pointed out that this had become an important topic for the International Union for the Conservation of Nature and Natural Resources (IUCN)

recently and the FAO Commission on Plant Genetic Resources. However, all discussions to date suffer from the lack of plant inventories of reserve areas. In relation to forages it was stressed that the loss of materials is usually associated with over-grazing and careful management of the reserve areas is crucial. The participants were strongly of the opinion that adequate reserves with scientific management had not been designated. In situ conservation should only be a complementary method of conservation and for the priority taxa would not be the primary method except possibly for continued maintenance of woody browse material in fenced-off forest reserves.

18. The Working Group noted several interesting examples. Iran had protected range areas some going back 150 years and Israel was also active in in situ conservation. PDR Yemen has organized fenced-off range areas. Clearly such sites have possibilities but in total they form such a small area, that the present contribution to conservation is negligible.

19. The Working Group did not make recommendations on this subject.

PRIORITY TAXA

20. The Group considered detailed priorities for genera bearing in mind the following criteria:

(i) Genetic erosion. Many species have important centres of diversity in the Mediterranean and Southwest Asia and major distribution of variation is in areas which are currently developing rapidly.

(ii) Potential for development and/or breeding new cultivars.

(iii) Comprehensiveness of existing collections.

Genera and species agreed to be of priority are shown in Table 1.

Table 1. List of priority species with indication of genetic erosion and potential

<u>LEGUMES</u>	<u>Extent of genetic erosion</u>	<u>Potential</u>	<u>Comments</u>
<u>Medicago</u>			
Perennial			
<u>M. sativa</u>	High	High	
<u>M. falcata</u>	Medium	Medium	
<u>M. arborea</u>	Medium	Medium	
Annuals			
<u>M. littoralis</u>	High	High	
<u>M. murex</u>	"	"	
<u>M. polymorpha</u>	Low	"	
<u>M. radiata</u>	High	"	
<u>M. rugosa</u>	"	"	
<u>M. scutellata</u>	"	"	
<u>M. tornata</u>	"	"	
<u>M. truncatula</u>	"	"	
<u>M. turbinata</u>	"	"	
<u>M. aculeata</u>	"	")especially for
<u>M. noeana</u>	"	")high altitude
<u>M. rigidula</u>	"	")continental
<u>M. rotata</u>	"	")climates
<u>Trifolium</u>			
Perennial			
<u>T. ambiguum</u>	Low	Low	
<u>T. fragiferum</u>	?	High	
<u>T. hybridum</u>	Low	Low	
<u>T. radicosum</u>	High	Medium	
<u>T. repens</u>	High	High	
Annuals			
<u>T. alexandrinum</u>	?	High	
<u>T. balansae</u>	?	"	
<u>T. campestre</u>	Low	High, 350-400mm rainfall-high elevation	
<u>T. canescens</u>	"	Medium	above timberline
<u>T. cherleri</u>	?	High	
<u>T. glomeratum</u>	?	Low	
<u>T. hirtum</u>	?	High	
<u>T. israeliticum</u>	High	Low	
<u>T. isthmocarpum</u>	?	Low	
<u>T. nigrescens</u>	?	Medium	

Table 1(Cont'd). List of priority species with indication of genetic erosion and potential

<u>LEGUMES</u>	<u>Extent of genetic erosion</u>	<u>Potential</u>	<u>Comments</u>
<u>T. purpureum</u>	?	High	
<u>T. resupinatum</u>	Medium	High, saline alkaline, 150mm rainfall	
<u>T. scutatum</u>	?	Low	
<u>T. stellatum</u>	?	Low	
<u>T. subterraneum</u>	?	High	
<u>ssp. yanninicum</u>			
<u>T. vesiculosum</u>	?	High	
<u>Vicia dasycarpa</u>	High	High, cold resistant	
<u>V. ervilia</u>	High	High	
<u>V. narbonensis</u>	High	High, especially arid Near-East	
<u>V. sativa</u>	High	High	
<u>V. villosa</u>	?	High, especially N. Africa & the Near-East	
<u>Astragalus siliquosus</u>	Medium	High	
<u>Coronilla varia</u>	Medium	Medium	
<u>Hedysarum coronarium</u>	High/M	Medium, interest W.Mediterranean	
<u>Lathyrus sp.</u>	High	Low	
<u>Lotus corniculatus</u>	?	Medium, 400mm area Iran/Russian border	
<u>Onobrychis melanotricha</u>	Medium	Medium	
<u>O. radiata</u>	High	High	can self seed
<u>O. viciifolia(sativa)</u>	Low	High	
<u>Ornithopus sp.</u>	?	High	on acid soil, recoloniser,
<u>Pisum sativum(forage form)</u>	High	High	/under utilised
<u>GRASSES</u>			
<u>Agropyron cristatum</u>	High	High	especially for W.Asia
<u>A. elongatum</u>	Low	High	West Asia
<u>A. intermedium</u>	Low	High	(<u>trichophorum</u> , <u>aucheri</u>)
<u>Avena forage types</u>	High	High	
<u>Bromus persicus</u>	Low	Medium	
<u>B. tomentellus</u>	Low	High	perennial grazing resistant
<u>Cenchrus ciliaris</u>	High	High	/Middle east
<u>Dactylis glomerata</u>	Medium	High	ssp. <u>hispanica</u> , underutilized
<u>Eragrostis spp.</u>	Low	Medium	
<u>Festuca arundinacea</u>	Medium	High	
<u>F. ovina</u>	Low	High	for high elevations
<u>Hordeum fragile</u>	Low	Medium, good for land conservation	
<u>Lolium rigidum</u>	Low	Medium	
<u>L. temulentum</u>	Low	Medium	
<u>Phalaris aquatica</u> (= <u>tuberosa</u>)	Medium	High	few collections available
<u>Secale montanum</u>	High	Medium, upland dry areas	
<u>Stipa tenacissima</u>	Low	Medium	

21. Priorities for a limited number of species which overlap with the interests of ECP/GR do not differ from those of the ECP/GR which reported on several of the species listed in Table 1. (specifically Medicago, subterranean clover, Trifolium resupinatum and T. alexandrinum, Lolium rigidum, Festuca arundinacea, Dactylis, Phalaris tuberosa and Cenchrus ciliaris).
22. Priorities agreed have not been separated into distinct ecological zones for a number of reasons: frequently wide ecological amplitude of many gene pools of species, altitudinal parameters, special stress conditions (saline soils, acid/alkaline soils, unstable soils etc.) but species with specific interest in certain ecological/geographical zones are annotated in Table 1.
23. The Group noted that a number of indigenous browse species are valuable but further recognized the major lack of practical efforts to assess and conserve variability. Nevertheless the Group draws the attention of suitable programmes to the need to initiate work on:
- (i) Atriplex, Kochia, Haloxylon and Salsola
- (ii) African species of Acacia, Calligonum, Ficus, Pistachio, Zizyphus, Cassia, Camphrosma, Comiphora, and Erythrina.
24. The data gathering by the International Council for Research in Agroforestry (ICRAF) on multipurpose species was outlined and the Group noted that more than 80% of the species in the area are used as fodder. ICRAF can respond to particular requests for species which fit specific ecological conditions. National programmes in the arid areas are urged to collaborate with ICRAF.

RHIZOBIUM COLLECTIONS

25. The Group examined a report prepared by the IBPGR Forage Officer, on the status of Rhizobium collections from some temperate and Mediterranean countries. Forty-one scientists were contacted and 29 replies had been received. The conclusions of this report were endorsed by the working group. They are:
- (i) For the success of the introduction programme it is essential to collect Rhizobium in the case of new or exotic species and where there are known difficulties with nodulation.
 - (ii) It is desirable to increase collections of Rhizobium to the point of having a representative collection of strains and to preserve a Rhizobium gene pool. The constraints are the extra resources needed in terms of time, facilities for storage and maintenance of cultures.
 - (iii) For commonly grown species the advantages of collecting additional Rhizobium variability are sometimes difficult to demonstrate experimentally except under certain specific soil conditions. For this latter reason Rhizobium samples are needed in collections.
26. In view of its regional mandate and growing programme on Rhizobium, ICARDA offered to build up a collection of R.meliloti for the region, maintain it and make it available for all interested scientists. In addition, ICARDA would be prepared to collect other species, if resources became available. This was welcomed by the Group.

CONSIDERATION OF DESCRIPTOR LISTS

27. Copies of the Forage Grass Descriptors List and Forage Legume Descriptors List jointly published by the Commission of the European Communities and IBPGR were circulated for discussion. These lists are in the IBPGR format and their use is recommended where possible, in order to facilitate the transfer of data internationally. The Working Group agreed that detailed passport data, which included site data, were vitally important for forage collections and this information should be as complete as possible. The published lists to a great extent, cover these requirements. As for characterization data, requirements needed to be tailored to particular species, and even in the European list there were different descriptors for the species listed. In the meantime established centres would have already developed their own sets of descriptors, but they could re-examine these in order to conform as far as possible with the published IBPGR format. New programmes, on the other hand, could adapt these lists for their own particular needs.

COMPUTER FACILITIES AND TRANSFER OF DATA

28. Computing facilities were deemed to be satisfactory in the following: Australia, Cyprus, Greece, Spain, Turkey and ICARDA. The Group was disturbed to find that an Apple III donated to Pakistan was apparently not working and asked the Secretariat to investigate. Doubt was expressed whether the computers in Iran were actually working or were adequate. There was generally a lack of computer facilities in North Africa. It was agreed that at present there was no urgent need to rationalize data in central data bases. It was recommended that workers with common interests would exchange data among themselves.

OTHER AREAS WITH MEDITERRANEAN TYPE CLIMATE

29. The Working Group draws to the attention of the IBPGR areas of Chile, Mexico/California, China, Australia and South Africa, where forage work is of relevance. It was known that evaluation work of local material is ongoing in all these areas except possibly in Chile and the IBPGR might wish to ascertain the requirements and usefulness of collecting some indigenous Chilean material.
30. The Group was informed that Australia has collected naturalized ecotypes of subterranean clover from Western Australia (over 100 distinct strains), Victoria (about 200 strains), New South Wales (70-80 strains) and at least 600 accessions in South Australia.

ACTION PROPOSED

31. In discussing priorities the Group noted that in many cases the distribution patterns of the species were inadequately known, and where they were better known the knowledge had been built up from ad hoc short visits to likely areas. It was agreed that a better approach was necessary and the IBPGR is urged to carry out a number of surveys on several of the major priority genera to include data from floras, herbarium specimens, published papers and passport data in existing collections. A clear example where this would be useful is for subterranean clover subspecies yannanicum where the previously known distribution pattern has been changed by the programme in Cagliari, Sardinia finding this in Sardinia, thereby extending the range far westwards. Now additional areas of the Balkans through to the Iberian peninsula and even the Atlantic Islands of Canaries and Azores should be searched. However, herbarium label data might be available to assist in planning. Data gathered during surveys of this kind should be computerized by IBPGR and could form files of the data base on wild relatives of crop plants which the IBPGR has agreed to develop.

COLLECTING PRIORITIES

32. In relation to the priority taxa in Table 1, a number of overlapping areas of interest were identified. As a result an action programme is proposed for a 3-5 year period (Table 2). Funding is expected to be available for some of this work by ICARDA, some national programmes and the IBPGR.
33. Specific priorities not included in Table 2 are:
- | | |
|----------------------------------|---|
| <u>Trifolium subterraneum</u> | Albania, Yugoslavia, Bulgaria, Canaries, Azores. |
| <u>Trifolium</u> species | All areas of the region on an opportunistic basis. |
| <u>Vicia</u> and <u>Lathyrus</u> | Apart from Greece, Cyprus and Turkey which are being collected systematically, all areas of the region on an opportunistic basis. |
| <u>Ornithopus</u> | In low altitude areas of Calabria, Italy. |
| <u>Grasses</u> | All areas of the region on an opportunistic basis especially low elevation and areas for <u>Cenchrus</u> and <u>Eragrostis</u> . ICARDA's priority will be to collect grasses in high elevation areas (1500-3600m). |
34. A general discussion ensued on collecting techniques. It was agreed that in future collecting should be more thorough and should be geared to a practical situation with the ultimate aim

Table 2. Priority areas for collecting (to be discussed with each national programme which will participate in planning and execution and deposit of material)

<u>collecting area</u>	<u>genera/species to be collected</u>	<u>interested country¹⁾/ institutions</u>	<u>collecting suggestions Date</u>	<u>Collected by</u>	<u>probable funding</u>
1) Sicily	<u>annual medics, ann.Trifolium, Hedysarum coronarium, Ornithopus</u>	Australia, Spain, ICARDA	1986	-	IBPGR
2) Central & South Italy	<u>Onobrychis, Hedysarum, Trifolium repens</u>	Italy, Australia, Iran, (Spain)	1986/87	-	?Italy
3) Atlas, N.Africa	<u>Trifolium fragiferum, Medicago, Hedysarum, Festuca, Dactylis</u>	Australia, Italy, ICARDA	1987	IBPGR ²	ICARDA
4) Coastal	<u>Ornithopus, Hedysarum, Grasses</u>	Morocco, Spain, ICARDA (Australia)	1987	"	ICARDA
5) Iran	<u>annual medics, Onobrychis, Vicia, Lathyrus, Pisum, Coronilla, Grasses</u>	Iran, ICARDA, (certain areas), Australia	1986	Iran	IBPGR
6) Cyprus	<u>Trifolium, Vicia, Lathyrus, Pisum, Coronilla</u>	Cyprus, ICARDA	1987	Cyprus	?Cyprus
7) Turkey, Syria	most forages	All programmes	1986	ICARDA	ICARDA
8) Arabian Peninsula	lucerne from wadis/oasis	at risk of genetic erosion	1988	IBPGR	IBPGR
9) Iberian Peninsula	<u>perennial Medicago, Ornithopus, Dactylis, Festuca, Trifolium subterraneum</u>	Spain, Australia	1986/7	-	?Spain
10) Afghanistan & Baluchistan	<u>whole range incl. Cenchrus, Eragrostis</u>	Iran, ICARDA	1987	ICARDA/ IBPGR ²	ICARDA
11) Iraq	<u>Pisum, Coronilla varia, grasses</u>	ICARDA	1988?	-	ICARDA
12) Wadis/Oasis N. Africa	<u>Medicago sativa</u>	ICARDA	1988	IBPGR	IBPGR
13) Aegean Islands	<u>annual medics & clover Vicia</u>	Australia ICARDA	1986 1986	Australia	IBPGR/ Australia

1) For Australia read the programmes on Trifolium and Medicago.

2) IBPGR to provide for grasses.

of collecting population samples representative of the variability. This will necessitate larger periods in the field to include local contacts, collection of herbarium material and actual collections. It is stressed that characterization of the collection sites is extremely important.

TRAINING REQUIREMENTS

35. The Group recognized a need to train a significant number of scientists of national forage programmes in aspects of genetic resources work. In particular there is the need for hands-on training on collection, seed storage, evaluation, regeneration, and documentation. It was agreed that training should be held in institutes which have active breeding programmes of which genetic resources work was an integral part. Where training on genetic resources is offered by Universities (e.g. Birmingham UK, Gembloux Belgium, Iran, Mediterranean regional course in Spain) they should be urged to include specific courses related to forages.
36. ICARDA expressed its intention of organizing 6-8 week courses in collecting and evaluation; and on conservation, but these depend on funding and require complementing by IBPGR. It was also noted that Dr. A. R. Monreal, Instituto Nacional de Investigaciones Agrarias (INIA), Spain had offered training on collecting and seed multiplication techniques to the ECP/GR. IBPGR has also funded a training course in 1984 for ECP/GR at the Welsh Plant Breeding Station, Aberystwyth, UK on forage collecting, maintenance, evaluation and documentation. The Group felt that more specialized hands-on training would be preferable and ICARDA, Western Australia and South Australian programmes offered facilities for scientists to spend extended periods there. It was stressed that there is an urgent need for training in the maintenance and evaluation of cross-pollinated material and on adequate techniques for its satisfactory pollination.

37. Institutes in the region which might be able to organize group training courses are the Fodder Crops and Pasture Research Institute, Larissa, Greece; INIA, Badajoz, Spain and Istituto Sperimentale per le Colture Foraggere Sezione OP di Cagliari, Italy. The IBPGR Regional Coordinator will assess the possibilities and take appropriate action.

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Agenda

1. Welcome
2. THE IBPGR PROGRAMME (J.T. Williams)
3. REVIEW OF EXISTING COLLECTIONS
 - 3.1 Brief review of existing programmes, aims, information on numbers of accessions
 - 3.2 Review and update of storage facilities
 - 3.3 Listing and review of in situ resources.
 - 3.4 Rhizobium collections
4. DEFINITION OF PRIORITIES
 - 4.1 Priority taxa for (a) breeding programme (b) genetic conservation
 - 4.2 Identification of critical areas for collection and taxa involved.
5. CHARACTERISATION AND PRELIMINARY EVALUATION
 - 5.1 Consideration of applicability of IBPGR/CEC Descriptor Lists for grasses and forage legumes.
6. DOCUMENTATION
 - 6.1 Listing of computing facilities available
 - 6.2 Data bases - transfer of information and responsibilities
7. DETAILS OF PROPOSED ACTION PROGRAMME 1985-1989
 - 7.1 Details, costs, how are the objectives to be achieved?
8. TRAINING - IDENTIFICATION OF NEEDS
 - 8.1 Group training - seminars, workshops
 - 8.2 Individual training
 - 8.3 Offers to hold training courses
9. AOB

ADDENDUM TO DIRECTORY OF GERMPASM COLLECTIONS - 7. Forages (IBPGR 1984)

SOUTH AUSTRALIA, Adelaide. Information per K. G. Boyce

Number of forage legume accessions at 1 March 1985 per species (see p. 4 of Directory)

1. Annual

a) Medicago spp. (total 11,406)

aculeata	390	lanigera	1	rotata	113
arabica	218	littoralis	1395	rugosa	123
blancheana	58	minima	250	sauvagei	3
constricta	196	murex	153	scutellata	171
coronata	20	muricoleptis	5	soleirolii	10
disciformis	48	noeana	39	tenoreana	1
granadensis	10	orbicularis	990	tornata	431
heyniana	1	polymorpha	2374	truncatula	2865
intertexta	299	praecox	23	turbinata	163
laciniata	288	rigidula	768		

b) Trifolium spp. (total 1616)

affine	1	eriosphaerum	18	resupinatum	142
aintabense	56	glanduliferum	2	retusum	1
alexandrinum	24	globosum	37	salmoneum	1
angustifolium	19	glomeratum	26	scabrum	12
apertum	1	goniacarpum	1	scutatum	30
argutum	67	hirtum	169	setiferum	1
arvense	12	incarnatum	10	spumosum	85
balansae	28	israeliticum	3	squarrosum	2
batmanicum	32	isthmacarpum	19	stellatum	35
berytheum	1	lappaceum	13	stendneri	1
billardieri	1	leucanthum	12	strepens	1
bocconeii	2	ligusticum	2	striatum	4
boissieri	3	lugardii	1	strictum	2
brachcalycinum X		lucanicum	15	subterraneum X	
erisosphaerum	14	masaiense	1	eriosphaerum	6
campestre	42	mattiriolianum	1	subterraneum X	
cernuum	8	magalanthum	2	pilulare	1
cherleri	126	meironense	2	suffocatum	5
chilense	1	nigrescens	38	sylvaticum	5
ciliolatum	1	obscurum	12	tembense	1
clusii	14	ornithopodioides	1	tenuifolium	1
clypeatum	7	palaestinum	8	tomentosum	43
constantinopolitanum	2	pallidum	2	tridentatum	1
dasyurum	20	pauciflorum	43	vavilovii	3
dichroanthum	9	philistaeum	1	velivolum	1
diffusum	1	pilurare	77	vernum	1
dubium	9	plebeium	11	vesiculosum	30
equinatum	61	purpureum	111		

c) Other Genera (total 1051)

Anthyllis	4	(1)	Lotus	75	(22)
Astragalus	315	(17)	Ornithopus	136	(5)
Biserrula	1	(1)	Scorpiurus	159	(4)
Coronilla	39	(5)	Segurigera	6	(1)
Hedysarum	13	(1)	Tetragonolobus	8	(3)
Hymenocarpus	86	(1)	Trigonella	209	(27)

() indicates the no. of species

2. Perennial

Medicago spp.	1650
Onobrychis	286

CYPRUS

Agricultural Research Institute
P.O. Box 2016
Nicosia

Curator/person in charge: Athena Della

Details of samples: Legumes: Lathyrus sativus 9, Medicago sativa 29, Pisum sativum 6, Vicia ervilia 5, Vicia sativa 67,
Cereals: Hordeum vulgare 26

Geographic origin: Cyprus

Availability of exchange: Samples need multiplication

Evaluation: No evaluation yet

Documentation: Passport data computerized

Storage: Active collection, 4°C 50% R.H., laminated foil packets

ITALY

Istituto Sperimentale per le Colture Foraggere
Sezione O.P. di Cagliari
via Mameli, 118 09100 Cagliari

Curator/person in charge: E. Piano

Details of samples: Legumes: Trifolium subterraneum (sensu lato) 1200

Grasses: Dactylis glomerata 40, Festuca arundinacea 50, Hordeum bulbosum 10, Phalaris aquatica 10

Geographical representation: Clover lines from Sardinian native populations. Grass ecotypes from Sardinia and others Mediterranean areas.

Availability for exchange: Clover freely available from 1987 in small quantities. Limited quantities of grasses freely available.

Evaluation: Clover maturity, oestrogen content (ssp. subterraneum and yannicum). In progress seed yield, hardseededness, and herbage yield.

Grasses - agronomic characteristics

Documentation: Manual

Storage: Ambient. Transfer in progress to short-medium term store (5°C).

MOROCCO

Station Centrale des Plantes Fourragères
I.N.R.A. BP 415 Guich
Rabat

Curator/person in charge: Bari Abdallah

Details of samples: Indigenous and introduced

Legumes: Lathyrus 26, Lotus 15, Lupinus 50
Medicago sativa 157, Medicago spp (annual)
539, Onobrychis 15, Ornithopus 28, Pisum
78, Trifolium 94, Vicia 42, others 21

Grasses: Agropyron 23, Avena 41, Bromus
10, Dactylis 29, Eragrostis 27, Festuca
32, Hordeum 12, Lolium 30, Panicum 13,
Pennisetum 16, Phalaris 23, Zea 24, others
39

Geographical distribution: Morocco & Mediterranean

Availability for exchange: No information

Evaluation: None

Documentation: No information

Storage: No information

SYRIA

International Centre for Agricultural
 Research in the Dry Area (ICARDA)
 P.O. Box 5466
 Aleppo

Curator/person in charge: B. Somaroo

Details of samples:

Legumes: Astragalus (18 spp) 310,
Coronilla (4)48, Hedysarum (3)12,
Hippocrepis (2)49, Hymenocarpus 61,
Indigofera 1, Lathyrus (20)533, Lotus
(9)39, Lupinus (4)33, Medicago(annual)
(29)3493, Medicago(perennial) (22)858,
Melilotus (3)24, Onobrychis (51)746,
Ornithopus (2)13, Pisum (3)3230,
Scorpiurus (2)54, Trifolium (46)932,
Trigonella (7)144, Vicia (40)2869

Grasses: 622 including Agropyron,
Dactylis, Panicum, Phalaris and other
genera

Forage cereals: Avena 531, Hordeum 1719,
Triticale 1565

Others: Atriplex (8)12, Brassica 10,
Poterium 17

Geographical representation: Mainly Southwest Asia and world wide

Availability for exchange: Generally available

Evaluation: Agronomic characters only

Documentation: Manual to be computerized

Storage: Base - deep freezer chest-16°C, 6-7%M.C.
 McCartney bottles. Active 4°+ 2°C,
 15%R.H., MC 6-7% in cloth bags.

PRIORITY TAXA(1) South Australia information per K. G. Boyce

(a) for breeding

annual legumes: Medicago littoralis, M. polymorpha,
M. rugosa, M. scutellata, M. tornata,
M. truncatula

perennial legumes: Medicago sativa, Onobrychis viciifolia.

(b) for genetic resources

All annual & perennial Medicago spp.,
Onobrychis spp.

Other legume genera: Astragalus, Coronilla, Hedysarum,
Hymenocarpus, Lotus, Ornithopus,
Scorpiurus, Tetragonolobus, Trigonella,
annual Trifolium spp., T. alexandrinum,
T. balansae, T. cherleri, T. hirtum,
T. nigrescens, T. purpureum,
T. resupinatum, T. vesiculosum.

(2) Western Australia information per W. J. Collins

(a) for breeding

annual legumes: Trifolium subterraneum, T. cherleri, T.
hirtum, Ornithopus compressus
(see also K. G. Boyce's list)

(3) Cyprus, ARI information per Athena Della

(a) for breeding

grass: Hordeum spontaneum
legumes: Medicago, Vicia sativa

(b) for genetic resources

grass: wild Hordeum, Lolium, Avena (local varieties)
legumes: Vicia (wild), Pisum, Medicago spp. (annual),
M. sativa, Trifolium spp.

Italy Cagliari per E. Piano

(a) for breeding

grasses: Festuca arundinacea, Dactylis glomerata, Lolium
rigidum, Hordeum bulbosum.
legumes: annual Medicago spp

(b) for genetic resources

grasses: Festuca arundinacea, Phalaris aquatica, Dactylis
glomerata
legumes: Hedysarum coronarium

Other IBPGR Forage Publications

Davies, W. Ellis 1984. A proposed plan of action for forage genetic resources AGPG:IBPGR/83/24, pp 1-30, IBPGR, Rome.

Davies, W. Ellis and McLean, B. 1984 Directory of germplasm collections. 7 Forages (Grasses, Legumes etc.) AGPG:IBPGR/83/90, pp 1-43, IBPGR, Rome.

Tyler, B.F., Hayes, J.D. and Davies, W. Ellis 1985 (Editors) Descriptor list for grasses AGPG:IBPGR/85/72, EUR, pp 1-30, IBPGR Secretariat, Rome 1985, CEC Secretariat Brussels 1985.

Andersen, S. and Davies, W. Ellis 1984 (Editors) Descriptor list for forage legumes. EUR 8354 en 3 AGPG:IBPGR/84/191 pp 1-29, CEC Secretariat, Brussels 1984, IBPGR Secretariat, Rome 1984.

Anon 1984 Report of IBPGR Working Group on Tropical and Subtropical Forages, held at the CSIRO Division of Tropical Crops and Pastures, Queensland, Australia, June 1984 AGPG:IBPGR/84/105 IBPGR Rome 1984.

Anon 1984 Report of a Working Group on Forages [European] held at the Fodder Crops and Pasture Institute, Larissa, Greece, 7-9 February 1984. AGPG:IBPGR/84/37, UNDP-IBPGR, Rome, May 1984, pp 1-19.

Davies, W. Ellis 1982 The role of an international agency (IBPGR) in the conservation of genetic resources of forage plants. in : The utilization of genetic resources in Fodder Crop Breeding. Proc. of the Eucarpia Fodder Crops Section, Aberystwyth September 1982 pp 185-197.

Davies, W. Ellis 1984 Conservation of forage legume genetic resources. in : Proc. of the Eighth Trifolium Conference, Tifton Georgia, USA p 6.

Burton, G.W. and Davies, W. Ellis 1984 The efficient handling of germplasm of cross-pollinated crops, Chap. 13 in : Crop Genetic Resources : Conservation and evaluation. pp 180-190 Eds : J.H.W. Holden and J.T. Williams. London, George Allen and Unwin.