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REVIEW OF TRAINING NEEDS

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REVIEW OF TRAINING NEEDS

I. INTRODUCTION

1. During its First Session the Commission recommended that manpower assessment be undertaken at national level to determine training needs for the collection and conservation of plant genetic resources, for plant breeding and seed development and production. Using data obtained in response to the enquiry sent to Member Countries for the FAO Seed Review 1984/85, this document reviews training needs in some of these sectors, especially in seed development and production. As far as plant genetic resources activities and plant breeding are concerned the information obtained through the enquiry is still insufficient, and although to some extent discussed in this paper these sectors should be the object of a more specific enquiry in 1987/88. In addition, the document provides on a country by country basis summarized information on training supported by FAO and IBPGR on plant genetic resources since 1969.

II. REVIEW OF PAST TRAINING ACTIVITIES ON PLANT GENETIC RESOURCES

2. FAO since 1969, and from 1974 jointly with IBPGR, has made a major effort to organize and promote training courses and provide fellowships for activities related to plant genetic resources. The Annex summarizes results on a country basis. This training has covered areas such as exploration and collection of germplasm, conservation of plant genetic resources both in situ and ex situ, regeneration, evaluation and documentation.

3. Examination of the data presented in the Annex shows that Asia has received almost 40 percent of the training positions, this high percentage being mainly the result of an active regional programme. It should be noted that a training course organized in a given country attracts a great number of trainees from that country. This was the case for China, Indonesia, Philippines, UK, Peru, India and Thailand. Grouping the numbers of trainees in the countries mentioned above shows that some 37 percent of all training positions have been filled from seven countries which represent only 6.4 percent of the 109 countries which have sent participants for training. Around 85 percent of the training courses sponsored by IBPGR have been conducted in English. It is important, therefore, to coordinate training needs with course location and language and to redirect training policy to anticipate these needs.

4. Experts and meetings sponsored by FAO/IBPGR have identified various subjects that should be given more attention in training on plant genetic resources, such as:

- . Collecting techniques for wild species
- . Characterization of germplasm
- . Seed physiology
- . Database management
- . Handling of vegetatively propagated material
- . Tropical/subtropical and arid zone forages

Widening of the gene pools open for breeding, particularly as regards the availability of wild species.
The handling of clonal crops, such as sweet potato, cassava, banana (including in vitro techniques).
Understanding of the ecological background of variation through eco-geographical surveys.
Planning for in situ conservation including such topics as assessment of minimal population size and selection of target populations.

III. TRAINING NEEDS

(i) General Considerations

5. To achieve the maximum output of food per unit area a farmer must sow seeds or plant vegetative propagating material of the right quality, in the right quantity, and at the correct time. The objective of seed production should be seen as part of a strategy to transfer the results of research on use of plant genetic resources and plant breeding to the farm. Each part of this strategy forms a link in a chain from the research station to the farm and each link must be staffed adequately with trained personnel for the strategy to succeed. A weak link means that investments in time, effort and money are wasted.

6. In the following paragraphs training needs for plant genetic resources are analyzed together with those for plant breeding and different aspects of seed production, using data referred to in paragraph 1. As stated in the Introduction, an enquiry to obtain more detailed quantitative information on manpower requirements at national level in specific areas of plant genetic resources is expected to be carried out in 1987/88.

7. For the purpose of this present document the enquiry for the FAO Seed Review 1984/85 was divided into six main sectors: plant genetic resources; plant breeding; variety evaluation and registration; seed quality control; seed production; seed marketing.

8. From replies it was found that in developing countries plant genetic resources are not usually treated as a separate sector from plant breeding. In some instances specialized genetic resources centres have been established, usually with assistance from one or more international aid agencies. However, in the majority of cases active or working genetic resource collections are sited at plant breeding institutions and are controlled by the plant breeders.

(ii) Assessing the Level of Training Required.

9. There is no objective way of assessing the number of staff needed for different tasks and the level of training required. However, some approximate general comparisons could be drawn between developed and developing countries. The replies received in response to the FAO enquiry for the 1984/85 Seed Review were not precise, and it was not possible to analyze individual countries' training needs. Instead, the data were pooled and

comparisons made between developed countries and the developing countries in Africa, Asia, Central America and South America; there was insufficient data from other regions. The following analysis uses all the data available and is not therefore a random sample since it represents only those countries which were able to supply the required information.

10. The FAO questionnaire asked for the numbers of experts employed under the various heads, the experts being divided between academic (high level trained experts) and technical support staff (medium level trained experts). A first comparison was made between the ratios of academic to technical support staff for the different tasks:

		Ratio:		
		Academic (high level trained experts)	Technical support staff (medium level trained experts)	
Region	Technical fields	Plant genetic resources, plant breeding and variety evaluation	Seed quality control, seed production and seed marketing	Overall
	Developed countries		1:1.00	1:2.11
Developing countries				
	Africa	1:0.31	1:0.38	1:0.36
	Asia	1:0.87	1:0.71	1:0.74
	Central America	1:0.30	1:1.49	1:0.90
	South America	1:1.15	1:0.90	1:0.98

11. These ratios indicate:

- (a) In developed countries greater use is made of technical support staff for seed quality control, seed production and seed marketing than for plant genetic resources, plant breeding and variety evaluation.
- (b) In developing countries academic staff are in general poorly assisted and more technical support staff are required, especially for quality control, seed production and seed marketing.
- (c) The emphasis in training for technical support staff should be on short, specialized courses, designed to prepare them for the more routine tasks to be undertaken under the direction of academically qualified staff.

- (d) That the developing countries in Africa and Asia are less well provided for than those in Central and South America.
- (e) Overall ratios represent a very wide range from one country to another and are only a general guide. Individual country needs must be assessed by in-depth country studies, which should also examine the ratio of academic to support staff. Only when adequate support staff are available can full value be obtained from expensive academic training.

(iii) Assessing the Numbers of Staff Required for the Different Tasks.

12. The above suggests that an adjustment is needed in the proportions of academic and technical support staff in developing countries, with an emphasis on increased training of the latter. It is not, however, clear whether the total numbers of both academic and technical support staff are adequate, and to assess this a different analysis of the data was undertaken. In each country for which data were available the total number of staff (both academic and technical support) employed on each task was determined for the main crop of the country (usually wheat, rice or maize). This was then related to the area under the main crop to give a figure indicating the approximate area per worker. The data for seed production and marketing was particularly sparse, partly because much of this activity is in the hands of private entrepreneurs in developed countries, while in the developing countries it appears to be the activity having received the least attention. The information on seed production and marketing has therefore been pooled for all developing regions.

Approximate 1000 ha. cultivated with the main crop in the country per employee in the area of:				
Technical fields Region	Plant Gen. Res./Plant breeding	Variety evaluation	Seed quality control	Seed Production and marketing
Developed countries	80	37	49	12 ^{1/}
Developing countries				
Africa	295	551	283	
Asia	200	750	295	68 ^{2/}
Central America	56	177	33	
South America	94	-	94	

1/ The information covers two countries only.
 2/ All developing regions.

13. This table indicates that:

- (a) For Africa and Asia technical coverage is considerably less than in Central and Southern America. Variety evaluation would seem to be a neglected subject compared with plant genetic resources, plant breeding or seed quality control.
- (b) In general terms the figures suggest that in Africa and Asia the number of plant genetic resources and plant breeding staff currently employed should be increased threefold, and the numbers employed on seed quality control five or six times. In addition, those employed on variety evaluation would need to be increased 15 to 20 times to bring them up to the level of the developed countries.
- (c) In Central and South America the current numbers of plant genetic resources and plant breeding experts as well as those employed on seed quality control should be maintained. The situation for variety evaluation is less clear, but a four-fivefold increase should be considered.
- (d) The data on seed production and marketing were so sparse that no conclusions could be drawn. However, the very sparseness of the data would indicate that these are subjects which have not yet received adequate attention.

(iv) Discussion

14. Any evaluation of training requirements in general terms can be only approximative. In dealing with average figures covering several countries wide variations are inevitable, and in some cases the average will conceal situations where no trained experts are available. Also in many of the developing countries covered by this survey staff with a university education are so few that they are expected to cover a much wider field than may be desirable. Thus, although plant genetic resources and plant breeding have generally been shown to be somewhat better provided for than other disciplines, it is very often the case that the plant breeder has to assume responsibility for many or all of the tasks involved in getting improved seeds on the market. By training others to assume certain of these responsibilities staff could be released to concentrate on the main tasks of plant breeding.

15. Of equal if not greater importance is the need to provide middle and lower level support for the highly trained experts. With the expense of university or other higher level education, the staff so trained should spend only a minimum proportion of their time on routine tasks. The graduates or post-graduates would be more properly employed in undertaking research and other tasks requiring a high level of professional competence, whereas the lower-level technical staff would undertake most of the routine practical tasks which are a part of each of the disciplines under discussion in this paper. Short specialist courses should be designed for these lower level technical staff.

16. At the same time the numbers of academic trainees should not be reduced, but rather increased. Available evidence shows that compared with the developed countries, the developing countries are equipped with too few academic experts to provide for a healthy seed industry development.

17. In seeking to increase the numbers of trained personnel in the seed area - in the broadest sense from plant genetic resource management and plant breeding to seed production and marketing - the greatest possible use should be made of opportunities to develop training on a regional basis, or within a regional project. This approach is usually more cost-effective than individual country efforts in providing a nucleus of trained experts. Co-operation between developed and developing countries on a bi-lateral basis can also be highly successful. The role of the private seed industry in providing training opportunities both within individual companies and as direct contributions to wider training programmes has not yet been fully developed.

18. Training is a major activity within FAO, and has been an important factor in providing the basis for agricultural development in the developing countries. However, as the preceding paragraphs indicate, the efforts so far in many developing countries have only provided the basis from which further development can take place. These efforts must be maintained and enhanced in order to establish viable programmes on plant genetic resources, plant breeding and seed production in the developing countries within the next decade.

Annex

No. of Trainees that have attended FAO and IBPGR-Supported Training Courses on Plant Genetic Resources, 1969-1986*

Country	1-Year Courses	3-Month Courses	Short Courses (less than 1 month)	Total
Afghanistan	3		2	5
Algeria		1	5	6
Angola	1			1
Argentina	1		31	32
Australia	1		1	2
Bangladesh	3	3	15	21
Barbados			1	1
Benin	1		3	4
Bhutan	1		2	3
Bolivia	1		13	14
Brazil	3	3	11	17
Bulgaria		1	3	4
Burkina Faso	1		3	4
Burundi	2		1	3
Cameroon			1	1
Canada			1	1
Czechoslovakia		1	7	8
Chile			2	2
China	1		68	69
Colombia	2	3	23	28
Congo			1	1
Cook Islands			1	1
Côte d'Ivoire	1		2	3
Cuba			1	1
Cyprus	2		5	7
Dominican Republic			3	3
Ecuador		3	8	11
Egypt	1	5	8	14
El Salvador			1	1
Ethiopia	5	1	10	16
Fiji			5	5
France	1			1
Germany, F.R. of	3		8	11
Guatemala		8	8	
Ghana	3	1	7	11
Greece	5	3	14	21
Guinea			3	3
Honduras			3	3
Hungary	1		5	6
India	6	8	31	45

* Figures cover up to January 1986.

Note: Some trainees have attended these courses with financial support from FAO and/or IBPGR.

Annex (cont.)

Country	1-Year Courses	3-Month Courses	Short Courses (less than 1 month)	Total
Indonesia	10	4	48	62
Iran	5	1		6
Iraq	5		5	10
Ireland			1	1
Israel			1	1
Italy	1	2	8	11
Japan	1			1
Jordan			2	2
Kenya	5	2	9	16
Kiribati			6	6
Korea			4	4
Lebanon			2	2
Liberia			2	2
Libya		1	2	3
Madagascar			1	1
Malawi			1	1
Malaysia	9	1	16	26
Mali	1		6	7
Mauritius			1	1
Mexico	1	1	8	10
Morocco			3	3
Mozambique			1	1
Nepal	4	4	9	17
New Caladonia			1	1
Nicaragua			2	2
Niger			1	1
Nigeria	5		14	19
Pakistan	6		8	14
Panamá			1	1
Papua New Guinea			10	10
Paraguay			2	2
Peru	4	13	37	54
Philippines	8		53	61
Poland	1	1	7	9
Portugal	1	3	8	12
Qatar			1	1
Rwanda			1	1
Saudi Arabia			1	1
Senegal			2	2
Sierra Leone	3		5	8
Solomon Islands			2	2
Somalia	3		1	4
Spain		1	9	10

Annex (cont.)

Country	1-Year Courses	3-Month Courses	Short Courses (less than 1 month)	Total
Sri Lanka	5	1	7	13
Sudan	1		6	7
Surinam	1			1
Switzerland			1	1
Syria	2	1	14	17
Tanzania			2	2
Thailand	2		40	42
Togo			4	4
Tonga			2	2
Tunisia			6	6
Turkey	4	2	18	24
Tuvalu			1	1
Uganda	9	1	5	15
UK	47		11	58
USA	1		9	10
Uruguay	2	2	4	8
USSR			2	2
Vanuatu			2	2
Venezuela	1		7	8
Viet Nam			1	1
Yemen, A.R.			2	2
Yemen, P.D.R.			1	1
Yugoslavia	1		7	8
Zaire	2		6	8
Zambia			2	2
Zimbabwe	1			1
TOTAL	201	82	779	1037