THE CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

TECHNICAL ADVISORY COMMITTEE

Fifteenth Meeting, Rome, 31 January - 4 February, 1977

FOREST GENETIC RESOURCES

(Agenda Item 8)

TAC SECRETARIAT

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Rome, 1977

W/K4594

NOTE FROM THE SECRETARIAT ON AGENDA ITEM 8 (Forest Genetic Resources)

The documentation on this agenda item includes a background note prepared by the FAO Forestry Department on the development of the programme and activities in the field of forest genetic resources with the following annexes:

(i) a summary of the five-year Global Programme, a portion of which is proposed for financing by the CGIAR;

(ii) a list of species which could be considered within that portion of the programme;

(iii) the proposed breakdown of the CGIAR contribution to the Global Programme;

(iv) the project no. 1, as an example of the type of projects which could be included in the Work and Budget of the IBPGR in 1978.

In addition the document,"Forest Genetic Resources Information Paper no. 4 " which describes the Global Programme, is provided as a general reference.

The Committee may wish first to consider the priorities as proposed by the IBPGR, and advise on the extent to which the IBPGR should include forest genetic resource activities in its Programme of Work for 1978 and its forward plans for 1978 - 82. It is not suggested at this stage that TAC discuss and possibly approve the programme proposals contained in the documents listed under (i) to (iv). TAC may however wish to give some guidance as to the relative importance which these activities should take within the IBPGR programme either in terms of percentage of the budget or in terms of an order of magnitude of the expenditures in this area.

Should TAC agree to the principle of including some of these activities in the 1978 IBPGR programme, TAC will have the opportunity to consider the proposal in more detail as part of its review of the Centres' 1978 programmes of work and budgets at its 16th meeting in Cali, Colombia. In line with the recommendations of the CGIAR Review Committee, it is expected that the IBPGR submission will include an outline of the five-year programme, within which the planned allocation for forest genetic resources could be considered by TAC.

PR 3/10.15
18.1.77

Background Note by the FAO Forestry Department on the Development of the Programme and Activities in the Field of Forest Genetic Resources.

INTRODUCTION

1. The area of man-made forests in the world amounts to about one fiftieth of the area of forest land. Forestry is where agriculture was ten thousand years ago; wild populations predominate, but there are some primitive cultivars of great promise established in most countries.

2. This situation confers big advantages in flexibility of action in forest genetic resources. On the one hand, an accelerated rate of domestication is inevitable and justified. Intensification of efforts in exploration, collection and evaluation is essential to achieve the greatest possible benefits from domestication. On the other hand, there are still good possibilities in some areas for conservation of gene resources as part of the conservation of natural ecosystems.

3. Conservation of genetic diversity is necessary for its long-term insurance value. Urgent action is needed to safeguard certain forest gene pools which are threatened by pressure to divert the land to agriculture or other purposes. The threat is imminent in some tropical areas. Whenever conservation *in situ* is impracticable, collection must be done for conservation *ex situ*.

FAO PANEL ON FOREST GENE RESOURCES

4. Formed as result of the 1967 FAO/IBP Technical Conference on the exploration, utilization and conservation of Genetic Resources. Met in 1968, 1971 and 1974. For latest report see FAO 1974. Next meeting due March 1977 in Canberra.

5. Initially decided to concentrate the limited financial funds available to FAO on exploration and collection activities carried out by institutes already working competently in this field. Collections supported or coordinated by the Panel have covered a number of important genera: *Araucaria*, *Eucalyptus*, *Picea*, *Pinus*, *Pseudotsuga*, *Tectona*. FAO funds spent on these activities from 1966-75 totalled $152 200 or an average of $ 15 000 a year. Expenditure budgeted for the 1976/77 biennium is $22 500 a year. This compares with $ 70 000 a year recommended by the Panel back in 1968.

6. Laid down priorities for action by (a) Region (b) Species (c) Operation.

7. Stimulated FAO to produce "Forest Genetic Resources Information", a recurrent but purposely irregular newsletter.

8. Prepared "Proposals for a Global Programme for Improved Use of Forest Genetic Resources" (FAO 1975 a).

THE GLOBAL PROGRAMME

9. Provides the basis for a balanced programme covering a five year period. Approximately one third of proposed expenditure is devoted to exploration and collection, one third to conservation, and the remaining one third to training, data storage and retrieval, research on flowering and seed, international seed orchards, information services, etc.

10. Possible sources of funds are indicated. Of the five million dollars proposed to be spent over five years, two million are expected to be available from the continuation of existing programmes, three million would have to come from new sources. Of the new sources, the most important proposed were UNEP ($0.85 million) and the Consultative Group on International Agricultural Research (CGIAR) ($0.87 million).

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RLW:sr
3 January 1977

11. The Global Programme Proposals were prepared in 1974. Previous proposals for a Global Research Project had been submitted to the United Nations Development Programme (UNDP) in 1972, but UNDP recommended submission to IBPGR, after it was constituted, as a more appropriate source of finance.

IUCN, UNESCO, IUFRO

12. Close liaison needs to be maintained with these organizations; with the International Union for Conservation of Nature and Natural Resources (IUCN) for its general concern with conservation, and especially with its Threatened Plants Committee; with the United Nations Education and Scientific Organization (UNESCO) for its MAB 8 Programme, "Conservation of natural areas and of the genetic material they contain"; with the International Union of Forestry Research Organizations (IUFRO) with special reference to the Working Party on Conservation of Gene Resources.

UNEP (United Nations Environment Programme)

13. Financed the Pilot Study on "The Methodology of Conservation of Forest Genetic Resources" (FAO 1975 b)

14. Included forestry in the "overview" on Conservation of Genetic Resources presented to the fourth session of its Governing Council in 1976.

15. Agreed to finance a two year project on Conservation of Forest Genetic Resources. This is based on the conservation portion of the Global Programme, but at a reduced level (UNEP contribution $ 328 000, estimated total expenditure $ 777 000). By the end of 1976, seed and money for establishment of ex situ conservation/selection stands of important provenances of two species of pine and two of eucalyptus had been distributed to five developing countries in Africa and Asia.

IBPGR

16. The International Board on Plant Genetic Resources was established in 1974 under the auspices of CGIAR. Its terms of reference refer to "plant genetic resources with particular reference to species of major economic importance". Several non-food crops are included among priority crops. Its budget for 1976 is $1.2 million.

17. At its Second Session (May 1975), the Board's forester member presented a paper which gave the forest resources background and described the main features of the Global Programme (Bouvarel 1975).

18. At its Third Session (February 1976) the Board Professor Morandini, Chairman of FAO's Panel of Experts on Forest Gene Resources, to review the activities of the Panel since its establishment in 1968 and the financial resources needed to implement the Global Programme. The Board unanimously recommended that certain limited projects in forestry, i.e. food trees, fuelwood species and stabilization of marginal environments, should qualify for Board support, as well as the extension of the Genetic Resources Communication/Information/Documentation System to forestry genetic resources collections.

19. Prior to including forest genetic resources conservation activities in its programme, IBPGR felt it necessary to seek the guidance of the CGIAR and TAC both as to their general relevance to the objectives of the CGIAR and the mandate of IBPGR and as to the more immediate need to start some of these activities as part of the 1978 programme and budget of the Board.

FOREST GENETIC RESOURCES, AGRICULTURE AND FOOD

20. The following arguments are relevant to the importance of forestry to food and to life:

(1) Production of higher forest yields per hectare through improved use of forest genetic resources can make more land available for food production.

(2) Use of forest genotypes adapted to poorer sites can make better sites available for food production.

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(3) Most food needs to be cooked. Wood, in solid or charcoal form, is often the most convenient form of fuel for cooking. In its absence, cowdung may be burned which should be returned to fertilise the arable soils for food production.

(4) Agrisilviculture, e.g. taungya, offers opportunities for combining food production with wood production during the early years of the forest rotation.

(5) Protection or restoration of forest cover on a watershed may be vital to the protection of the food crops lower down the valley.

(6) Shelterbelts in dry, windy areas may be a prerequisite for successful agriculture.

(7) Wood is much used both in the production and the consumption of food. The hoe handle to cultivate, the wooden table at which to eat food, the wooden cupboard in which to store it, the poles or sawn timber for housing, the paper through which the farmer may learn improved farming practices - all are important.

(8) In short, an exclusive preoccupation with food crops would be a dangerous oversimplification. Man shall not live by bread alone, still less by flour alone.

PRIORITIES

21. At its Third Session, IBPGR noted that the scope of the Global Programme for Forest Genetic Resources went far beyond the Board's own capacity to finance it. It therefore identified the following fields of action as most relevant to its own programme with agriculture and food production:-

(1) Forest tree species for the production of food. 1/

(2) Forest tree species for production of fuelwood for domestic cooking and heating.

(3) Forest tree species for amelioration of the agricultural environment (e.g. shelterbelts, sand dune stabilization, watershed protection).

(4) Extension of the Board's Genetic Resources Communications/Information/ Documentation System to forestry genetic resources collections.

22. Choice of the top priority species from (1), (2) and (3) above will be discussed by the FAO Panel on Forest Gene Resources at its fourth session (Canberra, March 1977). The attached Secretariat note lists a number of species of potential importance to which the panel will assign priority ratings. It should be noted that many of the species fulfil more than one purpose.

23. For many of these species the same operations of exploration, collection, evaluation, conservation and utilization will be needed as are already being carried out for industrial species, such as Pinus caribaea. Meanwhile, the basis for an immediate modest pilot project for establishment of ex situ conservation/selection stands of selected provenances of Eucalyptus camaldulensis is already available in the attached proposal which was submitted to IBPGR's Executive Committee in 1975. Since E. camaldulensis is a valuable species both for fuelwood and for shelterbelts, the value of certain provenances (e.g. Petford, Katherine and Lake Albacutya) is already proven by international evaluation trials, and seed is available from Australia, it would be an ideal species for a pilot project closely related to the theme agro-forestry.

1/ Including possibly tree species which can produce fodder.

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REFERENCES

Bouvarel, P. 1975. Analysis of the Global Programme proposed by the FAO Panel of Experts on Forest Gene Resources. Working Paper AGPE:IBPGR/75/32.

FAO 1974. Report of the Third Session of the FAO Panel of Experts on Forest Gene Resources. Rome

FAO 1975 a. Forest Genetic Resources Information No.4. Rome

FAO 1975 b. The Methodology of Conservation of Forest Genetic Resources, report on a pilot study. Rome

FAO 1977 Species for improvement of agricultural environment and rural living. Working Paper FO:FGR/4/6.

Extract from "Proposals for a Global Programme for Improved Use of Forest Genetic Resources"

ANNEX I

PROPOSED PROGRAMME 1975-79

SUMMARY OF GLOBAL PROGRAMME BY OPERATIONS

Note: 1 = Funds expected to be available from continuation of existing programmes.
2 = Additional funding required from new sources.

Operation		1975	1976	1977-79	Total 1975-79
Explore/Collect for evaluation	1	205	232	929	1366
	2	36	49	223	308
	Total	241	281	1152	1674
Collect to conserve	1	25.5	29.5	120	175
	2	(33)	(62)	(358)	(453)
	Total	(58.5)	(91.5)	(478)	(628)
Conserve ex situ	1	-	-	-	-
	2	90	156	290	536
	Total	90	156	290	536
Conserve in situ	1	-	-	-	-
	2	40	120	460	620
	Total	40	120	460	620
Training	1	68	9	117	194
	2	8	9	37	54
	Total	76	18	154	248
Data storage/retrieval	1	-	-	-	-
	2	30	70	150	250
	Total	30	70	150	250
Flowering/seed research	1	5	6	24	35
	2	25	60	165	250
	Total	30	66	189	285
International seed orchards	1	-	-	-	-
	2	40	70	140	250
	Total	40	70	140	250
Seed certification	1	-	-	-	-
	2	-	5	18	23
	Total	-	5	18	23
Appraise need for regional centres	1	-	-	-	-
	2	-	50	-	50
	Total	-	50	-	50
Information services	1	8	9	37	54
	2	-	25	35	60
	Total	8	34	72	114
Coordination (including panel meetings)	1	25	30	139	194
	2	-	36	145	181
	Total	25	66	284	375
Total	1	336.5	315.5	1366	2018
	2	302	712	2021	3035
	Total	638.5	1027.5	3387	5053

ANNEX II

SPECIES FOR IMPROVEMENT OF AGRICULTURAL ENVIRONMENT AND RURAL LIVING

At its third session in February 1976 the International Board for Plant Genetic Resources (IBPGR) expressed its unanimous opinion, subject to approval by its parent body, the Consultative Group on International Agricultural Research (CGIAR), that in addition to food trees, it ought to be supporting limited projects in forest genetic resources, including ..... exploration and conservation of the genetic resources of a few species important for agriculture in connection either with fuel requirements or the stabilization of marginal environments.

In the past the Panel has given high priority to species of international value for industrial wood production. At its third session in 1974, however, it recommended that slower growing species adapted to difficult sites, e.g. Acacia spp. in arid and semi-arid zones, should not be neglected. In view of the above-quoted opinion of the IBPGR that it is more likely to finance projects for species important for agriculture than industrial wood species, it would be opportune for the Panel to take a closer look at these "agricultural" species during its 4th session.

The natural variation of most of these species has received little or no investigation as yet, so that operations to be carried out must include exploration, collection and evaluation, as well as and in some cases preceding conservation and utilization.

The following categories appear suitable to engage the interest of the IBPGR:

1) Food (Fo) and fodder (Fd)

   Major tree food crops such as coconut and date palms are agricultural crops and need not be considered here, but species which combine a forest function with production of food or fodder merit inclusion.

2) Fuelwood (Fu)

   In this category some species have already passed through the stages of exploration and evaluation and qualify for immediate planting in provenance conservation/selection stands. A good example is Eucalyptus camaldulensis. A proposal for a project for this species was submitted to the IBPGR secretariat in July 1975 and is attached as Annex 1.

3) Shelterbelts (Sh)

4) Soil Stabilization (SS)

Includes special types such as sand dune stabilization, planting of eroded slopes.

5) Farm forestry (FF)

Species intimately mixed with agricultural crops (e.g. Acacia albida, A. senegal) or surrounding rural homesteads for shade and amenity.

The following list of candidate species is suggested. Most species perform more than one function, in fact a species which does not is probably not worth considering. The list is deliberately biassed towards the more arid zones, since this is where environmental amelioration or abuse is likely to have the greatest effects.

Acacia albida	Fd Fu FF
A. aneura	Fd Fu Sh SS
A. cyanophylla	Fu Sh SS
A. ligulata	Fu Sh SS
A. nilotica	Fd Fu FF
A. peuce	Fu Sh SS
A. salicina	Fu Sh SS
A. senegal	Fu FF
A. tortilis	Fu FF
Anacardium occidentale	Fo FF
Argania sideroxylon	Fd Fu SS
Atriplex spp.	Fd SS
Azadirachta indica	Fu Sh FF
Calligonum spp.	SS
Casuarina decaisneana	Fu Sh SS
Ceratonia siliqua	Fd Fu
Conocarpus lancifolius	Fu Sh SS
Eucalyptus astringens	Fu Sh SS
E. brockwayi	Fu Sh SS
E. camaldulensis	Fu Sh
E. gomphocephala	Fu Sh SS
E. intertexta	Fu Sh SS
E. leucoxylon	Fu Sh
E. loxophleba	Fu Sh SS
E. microtheca	Fu Sh SS
E. occidentalis	Fu Sh SS
E. ochrophloia	Fu Sh SS
E. salmonophloia	Fu Sh SS
E. salubris	Sh SS
E. sargentii	Fu Sh SS
E. sideroxylon	Fu Sh
E. tereticornis	Fu Sh
Gleditsia triacanthos	Fd Fu Sh SS
Haloxylon spp.	Fd Fu SS
Kochia spp.	Fd SS
Morus alba	Fo Fu FF

Prosopis spicigera	Fd Fu Sh SS
+Prosopis spp.	Fd Fu Sh SS
Tamarix aphylla	Fu Sh SS
Zizyphus spp.	Fd Fu SS

+ Nomenclature of the American species needs clarification.

The Panel is invited to select 4 - 6 from the above, for each of which a self-contained project proposal could be prepared in the event of IBPGR funds becoming available. In addition to Eucalyptus camaldulensis, the species Acacia albida, A. aneura, Eucalyptus microtheca, Prosopis spp. and Tamarix aphylla appear to be strong candidates for inclusion. Advice is also requested on the operations needed for each of the preferred candidates and the estimated cost.

ANNEX III

PROPOSED BREAKDOWN OF CGIAR CONTRIBUTION TO FOREST GENETIC RESOURCES

(over 5 year period)

Operation	1974 Proposal (thousand dollars)	1977 Proposal (thousand dollars)
Exploration/collection for evaluation	103 1/	200 2/
Exploration/collection for conservation	-	50 2/
Establishment of conservation/selection stands ex situ	63 1/	200 2/
Establishment of prototype international seed orchards (Pinus caribaea)	250	-
Data storage /retrieval	250	250
Appraisal of need for international forest gene centres	50	-
Coordination, training	150	166
TOTAL	866	866

Notes: 1/ Unrestricted range of important species.

2/ Restricted to species important for food, fuelwood and stabilization of marginal environments.

INTERNATIONAL BOARD FOR PLANT GENETIC RESOURCES

FOREST GENETIC RESOURCES PROJECT No. 1
ESTABLISHMENT OF PROTOTYPE STANDS
FOR EX-SITU CONSERVATION/SELECTION OF PROVENANCES

OBJECTIVES

(1) To initiate the establishment of ex situ provenance conservation/selection stands of Eucalyptus camaldulensis on two sites in each of three countries, India, Nigeria and Ivory Coast.

(2) To obtain information on the most suitable techniques and on the costs of establishment, to be used as an aid to planning further conservation/selection stands of this, and of other, species in a number of developing countries.

BACKGROUND

(1) Provenances/populations of potential value, endangered in their areas of natural distribution and with no prospect of really effective conservation in situ, need to be conserved in artificial stands established ex situ, where effective long-term conservation can be assured. Such stands may be planted both in the country of origin and in introducing countries. This is the Conservation Stand ex situ. Some provenances of Central American pine fall into this category.

(2) Provenances/populations which have shown clear superiority in local adaptability on new sites in introducing countries and which are not immediately endangered in their indigenous distribution, but seed of which from indigenous collection is inaccessible and expensive to collect, need to be established as artificial stands in the introducing countries as sources of seed or vegetative propagules and for individual selection for breeding and continued improvement. This is the Selection Stand ex situ. The Katherine and Petford provenances of E. camaldulensis fall into this category.

(3) Selection stands which survive automatically fulfil a conservation function, while conservation stands may provide a source of selected material as well as conserving variability. Thus, in practice, many stands will combine to some extent the conservation and the selection objectives, and may be considered as Conservation/Selection Stands ex situ.

(4) In order to maintain adequate variation within the gene pool, the minimum area for a Conservation/Selection Stand should be 10 ha. In order to ensure the maintenance of an asset which can be of immense long-term value, impeccable standards of planting, tending and protection (e.g. against fire) are essential. If several provenances of a species are to be established on more than one site, the whole operation is expensive.

(5) Ideally every country should have its own conservation/selection stands of the species and provenances in which it is interested. In practice this is not possible initially because: (a) Seed supplies are inadequate; (b) Not all countries can afford the considerable expense involved; (c) Not all countries can supply the technical expertise needed to supervise the work.

(6) Therefore, there is a need in the initial stages for a limited number of conservation/selection stands, which should serve international or regional, as well as purely national, needs.

(7) Countries suitable to "host" these international conservation/selection stands should be those which combine: (a) Intense interest in the provenances concerned from their own national forestry viewpoint (i.e. they will be among the countries which will benefit most from the project); (b) Sufficient technical expertise and organizational stability to ensure a high standard of long-term management; (c) Readiness to make part of the seed and/or other propagules produced by the stands available to other countries.

(8) If the above criteria are met, but national financial resources are inadequate for the considerable expenditure involved, these should be supplemented from international sources.

(9) In such cases, arrangements should be as simple as possible. e.g. (a) International resources should supply the seed and pay the estimated establishment costs over the first five years, while national resources pay the cost of long-term management and protection; (b) operational responsibility to rest with the forest service of the "host" country; (c) 50% of the eventual seed harvest to be made available to other countries on demand, the remainder to the host country. Vegetative propagating material to be made available to other countries on demand.

(10) Where the "host" country has adequate financial resources and prefers to pay for all expenditure itself, the above arrangement should be modified, e.g. international resources would make only the initial seed available and in return international needs would receive only 20% of the eventual seed harvest of the stands.

(11) Factors to be considered in establishing conservation/selection stands are summarised in chapter 8 of "The Methodology of Conservation of Forest Genetic Resources" (FO:MISC/75/8), which is attached as Annex 2. Medium-term proposals are shown in Table 4, (pages 24-26) of Annex 1.

(12) No international conservation/selection stands, as described above in (9), have yet been established. It is a matter of urgency to make a start. The prototype stands have an essential role, not only in themselves ensuring conservation and the possibility of selection, but still more in developing standards of establishment and management which can be applied to the many similar stands to be established in the future.

DESCRIPTION OF PROJECT

Seed will be provided by the Forest Research Institute in Canberra from the collections which its Seed Section has carried out over recent years. The provenances to be established will be selected on the results of earlier trials (see Forest Genetic Resources Information No. 2, pages 32-42, attached as Annex 3). Provenances of particular importance are:

Queensland (Petford or neighbouring locality),
Northern Territory (Katherine or neighbouring locality),
Victoria (Lake Albacutya or neighbouring locality).

Two localities will be selected in each country, in order to sample the climatic or soil variation which occurs over the most widespread representative sites available for afforestation. For example, in Nigeria, one set of stands should be established in the Guinea, and one in the Sudan Zone.

The estimated cost of establishment, including nursery, site preparation, planting and tending until the crop closes canopy, is summarised in the following table, in which P represents the date of planting, P - 1 the year before planting, P + 0 the first year after planting etc.

Cost in US $

Years before or after planting	P - 1	P + 0	P + 1	P + 2	Total
Unit of area					
Per hectare	120	120	70	40	350
Per site (2 provenances x 10 ha each)	2,400	2,400	1,400	800	7,000
Total for project (3 countries x 2 sites each)	14,400	14,400	8,400	4,800	42,000
Rounded to	15,000	15,000	9,000	5,000	44,000

The initial contribution requested from IBPGR in 1976 is $ 15,000. Further contributions, amounting to $ 29,000 over the period 1977-79, should be foreseen, but would be dependent on evidence of satisfactory progress during the first year.

Operational responsibility would rest with the following organizations:

(1) Director of Forest Research, Dehra Dun, India

(2) Director, Federal Department of Forest Research, Ibadan, Nigeria

(3) Directeur, Centre Technique Forestier Tropical, Abidjan, Ivory Coast.

Each would be responsible for submitting regular reports on the progress of the project, and for paying supervisory costs.