

Page No. ~~3910 296.2~~
 3910296 (4)
 PD-AAD-171-E1

TO: AS/PR - Room B-930 New State
 Agency for International Development
 Washington, D. C. 20523

FROM: USAID/Islamabad

SUBJECT: Non-Capital Project Paper (PROP)

REFERENCE: (A) TOAID A-230 sent 3/12/69 (PROP: Agricultural Research Project No. 391-17-110-296) 22p.
 (B) AIDTO A-257 (AID/W Review of FY 1972 PBS)
 (C) TOAID A-521 sent 10/29/70 (PROP: Agricultural Research, East Pakistan Project No. 391-17-110-296.1)

COUNTRY: Pakistan Project No. 391-17-110-296.2

Submission Date: December 24, 1970

Project Title: Agricultural Research, West Pakistan

US Obligation Span: FY '69 through FY 1975

Physical Implementation Span: FY 1970 through FY 1975

***Gross Life of Project Financial Requirements:**
 (See page 2 for explanatory notes on US owned local currency and cooperating country contribution)

	housand \$)
US Dollars (T.C. Grant)	1,470
US Owned Local Currency (Rs. 3.4 million @ US\$1.00=Rs. 4.76)	714
Cooperating Country Cash Contribution (Rs. 43.2 million @ US\$1.00=Rs. 4.76)	9,088
Other Donors:	
Ford Foundation (including Rockefeller Foundation)	1,800
Swedish International Development Agency	477
United States Department of Agriculture (PL 480)	1,500
UN FAO	<u>360</u>
Total:	15,409

*See Appendix, Table III

Drafted By: MSCruit/Singer, PRO 12/13/70

Approved: David H. Mathiasen
 VWBrown, D(Actg.) for

Clearances:

SDSamuelson, L-AGR (draft) DGM
 WAWolfer, L-WPD (draft) TRBlacka
 LAnderson, AD/AP(A) MLKellogg
 KAEWilliams, PRO _____

INFO:
 D-PD (10)
 L-WPD (12)
 K-AC/DC (1)

I. SUMMARY DESCRIPTION

The broad objective of this project is to assist the Government of Pakistan to develop the research foundation necessary to sustain and diversify agricultural production in West Pakistan. ^{1/} The dramatic accomplishments of the grain revolution have tended to obscure the fact that the infrastructural base for further progress does not exist. Nevertheless, the Fourth Five-Year Plan includes the following goals:

1. reduction of dependence on foreign aid and elimination of importation of food grains;
2. significant increase in yields and development of crops for export and transfer to East Pakistan;
3. increased per capita availability of food grains;
4. increased and balanced nutritional level for consumers.

In order to realize these goals, USAID feels two basic steps are necessary:

1. improvement of existing crops and production methods. This involves the breeding, selection and development of new strains to incorporate greater disease and insect resistance, and better water management techniques. Both of these steps are necessary to maintain and increase production and thereby meet aforementioned Goals One through Three;
2. introduction and development of new crops and technology in order to facilitate diversification of agricultural production and to address Goal Four.

To take these two steps, activities in four different areas are necessary:

1. The project will give technical and financial support to the development of a complex of priority-oriented research coordinated through the national Agricultural Research Council (ARC) and Provincial Research Coordination Boards, and carried out by West Pakistan Agriculture University (WPAU) and selected agriculture colleges and research stations.

^{1/} See Ref C for East Pakistan Agriculture Research PROP.

This technical support will help to develop the level of competence required to establish the agricultural priorities technologically and economically most desirable for West Pakistan. Financial assistance to the ARC will give that organization the power to ensure that these priorities are carried out. The technical support function began with the arrival of the Research Administration Advisor in August, 1970.

2. The project will assist WPAU to develop high quality, interdisciplinary research and suitable academic standard through the services of a Resident Research Advisor and short-term consultants under the Washington State University Contract. In this way, WPAU will be helped to fulfill its dual role as a research institution and as a training ground for future agricultural scientists.

3. Through the Council of United States Universities for Soil and Water Development in Arid and Sub-humid Areas Contract Team (CUSUSWASH), an attempt will be made to increase production through more effective water utilization.

4. The problem of nutritional imbalance in the diet will be addressed initially by a short-term consultant team which will design a research project to increase groundnut production. It is anticipated that the execution of the project designed by this team will require the services of a long-term research team for approximately two years upon completion of work by short-term consultants.

II. ENVIRONMENTAL SETTING AND JUSTIFICATION

West Pakistan has achieved self-sufficiency in food grain production during the period of the Third Five-Year Plan. Annual food grain production targets were exceeded to the extent that in FY 1970 over one-half million tons were shipped from West to East Pakistan to help meet deficit requirements.^{2/} The increase in food grain production has been accomplished under accelerated research and production programs adopted by the former Government of West Pakistan assisted by Ford Foundation (wheat, rice, maize, and millets) and USAID (infrastructural development and new inputs for increased food grain production).

Very little research has, however, been undertaken to continue adaptation of the new varieties and technology to conditions in Pakistan or to develop new crops. Indigenous scientific research capability has not progressed to the stage where it can be effectively applied to assure the continued development of technology required to maintain and accelerate

the production breakthrough that has occurred. Allocations for research on crop production and agricultural economics and statistics throughout Pakistan during the Third Plan amounted to only Rs. 106 million or 0.19% GNP, and only 60% of the allocation was actually utilized.

Agricultural Research in West Pakistan has consisted primarily of individual scientists working on specialized projects of short duration with little cooperation among scientists of supporting disciplines. Interdisciplinary research, i. e. that in which all realms of knowledge conceived to be applicable are brought to bear on the problem, is not a practiced discipline in West Pakistan's agricultural sector. Past efforts have resulted in isolated elements of information which seldom fit together to form a quantum of knowledge directly applicable to the country's development problems. Interdisciplinary, coordinated research based upon rationally defined national priorities is urgently needed to maintain the position already achieved by agriculture in the face of problems of disease, salinity, etc. The need for such research is yet greater since increased production rather than maintenance of the current position is Pakistan's goal.

The need for coordinated research with nationally defined priorities results from the aforementioned fact that investigations in Pakistan have heretofore consisted mainly of individual workers with no firm grasp of the research requirements of the country. If Pakistan is to reap the full benefits of agricultural research, there must be both national and provincial bodies with the capacity, responsibility and authority to establish research priorities. That is, these bodies must be technically competent, must have a clearly defined role as the priority-establishing bodies, and must have the power to see that their decisions are implemented. The only practical way of granting that power is by assuring that these bodies have funds at their disposal with which they may encourage research endeavor in the priority areas.

GOP and Other Donor Activities

The constraints imposed on agricultural research in West Pakistan by limitations of staff and facilities have been compounded by the break-up into four units. What there was of Wing-wide coordination fell victim to the break-up, and the resultant division of the West Pakistan Department of Agriculture into four provincial departments. There is a

major Research Institute in each province with a nucleus of trained Ph.D. and M.Sc personnel, but the numbers of trained men and adequate facilities are insufficient to accomplish high quality research work. The obvious solution to these problems involves long-term investment in training and facilities. The magnitude of the problem can, however, be almost immediately reduced by developing a mechanism whereby resources can be pooled, and areas of specialization developed.

The GOP Cabinet has begun to take actions to improve agricultural research coordination through reorganization and strengthening of the ARC. The ARC, with increased professional staff and provincial representatives, will establish priorities, fund major research programs and act as the inter-provincial coordinating and evaluating agency for agricultural research. The Provincial Governments are establishing research coordination committees to coordinate and administer research programs in their respective provinces in consultation with ARC. The ARC and provincial committees, in cooperation with the Central and Provincial Departments of Agriculture, will communicate research results and recommended practices to the farmers through the agricultural extension service.

In order to meet Fourth Plan objectives, funds allocated for agricultural research on crop production and economics and statistics have been increased by 43% over the Third Plan projection. Full utilization will result in a 160% increase in expenditure over the Third Plan level.

In addition, revised coordinated research and production programs are being developed by the ARC for wheat, rice, and maize and millets, with the assistance of advisors from Ford Foundation, and a similar program for oilseed crops is being formulated with assistance of advisors from Swedish International Development Agency (SIDA) and USAID.

Ford Foundation is providing adequate assistance to develop capacity to affect research technology, adaptation and productivity required for increasing and improving food grain production to meet planned targets.

Recognizing that cotton seed yield is dependent upon demand for lint,^{3/} the GOP has placed priority on increasing production of Brassica and groundnuts to increase oil production. GOP targets (see Appendix page 8) are judged by USAID to be feasible, with a major effort, and of high priority. SIDA, following extensive analysis and negotiations has entered into an agreement to provide assistance to the Brassica research project to commence in FY 1971. USAID has been requested to provide research assistance to develop the groundnut project.

^{3/} See Appendix, page 4.

U. S. Activities

In an initial analysis the Mission has concluded that increased production of groundnuts is the most technically feasible way to reach the government target. Consonant with this decision, three activities are underway:

1. A technical support PIO/T (391-320-2-10030) has been issued for AID/W to complete further study on oilseeds development policy for Pakistan. This policy study will:
 - a. Assemble published technical information on breeding, varietal characteristics and adaptation, agronomic practices, disease and insect control, harvesting methods, processing and utilization that apply to Pakistan for its oilseed crops.
 - b. Develop a comparative economic analysis of the various crops to determine where each would fit into the cropping program, their production and processing costs, demand volume and location, value and marketing of byproducts.
 - c. Develop analysis of GOP policies required to achieve sustained production at required levels.

2. USAID economic staff is continuing discussions with the GOP and further analysis within the Mission. In order to complete this analysis the Mission has issued a second PIO/T (391-320-2-10184) for the services of a four man adaptive Research Advisory Team of scientists to design a two-year research project for increased production of groundnuts.

3. It is anticipated that, and funds are requested for, a new university contract team to carry out the designed program beginning in FY 1972. Subject to the report and recommendations of the Adaptive Research Team, it is anticipated that a complement of contract advisors representing the disciplines of plant breeding, plant pathology, entomology and agronomy will be required to satisfactorily execute the project.

(See Appendix for further detailed information on agricultural production and research program in West Pakistan).

III. STRATEGY

USAID strategy is based upon capitalizing upon and reinforcing the

significant accomplishments of previous donor assistance to the GOP in achieving food grain production self-sufficiency in West Pakistan. USAID inputs are to be concentrated into a single project designed to develop an agricultural research system to maintain and expand the technology required for GOP to continue and diversify agricultural development to meet priority requirements, i. e. (1) continued expansion of food grain production to meet requirements of the expanding population, including food deficits in East Pakistan, and (2) improvement of nutritional level of the population.

IV. EXPECTED TARGETS, RESULTS AND OUTPUTS

The Project will result in the development of GOP research capacity and produce scientific data upon which the GOP can base policy decisions required to maintain and increase the modern agricultural technology necessary to conduct priority West Pakistan agricultural programs during the Fourth Plan as follows:

1. Establishment of an administrative organization to: (a) set national and provincial research priorities; (b) allocate human and financial resources to meet these priorities; and (c) coordinate research activities and projects among research institutions and donors of assistance.
2. Continuation and further development of the accelerated research programs for wheat, rice, maize and millets and the development of new programs for oilseeds and pulses in order to achieve increased production targets of the Fourth Plan.
3. Development of the concept and mechanism for coordinated interdisciplinary research at WPAU using grain legume crops as a model.
4. Development research for varietal improvement, increased disease resistance and a package of agronomic recommendations for significantly increasing production of groundnuts.
5. Development of data and a recommended program for rational evolution of processing and marketing relationships required for utilization of increased groundnut output for significantly increasing domestic production, processing and marketing of edible oils.
6. Development of a program of improved utilization and management of water on the farm for increased agricultural production through:

- a. **Systematic analyses of present systems of management of waters of varying qualities in production of various crops;**
- b. **Initiation of studies to develop base line data and comparative analyses of new practices and methods of utilizing water on the farm;**
- c. **Measurement of economic and social factors effecting present and recommended uses of water.**

V. COURSE OF ACTION

To achieve the goals of the Project, the following US inputs are necessary:

1. **continuation of the services of the Research Administration Advisor, which began in August 1970, to the ARC and the Provincial Governments;**
2. **local currency to supplement ARC budgets for priority research programs approved by the ARC;**
3. **an extension of WSU Contract (AID/NESA 440) begun 1 July, 1969, to provide the services of the Resident Research Advisor and short term consultants to WPAU;**
4. **continuation of AID/W funded CUSUSWASH Contract (AID-CSD 2162) to provide the services of two research scientists for improved utilization of water on the farm;**
5. **PASA or university consultant services for six months to assist the ARC and the provincial governments in the design of a two year research program to increase production of peanuts;**
6. **a US university contract to provide the services of a team of highly qualified research scientists to help implement the peanut research project for increased production of edible oils;**
7. **selective participant training; and**
8. **limited demonstrational equipment for the development of laboratory and field facilities.**

ARC

The portion of the project that focuses on ARC and the Provincial Departments of Agriculture will consist of a single research scientist in an advisory capacity to the council who will assist in the development of research priorities, evaluation of research proposals for funding and provide technical assistance to the Council in developing staff and working relationships with the Provincial Governments and research institutions throughout West Pakistan. The Advisor will work closely with the professional staff of the Council at all times as well as other donors of assistance to the agricultural research program. Local currency will be provided under the Mondale amendment for research projects approved by the ARC and USAID. Major emphasis will be placed on insuring that priority programs are adequately funded and that funds allocated to the ARC for agricultural research are utilized efficiently. A small amount of local currency may be utilized to provide flexibility to develop ARC professional and administrative capability as mutually agreed by ARC and USAID during the formative stage of ARC. Demonstrational commodities (upto \$10,000) and participant training for selected personnel to strengthen institutional research and administration capability will be provided by USAID.

WPAU

At WPAU, primary emphasis will be on improving research administration including the further development of capacity to conduct interdisciplinary research addressed to priority problems. Initial WSU advisory assistance will be concentrated on the development of a demonstrational grain legume research program to develop high yielding, disease resistant varieties. The departments of Plant Breeding and Genetics, Agronomy, Soils Science, Plant Pathology, and Entomology are developing this program. A formal arrangement with the Punjab Agricultural Research Institute, Lyallpur provides for inter-institutional cooperation in research and graduate student training. Additional interdisciplinary research programs will be developed in other priority areas. Short-term consultants to assist in problem areas and limited amount of demonstrational laboratory equipment will be provided under the contract. Participant training for selected personnel to strengthen key departments will be provided by USAID as a part of the overall project.

GROUNDNUT PRODUCTION

The portion of the Project focusing on the development of groundnut production and increased production of peanut oil will be divided into two phases. Phase One, to be accomplished in FY 1971, will provide a team of four research scientists from USDA or a university to assist the ARC and the Provincial Governments of West Pakistan in the design of a two-year research project to increase peanut production and peanut oilseed processing and marketing. This adaptive research team will be comprised of an entomologist, plant pathologist, agronomist and plant breeder.

Contingent upon approval of the research design by the ARC and USAID, Phase Two will begin in FY 72. It is anticipated that a university contract advisory team will be required to implement the program developed by Phase One, and that the major disciplines of entomology, plant pathology, agronomy, plant breeding, and processing and marketing will be represented on this team. The completed research program should provide the scientific base to rapidly increase peanut crop and edible oil production by FY 1975 thereby helping to fulfill Fourth Plan goals. It is planned that demonstrational laboratory and field equipment be provided under the contract. Participant training for selected personnel will be provided by USAID.

CUSUSWASH

The portion of the Project that addresses utilization of water on the farm will consist of one agricultural engineer and one agronomist assisted by short-term consultants in an advisory capacity to assist in the development of research data and recommendations to increase food production through improved water management practices to optimize economic returns from limited water resources. Initial CSU advisory assistance in cooperation with the Punjab Agricultural Research Institute, Lyallpur, WPAU and the West Pakistan Water and Development Authority, will be concentrated on research and recommendations related to: (1) the relationship and coordination between water control and land preparation; (2) characterization and classification of irrigation water and soils; and (4) cultural inducements and constraints affecting optimum utilization of water on the farm. Additional water management studies will be undertaken as jointly agreed upon by the ARC and USAID. Demonstrational laboratory and field equipment will be provided under the contract. Participant training for selected personnel to strengthen institutional research capability for this activity will be provided by USAID.

TABLE I

ATTACHMENT 'A'

NONCAPITAL PROJECT FUNDING (OBLIGATIONS IN \$000)

PROP DATE: December 24, 1970

COUNTRY: PAKISTAN Project Title: Agricultural Research, West Pakistan

PROJECT No. 39L-11-110-296.2

Fiscal Year	AP	L/G	Total	Cont	Personnel Services			Participants		Commodities		Other Costs	
					AID	PASA	CONT	Direct U.S. Agencies	CONT	Direct U.S. Agencies	CONT	Direct U.S. Agencies	CONT
Prior through Actual FY 70			295	255			255	40					
Operational FY 1971			382	264	46	-	264	72	-	-	-	-	-
Budget FY 1972			453	287	31	-	277	125	-	10	10	-	-
All Subsequent			340	237	103	-	232	-	-	-	5	-	-
Total Life			1,470	1,043	180	-	1,028	237	-	10	15	-	-

APPENDIX PROP - AGRICULTURAL RESEARCH, WEST PAKISTAN

TABLE - II

PLANNED PERSONNEL AND TRAINING INPUTS BY VARIOUS
DONORS RELATED TO AGRICULTURAL RESEARCH

<u>PERSONNEL INPUTS W.P.</u>	<u>Fiscal Years</u>					
	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
	----- Months -----					
<u>1. DIRECT HIRE RESIDENT ADVISORS</u>						
Research Administration Adv.		12	12	12	12	12
<u>2. CONTRACT RESIDENT ADVISORS</u> <u>(WPAU)</u>						
<u>Washington State University</u> <u>Contract # aid/nesa 440</u>						
<u>Resident Research Advisor</u>	10	12	12	12	12	12
<u>Consultant Services</u>	6	9	9	9	9	9
<u>3. CUSUSWASH CONTRACT</u> <u>No. aid-csd. 2162)</u>						
<u>Resident Advisors (AID/W Funded)</u>						
Agricultural Engineer	-	12	12	12	12	12
Agronomist (Soils)	-	6	12	12	12	12
Consultant Services (Estimated)	9	9	9	9	9	9
<u>4. OILSEEDS DEVELOPMENT</u>						
<u>a. Oilseeds Adaptive Research</u> <u> Team(4)</u>	-	6	-	-	-	-
<u>b. Contract Resident Advisors</u> <u> (Oilseeds)</u>						
<u>New University Contract</u>						
Plant Breeder	-	-	6	12	6	-
Plant Pathologist	-	-	6	12	6	-
Entomologist	-	-	6	12	6	-
Agronomist	-	-	6	12	6	-
Marketing and Processing	-	-	-	6	12	6

Appendix PROP - Agricultural Research, West Pakistan
Table II

	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
<u>Consultant Services</u>	-	-	-	3	3	4

New Training Programs
Number of Candidates

5. PARTICIPANTS

Research Administration (6 mm each)	2	4	4	4	4	4
--	---	---	---	---	---	---

Research Design and Techniques (6 mm each)						
---	--	--	--	--	--	--

Oilseeds (36 mm each)	2	2	1	-	-	-
-----------------------	---	---	---	---	---	---

Pulse Crops (36 mm each)	-	2	-	-	-	-
--------------------------	---	---	---	---	---	---

Coarse Grains (36 mm)		-	-	-	-	-
-----------------------	--	---	---	---	---	---

Participants in training
required funding

Coarse Grains (12 mm each)		3	3	1	-	-
----------------------------	--	---	---	---	---	---

Oilseeds (12 mm each)		3	3	-	-	-
-----------------------	--	---	---	---	---	---

Appendix

PROP: Agricultural Research, West Pakistan

TABLE III

EXPLANATORY NOTES ON US LOCAL CURRENCY AND GOP CONTRIBUTION TO PROJECT

1. US owned local currency contribution of Rs. 3.4 million represents West Pakistan's portion of FY 1971 allocation of Rs. 10 million (Mondale Funds) for agricultural research in Pakistan. Subject to availability of funds and effective utilization of initial release in conjunction with maximum GOP budgetary contribution to a successful coordinated research program, additional funds may be requested.

2. Cooperating country contribution to agricultural research West Pakistan consists of the following (\$000):

a. Estimated GOWP funding in FY 1970 for research on crop production and agricultural economics and statistics (Rs. 4.76 million @ US \$1.00 = Rs. 4.76)	\$ 1,000
b. Fourth Plan allocation for research on crop production and agricultural economics and statistics in West Pakistan (Rs. 38.5 million @ US\$1.00 = Rs. 4.76)	<u>8,088</u>
Total	\$ 9,088

The GOP contribution to Agricultural Research in West Pakistan is expected to rise above \$8,088,000 earmarked in the Fourth Plan with contributions from the Center Budget. (See comparative allocations below.)

Comparative Allocations Directly Related to Agricultural Research in Pakistan
(Rs. Million)

	Third Plan		Fourth Plan	
	Allocation	Likely Utilization	Proposed Allocation	% Increase over Third Plan Utilization
<u>EAST PAKISTAN</u>				
a. Research on				
Crop Production	30.57	23.95	60.00	150
b. Ag Economics & Statistics	2.94	1.67	8.00	379
Total	<u>33.51</u>	<u>25.61</u>	<u>68.00</u>	<u>169</u>
<u>WEST PAKISTAN</u>				
a. Research on				
Crop Production	32.38	16.54	35.00	112
b. Ag Economics & Statistics	2.50	12.07	3.50	169
Total	<u>34.88</u>	<u>18.61</u>	<u>38.50</u>	<u>106</u>
<u>CENTER</u>				
a. Research on				
Crop Production	31.84	10.39	26.00	150
b. Ag Economics & Statistics	6.23	2.13	13.50	534
Total	<u>38.07</u>	<u>12.52</u>	<u>39.50</u>	<u>215</u>

Source: Planning Commission, Government of Pakistan: Fourth Five-Year Plan, 1970-1975, July, 1970

Appendix - PROP: Agricultural Research, West Pakistan

A. Agricultural Production

Overall performance in production of food grains has been extremely good during the Third Plan Period and has contributed to the increase in the value added in agriculture as a percentage of GNP from 1.4% for the decade of the 1950's to 3.9% for the 1960's. Agriculture continues to be the dominant sector but its share of the GNP has declined from 60% to 45% from 1950 to 1970 as the economy, particularly that of West Pakistan, begins to urbanize and develop industrially. This highlights the importance of the application of imported technology, introduction of new varieties, improved irrigation and other inputs which together with GOP policies have made possible dramatic increases in yields of food grains to meet rising demands. In West Pakistan wheat yields have increased from 10.2 maunds/acre in FY 1950 to 11.6 maunds/acre in 1969. Rice yields in West Pakistan have increased from 9.4 maunds/acre in FY 1950 to 14.2 maunds/acre in FY 1969. Increased productivity of food grains in West Pakistan has made it possible for the West Wing to eliminate imports and to transfer over 1.2 million tons of wheat and rice to East Pakistan during the past four years to meet food deficit in the East Wing.^{1/}

^{1/} Transfers of food grains from West to East Pakistan (long tons):

<u>FY</u>	<u>Wheat</u>	<u>Rice</u>	<u>Totals</u>
1967	31,400	242,000	273,400
1968	200	132,000	132,200
1969	82,400	190,000	272,400
1970	<u>158,148</u>	<u>371,454</u>	<u>529,602</u>
Totals	272,148 *****	935,454 *****	1,207,602 *****

Appendix:

PROP: Agricultural Research: West Pakistan

- 2 -

During the period of the Third Five-Year Plan (FY 1966-70), the GOP achieved an annual growth rate in the agriculture sector of 4.2% (compared with 3.4% in the Second Plan and 1.3% during the 1950's). Growth in the agriculture sector during the Third Plan Period was due in large measure to significant increases in output of principal food grain crops, i.e., wheat, rice, and maize. Between FY 1965 and FY 1969, annual production of wheat increased by 44%, from 4,518,000 tons to 6,513,000 tons, which exceeded the planned target of 5,400,000 tons by 20%, i.e., 1,100,000 tons. Annual production of rice increased by 51%, from 1,329,000 tons to 2,000,000 tons, which exceeded the planned target of 1,720,000 tons by almost 15%, i.e., 280,000 tons. An 18% increase was achieved in maize production, from 520,000 tons to 616,000 tons, which was 80% of the 770,000 tons targeted in the Plan.

Fourth Plan targets call for further increases in food grain production over estimated FY 1970 levels. Annual production targets for West Pakistan in FY 1975 are:

(In 000 tons)

<u>Crop</u>	<u>FY 1970 Benchmark</u>	<u>FY 1975 Target</u>	<u>% Increase</u>
Wheat	7,000	9,500	37
Rice	2,300	3,700	41
Maize	800	1,000	25

Based upon consumption estimates, the Plan forecasts that West Pakistan will be surplus in wheat and rice in FY 1975: wheat by approximately 370,000 tons and rice by 1,550,000 tons. These surpluses are planned to be sufficient to cover the food grain deficit in East Pakistan and to leave an additional 600,000 tons of Basmati rice for export.

The significant increase in food grain production during the Third Plan Period also reflects government price policies favoring food grains. The increase, however, has resulted in less production of principal protein crops and a shortfall in edible oil seed crops which are needed to increase the nutritional level of the population. The annual production of the principal protein grain legume crops actually decreased from 862,000 tons to 693,000 tons and fell 25%, or 227,000 tons short of the planned target of 920,000 tons. While domestic annual oilseeds production in West Pakistan increased from 983,000 tons in FY 1965 to 1,312,000 tons in FY 1969, this was 15%, or 235,000 tons, short of the 1,550,000-ton Third Plan target.

FY 1971 Swedish International Development Agency (SIDA) estimates indicate present total consumption of vegetable oil at approximately 400,000 tons, of which 140,000 tons are imported. SIDA calculations on domestic oil production derived from the following crops in 1968/9 are as follows:

Crop	Acres ('000)		Yield Mds/Acre		Seed Production ('000 Tons)		Oil Production ('000 Tons)		Total
	WP	EP	WP	EP	WP	EP	WP	EP	
Rape/Mustard	1,036	550	5.8	6.3	219	128	77	35	112
Cottonseed	4,411	36	6.7	4.0	1,036	5	105	1	106
Groundnuts	86	83	16.5	17.1	52	52	22	11	33
Sesamum	68	129	3.2	6.4	8	31	3	10	13
Linseed	17	36	4.8	5.3	3	7	1	2	3
Total	5,618	834			1,318	223	208	59	287

Seventy-eight percent of present production comes from West Pakistan, where there are five major solvent extraction plants. These plants work mainly with cottonseed. They have, however, considerable over-capacity capable of meeting a significant increase in oil production.

Survey of the data indicates that over most of the past decade Pakistan's edible oil consumption has increased at almost the same rate as population growth. Per capita oil consumption has remained nearly static at 7½ to 8 pounds per year. Domestic production has consistently provided approximately two-thirds of the total supply and imports make up the balance. Imports of vegetable oils to fill the annual production-consumption gap have more than doubled since 1961, with imports rising from 50,000 tons in 1961 to an estimated 140,000 tons in 1969. Value of the 1969 import requirement approximates \$40 million based upon costs paid by processors calculated by USAID at \$285/ton.

Pakistan's total average daily per capita calorie intake (2090) is some 11% below the international minimum level recommendation of 2350. Calories from fats and oils show a much greater deficiency with Pakistan at 63 calories (85% derived from vegetable protein) compared to a recommended minimum level of 300 per day. This low per capita intake needs to be improved, and to do so the GOP is projecting total fat and oil consumption in 1975 at 800,000 tons to meet the projected consumption increase. However, to substitute locally produced oil for imports at projected consumption would require an immense increase in annual production from the present 280,000 tons to an estimated 700,000 tons of vegetable oils. The Fourth Plan states that it will not be possible to raise domestic levels high enough by 1975 to meet demand. Imports including PL 480 will be required to fill the gap during the Fourth Plan Period. Priority will be given to development of policies and programs to maximize edible oil production, including introduction of and adaptive research on high yielding oilseed crops.

Since cottonseed is considered a by-product of the fiber production, and volume of production is thus based on the cotton fiber market, the main emphasis on vegetable oil production is tied to rape/mustard and groundnuts. Accelerated oilseeds improvement programs, similar to the highly successful wheat, rice, maize, and millet programs, are to be undertaken with emphasis on Brassicas (rape and mustard) and groundnuts (peanuts).

B. Agricultural Research

Significant as food grain production achievements are, they are based primarily on imported technology and advisory assistance which have been provided by donors under grant and concessional loan terms. Indigenous scientific research capability has not progressed to the stage where it can be effectively applied to assure the continued growth of technology required to maintain and accelerate the technological and production break-through which has occurred. Allocations for research for crop production and agricultural economics and statistics throughout Pakistan during the Third Five-Year Plan amounted to only Rs. 106,460,000, or 0.19% of the GNP for the Plan period. However, less than 60% of the allocation, only Rs. 56,940,000, were actually planned for utilization during the period. In West Pakistan, Rs. 34,880,000 were allocated but only Rs. 18,510,000 utilized.

Most agricultural research in West Pakistan has been done by scientists working on individual projects of short duration with little cooperation with scientists of other disciplines. These efforts have resulted in isolated elements of information which seldom fit together to form a quantum of knowledge which is directly applicable to Pakistan's development requirements. Some have received outside funding assistance through PL 480 research grants which are planned to be continued.

In the past, the Research Staff of the Department of Agriculture in West Pakistan has been largely responsible for the GOWP agricultural research program. Major research was concentrated at the West Pakistan Agriculture Research Institute at Lyallpur (formerly Ayub Research Institute) while substations in outlying areas utilized the research results in further testing and conducted research on crops grown only in their area. In addition to Lyallpur, the major institutes are located at Tandojam (Sind), Tarnab (NWFP), and Quetta (Baluchistan). The institutes have a small nucleus of trained Ph.D. and M.Sc. personnel, many of whom require further training in their fields and in research methodology to accomplish high standard, coordinated agricultural research on international standard. With the division of West Pakistan into four provinces, the Lyallpur station has become the major research station for the Punjab Province. Northwest Frontier, Sind, and Baluchistan Provinces are not continuing research centered around their major institutes with limited trained staff and facilities available. While lack of coordination,

insufficient numbers of qualified staff, and inadequate facilities were major problems before the division of West Pakistan, the situation has now become more complex. Four separate Departments of Agriculture are presently conducting research with little or no coordination among provinces. Throughout the four provinces an additional 20 substations operate with limited staff and facilities.

In addition to the Department of Agriculture Research Programs, the West Pakistan Agriculture University and the two colleges of Agriculture in NWFP and Sind have varying research capabilities. These institutions have placed heavy emphasis on teaching and as a result many staff are not involved in research to the extent that they should be for faculty and graduates to be competent research scientists. This project has as a major objective, particularly at WPAU, where there has been developed a strong institutional base, the improvement of interdisciplinary research programs and the involvement of faculty and students in planned research efforts so that quality research scientists and coordinated interdisciplinary research work will be produced in West Pakistan.

WPAU, which has been heavily supported by USAID and IBRD, has eight faculties or divisions and 37 departments of accommodate 2,000 students at the undergraduate and graduate levels. The faculties and divisions are staffed by 63 Ph.D.'s and 180 M.Sc.'s with another 21 currently studying for advanced degrees. While some departments are considerably stronger than others, this is the best equipped and staffed universities in West Pakistan. In addition to faculty research programs, over 740 individual research projects have been completed by post-graduate students at WPAU. Some joint projects are undertaken with the Punjab Research Institute in Lyallpur. However, the faculties need to develop a more coordinated interdisciplinary approach to longer range priority problems and to continue to develop the capacity of some departments to contribute to them.

The faculties of the two Agricultural Colleges at Tandojam (established with USAID-sponsored assistance from New Mexico University in the 1960's) and the University of Peshawar (previously assisted by USAID-sponsored assistance from Colorado State University) are primarily engaged in teaching undergraduate students. Little research work is presently being done. The Peshawar College staff includes 39 rated as lecturers or above, six of whom are Ph.D.'s. The staff at Tandojam is smaller. Both faculties require strengthening (with graduates from WPAU, further training at WPAU, and selective participant training) and need to develop closer working relationships with the Agriculture Research Stations at Tandojam and Tarnab in Peshawar in order to improve curriculum, teaching methods, and supplied research methodology.

Prior to the division of West Pakistan, some actions were taken to ensure more coordinated research efforts. The GOP was planning to strengthen the National Agricultural Research Council (ARC) along the lines

recommended by the joint Pakistan-American Research Review Team (Parker-Moseman report). An Agricultural Research Coordination Board (ARCB) was established to set priorities and coordinate research in West Pakistan. Accelerated research and production programs had been established for wheat, maize-millets, and rice, with Ford/Rockefeller Foundation's assistance. However, when West Pakistan was divided into four provinces, the ARCB became non-functional and there was no organization within which the accelerated grain programs could function.

The reorganization of the ARC, always a high priority objective in this project, has assumed greater importance with the break-up of West Pakistan. The development of a central body with coordinating and funding capability is required for establishing inter-provincial research efforts in West Pakistan.

The Central Government is now moving ahead with plans to reorganize and greatly strengthen the ARC to assume responsibility for inter-provincial coordination. The ARC, with Provincial representation, will establish priorities, fund the major research programs, and act as a coordinating agency. The Provincial Governments are establishing research coordination committees to coordinate and administer research programs in their respective provinces in consultation with ARC.

Revised coordinated research and production programs are being developed for wheat, rice, and maize-millets with the assistance of advisors from Ford Foundation, and a new coordinated research and production program for oilseed crops is being formulated with assistance of advisors from SIDA and USAID.

The Ford-Rockefeller Program of intensive research began in 1967 and has resulted in introduction of large quantities of high yielding new varieties of grain into Pakistan and the entire region. According to Ford estimates, there are currently 33 million acres devoted to production of imported Mexi-Pak wheat varieties in countries from India to Turkey. While initial targets of sharply increased production have been reached in Pakistan, very little work has yet been done to improve the varieties for resistance to diseases of the sub-continent such as the race 42 of rust, to which, it has been discovered, much of the new wheat acreage is susceptible. Ford advisory assistance is concentrated in three accelerated research programs through resident and consultant advisory services and participant and on-site training to develop Pakistani research staff.

1. Wheat research is centered at the Agricultural Research Stations in three provinces at Lyallpur, Tarnab, Tandojam, and the Central Cereal Diseases Laboratory, Murree. Research is concentrated on breeding and testing for development of multi-lineal varieties to increase yields and disease and drought resistance for increased production and improvement of grain quality protein content. Target is to develop technology to increase annual wheat production from current 7 million tons on 15 million acres to 9½ million tons on 14.5 million acres by the end of FY 1975.

2. Rice research is centered at two research stations; Kala Shah Kaku (Punjab) and Dokri (Sind). Research is concentrated on improvement of varieties for increased yields and disease resistance, improved grain quality, and earlier maturity to increase land productivity. Target is to develop technology to increase annual rice production capacity from 2.5 million tons on 4 million acres to 4 million tons on 4.5 million acres by the end of FY 1975.

3. Maize research is centered at two stations: Pir Sabak (Nowshera) in NWFP and Yusaf Wala (Montgomery) in Punjab. Research is concentrated on (1) improved irrigated and non-irrigated varieties for improved yields and insect and disease resistance, and early crop maturity for effective utilization of land, and (2) development of composite and synthetic varieties to simplify domestic seed production. Target is to develop research technology to double current production capacity of 660,000 tons on some 1.6 million acres by the end of FY 1972.

4. Millets (and sorghums) research is centered at Pir Sabak, Yusaf Wala, and Tandojam Stations. Concentration is placed on improvement of varieties for increased yields and disease resistance, improved and more balanced protein content, and early maturity for easier multiple cropping. Target is to develop technology to double the present annual production capacity of 250 tons each of millets and sorghum on present acreage.

The USAID-sponsored program for development of interdisciplinary research at WPAU under contract with Washington State University began in July 1969. A Research Evaluation Committee has been established to review on-going and proposed research projects. Interdisciplinary research has begun on improvement of grain legume crops involving a joint program with the Punjab Agricultural Research Institute (PARI).

The AID/W-sponsored program for research for improved utilization of water on the farm under the CUSUSWASH Contract was begun in FY 1970. Resident and consultant advisory services have been provided to begin an initial study on interrelationships of tillage practices, water movement, and water quality in a joint program conducted by WPAU and PARI. A second Research Advisor is scheduled to arrive in Pakistan in FY 1971.

UN-FAO is engaged in research activities in West Pakistan in the areas of veterinary medicine, sugarbeet seed production, animal productivity and health, agricultural economics, forestry development, livestock development, farm management and nutrition planning. These activities tend to be restricted to the aid of one technician or the grant of one fellowship for one or two years with the exception of veterinary medicine efforts which involve four technicians and six fellowships for periods of one to three years.

The five-year SIDA research project to provide the scientific data for improving the varieties, yields, and processing of winter Brassica oilseeds for increased production of edible oil is scheduled to begin in FY 1971. Concentration will be placed on rape and mustard crops which account for 40% of the total current annual domestic production of edible oil, i.e., 110,000 tons. West Pakistan produces approximately 75,000 tons of rape and mustard derived oils annually, of which approximately 30,000 tons is transferred to East Pakistan. It is anticipated that this project will provide the research technology and recommendations for the GOP to increase annual production of Brassica oils to approximately 230,000 tons to meet total projected demand of 700,000 tons of vegetable oil in FY 1975. West Pakistan annual production potential for FY 1975 is targeted at 183,000 tons.

The GOP has requested assistance to improve the varieties, yields and processing of groundnuts to increase production of edible oils. Groundnuts are the third most important oilseed crop in West Pakistan currently accounting for 12% of the total annual edible oil production. GOP anticipates that groundnuts will supply a much greater portion of West Pakistan's edible oil supply by 1975. Acreage is projected to increase 6 fold and yields are expected to increase 40%. The GOP estimates for current and projected oil mix for West Pakistan is as follows:

Crop	Acres		Yield		Seed Prod.		%Pro- cessed 1975	% Oil 1975	Oil Prod.	
	1967-68 (000)	1975	1967-68 (Mds/A)	1975	1967-68 (000 tons)	1975			1967-68 (000 tons)	1975
Cottonseed	4245	4754	6.3	7.8	982	1362	85%	15%	100	174
Rape/ Mustard	1340	2010	5.5	6.9	270	340	90%	33%	80	103
Groundnuts	125	750	15.9	22.2	73	612	50%	30%	11	92

GOP bases these projections on cropping pattern adjustment, an intensive adaptive research and production program, incentives to growers, price control, fertilizer availability and foreign technical assistance.

It is clear that if Pakistan is going to achieve the agricultural targets of the Fourth Plan, a more effective program has to be mounted to develop and utilize indigenous scientific agricultural research capability and donor assistance support to achieve coordinated research applicable to priority requirements. Continued improvement of the West Pakistan agricultural and industrial resource base is vital to furthering economic and social development in East Pakistan which lags behind that of the West.