PD-AAU-891

PROJECT ASSISTANCE COMPLETION REPORT

STRENGTHENING OF AGRICULTURAL RESEARCH IN PAKISTAN

PROJECT NUMBER 391-0296

I BASIC DATA

	Country	: Pakistan
2.	Project Name	: Agricultural Research
3.	Project Number	: 391-0296
	Loan	: 391-T-156
	Grant	: 391-17-110-296
4.	Project Dates	: April 30, 1974 to June 30, 1985
	a. Project Agreement	: June 30, 1969
	- First Amendment	:
	- Second Amendment	: April 20, 1974
	- Third Amendment	: May 20, 1978
	- Fourth Amendment	: April 20, 1982
	b. Project Assistance	:
	Completion Date(PACD)	: June 30, 1985

5. Amount Authorized:

FY	Dollar Grant	Dollar Loan	Rupee Grant
1969	+ 830,000	-	+ Rs. 3,400,000 ($714,286)b/
1972		-	+ Rs. 2,600,000 ($236,364)c/
1973		-	+ Rs. 6,000,000 ($606,061)d,f/
1974g/	+ 175,000	+ 7,600,000	+ Rs.73,500,000 ($7,424,242)d/
1975	+ 20,000	-	-
1976	+ 187,050	-	-
1978	-	- 1,400,000	- Rs.20,000,000 ($2,020,202)d/
			+ Rs. 1,000,000 ($1,010,101)d/
1979	+ 200,000	-	-
1980	-	-	+ Rs.60,000,000 ($6,060,606)d/
1982	3,200,000	-	+ 29,700,000 ($2,847,555)e/
	4,792,050	6,200,000	156,200,000 ($16,879,013)

Grand Total: 27,871,063

---

a/ + = Obligation; - = Deobligation
b/ At the exchange rate of $1.00 = Rs.4.76 as of 2/15/71 (Mondale)
c/ At the exchange rate of $1.00 = Rs.11.00 as of 5/31/72 (Mondale)
d/ At the exchange rate of $1.00 = Rs.9.9 between 2/73 - 1/82 (Mondale)
e/ At the exchange rate of $1.00 = Rs.10.43 as of 1/26/82
f/ FAA SECTION 204 Rupees
g/ Original FY 1974 Authorization = $1,500,000 grant and
7,600,000 loan

6.	Project Funding	: AID Bilateral Funding (Loan or Grant)
	Loan	: $6,200,000
	DA Grant	: 762,050
	PLLP (Closed Project)	: 830,000
	Est. Grant	: 3,200,000
	Mondale Rupees	: 16,272,952 (dollar equiv.)
	FAA Sec. 204 Rupees	: 606,061 (dollar equiv.)
	Total AID Contribution	: 27,871,063
7.	Other Donors	: Government of Australia, Canada and UNDP
8.	Life of the Project	: 16 years
9.	Project Officer (Alt.)	: Abdul Wahid
10.	Authorized Representative of GOP	: Dr. Amir Muhammad, Chairman Pakistan Agricultural Research Council (PARC), Islamabad
11.	Name of Implementing Agency	: Pakistan Agricultural Research Council, Islamabad

Table 1

SUMMARY OF OBLIGATION EXPENDITURES

AND UNEXPENDED FUNDS

(EFFECTIVE 3/31/87)

TECHNICAL ASSISTANCE	OBLIGATED	EXPENDED	UNEXPENDED
Grant (Pre-74)	830,000	830,000	0
Grant	2,438,595	2,383,165	55,430
Loan	1,439,373	1,410,438	29,935
Rs. Grant	1,226,277	997,564	228,713
Sub-Total	5,934,245	5,521,167	313,078
TRAINING			
Grant	172,411	166,749	5,662
Loan	2,138,227	2,138,227	0
Rs. Grant	8,096	7,328	768
Sub-Total	2,318,734	2,312,304	6,430
COMMODITIES			
Grant	1,310,099	1,309,430	669
Loan	2,622,401	2,621,481	920
Rs. Grant	153,762	116,183	37,559
Sub-Total	4,086,262	4,047,094	39,168
OTHERS			
Rs. Grant	15,490,870	14,914,841	576,029
GRAND TOTAL:	27,830,111	26,895,406	934,705

Narrative Discusion:

A. Introduction and Project Purpose:

Consequent on the recommendations of Pakistan-American Joint Agricultural Review Teams in 1969 and 1973, AID entered into a series of Project Agreements with the Government of Pakistan (GOP) to strengthen its research capability. This was followed by a major Project Assistance Agreement of loan and grant funds (391-0296) with the Pakistan Agricultural Research Council (PARC).

Several problems arose during the early stages of implementation of the project because of PARC's inadequate research management capability. The project was reviewed in 1976 and 1977 which eventually led to a redesign in 1978 concentrating efforts on providing an institutional base capable of supporting a comprehensive program of national agricultural research.

The project was again amended in 1982 extending it for another period of three years with Project Assistance Completion Date (PACD) as June 30, 1985. This was to complete the construction of National Agricultural Research Center (NARC), adequately equip the facility, and provide further strengthening of the research and management capabilities within PARC and NARC. The PACD was adhered to and the project was completed on June 30, 1985 as scheduled.

Purpose of the Project:

The project purpose was to establish a functioning centrally coordinated program of agricultural research for major agricultural commodities which effectively transaltes policy guidelines into specific research projects with achieveable results to increase agricultural production and improve the income of low income farmers. The main project elements comprised technical assistance, training, commodities, national coordinated research programs for major agricultural commodities/disciplines and construction of NARC at Islamabad.

B. Status of the Project

Acquisition of technical assistance, commodities, training and all other costs have been 100% completed. Furthermore, out of a total AID cost $27.87 million all but $0.93 million or nearly 3.34% from IAD project funds have been disbursed. Most of the undisbursed funds, approximately $0.58 million or 2.08% were in the mondale rupee account. The table below shows in summary form for each account funds obligated, expended and unexpended. Although the project was national in scope, greater support was provided to the institutional development of PARC and NARC. A sound base has now been laid for an effective national research program. NARC demonstrates tangible evidence of a construction and vitally important partnership between USAID and GOP for agricultural research and development in Pakistan. GOP also took a number of important steps to improve organizational structure of PARC coupled with competent technical staff and appropriate support personnel.

A detailed discussion of all project inputs follows in the section below.

C. Summary of Contributions (Inputs)

1. AID-financed

a. Short and long term Technical Assistance

Long and short-term technical assistance helped PARC/NARC in the development and implementation of national coordinated agricultural research projects; the construction of NARC; and in certain specialized fields such as farming systems research, weed science, oilseeds, livestock production, fruits, research management and biological nitrogen fixation. Long-term consultants provided expertise in the field of Farm Machinery Development (IRRI)a; Station Development (USDA)b; Research Management (IADS)c; Wheat and Maize Production (CIMMYT)d; and Rice Production (IRRI)e. Technical assistance provided under the project for the period 1974 thru 1985 is summarized in Table 2.

---

a) International Rice Research Institute, Manila, Philippines. b) United States Department of Agriculture. c) International Agricultural Development Service. d) International Center for Wheat and Maize Improvement, Mexico.

Table 2
Summary of Technical Assistance
(from 1974 to 1985)

Category	Actual Person/month
Long-term	444
Short-term	81
Total	525

This significantly helped PARC/NARC to improve research management capabilities and implement national coordinated research programs based on sound scientific lines in a more effective manner.

b. Support for in-service training programs and short- and long-term participant training.

The original project of 1974 provided for long-term training of 73 positions leading to M.S. and Ph.D. degrees in the United States, third countries and local institutions. It also included short-term non-degree training abroad, mainly at CIMMYT and IRRI. However, due to sharp rise in the cost of training, the degree program for advanced training abroad was scaled down to 50, which was fully utilized. There was a large shortfall of 35% in the utilization of training positions at the local universities during 1974-82.

Due, however, to PARC's special efforts to stimulate expansion of advanced training at the Pakistan Agricultural Universities, there was a positive response and all training opportunities leading to M.S./Ph.D. degrees provided in the Amended Project Assistance Agreement (1982-85) were fully utilized. Table 3 presents the foreign and local training by province as implemented under the project.

Table.3 - Manpower Trained

	Federal	Punjab	Sind	NWFP	BAL	AJK	Total
Foreign Trained							
A. Degree							
Ph. D.	6	6	-	4 -	-	-	16
M.Sc.	15	7	2	6	1	-	31
Subtotal	21	13	2	10 1	1	-	47
B. Non-Degree							
IRRI	6	17	10	3	-	-	36
CIMMYT	13	26	8	17	4	6	74
USA & Other countries	15	12	2	6	3	2	40
Subtotal	34	55	20	26	7	8	150
Total Foreign	55	68	22	36	8	8	197
Local Trained							
Ph.D.	-	-	-	1	-	-	1
M.Sc.	19	53	10	-	2	-	84
Total Local	19	53	10	1	2	-	85
Grand Total	74	121	32	37	10	8	282

The program for advanced training abroad has been, on the whole, quite successful. All the participants sent abroad returned and, with few exceptions, are working in their parent institutions. Four participants returned before completing their training because of health problems. One participant had his program changed to less demanding requirements due to sub-standard performance. The training objective of another participant was changed from a Ph.D. to M.S. Degree and that of still another candidate was changed from M.S. to a non-degree. Two participants trained abroad were placed in other departments within Pakistan and two left for employment abroad. On the whole, however, the training program successfully met its objectives. It substantially enhanced the research capability of both the Federal and the Provincial Agricultural Research Institutions. AID Inputs particularly complemented the World Bank Training Program of PARC. The deficiency of well trained staff for the provincial institutes is proposed to be met under the AID-funded "Management of Agricultural Research and Technology" (MART) and "Transformation and Integration of the Provincial Agricultural Network" (TIPAN) projects now in operation.

C. Construction of NARC

The establishment of NARC was initiated in 1975 with the acquisition of 556 hectares of land near Rawal Lake, 6 km south-east of Islamabad on the National Park Road.

The NARC was formally inaugurated by the President of Pakistan on March 27, 1984.

Details of civil works comprising utilities and buildings completed at NARC under this project total 310,474 square feet (Table 4). These include: (1) laboratories for germplasm, genetics, pest control, chemistry, socio-economic studies and analytic services; (2) Crop Farm Center; (3) Administration Block; (4) Training Center; (5) Hostel; (6) Library; (7) Documentation Center; (8) Auditorium; (9) Cafetaria; (10) Residences - (12 for category I and II and 128 for category V); (11) Central Stores and Support Buildings; (12) Covered Machinery Shed; and (13) Utilities-canals, water supply, sewerage, electricity, gas, roads, telephone system, fire-fighting etc.

The major goal of NARC is to conduct mission-oriented, long-range and high risk basic research in areas of national importance. It also conducts research currently not being undertaken in the provinces/other federal institutes, or is seriously inadequate and can best be done at a well equipped, properly staffed and adequately funded national institution. Furthermore, it provides facilities needed for research on intricate problems of agricultural production/protection to scientists o other federal and provincial agricultural research institutes in the country, where such facilities are not available in their respective institutes.

Table 4

NARC - BUILDINGS, STATION DEVELOPMENT AND UTILIEIS

		Area Sft.
1.	BUILDINGS	
	a) Administration I/C Basement	14,000
	b) Training center	3,900
	c) Hostel	10,953
	d) Auditorium, Library	11,700
	e) Documentation center	4,057
	f) Socio-Economic	5,900
	g) Cafetaria	2,500
	h) Entrance Plaza	4,000
	i) Covered Walkways	1,000
	Sub-Total - 01	58,010
2.	Laboratories for germplasm, genetics, pest control, chemistry and Lab. services	35,629
	Sub-Total 02	35,629
3.	Crop Farm Center	29,606
	Sub-Total 03	29,606
4.	Residential Building Houses:	
	a) Category I & II - 12 houses	23,800
	b) Category V - 30 houses	35,400
	c) Category V - 98 houses	115,665
	Sub-Total 04	174,865
5.	Common Buildings:	
	a) Central Store and Support Buildings	6,700
	B) Covered Machinery Shed (Workshop)	5,664
	Sub-Total 05	12,364
	Grand Total	310,474

6. Utilities:

a) Infrastructures (canal, culverts, central road, gravel road, pucca water course etc).
b) External electric supply
c) Water supply;
   i) Underground tank 120,000 Gallons
   ii) Overhead tank 2500 Gallons
   iii) Covered and underground tanks for crop farm center
   iv) Service connections for water, electric, gas etc.
   v) Rain water drains
   vi) Walk ways
   vii) Retaining walls
   viii) Roads and parking
   ix) Fire alarm/fire fighting
   x) Telephone system

NARC has now been developed into a "Center of Excellence" for agricultural research in the country. In addition to its own research program, it has several important facilities for the local and visiting scientists. These, inter alia, include a well maintained reference library, a computer-based data processing facility, a center for plant introduction and genetic resources, a farm machinery institute and a centralized facility for instrumentation and repair of laboratory equipment. It is a focal point for national and international seminars and conferences on various aspects of agricultural research and development. Training courses are also organized at NARC in collaboration with other national, provincial and international agricultural research organizations.

NARC's other principle objectives are to:

a. Support provincial institutions by conducting fundamental research, providing analytical reference laboratory services and through establishing a germplasm bank.

b. Give special emphasis to agricultural problems of rainfed areas and selective research under various National Coordinated Programs.

c. Provide farming systems thrust to research and training whereby improved technology and methodology are generated and transmitted by multi-disciplinary teams, to different agro-ecological zones socio-economic groups.

d. Develop a Training Institute for technical, scientific and management manpower development.

e. Provide scientific information and data processing facilities.

f. Provide repair and maintenance services for sophisticated laboratory equipment.

g. Provide facilities for graduate and post graduate research for all scientists to solve complex problems for which their respective institutions are not adequately equipped.

1. Commodities

Major commodities supplied included vehicles, tractors, motorcycles, office machines, field and research equipment. Distribution made to PARC/NARC and the provinces is summarised in Table 5 below:

Table 5. Commodities Supplied

Punjab	:Rs. 2.365 million
Sind	: 2.261 million
NWFP	: 1.752 million
Baluchistan	: 0.677 million
PARC/NARC	39.239 million
Total	:Rs.46.294 million

2. GOP-financed

a. Personnel salaries and allowances
b. Operating Expenses
c. Facility rental and maintenance
d. Vehicle and equipment maintenance and repair
e. Construction costs
f. Locally available supplies and equipment

D. Project Accomplishments (Outputs)

1. One research center complex, farm center, residences and experimental farm constructed, equipped, furnished and staffed.
2. One station development and Farm Operations Division in place
3. 10 trained engineering staff at the PARC
4. 190 trained administrators and researchers at the NARC
5. Methodology for genetic improvement of wheat, rice and maise agreed upon and implemented
6. Five reports on farming systems for wheat, rice, and oil crops completed.
7. 9 specialized laboratories at the NARC established
8. Research finding on wheat and maize tested through on-farm trials and extension activities
9. Standard operating procedures, a reliable management information system and sound resource allocation planning being used by top management of the NARC and PARC

E. Achievement of Purpose

The project purpose was "To promote the advancement of technology which will increase agricultural production and to establish a functioning centrally coordinated program of agricultural research for major agricultural commodities which effectively translates policy guidelines into specific research projects with achieveable results."

The sub-points below are the conditions cited as the end of project

status (EOPS) in the 1982 Project Paper Amendment. Below each condition follows a discussion of the degree to which each EOPS has been discernably met as of December 31, 1985, six months after project completion.

1. Planned EOPS: "NARC is conducting research and disseminating results in wheat, maize, rice, oil crops, fodder and forage, vegetables and horticulture, dairy technology, ruminant nutrition and reproductive physiology."

Actual Status:

PARC has organized a number of National Coordinated Programs of Agricultural Research to optimize use of scarce resources, funds and technical manpower to develop improved technologies and unearth new knowledge of benefit to the farmers in the areas of national concern in close cooperation with the provincial governments using inter-disciplinary teams of scientists located in different agro-climatic and soil conditions. So far a total of 33 such programs have been organized on major crops, livestock and disciplines like soil, water and social sciences.

2. Planned EOPS: "Station Development and Farm Operation Division adequately responds to request for technical support by researchers".

Actual Status:

PARC has developed facilities for providing adequate technical support to researchers in the form of latest scientific information, farm services, maintenance and repairs of instruments, computer and statistical services.

3. Planned EOPS: "NARC is planning and implementing research in coordination with the research carried out by the provinces."

Actual status:

PARC/NARC has developed a Coordinated Agricultural Research Planning system for planning and implementation of national coordinated research programs in close coordination with the provinces. Its salient features include: 1) identify problems; 2) establish priorities; 3) formulate projects; 4) evaluate research projects; 5) approve research projects; 6) assign research projects to various institutions; 7) implement research projects; 8) report finding and 9) evaluate and disseminate results.

PARC also plans, promotes and provides funds for contract research to provincial and university scientists in specific areas of their expertise on the advice of regularly constituted technical committees comprising federal, provincial and university scientists, and progressive farmers. This ensure planning and implementation of contractual research under a closely coordinated federal/provincial/ participatory system.

4. Planned EOPS: "PARC is planning and implementing nationally coordinated research programs which are responsive to Pakistan's priorities in agricultural research."

Actual status:

As mentioned earlier nationally coordinated research programs are developed by PARC on the basis of well considered national priorities in research on various agricultural commodities and disciplines. Research efforts are intensified on problems which constitute serious constraints to increased/improved production. The main points kept in view in establishing priorities are that the programs should be of national concern, cost-effective with relatively quick potential pay-off, benefit majority of the farmers, particularly the small farmers, and could be completed within the stipulated time with available resources.

5. Planned EOPS: "Increased production of key agricultural commodities which are directly attributable to the application of research findings."

Actual status:

Key agricultural commodities in Pakistan are wheat, rice, maize, sugarcane and cotton*. Comparative yields/hectare of these commodities for the years 1974-75 and 1984-85 are given below.

	Yield/hec. in Kgs		
Commodity	1974-75	1985-86	Percent. increase
Wheat	1.32	1.85	38.64
Maize	1.22	1.25	2.46
Rice	1.44	1.63	13.19
Sugarcane	31.60	34.81	10.16

*Research on cotton is the responsibility of Pakistan Central Cotton Committee

Most of the increase in yield/hec. could be attributed to introduction of high-yielding, disease resistant and fertilizer responsive varieties developed through research and application of improved packages of site-specific technologies. But for widespread water logging and salinity, the increase in yield would have been much higher.

Unplanned EOPS.

Other EOPS which were unplanned but nonetheless are significant as a consequence of this project in further strengthening the research capability of PARC and making it a really effective and viable apex research organization in the country are synopsized below.

1. PARC received substantial financial and technical assistance from several donors for the implementation of 15 important research projects of national significance. They include World Bank, Asian Development Bank, UNDP and Governments of Canada, Australia, Switzerland and Italy.

2. PARC developed linkages with 15 UNDP and International organizations on multilateral and with 15 organizations of nine countries concerned with agricultural research and development including five organizations of USA on bilateral basis.

3. In addition to issue of one quarterly, three monthly and six bimonthly periodicals on regular basis, PARC scientists published 88 scientific papers, 11 technical reports, 13 status papers, 12 brochures, 13 proceedings of workshops/seminars, 9 manuals and handbooks, and 2 bulletins in English for scientists, extension workers and administrators and 73 pamphlets in Urdu for progressive farmers during the period 1978-85.

4. PARC established a Technology Transfer Unit at NARC to provide a link between the scientists and the farmers. It disseminates improved technologies to the farmers in Islamabad district and brings back farmers' problems to research workers for finding solutions. Its other activities include organization of training

courses, demonstrations, field days, supply of farm inputs, livestock and dairy development, disease control and soil conservation.

5. NARC is assisting agricultural scientists with the latest information gathered from within the country and abroad. A well stocked reference library has been established to ensure continuous flow of current information, especially in the form of journals. Major emphasis is given to documentation services - selective dissemination of information, contents of current journals, fresh arrivals, etc. A micro-computer is being used for storage and information retrieval. The documentation section is functioning as liaison office for the agricultural sciences and technology (AGRIS) and current agricultural research information system (CARIS). NARC provides, on demand, specialized bibliographies based on retrospective searching of AGRIS data base. The facilities for audio-visuals such as slides, overhead transparencies, photographs, charts, etc. are well developed

F. Recommendations for Final Adjustment in Project Design

1. Completion of a National Agricultural Research Plan where problems are prioritized, responsibilities assigned, budget predictions identified, target dates set and critical assumptions articulated remains as an urgent agenda for the Research System under PARC leadership to address.

2. Development of a Research System Manpower Plan by PARC is needed which outlines opportunities for career advancement of scientists with

outstanding accomplishments so as to attract and retain superior talent in the national agricultural research network. There is an urgent need for Pakistan to provide quality PhD training within country.

3. Research is a continuous activity. A suitable mechanism must be developed to ensure timely supply of funds for approved research projects.

4. PARC coordination role deserves to be strengthened in planning monitoring and evaluation of research in participation with provincial institutions. National Coordinated Programs should be further developed and strengthened.

5. There is need to accelerate the amount of interdisciplinary research on priority problems. Collaborative Research Projects with outstanding scientists from abroad should be initiated.

6. The research extension farmer linkage deserves to be strengthened. Opportunity to develop and expand farming system research in selected areas by joint Federal and Provincial bodies should be rigorously developed.

7. Research management throughout the country's research network must be strengthened such that support services to scientists (information flow, fund release, logistic support, office managment etc.) enhance and not constrain research productivity.

These will be addressed under the MART Project.

G. Post-project AID Monitoring responsibilities

Continued agricultural research is necessary to open ways towards maintaining and improving farm production resources, lowering the costs of production, improving quality, finding new uses of existing products, evolving/introducing more profitable species/varieties/strains of plants and animals, devising new and better methods of growing, processing, distributing and utilizing farm products. Research should also find ways and means to control weeds, insect pests and diseases of plants and animals, reduce wastages in production, transportation, storage and distribution. It must anticipate the economic problems involved in farming technology and help farmers to solve them.

As stated earlier, relatively greater emphasis was given to strengthen the research capability of PARC under this project. In order, therefore, to develop a balanced federal/provincial cooperative system of agricultural research, it was necessary to strengthen the research capability of the principal provincial agricultural research institutes including the agricultural universities. To this effect another project entitled "Management of Agricultural Research and Technology" (MARY) was developed, which is now in operation since October 1984.

The project consists of five components: (1) Research Management and Administration; (2) Information Transfer; (3) Training for the Agricultural Research Network; (4) Arid Zone Research; and (5) Wheat and Maize Coordinated Programs.

The first three components are designed to strengthen and expand the human, physical, and technological resources available within the national agricultural research network and to improve the management of the system at the Federal and Provincial levels. Participating entities will include but are not limited to: the Pakistan Agricultural Research Council (PARC), the National Agricultural Research Center (NARC), the Arid Zone Research Institute (AZRI), the provincial agricultural research institutions and training institutes in all four provinces; and the agricultural universities in the provinces Sind, Punjab, and the North West Frontier. The fourth component addresses the substantial gap that has existed in arid high altitude agricultural research for non-irrigated areas, which is especially important for the western regions of the country. Under this component, funds will be provided to strengthen the capability of AZRI, which is located at Quetta, (Baluchistan) to generate and disseminate quality and relevant technologies applicable to the non-irrigated areas of the country, which represent 47 percent of the total land area. The fifth component will enable Pakistan to sustain and build on the impressive gains achieved in wheat and maize production by improving the research and outreach activities carried out through its nationally coordinated wheat and maize programs.

H. Lessons Learned and Recommendations:

1. The most important lesson learned is to be patient and flexible with an institution building project such as this. The decision to stay with it, despite initial poor performance, and redesign the project to adjust to local conditions, has been the key to the success of this project.

2. National Coordinated Research Projects constitute one of the major PARC/NARC activities to mobilize Federal and Provincial talent into a meaningful national cooperative agricultural research program. They have yet to be adequately strengthened for effective utilization of scientific resources to solve problems of agricultural production.

3. Qualified, experienced and committed scientists in the country should be given higher pay-scales and provided opportunities for career advancement based on performance - and not seniority alone. This wil improve quality of research.

4. At present research funding is not satisfactory. Ad hoc budget cuts and inordinate delays in provision of funds adversly affect progress of research. Creation of a PARC revolving fund should be explored with the Finance Ministry.

5. Agricultural research is not being conducted on a well planned basis. Prioritization, proper formulation, implementation, monitoring and ciritical evaluation of well considered research projects is essential to effectively utilize scarce resources both in trained manpower and physical facilities.

6. Currently agricultural research, education and extension are compartmentalized and operate in isolation with each other. Their integration is imperative for the development of a viable agricultural research system to effectively tackle complex problems of agricultural production.

7. While advanced training abroad has been quite successful, it could be further improved by rigid selection of participant trainees, pre-departure training in the selected field and, on return, placement of trainees in positions for which specialized training was received.

8. The Technical assistance program has not been as effective as it should have been. There is need to develop precise terms of reference, a detailed job description together with a work plan, including places to be visited, persons to be contacted, appointment of suitable counterparts and timely submission of preliminary and final reports.

9. Communication between scientists within country and abroad remains to be strengthened. Participation of local scientists in international seminars/conferences, ready access to current scientific information and opportunity for collaborative research with the international community of scientists is needed..

10. Linkage between scientists and the small farmer remains weak and mechanisms for feed back from farmers to scientists deserve to be developed.

11. Planning, coordination and evaluation of agricultural research remain seriously inadequate. There is urgent need for the development of a federal/provincial participatory and cooperative system, which ensures optimum utilization of scarce resources that focus on priority problems.

12. In order for NARC to develop as a Centre of Research Excellence and support a productive National Research System there is urgent need to establish:

(a) Collaborative Research Projects with outstanding scientists/institutions from abroad and

(b) a NARC post graduate capability by which students may pursue advanced degrees (M.S./PhD.) in Agricultural Sciences with distinction.

ARD:AWahid:ga