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Spring Review

New Cereal Varieties

RICE and WHEAT in PAKISTAN

March 1969

USAID - PAKISTAN

draft

Note:

This package consists of:

(1) USAID Country Crop Paper on Wheat (31 pages)

(2) USAID Country Crop Papers on Rice: East and West Pakistan (27 pages)

(3) Additional Information (A series of AID/W questions and USAID answers.) (9 pages)

(4) Two USAID Cables with additional information (4 pages)

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SUBJECT - Spring Review on New Grain Varieties

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1. Transmitted herewith is the "Country Crop Paper" on wheat. The paper pertains only to West Pakistan, since wheat as a crop is relatively insignificant in East Pakistan.

2. Country crop papers on rice are prepared separately for East and West Pakistan because both the physical environment and the experience with high yielding varieties are so different. The rice papers are being forwarded as a separate airgram.

ROGERS

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C.C. Brookshier	AGR		3/14/69	V. W. Brown, D(A)

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CROP - Wheat

I. Record to Date

1. Summary of New Grain Variety Program

Short-straved, high yielding varieties (HYV) of wheat were first introduced in Pakistan in 1964 by an FAO wheat expert who helped bring in many different varieties of wheat for testing in micro plots. The Mexican-type varieties performed very well throughout the large irrigated wheat area of West Pakistan. In 1965, Ford Foundation and Rockefeller Foundation, in cooperation, brought in 350 tons of Mexican wheat seeds for further trials and multiplication on farms. Except for a very small amount which later became known as Mexipak white, the 350 tons consisted primarily of a few varieties of "red" Mexican-type wheats.

In 1966, USAID financed and assisted the GOWP to bring in from Mexico 50 tons of the white variety, which had milling and baking qualities more nearly like those preferred by Pakistanis. Today, a very high percentage of the HYVs grown in West Pakistan are of the white variety, and most of the seed as a result of the 50 ton shipment in 1966.

In 1965, Ford Foundation brought in Dr. Ignatio Narvaez, a wheat breeder on loan from the Rockefeller Foundation staff in Mexico, to assist with Pakistan's coordinated wheat improvement program and to give technical advice on the overall grow-more-wheat campaign. Cooperation among Ford Foundation, USAID technicians, and government was and continues to be exceptional. USAID Extension Advisors worked with the GOWP Extension Service to carry out the demonstration and farmer education program which emphasized the necessity of fertilizer and improved cultural practices in order to obtain the potential benefits from the new varieties.

Largely because the HYV's were so highly responsive to increased amounts of fertilizer, the demand for fertilizer grew very rapidly. The use of fertilizer was projected to increase very rapidly if supplies were available and if the distribution system were capable of handling it. Distribution was in the public sector and was inefficient. USAID was instrumental in getting the Government to change its policy on fertilizer distribution and beginning in early 1967 private enterprise was given major responsibility for distribution, sales and promotion of fertilizer. Three firms have built sales organizations and others are in the process. Results are very encouraging.

USAID supported the foodgrain self-sufficiency goals of the GOP by helping to assure through development loans that ample supplies of fertilizer, pesticides, and irrigation equipment were provided. Technical assistance in agriculture was focused primarily on foodgrains.

2. Crop Production

Prior to 1967/68, the first year of any significant acreage of HYV, wheat production fluctuated around 4 million long tons per year. Due to very favorable weather, a record crop of 4.5 million tons was harvested in 1965. This was followed by two drought years. Then in 1967/68, production rose to 6.3 million tons, with favorable weather having a positive influence. The above-average weather of 1967/68 is estimated to have caused production to be approximately 900 thousand tons more than would have been the case with "average" weather. The weather in 1968/69 was not as good as in 1967/68. It was very dry at sowing time and during the early winter months, although generally favorable rainfall occurred later in the growing season. Production this year was not almost certain to exceed that of 1967/68.

The official GOWP estimate of wheat production for FY 1969 is 6.5 million tons. Based on extensive field observations, USAID agriculture advisors estimate production will be .5 million tons more than present GOWP estimates. (Ford Foundation advisors contend that the actual production was 8.5 million tons during harvest year 1968 and they are estimating 9.5 million tons for harvest year 1969.)

The per acre yield yields of Mexican wheat varieties originally introduced with a small number of farmers were slightly over one ton per acre during harvest year 1966. However, this average per acre yield has been gradually reducing as more farmers have adopted the variety. During the harvest year of 1969 USAID and GOWP agriculture officials jointly estimate that the yield per acre will be reduced from approximately 1.1 metric tons the first year to .75 tons, on the average. During the same time span there has been very little change in yield per acre of the local varieties other than that resulting from changes in climatic conditions.

The local varieties, with the possible exception of the dryland areas, will gradually disappear. Local varieties will probably be rare by crop year 197 -71.

3. Input Utilization

a. New Seed Varieties

During the crop year 1965-66 the first Mexican wheats were commercially sown by farmers; 350 tons of Penjamo and Sonora Rojo were imported by the GOWP

TABLE I Wheat Production 1/

Year	Irrigated Wheat: Mexican Varieties Acreage	Irrigated Wheat: Mexican Varieties Production	Irrigated Wheat: Local Varieties Acreage	Irrigated Wheat: Local Varieties Production	Dry Land Wheat Acreage	Dry Land Wheat Production	Total Production
	(Million acres and million long tons)						
1956-66	.012	.014	8.7	NA	3.9	NA	3.8
1966-67	.25	.22	8.9	NA	4.0	NA	4.2
1967-68	2.5	2.1	7.7	NA	4.6	NA	6.3
1968-69	6.2	4.6 2/	4.[illegible]	1.6 2/	4.8	.8 2/	7.[illegible] 2/

Source: Government of Pakistan official figures

during November 1965. These varieties gave excellent results. However, the farmers and the market resisted them due to red color and allowed poor milling qualities of the grain for chapatis. This resistance gave way due to a grain shortage during late summer and fall of 1966 that resulted in rising prices and an incentive for high yields. Fifty tons of a new variety known as "Siete Cerros" in Mexico and as Mexipak 66 (White) in Pakistan was imported from Mexico, with the help of USAID, in the fall of 1966. This variety was in great demand by the farmers because it had the qualities desired by the local markets. These seeds were kept under the control of the Department of Agriculture, GOWP and were only released to farmers who agreed to seed in 24 inch rows at a seeding rate of twenty pounds per acre. The resultant increase was over 120 to 1 which not only speeded up the complete acceptance of Mexican wheats but the farmers who produced the seed were able to sell their excess seed (without exception seed producers sowed their complete area to this variety before selling to their neighbors) at prices from $7 to $14 per bushel (converted at official rate of exchange). To add to the seed supply, during the summer of

1/ The general consensus among USAID, Ford Foundation and GOWP officials is that production estimates are understated by approximately 1 million tons. If true, it is reflected in yield estimates for many years and presumably relative increases in production are not seriously biased. The figures for acreage planted are reasonably accurate, so that yields per acre are understated.

2/ These are USAID yield estimates based on per acre yield of 26.7 bushels for Mexican, 15 bushels for local irrigated wheat and 7.4 bushels dry land. These estimates were made March 1, 1968 and should be considered preliminary.

1967 the government imported 42 thousand tons of additional Mexican seed wheat; 40 thousand tons of a sister variety to Mexipak known in Pakistan as Mexipak "Red" and 2 thousand tons of Mexipak (66) White. The 1967 import added 2 thousand to the 6 thousand tons of locally produced Mexipak White. The combining of the production of both imports provided enough Mexipak White seed to sow the present 6.2 million acres. It is estimated by government, USAID and Ford Foundation that at least 90% of all the Mexican wheat presently seeded is of the Mexipak White variety. The average price of Mexipak White seed for the 1968/69 crop hovered at approximately two rupees per maund more than the market price for local commercial wheat. All other varieties of Mexican wheats were available to farmers for less than the cost of local white varieties.

Until 1968 over three quarters of the Mexican wheats were sold from farmer to farmer with government or commercial sales being almost nil. However, a larger percentage of the 1968 Mexipak White seed was purchased by the Agricultural Development Corporation (ADC), a quasi-government organization, and this variety accounted for more than one-third of its later resales to farmers.

b. Land

As indicated in Table I, 10.2 million acres of irrigated land and 4.8 million acres of non-irrigated land was sown to wheat during crop year 68/69 making a total of 15 million acres. This compares to 12.7 million in 65/66, 13.1 in 66/67 and 14.8 in 67/68. (1965/66 and 1966/67 were drought years.) Essentially, the only competitive crop to wheat is cotton. Cotton acreage during the period 1965/66 through 1968/69 is as follows: 3.83, 3.9, 4.24 and 4.32 million acres respectively.

Farmers and GOWP officials of the Agriculture Department believe that rice is more competitive with cotton than wheat and that rice is replacing potential cotton acres. If this be the case there is very little indication that wheat is replacing any existing crop.

c. Fertilizer

Fertilizer occupies a key role in the drive to increase wheat production. The policy of the GOP is to provide adequate supplies of fertilizer and to encourage its use by subsidizing its price and by educational efforts.

The use of chemical fertilizers has increased rapidly, as shown below:

	Thousand Nutrient Metric Tons	% increase
1965-66	71	34%
1966-67	116	63%
1967-68	190	64%

During the first half of 1968-69, sales of fertilizer were 41 percent higher than for the same period one year earlier.

The estimated fertilizer use on wheat crop has been as follows:

	Thousand Nutrient Metric Tons	% of total consumption	% over the previous year
1965-66	33.00	46%	-
1966-67	70.00	60%	112%
1967-68	95.00	50%	36%
1968-69 1/	125.00	68%	31%

GOWP allowed private distributing agencies to begin distributing fertilizer in 1963. In 1968-69 private distributors are handling three fourths of all fertilizer sales.

5. Wheat

Table I shows the breakdown between irrigated and dryland wheat. The popularity for Mexican wheats has not moved to the dryland area. Total dryland wheat acreage in West Pakistan depends on the climatic conditions during the normal planting season. There has been an increase of 1.3 million acres of irrigated wheat since Mexican wheat introduction in 1965. Forces favoring the increased wheat acreage were relatively stable wheat prices and increased per acre yields due to Mexican varieties. This increase of irrigated wheat acreage was made possible by the increased water brought about by the rapid introduction of tubewells, both private and public. The number of pri ate tubewells have

1/ Total sales for the first seven months only are estimated at 175,000 tons.

increased from 35,000 to 64,000 from 1965 to 1968. The increased yield from Mexican wheat wheats has made the use of tubewells economically feasible and has also generated the cash with the farmers for financing the wells.

e. Pesticides

Insect pests have not been a problem in the production of Mexican wheats in West Pakistan and no pesticides have been required for its protection. However, the stem borer has been noted in late planted Mexican wheats and could develop into economic damage.

f. Equipment

The progress in West Pakistan in wheat production has been made, thus far, without additional farm equipment. The increased prices along with the increased production of wheat have resulted in a demand for more labor, especially during the harvest season. In many areas additional labor has not been available, resulting in delayed harvesting, and in some localities heavy harvesting losses have occurred. The shortage of labor for harvesting has also resulted in a much higher charge to the farmer for this work. Both of these factors have made the use of combines and threshers economically feasible. There has been more demand than supply for the local thresher and the government has already sanctioned $1.5 million of foreign exchange for the import of combines (USAID loan 131). Additional loan funds are being requested by the GOP for this purpose. IDA has loaned the GOP $42 million for farm machinery since the introduction of Mexican wheat; while these loans were not directly generated by the Mexican wheats, the added financial resources and the profitability of wheat production have certainly increased the effective demand for tractors and equipment.

4. Profit Calculations

A. Output Prices

Pricing policies have been used in West Pakistan to induce production and cropping patterns more consistent with food needs. In May 1967, the GOWP increased the "floor price" for wheat to 17 rupees per maund from the previous year's level of 14.50 rupees per maund, and announced it would prevail for a three-year period.

Procurement of Wheat

Financial Year	Amount Procured (000 long tons)	Floor Price (Rs / md.)	Value (Million Rupees)
1963-64	85.0	13.50	31.2
1964-65	0.7	13.50	0.3
1965-66	0.5	13.50	0.2
1966-67	21.0	14.50	8.3
1967-68	9.0	17.00	4.2
1968-69	778.0 1/	17.00	360.0

Source: Food Dept., GOWP

The present floor price for wheat (Rs. 17/maund) is about 30 per cent above the CIF import price of wheat, at the official rate of exchange (Rs. 4.76 $1), which is the way wheat is priced in the budget. The floor price is 26 per cent below the CIF price at a shadow rate of 8.5 or 31 per cent below at a shadow rate of 9.0 (approximately the present cash-cum-bonus rate for industrial materials).

The market price for wheat during the past year, except immediately after harvest, has been above the floor price. With the bumper wheat crop in 1968 the floor price mechanism was tested really for the first time. That the Government purchased nearly 800,000 tons indicates that they were willing to take a substantial measure to avoid having prices fall to a level that might be unprofitable to farmers.

1/ From crop that was cut late in spring of 1968 but threshed and sold to Food Dept. after July 1, 1968.

AVERAGE WHOLESALE PRICES OF WHEAT IN WEST PAKISTAN

	WHEAT			
	1965-66	1966-67	1967-68	1968-69
	Rupees per maund			
July	14.90	16.90	23.35	18.37
August	15.33	18.89	24.08	18.59
September	15.44	19.48	22.83	18.52
October	15.22	20.27	22.87	22.47
November	15.23	22.56	22.87	20.89
December	15.72	26.91	23.57	19.78
January	16.01	35.72	23.47	
February	16.40	35.26	23.11	
March	15.55	32.67	20.61	
April	14.95	29.90	20.27	
May	15.39	19.59	18.56	
June	16.28	19.87	16.47	
	15.52	24.83	21.81	19.63

E. Input Prices

Fertilizer

The GOWP stimulates fertilizer consumption by providing fertilizers through imports, local manufacture, and by subsidizing its price. The GOWP also has made the sale and the promotion of fertilizer use a major element of its agricultural development program.

Type of Fertilizer	Weight Lbs/bags	Price to Farmers Rs./bag	Nutrient Content %	Nutrient Content Lbs/bag
Ammonium Sulphate (Imported)	112	11.50	21	23.0 N
(Indigenous)	112	11.50	21	23.5 N
Ammonium Nitrate (Indigenous)	87.5	11.40	26	23.0 N
Ammonium Sulphate Nitrate (Imported)	110	14.50	26	29.0 N
Urea (Indigenous)	50.6	13.00	46	23.0 N
Urea (Imported)	88	20.00	46	40.5 N
Urea (Imported)	110	26.00	46	50.5 N
Super Phosphate (Indigenous)	112	9.50	16	18.0 P_2O_5
Triple Super Phosphate (Imported)	110 50	20.00 10.00	46	50.5 P_2O_5
Muriate of Potash (Imported)	110	17.50	60	66.0 K_2O
Nitrophosphate (Imported)	110	21.0	20%N 20%P_2O_5	22.0 N
Diammonium Phosphate (Imported)	110	28.00	18%N 46%P_2O_5	20.0 N 50.5 P_2O_5
1/4 Small bag	50	13.00		

From 1962 to 1966 the subsidy on fertilizer in West Pakistan average about 50 per cent. During 1966 the price of fertilizer to farmers was revised so that the subsidy amounted to about 35 per cent of total cost. Since that date the import price of fertilizer has lowered, so that the present subsidy is about 25 per cent.

The subsidy on fertilizer is a residual after subtracting sales receipts at the fixed price from the total cost of fertilizer.

AMOUNT OF SUBSIDY FOR FERTILIZERS IN WEST PAKISTAN 1/

Fiscal Year	Million Rupees
1962-63	6.7
1963-64	28.6
1964-65	20.2
1965-66	40.0
1966-67	75.0
1967-68	43.9
1968-69	127.5*

*Projected

Source: Department of Agriculture, GOWP

Pesticides

Prior to 1965 pesticides were made available to farmers without cost. Since that time the GOWP has evolved a system of recovery of 25% of the cost of pesticides from the farmers. GOWP is now committed to hand over the pesticides distribution and application to private enterprise.

Water

(a) Canals

Water rates are not based on scientific studies which might define a rate schedule more equitably tied to costs and benefits. The volume of water varies considerably from year to year, due to climatic variations; unfortunately for producers the short supply year of canal water is an aggravation of low rainfall conditions the same year.

1/ Central Government contributes about 50% of expenditures incurred by GOWP for fertilizer subsidy

The table below summarizes the canal water rate schedule over a period of time:

Schedule of Water Rates per acre
(in rupees)

	1968	1965	1959	1937-38
Wheat	8.80	7.20	6.00	4.25
Rice	14.40	11.20	10.00	6.50
Sugarcane	27.50	24.00	20.00	11.00
Oil Seed	10.40	8.80	7.25	4.25
Cotton	14.40	12.00	10.00	5.25
Fodder	5.60	4.80	3.50	2.50

(b) Government Tubewells

In the areas where government tubewells have been installed, the water rate per acre is double the price of canal irrigated acreage. That is to say that the water rates for wheat, rice and sugarcane are Rs. 17.60, 28.80, 55.00 respectively.

Credit

Credit needs of agriculture are enormous. The supply of institutional agricultural credit in Pakistan is far short of the amount needed by farmers. No reliable data are available on the total volume of outstanding agricultural credit. The State Bank of Pakistan estimates roughly that about Rs. 3,000 million of farm credit is available in the country, of which 19% is from institutional sources and 81% is from other sources; such as, relatives, store keepers, private banks, etc.

ADBP official rates of interest on all types of loans remained unchanged at 7% for short and medium term loans, and 6% for long term loans until July 1, 1968, when the rate for long term loans was also fixed at 7%.

During the year 1967-68 the ADBP loaned Rs. 106.23 million to farmers in West Pakistan, exceeding its Five Year Plan target for that year.

The breakdown is as follows: (In million rupees)

Short term	24.60
Medium term	10.45
Long term	71.18
Total	106.23

Yearly loan targets for third Five Year Plan are as follows:

In Million Rupees

Year	Board of Revenue	Coop. Dept.	ADBP	Total
65-66	10.7	100.0	68.5	179.2
66-67	10.9	120.0	85.0	215.9
67-68	23.0	150.0	100.0	273.0
68-69	25.5	180.0	120.0	325.5
69-70	29.9	200.0	140.0	360.0
	100.0	750.0	513.5	1363.5

Source: Third Five Year Plan

C. Net Return

An average farmer growing Mexican varieties of wheat, earns Rs. 619 per acre against an expenditure of rupees 361.00 which includes land use rent at 5% of the value of land for a profit of Rs. 258.00. As compared to this a farmer growing traditional varieties of wheat earns Rs. 275.00 per acre against an expenditure of Rs. 203.00 for a profit of Rs. 62.00. This is shown in Table I and II.

Water charges have been calculated at Rs. 20.00 for Mexican varieties and Rs. 10.00 for traditional varieties. In public tubewell areas charges for supplying water are double that of the canal irrigation.

TABLE I

EXPENDITURE ON THE CULTIVATION OF HIGH YIELDING WHEAT VARIETIES PER ACRE UNDER IRRIGATION CONDITIONS

1.	Land use	Rs. 100.00 1/
2.	Plowing/land preparation	40.00
3.	Manual labor (5 man days)	15.00
4.	Water rates 2/	20.00
5.	Seed	20.00
6.	Fertilizer application	76.00
7.	Harvesting	60.00
8.	Transportation charges	30.00
	Total Expenditure	361.00

INCOME

Yields in maunds	=	35 maunds
Rs. per maund	=	Rs. 17.00
	=	Rs.595.00
Wheat straw	=	12 maunds
Rs. per maund	=	Rs. 2.00
	=	Rs. 24.00
Total Return	=	Rs.619.00
Expenditure	=	Rs.361.00
Net Return		Rs.258.00

1/ 5% of present land value

2/ Based on cost of public tubewells as well as canal water rates.

Source: USAID estimates

TABLE II

EXPENDITURE ON THE CULTIVATION OF TRADITIONAL WHEAT VARIETIES PER ACRE UNDER IRRIGATION CONDITIONS

1.	Land use	Rs. 75.00
2.	Plowing/land preparation	30.00
3.	Manual labor	15.00
4.	Water rates	16.00
5.	Seed	15.00
6.	Fertilizer application	15.00
7.	Harvesting	25.00
8.	Transportation charges	12.00
	Total Expenditure	203.00

INCOME

Yields in maunds	=	15 maunds
Rs. per maund	=	Rs. 17.00
	=	Rs. 255.00
Wheat Bhusa	=	12 maunds
Rs. per maund	=	Rs. 2.00
	=	Rs. 24.00
Total Return	=	Rs.275.00
Expenditure	=	Rs.203.00
Net Return		Rs. 62.00

Source: USAID estimates

5. Policies

An interesting evolution of policy in regard to the HYV took place in both the Central and West Pakistan Governments. Originally, Government officials were skeptical of the prospects of HYV's but unofficially condoned the testing of these varieties. When the 50 tons of Mexipak seed were brought into Pakistan in 1966, the Department of Agriculture of West Pakistan, with USAID assistance, was able to distribute this seed under conditions to get maximum increase. The high yields obtained from low rates of seeding (but high fertilizer) convinced farmer and policymaker alike that this was a way to balance the foodgrain situation.

A. Promotional Campaign

As a result the "Grow-More-Food" campaigns of the Central and Provincial Governments were made a first priority. The government leaders, communications media and educational institutions joined the band wagon of "Grow-More'Food". It was the first order of business.

B. Price Policy

Price policy was reviewed and the floor price of wheat was increased from 14.5 rupees per maund to 17 rupees in May 1967 to encourage farmers to grow more wheat. The new floor price was announced for a 3-year period.

C. Fiscal Policy

The Government of Pakistan has continued the fertilizer subsidies on both the locally produced (public sector) and the imported fertilizer, as well as subsidies on certain other inputs as noted under A above. No new fiscal policy measures were adopted specifically with reference to HYV's.

D. Fertilizer and Irrigation Supply Inputs

The Government of Pakistan made a significant change of policy in fertilizer distribution. With the big increase in demand, the government decided to transfer to the private sector the responsibility for fertilizer distribution. It is estimated that three fourths of the fertilizer will be handled by the private sector in FY 1969.

The Government has encouraged the drilling of private tubewells as well as continuing to install public sector wells. Since many of the existing canals are non-perennial (have water only when rivers are in summer high flow) the tubewells have made possible the 1.3 million acre increase in wheat acreage.

E. Market

Marketing policy of the government has limped behind the Grow-More-Food program. Grain storage facilities are belatedly being constructed but little if any cleaning facilities have been planned. Except for depots to purchase wheat, no change has been evident in the market system. Pakistan wheat would be severely penalized in the world market unless better means of handling and cleaning are devised.

6. Institutions

A. Research and Extension

1. Research

The yield breakthrough of Mexican wheats has brought about a growing demand for research, both for research to find better agronomic practices and research to develop improved varieties with better milling qualities, higher yields, more resistance to lodging, more disease and insect resistance, etc. The President, Ministers, National Assemblymen, businessmen, progressive farmers and others have begun to visit the research farms and trials carried out by farmers throughout the country. This added interest on the part of both public officials and private individuals has created a demand for more and better research, more and better trained researchers and a willingness on the part of government to allocate more financial resources to research. USAID and Ford Foundation have been asked for and have supported more participants for foreign training in research from the agricultural research stations and the universities.

2. Extension

The extension service has gained status due to the foodgrain breakthrough. The new variety introductions have brought about a demand for information by farmers that heretofore have never felt a need for information to carry out their traditional farming. The only person with reliable information available to the farmer for information on seed rate, planting dates, fertilizer requirements, timing of fertilizer application, placement of fertilizer, water requirements, timing of water application, etc., were the agricultural development officials (extension workers). Much misinformation naturally reached the farmer through the grape-vine system of communication, as well as correct information, but for the first time in their careers many of the extension workers found influential farmers coming to them in order to get garbled information clarified. This built up the extension worker's desire and need for information that they had not obtained either through their experience or training. As a result of these increased knowledge requirements,

training courses of a practical nature were initiated in all parts of the country and trainees have begun to show a genuine interest in new knowledge. The technical level of knowledge required for advising farmers has made the Government aware of the insufficient training of their field assistants in the Extension Service; therefore, they have initiated a project to replace these workers, who have a maximum of 10 years schooling, with university agricultural trained graduates. USAID has agreed to assist the Government with technical assistance and guidance to get this new project off to a well-based start.

B. Credit

The Agricultural Department, CCIP, the Ford Foundation and USAID agree that credit facilities in West Pakistan had very little direct effect on the adoption of the high yielding varieties of wheat and rice by farmers. Credit facilities supported by government have not been increased significantly to accompany the introduction of new varieties. Since 1965, IDA and SIDA loans amounting to $42 million have been sanctioned by the GOP for supporting the foreign exchange components for farm machinery and tubewells. These loans have been utilized much ahead of schedule and the Government has requested additional loans to meet the demand. The added income to farmers from Mexican wheats and the profit potentials have resulted in a greater effective demand for tractors and farm implements. Additional credit made available for installation of tubewells along with increased effective demand created by the new varieties have resulted in additional irrigation water which in turn has brought about an additional acreage of irrigated wheat.

Other domestic loans directly tied to production, but in most instances not contingent on adoption of new practices, are taccavi (Board of Revenue) Rs. 238 million, Cooperative Department Rs. 150 million and Agricultural Development Bank of Pakistan (ADBP) Rs. 100 million during 1967/68 making a total of Rs. 273 million; this compares to Rs. 179 million in 1965/66 and a projected target of Rs. 360 million during 1969/70. This increase is formidable but tends to assist the same farmers who were already deemed credit-worthy rather than to benefit more and more farmers.

C. Input Distribution

The marketing of fertilizer has changed from one hundred per cent distribution by the public sector (Agricultural Development Corporation and Cooperative Societies) in 1965 to 80% distribution by the private sector in 1968. This change has resulted in a much smoother marketing system with fertilizer moving to the areas of farmer demand rather than the areas of need as pre-determined by the government agencies. Pockets of shortages, however, still do result in temporary black market operations which are

exaggerated by political pressures. As long as short supplies occur, prices higher than those advocated by the Government will be obtainable for periods of shortage; on the other hand, instances have been noted where slightly lower than Government recommended prices have occurred under excess quantity situations.

Over three quarters of the seed purchases have taken place between farmers. When Mexipak (White) seed supplies were below the demand the prices for seed became excessive and prices reached 140 rupees per maund (fourteen dollars per bushel) during the fall of 1967, but this situation changed when supplies increased and the price during the fall of 1968 was only about 15% above commercial grain prices. Responsibility for wheat seed distribution will probably remain in the public sector for sometime in the future; however, this does not appear to be a problem as farmers have traditionally kept their seed wheat reasonably pure and have a neighborhood system of seed production and distribution. The seed exchanged from farmer to farmer has been superior to that sold to the AIC and resold by them to farmers.

D. Marketing and Storage

Best estimates of grain storage facilities in West Pakistan are as follows:

Central Government Storage	377,000 tons
Provincial Government Storage	589,000 "
Commercial Storage	2,[illegible] "
On the Farm Storage	2,030,000 "
Commercial Agents Storage	400,000 "
Storage at Mills	100,000 "
Total Storage:	5,466,890 "

Much of this storage is of poor quality. Grain storage facilities not only are utilized for wheat but also for rice, corn and all other coarse grains. It is estimated that the 1969 grain harvest for all grain crops in West Pakistan will be 14 million tons of which at least 9 million tons will require concurrent storage facilities if timely export of grain is not effective. This indicates a possible 3.5 million ton grain storage facility deficiency during 1969.

The GOP requested assistance from USAID for determining means of increasing available grain storage for the immediate future during August 1968. The Mission responded by bringing a grain storage expert to Pakistan under the WOI/PSU contract and this report was submitted to the Government in early October. In his report he stated that grain storage facilities could not be

imported from the U.S. and constructed in time for the 1969 wheat harvest year. He recommended among other things that an in-depth study be made of the entire problem of grain storage marketing and handling and that GOWP proceed on a crash program with their present grain storage project to build additional storage for Government stocks of grain. Since that time the GOP has arranged with the Canadian Government to do an in-depth study and it also has requested the Mission to provide Rs. 12.5 million under the Mondale amendment to PL-480 to assist the financing of their crash grain storage construction program. No dollar financing and no direct-foreign exchange financing was requested. This rupee financing request has been forwarded with a favorable recommendation to Washington where it is presently being considered.

E. Land Tenure and Ownership

Census of Agriculture indicates 51 percent of the cultivated land in West Pakistan is operated by owners. Owners, regardless of size of farm, have adopted Mexican wheat along with the package of inputs it requires to be effective more rapidly than non-owners or tenants. Mexican varieties will also be adopted by tenants but the use of the recommended types and quantities of fertilizers definitely faces resistance by tenants. This statement has to be general as some land-lords have taken the initiative of encouraging their tenants to adopt new practices by financing the purchase of Mexican varieties along with the recommended quantities of fertilizers. However, these cases are still the exception. In West Pakistan the land-lord furnishes the land and the water rights and the tenant furnishes the labor, equipment, traction; through agreement they divide equally the water charges, fertilizer cost and the seed. The land-lord generally is absentee and the responsibility for the purchase of fertilizer falls upon the tenant. This responsibility and financial burden acts as an impediment in the adoption of improved input practices.

Although thus far in small numbers, there has been a definite movement of eager land-lords or their sons to the farm to begin direct cultivation of the family farms. This generally includes the purchase of a tractor and the displacement of a few tenants. These tenants are usually offered employment on the farm. When this occurs the results are usually an increase in yields not only on the land cultivated by the farmer but also on the lands of the tenants remaining on the farms. In farming areas where Mexican wheats and other improved practices have been utilized, and a resulting large yield increase has occurred, there are an increasing number of instances of the more progressive farmers purchasing additional land and the smaller farmer who has not adopted new practices, being induced to sell his land. Land prices have increased due to the increased income obtainable from the new varieties.

F. Agricultural Education

The President of Pakistan has requested the West Pakistan Agricultural University to investigate the possibilities of including agricultural subjects in all the public schools and to begin training of teachers for this purpose. This proposal has not yet been implemented. Farmer short courses at the Union Councils have also been proposed and announced in the newspapers but actual training has not begun. Probably the most significant massive training program has been initiated through radio. At the direct orders of the President of Pakistan a daily fifteen minutes program occupying "prime" time, for informing farmers of improved practices was initiated July 1, 1967. This program has been very well received by the farmers and government officials. The Secretary and Minister of Agriculture each faithfully present messages on one day each week; the other five days are dedicated to seasonally applicable information on crop production by research and extension officers. There is no doubt that the information presented by these officials and their enthusiasm have speeded up the adoption of Mexican wheats and IRRI rice.

/. Weather

Weather for the crop year 196 /65 was very favorable. The next two years were drought years and even though a high percentage of the wheat acreage (approximately two-thirds) is irrigated, production is very much affected by weather, particularly rainfall. If soil is dry at planting time, smaller acreage of wheat is planted. The unirrigated area, of course, is heavily dependent on rainfall. The supply of canal irrigation water depends upon rainfall in the northern areas and in the two drought years, canal irrigation water was down also.

Germination was good for the 1966/67 crop, but virtually no rain came after sowing time until about mid-February to mid-March. Good general rains at that time improved crop conditions.

The crop year 1967/68 was one of the best ever for wheat in West Pakistan. It was characterized by good soil moisture condition at planting time, timely rains during the growing season and a regular supply of water in canals. Our best estimate is that 900,000 tons of wheat production in 1967/68 was attributed to better than average weather.

RAINFALL DATA FOR WEST PAKISTAN
(in inches)

1966-69

	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
1966-67	1.38	1.29	.52	0.61	0.0	0.6	.9	2.28	7.55	1.85	0.0	0.45
1967-68	5.44	3.86	.73	0.96	0.33	6.41	4.7	1.8	1.9	1 6	0.1	0.7
1968-69	2.5	3.9	0.3	0.4	1.7	0.9	.3					
LAHORE												
1966-67	NA	1.38	0.16	1.2	0.0	.3	0.	.62	2.34	1.18	0.09	0.65
1967-68	2.14	.55	0.85	0.78	0.27	3.28	0.5	1.6	2.2	0.7	0.9	1.7
1968-69	3.0	3.6	0.3	.0	0.0	0.0	0.1					
MULTAN												
1966-67	3.94	2.38	4.64	0.67	0.0	0.0	.9	0.83	2.95	0.51	0.01	0.03
1967-68	3.54	5.04	1.26	0.29	0.11	4.40	1.1	.7	0.7	0.0	.3	1.6
1968-69	4.3	7.9	0.0	0.8	0.0	0.5	0.1					
SUKKAR												
1966-67	1.58	0.34	1.14	0.0	0.0	0.0	0.3		2.14	0.05	0.0	0.83
1967-68	.91	3.18	0.05	0.21	0.07	4.28	0.4	.3	1.1	0.0	1.5	0.1
1968-69	1.3	0.3	0.0	0.1	0.0	0.3	0.1					
HYDERABAD												
1966-67	2.26	0.	0.0	.40	0.0	0.0	0.0		2.95	1.13		0.46
1967-68	5.69	2.15	1.81	.0	0.13	0.33	.3	.3	.8	0.0	0.1	0.0
1968-69	0.0	0.7	0.0	0.0	0.0	0.2	0.1					

II. Assessment of Causes

The exceptional speed of the introduction of high fertilizer responsive varieties of wheat and rice in West Pakistan can be attributed to a number of factors. The major reason for its relative success in West Pakistan was the complete environmental adaptability of the varieties. Mexican wheat was developed in a latitude almost identical with the Indus area of Pakistan, for growing under irrigation. When introduced into West Pakistan, it did not develop any significant insect or disease problems; it yielded equally as well if not superior to yields in Mexico. The Mexipak White has almost identical milling qualities to the wheat already preferred by the people. The timing was also marked by conditions favoring the new initiative: Pakistan was in its second drought year and shortages of foodgrains had sharply increased domestic prices; import sources of food grains were also short, particularly from the U.S., and heavy commitments of foreign exchange had to be made to assemble enough assured imports.

In retrospect it seems that the stage had been prepared over a period of years for the introduction of high yielding varieties. Long-range water development had been taking place in the Indus Plain. Economic incentives in the form of price supports on foodgrains and subsidies on inputs had been instituted in the early 1960's. The Extension Service had benefited from USAID technical assistance. The U.S. Government had announced that aid-receiving countries must pursue "self-help" measures in agriculture, and the GOP almost simultaneously embarked upon its Grow-More Food campaign and set out to make available the quantities of fertilizer, insecticides and other inputs necessary to meet what appeared to be optimistic targets for foodgrain production. Perhaps somewhat fortuitously, the Mexican varieties came along and served as a catalyst to set in motion the forces that had been built up.

The President's strong personal participation and support along with his personal example passed on to the other high officials of government have been a major contribution focusing attention of farmers on the need for innovations and the economic benefits and the highly successful performance of the varieties underscored the advantages of the objectives and course advocated by the President. Without the President's support the adoption of new varieties and practices would have been much less rapid. The participation of the President was calculated and well planned, his insistence on floor prices and the funds to make an effective price support program possible along with the import of large quantities of seed and adequate fertilizer stocks contributed to the atmosphere for success and to carrying out the desired policy.

III. U.S. Role

1. Policy Influence

U.S. exercised a major policy influence early in 1966 when it announced on a global basis that agriculture was to have priority in foreign aid programs

and that recipient countries would be expected to make greater efforts to increase food production. A more direct influence came when the U.S. offered to finance and assist the Government of Pakistan in the purchase of the original 50 tons of Mexipak White wheat during the fall of 1966.

Another major action was the emphasis the USAID Mission put on developing an effective floor price for wheat along with the system to implement such a program. From these considerations the GOWP adopted a support price of Rs. 17.00 per maund. The massive demonstration program supported by USAID Extension Advisors in SCARP-I had also demonstrated effectively that large scale change could be accomplished with Pakistan farmers through intensive result demonstrations. Where the farmers could see resulting increases in yield and profit, they would follow up to try the new varieties and methods. U.S. support to joint ventures to help finance the rapid development of fertilizer plants and USAID loans to finance large scale imports of fertilizer in the interim period as well as the help and encouragement of Pakistan to make the case for financing to other donors was significant in helping Pakistan to raise its sights and targets to increase the effectiveness of the all-out push for foodgrain self-sufficiency.

2. Capital Inputs

The first direct financial assistance USAID gave to the Mexican wheat program was a $25,000 grant using the Mission Director's special fund authority for the import of 50 tons of Mexipak (White) seed during the fall of 1966. This seed was the parent of 90% of the Mexican wheat growing in Pakistan today. U.S. AID technicians were assigned to assist the GOWP throughout the province in carrying out their 1966 and 1967 demonstration program with farmers. The decision of the Mission to support Pakistan's fertilizer requirements with imports from the U.S. was a major support for the Mexican wheat breakthrough. USAID program loans 115, 121, 127 and 131 committed a total of approximately $66.4 million CIF for fertilizer. An estimated three-fourths of this fertilizer has been used on wheat and rice. Support for pesticides imports has also been significant; $20.9 million from program 115, 121 and 131 has been committed to finance the import of pesticides.

3. Technical Assistance Inputs

USAID has not had any technicians assigned full time to the introduction of new varieties; however, an Agronomist has spent half of his time and 7 other advisors in the "Agricultural Area Development" project have worked at least one quarter of their time with GOWP officials in the promotion and demonstration of the new varieties of wheat and rice. The foodgrain self-sufficiency implementation plan used throughout the country was patterned on the approach of the "Agriculture Development Plan for SCARP-I" which had

been developed with the GOWP in relation to AID supported project activity, with emphasis being placed on massive demonstration of wheat varieties along with a package of inputs necessary for high per acre yields.

4. Overall Effectiveness and Lessons

As stated earlier, several factors have been involved in the apparent success of the HYV wheat program. It would be overstating the case to say that the USAID role was decisive. Nevertheless, the USAID role was important. Two significant elements of the success story would almost certainly have been missing were it not for USAID initiative: (a) the fertilizer distribution system would not have benefitted from the timely entry of private enterprise at the early stages of the burgeoning growth of the market, a shift in policy made at that time in large part due to considerations raised by the U.S. and reflecting our interest in efficiency and acceleration of the fertilizer distribution program; and (b) the 50 tons of Mexipak White seed would not have arrived in time for planting in 1966; USAID technicians and administrators played a decisive role in assisting the GOWP with the financing, purchase and shipment of this key seed.

The fact that the U.S. announced early in 1966 its intention to emphasize the importance of agricultural development and to assist those countries which were making a determined effort to improve their policies and programs to expand food production, was underscored by the lesser availabilities of foodgrains under PL-480 at a time when Pakistan was experiencing the first of two severe droughts. The prospective "hardening" terms of PL-480 also hardened the Government's decision later in 1966 to step up its emphasis on agriculture--foodgrains in particular. The general posture of USAID was to support the GOP foodgrain self-sufficiency goals.

The impact of the U.S. policy interest in this area of growth was significant even though it is difficult to measure in any quantitative way. The Mission worked closely with the GOP and GOWP both at planning and technical levels to build an appreciation of the quantitive, technical and policy issues that the national and provincial governments would have to anticipate and to help them to take planning measures to meet such needs, by by using and improving their own resources and calling on those of the U.S. and other donors. Mission staff worked with GOP in developing technical assistance projects aimed toward increasing foodgrains and in arranging commodity loans for fertilizer. Mission staff continually were on the lookout for bottlenecks and barriers which might inhibit progress toward reaching the foodgrain goals and found a receptive audience with the GOP and GOWP when constructive suggestions for resolution of such difficulties were brought to their attention.

IV. Social, Political and Economic Consideration

1. Differential Adoption of New Technology

No formal studies have been made of the differential adoption of the new technology; however, the USAID personnel assigned to the Agricultural Area Development project under the Indus Plain Development Scheme have been working very close to the grass roots and these advisors have had an opportunity to observe and to evaluate the local results of these adoptions. They make the following observations:

a. The larger the farm size the more rapidly the farmers adopt new practices.

b. Generally tied to farm size is socio/economic status. The higher the socio/economic status the more rapid the adoption.

c. A land-owner, no matter what the size, is more responsive to the new technology than the non-owner.

d. The educational level per se does not appear to affect the interest in adoption of profitable new technology, but the litera
the new information sooner and adopts the new knowledge more rapidly.

The Mexican wheats were first adopted by a higher percentage of large farmers than of small farmers but in absolute numbers there are many more small farmers producing HYV wheats than large farmers. The percentage of large farmers directly farming their own land is very small. Large farms operated by tenants tend to have a lower percentage of HYV than small owner-operated farms. The government policy in the introduction of Mexican wheats was to sell a small amount of seed to as many farmers as possible. However, with the limited quantities, most of the more progressive large farmers received some new wheat. They in turn sold their seed production strictly on a voluntary commercial basis. As a result, in FY 66/67 and FY 67/68, a high percentage of improved seed ended in the hands of the larger farms. In 1968/69 seeds were available at a reasonable price to all farmers. New technology in general has been adopted in about the same pattern as the new seeds were adopted.

2. Differential Adoption of Inputs

The major input for wheat other than seed and technology is fertilizer. No new public sources of credit were budgeted for fertilizer in West Pakistan, and, most fertilizers have been purchased out of the farmer's cash resources or with credit that he has arranged privately. The larger farmers generally

have more resources. Hence they have used more fertilizer. It is generally believed, based on observations, that the small farmers apply at least some fertilizer while the larger farmers apply the amounts recommended. On the other hand, the small farmer applies a larger per acre quantity of barnyard manure which partially offsets the lower amounts of chemical fertilizers. The distribution system itself and the price policies give rise to no differential availability of fertilizer between economic classes of farmers but there are more impediments in fertilizer use for small farmers than for larger ones.

3. Employment Effects

The introduction of HYV wheats and the requisite inputs have significantly increased the requirements for labor on the larger farms and have more fully utilized the available labor on the smaller farms. The harvesting requirements for labor have increased by 20 to 40% and the requirements for early weeding have increased due to the rapid growth of the fall weeds responding to early fertilization. The increased yields per acre from HYV have made farmers more income conscious, resulting in a greater likelihood of their striving to produce a second crop. There are also more possibilities for profits for a second crop where heretofore fertility was a limiting factor. This second crop demands more labor and also has an effect on more fully utilizing the labor throughout the year. In many areas of the Indus Plain, where the Mexican wheats have been more completely adopted, the cost of labor as a percentage of the crop has doubled. This has caused the larger farmer to seek other means of harvesting such as combines or threshers but it has also increased incomes of the seasonal workers in the villages. The last two years, 1966/67 and 1967/68, have been blessed with good weather during harvest; in the absence of exceptional labor arrangements or some access to appropriate machinery, rainy harvest along with further increases in production could result in a sizeable loss of wheat. In sum, total employment has increased in the rural areas due to the introduction of HYV.

4. Income Effects

All farmers have felt the impact of increased income from HYV wheats. This effect has come from two sources, the increased yield per acre and the stable, favorable prices throughout the year. The farmers who have first adopted the HYV along with recommended inputs have reaped the most benefits. Increased income has with few exceptions gone back so into the farming operations; first, to pay off outstanding debts, thus improving the farmer's credit position, second, to purchase more fertilizer and better seeds and third, to buy a tractor or install a tubewell (mechanized deep irrigation well).

5. Social Effects

Very little of the added income appears so far to have been invested in houses, better education, better clothes or appliances. However, the bicycle and the transistor radio are rapidly finding their way into the villages. Added income among farmers has created other desires, such as for improved roads, more educational facilities, etc., but these desires had not been strong enough yet to initiate agitation. These demands will come at a later date; however, as the seeds have been sown plans will have to be made.

6. Political Effects

Through 1968 there was no significant agitation in the rural areas of West Pakistan. The farmers are in general, pro government because they realize that they have been in a more favorable position in this administration than any other. Since tapping rising agricultural income for public purposes will be a crucial problem of resource mobilization in the period immediately ahead, it is generally believed that a shrewd politician appealing to local loyalties might be able to agitate this group also. No politician, at this period, has gone into the rural areas with a distinctive program to obtain the farmers' support. Active politics in the rural areas has generally been aimed at local personalities and questions rather than provincial or national issues. Politics at the Union Council level can be very heated. The only political influence, through Fy 68, that can be attributed to the HYV wheat has been on the side of the administration due to the recent benefits from improved per acre yields and stable prices.

7. Economic Costs

A. Substitution Effects

There has been no significant reduced support of other crops due to the introduction of HYV wheat or rice. The price support of corn and rice was initiated at the same time as the increased wheat support price and at comparative prices resulting in added emphasis and additional fertilizer usages on those crops also. Indirectly, the support of the HYV and the consequential added income to farmer from them have put HYV in a more favorable competitive position with crops which possibly were in a better position before -- such as cotton, oil seeds, citrus orchards, potatoes, vegetables, etc.

B. Foreign Exchange Cost

The best estimates made by the Agriculture Department are that 125,000 nutrient tons of fertilizer were used on wheat in FY 68/69. (Fertilizer is applied on wheat land from about October through January). The same source

also estimates that 85% of the fertilizer used on wheat has been used on HYV. Taking these assumptions and taking the average CIF price per nutrient ton of fertilizer from the U.S. at $220 per ton, the average cost of foreign exchange per acre of Mexican wheat will be $3.80. That is, .85 x 125,000 x 2204 ÷ 6,200,000 acres = 38(nutrient pounds per acre). Average price of one nutrient pound of fertilizer is 220 ÷220.00 = $.10 (price per nutrient pound).

85% of fertilizer used on Mexican wheat
125,000 = tons of fertilizer used on wheat 68/69
2204 = pounds in 1 metric ton
6.2 million acres = estimated area in Mexican wheat 68/69
$220.00 = average U.S. cost per metric ton urea.

Total foreign exchange cost of Mexican wheat production 1968/69 is estimated at $23.56 million. The rate of imported machinery and fuel is still relatively small and other foreign exchange costs in the production of ... wheat is at present considered to be negligible.

C. Program Budget Cost

The main special allocations to the Agriculture Department for carrying out the Mexican wheat program were the amounts budgeted for the general fertilizer subsidy and the procurement to maintain the support price of wheat. All other programs operated under their regular budgets. All "farmer trials" were financed by the farmers themselves. The farmers paid for the seed and the fertilizer and were rewarded for their efforts by being able to purchase the new xxxx varieties with permission to sell the increases at a premium price. The major change in the extension service program was from an extensive, all inclusive, educational program to an intensive one-crop approach. This new approach had been developed in the SCARP-I project and is now being adopted throughout the extension services.

National Budget Provision for Subsidy on Fertilizer

Fiscal Year	General	Small Tea Estate
All Pakistan	(Million rupees)	
1966/67 (accounts)	73.3	-
1967/68 (revised budget)	101.4	0.1
1968/69 (budget)	141.1	0.1
West Pakistan		
1967/68	50.0	-
1968/69	65.0	-
East Pakistan		
1967/68	51.4	0.1
1968/69		0.1

Note: Central Government contributes about 50% of expenditures incurred by GOEP for fertilizer subsidy.

Of the amount budgeted for fertilizer subsidy in West Pakistan, more than one-half went to wheat production. About 360 million rupees were used in procurement program for the crop harvested at the end of FY 67/68. An undetermined amount was budgeted for radio and television programs of which half is estimated to have been dedicated to the campaign of "Grow-More-Wheat".

8. Taste Factors

The first Mexican wheats -- Penjamo, Lerma, Rojo and Sonora -- met with resistance by consumers. This resistance was due to the poor baking qualities for Chapati making and the red color which gave the Chapati a different appearance. The Chapati made with the red wheats was acceptable when hot but when its consumption was delayed it became hard and dry. The Pakistan laborer takes his mid-day Chapati to work with him and consumes it about 4 or 5 hours after it has been cooked. Although the quality of the Mexipak White is acceptable the experts state that its quality is not as good as the local improved varieties. The Mexipak White's appearance is equal to the highest quality wheat and the market price is also equal to the superior local varieties. The usual price of the red Mexican wheats is presently about 4 rupees below the local or Mexipak wheat, so that when the local wheat is 22 rupees per maund the Mexican Red wheats will sell for about 18 rupees per maund. This evidently enough price differential for the consumer preference.

V. Projection

Pakistan is further along than most countries of the Middle East in respect to the introduction of HYV wheat. The area under Mexican HYV is estimated to be 6.2 million acres as compared to 4.0 million acres of the local varieties being grown under irrigation, or about 61% of the total irrigated wheat area is in HYV. Without any further assistance it is believed 85% of the irrigated wheat areas will be in Mexican wheat by the next crop year 1969/70 and by 1971 the local wheat will have almost disappeared in the irrigated area. The estimated 7.0 million tons of wheat for harvest in 1969 immediately following a 6.3 million ton crop makes West Pakistan self-sufficient in wheat. Foodgrain self-sufficiency was reached one year ahead of what were previously believed to be optimistic projections. In a recent meeting held in Lahore attended by representatives of the Central Planning Commission, the WP Agriculture Department and the Planning and Development Department of West Pakistan, the discussions had already shifted from how to become self-sufficient to how Pakistan should deal with its surpluses. The Agricultural Sector of the Mission program memorandum for 1970 points out many of the issues Pakistan will have to face with grain self-sufficiency.

These issues have not been resolved. The Mission is currently engaged in a review of Pakistan's agricultural policy and prospects and will attempt to determine the best future policy for the Mission to support. The study will be made available to the GOP for consideration and use in formulating its own goals for future agricultural development and the Agricultural Sector of the 4th Five Year Plan. To assist in this study a contract was made with OSTI for the services of Messrs. Falcon and Gotsch, whose previous work in Pakistan's agricultural economic problems was well known. They have already presented 8 initial working papers dealing with such subjects as implications involved in grain self-sufficiency, pricing policies, possibilities of exports, implications of transfer of foodgrains from the West Wing to the East Wing, etc. Indications are that desirable policy changes will result at least partly because of consideration GOP will be devoting to the subjects of these papers: reduction in subsidies to inputs, shifts in support prices, export incentives for cash crops, objectives for future agricultural investment, etc.

The Mission plans to use as much outside help, such as the Gotsch and Falcon papers, as possible along with special analysis by the Mission to complete the "Agricultural Policy Review". A significant piece of this study will be submitted as part of the program memorandum for FY 71 with further analysis and refinements to be completed by the following summer.

AIRGRAM

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DATE SENT 3-18-69

FROM - USAID Rawalpindi

SUBJECT - Spring Review on New Grain Varieties

REFERENCE - (A) AIDTO CIRC A-29
(B) STATE 008551
(C) TOAID A-252

1. This airgram constitutes the Country Crop Papers on rice for Pakistan. Because the physical environments and the experiences to date with HYV of rice are so different for the two provinces, separate crop papers have been prepared for East and West Pakistan.

2. The country crop paper on wheat was forwarded as TOAID A-252.

ROGERS

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PAGE 1 OF PAGES 27

DRAFTED BY	OFFICE	PHONE NO	DATE	APPROVED BY:
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AID-5-39 (11-68) (Do not type below this line) PRINTED 3-67

COUNTRY: PAKISTAN (East)

CROP : RICE

I. Record to Date

1. Summary of New Grain Variety Program

(East Bengal)

East Pakistan has been a deficit foodgrain area since the late 1930's. For a long time production rested at around 7.5 million tons and population continued to increase, in recent years growing more than 3 per cent annually. By the late 1950's, with increased emphasis in agriculture and the introduction of foreign advisors (primarily USAID or predecessor agencies) foodgrain production started to increase and reached 10.3 million tons in the 1965-66 season. In 1966-67 due to adverse weather conditions the crop dropped to 9.4 million resulting in a general foodgrain shortage throughout the province. A goal of foodgrain self-sufficiency by 1970 was chosen, and again greater emphasis was placed on agriculture, budgets were revised and a "Grow-More-Food" campaign initiated.

The success of new rice varieties developed by IRRI in the Philippines and tested in 1965-66 in East Pakistan, seemed to make this variety a natural focus for the "Grow-More-Food" campaign as a principal source of increased production. Three lines designated as IR-8, IR-5 and IR-9-60 had shown some promise and were given field trials in all three 1965/66 rice gami growing seasons--Aus, Aman and Boro. Indications were that IR-8 and 9-60 looked adaptable for Boro and early Aus while IR-5 appeared the best for Aman but had only marginal success. IR-8 was the best for the Boro season and in the 1966-67 Boro season, following the low Aus and Aman production, 500 acres were planted for seed multiplication on farmer plots supervised by Agricultural Development Corporation (ADC) and the Agriculture Department staff. Results were excellent with this crop averaging close to 2.5 tons of paddy per acre, compared with previous average yields of 1.0 ton per acre for the best of the local varieties under similar conditions. On the basis of this result a large-scale promotion and training program was initiated by the GOEP Agriculture Department in the hope that the "Miracle Rice" had arrived. IRRI provided teachers for training Pakistan field staff on IR-8 cultivation and this staff in turn trained farmers and promoted IRRI rice. One thousand five hundred tons of seed were imported from the Philippines in addition to the 500 acres of locally multiplied seed for the 1967-68 winter crop. All through the summer of 1967, promotion of IRRI rice by Agriculture Department staff and through mass media continued.

In November of 1967 the bubble burst. Even though the public had accepted the fact that IR-8 was suitable for the Boro season only, small plots throughou

the province were planted early for Boro--i.e., in October and November. By December and January--normal Boro planting time--the early plantings were heavily infected with tungro virus, bacterial leaf blight, and showed signs of cold damage. IR-5 test plantings in the Aman season of 1967 also had retarded or no pinnacle initiation due to cold. All mass media publicity turned against the IRRI varieties resulting in reduced plantings during the normal Boro season, where they might conceivably have fared better. Also test plantings in the Haor areas, the traditional large Boro growing area, during the 1966-67 Boro season matured too late to be safe from early flooding. This limited IR-8 to the small acreage of high land in this principal Boro area.

As the 1967-68 Boro season progressed, however, IR-8 was vindicated. Where proper care was given, the December, January and February plantings were highly successful; the total acreage averaged more than 1.5 tons of clean rice per acre, or three times the yield of the local varieties. (see table I).

Even some of the early plantings made satisfactory yields. It was found that all things considered--weeding, irrigation, disease and insects --that the January and February plantings were more suitable than earlier plantings as there was not more than 2 weeks difference in maturity and little difference in yield after the crop was 120 days old.

By the end of the 1967-68 Boro season, though the Miracle had faded, a much more realistic appraisal could be made of IRRI rice in East Pakistan. Over 150,000 acres of IR-8 xx had been harvested--some in each district of the province. The results were a high yielding, coarse quality (although acceptable to most East Pakistanis) variety that required good management and closer attention to detail.

The IRRI 8 had limited adaptability requiring more irrigation water and a longer growing season than traditional Boro varieties. It was not the final answer to East Pakistan rice needs nor would it likely be a major contributor to overall rice production but it did show that high yield potential existed in improved rice plants. It revitalized thinking about the rice plant. Rice was no longer a common place thing. Farmers, businessmen, professionals and politicians were made aware of the potential of new technology in rice and the agricultural problems of East Pakistan. Farmers and land owners took a new interest in improved cultural methods and the use of such inputs as fertilizer, pesticides, and irrigation. Every one in the province became involved with the "miracle," its disillusionment and later its more realistic appraisal. Agriculture in total profited by this involvement and concern of all peoples in agricultural problems.

The 1968-69 IRRI program continued, but without the mass promotion and publicity of the 1967-68 season. Training of field staff and farmers so essential for the success of the program continued unabated. IRRI and Ford Foundation, which had throughout this period continued to look for better varieties, are now evolving lines resistant to local disease and insects, more resistant to cold and with shorter maturity periods. They predict that such improved varieties will be available for commercial use within 3 to 4 years. Improved testing and field trials are being used on these new varieties to assure wide adaptability. IR-5 and IR-9-60 both have been dropped from recommended varieties for farm use. During the 1969 Boro harvest it is estimated that 260 to 270 thousand acres will be IR-8 with an average yield of 1.7 tons of clean rice per acre.

USAID's contribution has been indirect and in conjunction with the overall rice and agriculture development program. About one-third of the fertilizer and one third of the pesticides have been provided by USAID commodity loans. Seed production and generally improved cultural methods recommended by the USAID Agriculture staff have been used. Participants trained under USAID programs and agricultural extension methods all have contributed. In the beginning the Mission cautioned against too rapid distribution of untried varieties, but at the same time helped in providing solutions once problems were identified. USAID has not been directly involved with research, plant breeding or varietal trials.

2. Crop Production

Though Table I indicates a target for 1968-69 Boro of 540 thousand acres and 810 thousand tons production, from HYV, current estimates are that only between 50 or 60 percent of the target will be accomplished. The 1967-68 problems and disillusionment carried over into 1968-69 in some cases. The results of this year's harvest in late April and May will largely determine next year's acreage of HYV. The crop could easily reach 600 thousand tons in 1969-70 with a successful crop this year. With present surface water irrigation capability, the next few years will likely see no more than 1 million acres of IR-8 grown. With the development of other surface water sources and ground water, 2 to 2.5 million acres could be grown within the next 4 to 5 years. However, by this time presumably improved IRRI varieties will be available for all seasons and over a wider range of crop conditions. Of the 25 million acre total crop, only the 5 million acre deep water crop would not be suited for new varieties now being developed. However, it appears that for the next 3 to 4 years we must depend on local varieties for 90% or more of the production.

TABLE I

New Grain Variation and Total Grain Production
East Pakistan 1967-1969

Crop	Production Estimate 1966-67 Acres (000)	1966-67 Tons (000)	1967-68 Acres (000)	1967-68 Tons (000)	Target 1968-69 Acres (000)	1968-69 Tons (000)
Local Rice	22,414.0	9,474.1	24,280.7	10,759.7	24,880.3	11,264.7
IRRI rice	0	0	155.9	235.2	540.0	810.0
Total rice	22,414.0	9,474.1	24,436.7	10,995.0	25,400.3	12,074.7
Local wheat	168.1	50.0	192.2	57.1	279.9	89.5
Hex. wheat	0	0	---	---	46.5	34.9
Total wheat	168.1	50.0	192.2	57.1	326.4	124.5
Total grain	22,520.2	9,524.1	24,168.9	11,052.2	25,746.7	12,199.2

The first sizeable acreage of IR-8 in the Aus season was harvested in FY 1968-69. A target of 20,600 acres and 25,240 tons production was set. Sixteen thousand five hundred acres were planted and 23,455 tons harvested. This represents .25 per cent of the acreage and 0.75% of the normal Aus production. While the yields--1.5 tons per acre--are 3 times the normal yields it is not feasible to increase the IR-8 Aus acreage rapidly due to lack of water for irrigation and chance of disease and insect infestation. Planting of IR-8 comes at the extreme dry season, March and April, when there is little surface water for irrigation on land above monsoon flood level and due to its long maturity interferes with a more sure Aman crop. Average acreage per farmer of IR-8 is one acre in both Aus and Boro seasons meaning some 280 to 290 thousand farmers planted IR-8 during the 1968-69 season.

3. Input Utilization

a. Seed: With the exception of the 1,500 tons imported from the Philippines in 1967-68 all other seed used for commercial purposes has been grown in East Pakistan. Twenty seven tons of the 1966-67 crop were air freighted to West Pakistan to start their IRRI program. Four thousand two hundred tons of seed are required for the total Boro crop, of which 90 per cent of the seed is farmer grown. The 10 per cent supplied through ADC facilities is grown by ADC on their farms, by ADC registered growers or purchased by ADC from local markets. Seed availability has not been a restriction on increased production.

b. Land: (see Table I) IRRI varieties are suited to the heavy clay rice soils due to their high water requirement. They require good water control and are not suited to free flooding areas. Land at present is not a deterant to expanded production though with increased production and the limited adaptability of IRRI varieties land could become ~~xkm~~ a limiting factor.

c. Fertilizer: (see Table 2) IR-8 fertilizer requirements are about double those of local varieties. Credit programs providing fertilizer and other inputs in kind including IR-8 seed have stimulated this program. The ADC imports and distributes all fertilizer to the Thana level at a 50 per cent subsidy. Over 16,000 private dealers buy fertilizer from Thana stores for retail in village markets at the 50 per cent subsidy rate to farmers. Retailers are allowed between Rs. 1 and 2 margin per maund* depending on transportation costs and distance.

TABLE 2

USAID Commodity Loans for Fertilizer and Pesticides for East Pakistan

	Fertilizer	Pesticides
	(million dollars)	
FY 1966	-	6.5
FY 1967	5	.1
FY 1968	8	.6
FY 1969	13	5.5

d. Water: In the Boro season 100 per cent of the crop is irrigated. This amounted to 1,377,857 acres of local Boro and 155,940 acres of IR-8 in

*1 maund equals 82 pounds

1967-68. In 1968-69 a target of 2,600,000 acres total was set of which 540,000 was to be IR-8. It is expected that no more than 1,750,000 total acres will be grown of which 270,000 will be IR-8.

IRRI Aus is normally irrigated to start and is rainfed 2/3 of the season. This amounted to 16,500 acres in 1968. No estimate has been made for 1969. Normal Aus is not irrigated.

e. Pesticides: The Agriculture Department sets as a target one spraying of local rice and 8 sprayings of IR-8 to control insects and disease. Half this amount is perhaps accomplished. This would mean 1,080,000 spray acres of IR-8 and 850,000 local Boro. Considering the wide variety of material applied, a rough estimate is 1 lb. per acre per spraying or for the 1968-69 season 1,930,000 lbs. of spray materials used. All spray material and equipment are provided to the farmer at 100 per cent subsidy.

f. Equipment: The principal equipment change has been the increase in irrigation equipment. To date 12 thousand 2 cusec pumps have been provided by the GOEP to increase irrigation. These are maintained by ADC but managed on site by farmer committees. In addition funds have been made available through USAID and IDA loans for 20,000 1/4, 1/2 and 3/4 cusec pumps to be sold in the private sector. Approximately half of these have arrived in East Pakistan. ADC has started a tubewell project under which it is planned to drill 100 wells per year. Also in the private sector 300 to 400 private irrigation wells have been sunk. With the exception of a few hundred power tillers in the private sector all land preparation, tillage, harvesting and processing is done with traditional local equipment.

4. Profit Calculation

a. Output Prices: Price has been the same in East Pakistan for both IR-8 and the same quality of local rice. IR-8 for food has normally sold at the low end of the price scale. For 1965-66 this was Rs. 29.6 per maund, 1966-67 Rs. 38.74 and for 1967-68 Rs. 34.62. The 1968-69 price has been following the 1966-67 levels to this date. No stabilization or subsidization schemes have been in effect. No other crops competitive for this acreage have been changed in price by IR-8.

b. Input Prices: Seed of IR-8 in 1967-68, the first year of commercial release, was 2 to 2-1/2 times the price of local rice seed, or Rs. 45 to 50 per maund. In 1968-69 it was only in isolated cases higher than normal good quality paddy seed price. This is usually Rs. 2 to 3 per maund above market price for rice, or during the past year, Rs. 20 to 25 per maund. Fertilizer is sold at 50% subsidy or Rs. 10 per maund subsidy for urea and TSP and Rs. 7 per maund subsidy for Muriate of Potash. Water also is on a 50% subsidy at

Rs. 35 to 40 per acre. Pesticides are provided at 100% subsidy. Credit provided by government carries a 7% interest charge. However, repayment percentages are so low that government credit is frequently more like a grant. Moneylender credit runs to 50 to 75% interest.

c. Net Return: (see Table 3) IR-8 gives an estimated return of Rs. 579 per acre compared to Rs. 143 with local Boro. Returns to IR-8 compare quite favorably with those of competitive crops. In the case of IRRI Aus, if varieties become suitable for widespread adoption it will cause severe competition for jute--East Pakistan's principal foreign exchange earner.

5. Policies

a. Promotional Campaign: The first large-scale introduction was preceded by mass media promotion, agricultural and other GOEP promotions and by training programs for agriculture staff and farmers. The GOEP was the prime introducer and distributor. No particular policy changes were made purely for IR-8 rice.

b. Price Policy: No changes in price policy were made.

c. Fiscal Policy: No change was made for IR-8. Subsidies as previously described were in effect prior to IR-8 introduction.

d. Fertilizer and Other Input Policies: No change especially for IR-8. With the "Grow-More-Food" campaign an overall improvement in input availability was made.

e. Market: No actions.

f. Discrimination: No actions.

6. Institutions

IRRI and the Ford Foundation with the Agriculture Directorate and ADC were the basic institutions and principal instigators for the introduction and development of IRRI varieties. As indicated in the summary only one year of testing was done before seed multiplication, giving 2 years of tests before distribution to farmers.

a. Research: The Department of Agriculture with Ford Foundation financing is presently establishing an accelerated rice research institute to carry on local breeding and adaptive trials. This should be operative within the next two years. For the present IRRI and Pakistani researchers are using locally available but inadequate facilities for breeding and

Table 3

Estimated Income and Expenditure on the Cultivation of Boro Rice in East Pakistan

Item	Local Variety	IR-8
	....(Rupees per acre)...	
Expenditure		
Plowing/land preparation/weeding	75.00	150.00
Water charges	25.00	40.00
Seed/nursery	14.50	30.00
Use of land	75.00	75.00
Fertilizer/manure	27.00	72.00
Manual labor	37.50	50.00
Harvesting	24.50	24.50
Land revenue	7.50	7.50
Transportation	11.25	25.65
Total expenditure	297.25	474.65
Income		
Yield (maunds paddy per acre)	(20)	(50)
Income from rice paddy (@ Rs. 20/maund)	400.00	1,000.00
Income from straw	40.00	45.00
Gross income	440.00	1,045.00
Less expenditure	297.25	474.65
Net income	142.75	570.35

Source: USAID estimates.

adaptive research. Only imported varieties are presently showing promise. Imported parental stock crossed with resistant local varieties is projected to solve East Pakistan's rice varietal problems.

The East Pakistan Agricultural University (EPAU) and the Atomic Energy Center also are carrying on research in coordination with IRRI, Ford Foundation and the Agriculture Department both on developing new lines and adaptive research.

b. Extension: The Extension Division of the Agriculture Directorate provided training to all staff members who in turn trained local farmers in IR-8 cultivation. Only in this way were farmers made aware of the technology required to grow IR-8. A system of model block farms on farmer-owned land but supervised by agriculture staff contributed to this program. In the district, sub-division, thana and union the respective agriculture officer was responsible for a 200,100, 50 and 25 acres size of model farm where all improved practices were to be followed: This became a demonstration to the surrounding area, that on farmer's plots and with farmer methods improved technology was profitable. These model blocks are changed to new locations as a local area becomes convinced and adopts improved methods. In this way the program may be expanded. This system is used for all crops not only for IR-8.

c. Input Distribution: Input distribution is handled entirely by the Agriculture Department except for village fertilizer dealers and plant protection squads. ADC imports fertilizer and pesticides which are then distributed to the thana level. Fertilizer is then distributed by private dealers. Pesticides may be applied by agriculture staff or locally organized farmer plant protection squads. Aerial spraying is done in a limited amount comprising about 10% of total spray acres. Irrigation also is provided by ADC and organized on site by farmer committees. Seed is handled about 90% farmer-to-farmer and 10% by ADC.

d. Credit: Government loans through the Agriculture Department, Agriculture Development Banks, Cooperatives and special credit programs constitute only about 10% of the needed credit. Rs. 85,390,000 was available through these sources in 1966-67, Rs. 171,800,000 in 1967-68 and Rs. 195,000,000 in 1968-69. However, it is estimated that due to inefficient procedures for loaning and collecting, no more than half of this credit was actually used by farmers.

e. Marketing and Storage: This is entirely handled by private enterprise. No changes were made by government due to the introduction of IR-8. Both the Marketing Directorate and the Cooperative Directorate are now working on storage-credit programs at the village market level. USAID has a proposed program for bonded warehouses which will provide farmer storage and credit to help level the widely fluctuating rice prices during periods of surplus and scarcity.

f. Cooperatives: Cooperatives have played a minimal role in both IR-8 and other farm crop credit and marketing programs.

g. Agricultural Education: EPAU is presently starting a rice research program in cooperation with IRRI. Other than that, no significant participation by an educational institution has occurred.

7. Weather

The poor crop due to adverse weather conditions in 1966-67 possibly spurred the GOEP to greater efforts in expanding IRRI production. In the past two years, weather has not affected IR-8 production significantly either way. However, more-than-usual flooding in late summer 1968 caused a reduction in rice output estimated at 1 million tons.

II. Assessment of Causes

IR-8 was one of the factors in an overall policy of increased emphasis on agriculture production by the GOEP. The Third Five-Year Plan was re-evaluated and budget shifts made for larger expenditures in the agriculture sector. The main objective was food grain production. This was stressed in the "Grow-More-Food" campaign. The IRRI varieties were lauded as a "Miracle Rice" that would solve East Pakistan's foodgrain problems without major field trials. This caused considerable disillusionment with government agriculture programs and the IRRI varieties. It was not until further adaptability tests were made that a realistic appraisal was made and a suitable though limited place could be found for IR-8.

This should be a lesson on future seed introductions to assure that proper and adequate testing is done before a variety is released to farmers as a miracle crop. Because a particular variety is successful in one area does not ensure its success in another.

The promotional campaigns, although they were not particularly sophisticated or elaborate, were successful because of the province-wide deficiency of food grains and the farmers' need for increased income. Training programs also were comparatively successful because everyone wanted to know how to grow this new rice. Though IR-8 itself due to its limited adaptability was not a consummate success, the interest aroused in all peoples of East Pakistan in agriculture problems in general and the specific improved methods adaptable to all rice are growing learned by farmers and agriculture staff made the promotional and training efforts very worthwhile.

The research institute and other research programs that evolve as a result of IRRI introductions will likely within the next few years provide rice varieties with yield potential of IR-8 but with improved quality and suitability for all seasons and all areas of East Pakistan. Then there will truly be a miracle rice which will do much to solve East Pakistan's foodgrain problems.

No specific marketing or price incentive policies appear to be necessary to get introduction of acceptance of a new variety in East Pakistan provided the variety itself is satisfactory.

The mass media promotional work and province-wide training programs coordinated with "Grow-More-Food" campaign and the model block farm program as described before all had comparative success and would be useful in any crop introduction program.

III. USAID Role

1. Policy Influence

USAID's contribution has been focused on overall grain production, working with agricultural extension and education programs as documented in Program Memorandum and E-1. A.I.D. commodity loans for fertilizer, pesticides and irrigation equipment previously mentioned also contributed to grain production. (See Wheat Country Crop Paper for a broader coverage of USAID policy role.)

Specifically on IRRI introduction, the GOEP was cautioned by USAID advisors against rapid distribution without adequate adaptive testing and these cautions have proved warranted.

USAID and predecessor agencies' programs since the late 1950's had set the stage for more rapid acceptance of new varieties and the adoption of improved methods necessary for the success of new varieties. The development of an Extension Service that could effectively reach the people is a significant example.

2. Capital Input (see Table 2)

Only with loans for fertilizer, pesticides and irrigation equipment has USAID made a direct contribution in terms of capital inputs. As seen from Table I on acreages and production, IR-8 constitutes no more than 1 per cent of total rice acreage. No USAID capital has been used directly to increase capacity or develop infrastructure to speed introduction or adoption of IR-8.

3. Technical Assistance

As previously noted, USAID's technical assistance has been aimed toward overall grain production and only incidentally to IR-8. USAID has provided a Provincial Extension Advisor working on policy, an Extension Education Advisor working with the Agriculture Training Institutes, two to three field extension advisors, an irrigation advisor and a seed improvement advisor. The extension,

irrigation and seed improvement services were all in a much better position to support IRRI seed introduction, due to the efforts of USAID advisors.

4. Overall Effectiveness and Lessons
(See Wheat Country Crop Paper for a broader coverage.)

As has been stated, USAID's influence was indirect and focussed on the grain program in general. As pertains to the IR-8 introduction, USAID's contribution was not decisive. USAID can best influence programs and policies by practical, well thought-out recommendations based on a thorough knowledge of the country and by supplying appropriate technology to specific problems. USAID's most effective role is in helping people to improve their capacity to carry out policy, implement plans, and operate institutions.

One can speculate that the possibility of a shortage of PL-480 during 1966-67 and subsequent years had more influence in causing East Pakistan to develop self-help and self-sufficiency programs than the income from a supposed unending supply of PL-480 supplies had in the past.

5. Operational Problems

As USAID was not directly involved in IR-8 introduction no operational problems occurred.

IV. Social, Political and Economic Considerations

1. Differential Adoption of New Technology

In East Pakistan the average farm size is 3.5 acres. Plantings of IR-8 average about 1 acre. Therefore, nearly all farmers involved are small farmers. It has been observed however, that the owner-operator with 2.5 to 5 acres tends to be the most receptive to change and improved methods of any kind. He has a small amount of risk capital, is totally dependent on his farm for livelihood and so has both the means and desire for increasing crop production.

2. Differential Availability of Inputs

Inputs are generally available province-wide.

3. Employment Effect

IR-8 has not had wide enough adaptability to affect employment rates overall. It does require more labor due to more intensive cultivation requirements and with widespread adaptability would require 10 per cent more labor in Aman and Boro seasons and as much as one fourth more labor in Aus season. Aus is normally broadcast and not weeded and poorer land preparation methods are used for local variation.

There is a trend toward more power tillers, increased power pump irrigation and generally improved land preparation and crop growing practices, partly due to the introduction of IR-8. About twice the amount of fertilizer per acre may be profitably applied to IR-8, compared with traditional variation, which also tends to increase employment.

4. Income Effects:

In general, only those farmers who happen to have access to irrigation water, whether large or small farmers, have benefitted from HYV of rice. The total significance [illegible] in East Pakistan is small, as yet. Additional income is used for watches, transistor radios, bicycles, home improvement and other small consumer items. Production items such as fertilizer, small power pumps and part interest in power tillers are also purchased.

5. Social Effects

Adoption of IR-8 is not as yet wide enough spread to have had much effect. Farmers able to grow IR-8 now are definitely in a superior financial position.

6. Political Effect

Adoption again is not wide spread enough to have great political effect. The opposition parties however did make political capital of the limited usefulness of IR-8 after the widespread promotion program given it by the GOEP. This negative impact is not likely to be lasting. IRRI varieties of province wide and all season adaptability when they are developed will likely have considerable influence on economic status and political satisfaction.

7. Economic Cost

a. Substitution Effect: None

b. Foreign Exchange Cost: As yet this has had only minimal effect on foreign exchange. With increased acreage and wider adaptability fertilizer costs per acre will double and pesticide cost will be 3 to 4 times the present per acre cost. These both are now financed largely by foreign exchange loans. East Pakistan is presently increasing local fertilizer production and planning for pesticide manufacture. These are needed for general crop production and at this juncture only incidentally related to IRRI varieties.

c. Program Budget Cost: Due to small the small acreages of IRRI rice, this has not materially affected the budget. The training programs, promotional programs, extra fertilizer and pesticide expenditure would largely have been made whether IRRI varieties had been introduced or not to develop the

"Grow-More-Food" campaign and reach the food self-sufficiency goal. No tax relief has been provided as an incentive to introduce HYV.

d. Urban Income Effects: Widespread IR-8 adoption would likely increase production and supplies and likely bring down the price of rice over the province. Rice prices in East Pakistan are not supported, although market prices have been relatively favorable to farmers.

8. Taste Factor

IR-8 is acceptable to East Pakistanis as coarse rice and is priced accordingly.

V. Projections

East Pakistan's present foodgrain shortage averages about one million tons annually. The deficit could be met either by using improved methods and more fertilizer on local varieties to effect a 2 maund per acre increase province-wide, or by planting 750,000 acres of IR-8 in place of local Boro. However, with the current rate of population increase, 460,000 tons annual increase in rice production is needed just to keep even. Without a high impact technology such as an approximate appropriate IRRI or Mexipak seed, a sustained 3 to 4 per cent annual rate of increase in agricultural production will be difficult to maintain. East Pakistan's goal of foodgrain self-sufficiency by 1970 will not likely be reached, 1972 or later seems more realistic, depending partly on whether or not IRRI varieties with wide adaptability are found. Nutritional self-sufficiency, which requires greater diversification of crops grown and concentration on crops other than rice, is an additional and serious problem for East Pakistan.

A report on crop diversification in East Pakistan by Daniel Richie[1/] indicates that the foodgrain requirement could be met on 18 million acres instead of the present 24.5 million provided other more nutritional crops were grown to provide needed proteins, fats and oils. Present diets in East Pakistan provide 85 per cent of the protein requirement and 35% of the fats and oil requirements, counting both local production and imports. Diversification would mean reducing per capita rice consumption from 15 oz. to 14 oz. per day and increasing the intake of protein, oil and other more nutritious food to make up the caloric and nutritional balance. To bring about this desired state of nutritional self-sufficiency would require a massive educational program in teaching people not only what to eat but how to produce it. The required land and irrigation facilities are available. Proper utilization is the prime constraint.

1/ Diversification of Agriculture in East Pakistan, Daniel Richie, USAID, 1967

COUNTRY: PAKISTAN (West)

CROP : RICE

I. Record to Date

1. Summary of New Grain Variety Program

Following the highly successful program of the introduction of Mexican wheat in West Pakistan in 1965/66, the newly developed "miracle rice" (IR-8-288-3) was brought to Pakistan and tested both in the research stations and on private farms for testing. The first test during the summer of 1966 using low fertilizer dosages for comparison with the local varieties made very little impression on the research personnel or the farmers. The errors made on the initial testing were the same as those made on Mexican wheat two years previous when the recommended dosages of fertilizer were exactly the same as those generally applied to the local varieties. During the fall of 1966 a representative of the International Rice Research Institute (IRRI) at Los Banos, Philippines visited the rice trials to evaluate performance. He noted that, although the yields were not as high as anticipated due to the low quantity of fertilizer applied, there appeared to be no disease problems and insect damage was no worse than encountered in the local varieties.

The report given to the MAP by the IRRI representative was very encouraging and recommended the immediate widespread introduction of the variety. To test the variety further in early spring (rice is normally a summer crop in West Pakistan) the Mission purchased 2 tons of IR-8 during the winter of 1966/67 for February planting in SCARP I. The low temperatures in the spring of 1967 resulted in poor germination and poor start, but it was soon apparent that with the application of heavy dosages (150 N and 75 P_2O_5) of fertilizer that the yields were going to be outstanding. To follow up on recommendations of the IRRI report, the MAP injected 5 tons of IR-8 directly from Los Banos and requested the Mission for assistance to air freight up to 50 tons more from East Pakistan after they discovered that farmers were more eager to plant these new seeds than was indicated earlier. The Mission agreed to assist and 27 tons were air freighted from East Pakistan. This made a total of 79 tons of IR-8 seed for nursery plantings during 1967/68. Ford Foundation brought in a rice breeder in 1967 with IRRI experience to assist in this first introduction. Ford continues to furnish technical assistance.

During 1967/68 this seed, renamed in Pakistan as "IRRI Pak," was heavily fertilized and well protected from insect pests. The yield results were excellent, with average yields reported ranging from 4,000 pounds of paddy where fertilizers were applied as recommended. The rice was given as much publicity

through radio, newspaper announcements from the President, Governor and Ministers as was given the Mexican wheats. One farmer near Sheikhupura obtained an average of 11,36[illegible] pounds of paddy rice per acre on 5 acres and this was publicized as a world record. The results were even better than the Government had expected, resulting in a possible problem of IRRI Pak rice replacing Basmati rice which is one of West Pakistan's major foreign exchange earners. To hold Basmati rice production in the area where Basmati is normally produced and to encourage the increased production of IRRI Pak the GOWP announced that the Government would purchase IRRI Pak milled coarse rice at Rs. 19 per maund (1 maund = 82 lbs.) and would raise the purchase price of milled Basmati rice from Rs. 31 to Rs. 38 per maund.

Almost all of the 1967/68 crop of IRRI Pak was purchased by the Agriculture Development Corporation for seed for the 1968/69 crop. However, for the first time a realization of the poor quality of IRRI Pak rice became known to the farmers and to the trade. IRRI Pak rice, as a food rice, was not up to standard in West Pakistan. The rumblings on quality were heard throughout Pakistan. IRRI Pak rice was then publicized by Government as an export rice and the Government agreed to purchase IRRI Pak rice to help maintain the price.

For 1968/69 a million acre target was set for IRRI Pak rice. Latest estimates indicate that 960 thousand acres were planted to IRRI Pak out of a total of 3.6 million acres of rice and an estimated 970 thousand tons of IRRI Pak milled rice were produced. This is an average of 38 maunds per acre of IRRI Pak on 960 thousand acres as compared to a Provincial average, including the IRRI Pak rice, of 15 maunds per acre on 3.6 million acres. The total estimated production (preliminary) of rice in West Pakistan during 1968/69 was 2.07 million tons as compared to the 1967/68 production of 1.48 million tons, for an increase of 40 per cent. An additional 1[illegible] thousand acres was seeded to rice in 1968/69 compared with 1967/68.

2. Input Utilization - New Seed Variation

a. Seeds:

The first HYV of rice (IR-8) was imported to West Pakistan from IRRI at Los Banos in 1966. During the spring of 1967, 77 tons of this rice (IRRI-8-288-37) were imported from the Philippines. West Pakistan released the [illegible] seed under the name of IRRI-Pak in an attempt to give the same appeal to rice as was given to HYV wheat, Mexipak. Rice from the initial seed was planted in 1968 on about 10,000 acres. The yield in West Pakistan averaged about 4,5[illegible] to 5,00[illegible] pounds per acre with yields varying from 2,5[illegible] pounds to 11,000 pounds per acre.

Added fertilizer has been the key to the success of this rice. In West Pakistan the recommendations of the Department of Agriculture supported by the research stations were 100 pounds of actual nitrogen and 40 pounds of P_2O_5 per acre. Other related practices, i.e. proper plant spacing, insect and weed control and irrigation are the same as for local varieties.

Stem borer is the only major insect problem prevalent in West Pakistan and it can be effectively controlled with granular insecticides.

The impressive results obtained from the introduced variety within a short period reflect the assistance and cooperation given by the extension service, other government support and technical assistance from Ford Foundation and USAID advisors.

b. Land

Rice Acreage and Production in West Pakistan

Year	Acreage (million acres)	Production (million tons)
1965-66	3.44	1.29
1966-67	3.48	1.34
1967-68	3.50	1.48
1968-69 (Prelim)	3.60	2.07
	IRRI Rice Production 1/	
1966-67	(trials only)	2/
1967-68	0.01	2/
1968-69 (Prelim)	0.90	0.97

Source: GOWP, Agriculture Department

1/ Included in total rice production above.

2/ Not measured separately.

The increase in land devoted to rice has been 160 thousand acres since 1965-66. Of this, an estimated 100 thousand acres was added during 1968-69. There is little proof that there has been an increase in rice at the expense of other crops; however, agricultural officials state that IRRI-Pak rice has gone on land that would have gone to cotton if the new HYV had not been introduced. There was very little increase in cotton acreage during 1968-69 in spite of a concerted effort on the part of the government to increase acreage.

c. Fertilizer

FY	Total Consumption	Estimated Consumption on rice	Annual increase	% of total fertilizer used on rice
	(thousand nutrient tons)			
1965-66	71	13.4		16.7%
1966-67	116	24.0	79%	19.6%
1967-68	190	41.8	75%	20.6%

As in HYV of wheat the key to the success of HYV of rice is its ability to respond to fertilizer without lodging. With respect to lodging, IRRI-Pak rice will withstand much higher dosages of fertilizer than the HYV of wheat. A higher percentage of rice producers than wheat producers have traditionally used fertilizer. Technicians working with rice estimate that more than 60% of the rice farmers are applying fertilizer to IRRI-Pak rice.

d. Water

All rice in West Pakistan is grown under irrigation. Rice is seeded in the nursery in the Punjab area after June 1 and is transplanted in the fields after July 1. These dates are fixed by law to assist in borer control. This law does not apply in the Sind area where borer is not considered an economic problem. Even though all rice is grown under irrigation, farmers in the Punjab and the Larkana District of the Sind depend on the monsoon for additional water. If the Monsoon is light the yield is adversely affected due to insufficient water; in extremely heavy monsoon years flooding occurs that results in losses; however, farmers consider heavy monsoon years good rice years and low monsoon years as poor rice years.

IRRI-Pak rice requires one to two extra irrigation over local varieties of coarse rice due to the longer growing period.

e. Pesticides

Rice

The following chart summarizes the total acreage under rice crop, acreage treated, and tons of pesticides used from 1965-66. Since no reliable data are available by crop, best estimates have been given as regard to tons of pesticides used on rice and value thereof:

Year	Total acreage grown	Aggregate acres treated		Tons of pesticides used	Value of pesticides $ million
		Nursery	Paddy		
1965-66	3,443,000	34,912	141,377	110*	0.24*
1966-67	3,483,000	17,370	52,910	44*	1.10*
1967-68	3,500,000	45,100	140,090	770*	0.68*
1968-69	3,606,000	100,000*	300,000*	1050*	1.46*
1969-70	3,620,000**	500,000**	1,500,000**	8250**	7.30**

f. Equipment

The use of modern equipment in the production and harvesting of paddy in West Pakistan is negligible. All land preparation and harvesting equipment is completely antiquated, even by traditional standards in countries like Thailand and the Philippines. Harvesting is done by beating the grain out over logs by hand; drying is done in the sun. Weed problems are not critical, therefore little weeding is done. Rice is transplanted in broadcast fashion, not in lines. The technicians and advisors do not consider the lack of equipment as an important obstacle in the production of paddy; however, the

1. *Estimated by Agriculture Department, Plant Protection Division (no reports available) Cost to Agriculture Department.
2. **Projected estimations. (Usaid considers these estimates optimistic.)
3. 1968-69 and 1969-70 figures are approximately 25% old varieties treated, and 75% new varieties treated.
4. Years 1965-67 - primarily liquid spray
5. Years 1968-70 - primarily granules
6. Year 1966-67 - Reason for reduction: Government began charging farmers 25% of cost.

drying and milling problems loom as critical and affect the quality of finished rice. The present quality of IRRI-Pak rice produced in Pakistan is not acceptable in world trade without drastic price reduction.

4. Profit Calculation

a. The good yields of IRRI-rice have made the cultivation of coarse rice much more profitable. If Basmati procurement prices had been kept at Rs. 31 many farmers would have no doubt started to cultivate IRRI instead of Basmati rice, which is a major export earner. The Government of West Pakistan in May 1968 raised its mill procurement price of Basmati rice from Rs. 31 to Rs. 38 per maund and established a procurement price for IRRI at Rs. 19 per maund. All Basmati rice and other fine varieties are purchased by the Government and its movement is rigidly controlled. The policy of the Government is to purchase coarse rice when the commercial price falls below 19 rupees per maund. However, there is no control placed on coarse rice.

The incentive prices were announced before the IRRI rice was planted in 1968-69. However, the millers, who purchase from farmers, paid as little as possible, indicating farmers lack confidence in price guarantees. It is feared that these prices will be reflected during the planting season next year.

A high percentage of broken rice, up to 30%, is due to chalkiness, excessive cracking and lack of uniformity of grain size. Excessive breakage has resulted in exceptionally low prices, or no market, for cracked grain.

Monthly Average Wholesale Price of Coarse Rice at Lahore

	1965-66	1966-67	1967-68	1968-69
		(rupees per maund)		
July	22.81	22.75	36.37	32.14
August	20.62	22.65	36.25	37.67
September	21.37	23.06	34.50	37.51
October	21.50	23.44	30.50	38.22
November	10.00	23.75	32.12	33.25
December	17.03	30.56	34.62	33.25
January	20.12	31.94	34.56	
February	21.69	33.69	33.19	
March	22.25	34.81	33.50	
April	22.50	35.25	33.25	
May	22.00	35.62	33.50	
June	23.06	35.50	33.75	

b. Input Prices

Please refer to section B, Input Prices, of the Country Crop Paper on Wheat (TOAID A-252).

Estimated Income and Expenditure on the Cultivation of Paddy in West Pakistan

Item	Fine Rice	Local Coarse	IRRI Pak
(Expenditure)	---------(Rupee per acre)---------		
Plowing/land preparation/weeding	75.00	75.00	75.00
Water charges	25.00	25.00	28.00
Seed/nursery	14.50	14.50	21.00
Use of land	75.00	75.00	75.00
Fertilizer	38 00	38.00	72.00
Manual labor	37.50	37.50	45.00
Harvesting	24.50	24.50	24.50
Plant protection 1/	-	-	6.00
Transportation	11.25	11.25	20.00
Total Expenditures	300.75	300.75	366.50
Income			
Yields (maunds Paddy per acre)	18	20	45
Price per maund	27.00	19.00	12.00
Income per acre for Paddy	486.00	380.00	540.00
Income from Straw	40.00	40.00	45.00
Gross Income	526.00	420.00	585.00
Less expenditure	300.75	300.75	366.50
Net Income	225.25	119.25	218.50

Source: USAID & Agriculture WP estimates

1/ Plant protection charges are included under IRRI Pak, there is no difference in susceptibility to insects between the varieties, however the added investment in fertilizer on IRRI Pak makes the farmer more amenable to its use.

c. Net Returns

It is estimated that an average farmer growing fine rice (Basmati) earns 526.00 rupees per acre against an expenditure of 300.75, which includes land use rent at 5% of the current value of the land, for net return of 225.25 rupees per acre. As compared to this, a farmer growing IRRI-Pak is estimated to earn 585.00 rupees against an expenditure of 366.50 rupees for a net return of 218.50 rupees. A farmer growing local coarse rice earns an estimated 420 rupees against an expenditure of 300.75 for a net return of 119.25 rupees.

Basmati is not being replaced by IRRI-Pak to any appreciable extent. However, IRRI-Pak has already replaced over 800 thousand acres of local coarse rice which is approximately two fifths of the total coarse rice presently grown in West Pakistan.

5. Policies

Unlike the HYV of wheat, the HYV of rice were accepted by the Central and West Pakistan Governments virtually without question, with very little testing. Likewise, farmers were eager to obtain the so called miracle rice because of their experience with the Mexican wheat. Without the experience of the HYV of wheats, new varieties of rice would not have been so readily adopted.

a. Promotional Campaign

See same section under Country Crop Paper for Wheat.

b. Price Policy

In 1967, a floor price was set on coarse rice at Rs. 19 per maund and the floor price of fine rice was raised in 1968 from 31 to 38 rupees per maund. The GOWP buys all of the good quality (number one) Basmati rice from the rice mills for export and releases the rejects for sale in the local markets. The rejected Basmati usually sells at a higher price than the GOWP pays for top quality Basmati. The IRRI-Pak is also purchased from the mills rather than directly from the farmer; however, milling deficiencies and the subsequent lower prices for inferior quality coarse rice have resulted in a much lower paddy rice price to farmers than anticipated -- from 7 to 11 rupees per maund of paddy as compared to an anticipated price of 14 rupees. The floor price on coarse rice was announced in spring of 1967 for a 3-year period (of which FY 69 is the second rice crop).

c. Fiscal Policy

See same section under Country Crop Paper for Wheat.

d. Fertilizer and Irrigation Supply Inputs

See same section under Country Crop Paper for Wheat.

e. Market

The same market conditions exist for rice as for wheat (see Country Crop Paper for Wheat); however, an added market problem for rice is drying and milling. Dr. Efferson, Dean of Agriculture of Louisiana State University on contract as a consultant with Ford Foundation, has visited Pakistan twice to advise the GOWP on their rice marketing problems. He has recommended the import of drying equipment and special rubber roll milling units for 5 large milling operations. In his opinion, such equipment is necessary if Pakistan expects to produce the quality of rice required for export. Dr. Efferson believes the production potential of IRRI-Pak rice will enable West Pakistan to be highly competitive on the world market, if proper milling facilities are provided.

f. Discrimination

The intention of government with respect to HYV of rice is to have policies which favor production. The fact that the Government does not purchase paddy rice directly from farmers and the reluctance of mills to purchase IRRI-Pak paddy from farmers due to the local consumers' resistance to the quality has resulted in low prices to farmers. These low prices this year without corrective measures could result in a slow down in the adoption of the new varieties.

6. Institutions

a. Research and Extension

1. Research (See the Country Crop Paper on Wheat)

The Government of West Pakistan has two rice research stations: one at Pala Shah Kaku near Lahore, with 625 acres, and another at Dokri in the Sind area, with 5,000 acres. Ford Foundation has furnished an advisor and, Ford and the International Rice Research Institute, have assisted in the training of 12 research assistants at Los Banos, Philippines. Additional staff have been employed at the two research stations in order to speed up the research activities, at an additional cost of Rs. 700,000 for three years. A new variety, IRRI-6 has been thoroughly tested and has been found to be equal to IR-8 in yield and much superior in quality. The experiment stations expect to distribute enough seed to plant 6 thousand acres of IRRI-6 in 1969. IRRI-6 will likely completely replace IRRI-Pak by 1971. Also, the Research Stations in West Pakistan in cooperation with the Research Station at IRRI have evolved a dwarf Basmati which will yield 50% more than the present Basmati. The new variety has similar quality characteristics to the present high quality Basmati rice. Five thousand acres of the dwarf Basmati will likely be planted in 1970.

2. Extension (See the Country Crop Paper on Wheat)

Special emphasis has been given for training extension workers in methods of growing IRRI rice. During 1967 two Philippine rice specialists were brought to W. Pakistan for training agriculture extension service personnel. Fifty Agricultural Assistants were trained in Pakistan and 12 of the Agriculture Assistants who performed the best were sent for six months training to IRRI. A similar program was carried out in 1968 and is planned for 1969.

b. Credit

See Country Crop Paper for Wheat.

c. Input Distribution

See Country Crop Paper for Wheat.

d. Marketing and Storage

See Country Crop Paper for Wheat.

e. Land Tenure and Ownership

See Country Crop Paper for Wheat.

II. II. Assessment of Causes (See Country Crop Paper on Wheat)

The same factors that made the HYV of wheat a success have contributed to the success of the HYV of rice. The success of the wheat program was a major cause of the rapid acceptance of the rice program. The initial introduction of the IRRI rice actually met with less resistance than the "Red" Mexican wheat. IR-8 rice performed better in West Pakistan ~~[illegible]~~ than in its area of origin, because there is more sunshine during the growing season and better water control than in the Philippines. Yields of IR-8 rice are definitely influenced by sunshine and fluctuating water depths. The unacceptable quality of the product (unknown to the farmer in the first two years, 1966/67 and 1967/68,) will affect future adoption of IR-8 unless the price to the farmer can be maintained. Prices can be maintained only if a foreign market can be found or if arrangements can be made for export to East Pakistan where the acceptability of coarse rice is much greater. If the expectation materializes that IR-6 is of substantially better quality than IR-8, rapid adoption of HYV may only be delayed momentarily.

III. USAID Role

1. Policy Influence

See Country Crop Paper on Wheat.

2. Physical Input (See Country Crop Paper on Wheat)

The Mission granted five hundred dollars for importing 2 tons of IR-8 rice during January 1967 for the first commercial seeding in the country and for testing the variety to determine the possibility of growing two crops per year. The Mission also financed the air shipment of 27 tons of IR-8 from East Pakistan during July of the same year. This was in addition to the 50 tons imported directly by the GOWP from the IRRI in the Philippines.

3. Technical Assistance Inputs

See Country Crop Paper on Wheat.

4. Overall Effectiveness and Lessons

See Country Crop Paper on Wheat.

IV. Social, Political and Economic Considerations

See Country Crop Paper on Wheat, number 1 through 7.

8. Taste Factors

Rice is a status food in West Pakistan. Low income groups consume rice at festive affairs, weddings, etc. Higher income groups consume only fine rice at these affairs. Generally: Coarse rice is consumed by the middle and lower income groups, but they prefer a coarse rice that has the appearance of fine rice: that is, long grain, not glutinous and with grains that tend to remain separate when cooked rather than stick together. IR-8 is almost opposite to all these characteristics: it has a short plump grain, tends to stick together upon cooking and becomes soft and glutinous in the special West Pakistan dishes. Consumers claim also that they do not like the taste of IRRI-Pak rice, but government officials believe that the actual taste reaction is more psychological than actual. In the southern areas, where almost half of the coarse rice grown during 1968/69 remained as local varieties, government officials state that the IR-8 rice is being mixed with the local coarse grains and is being sold as local coarse rice. This mixing did not occur in the Punjab area where Basmati rice is generally grown and where most of the local coarse rice has been replaced by IR-8. In areas where IRRI paddy has been sold without mixing with other paddy, the prices have gone as low as 6 rupees per maund.

V. Projections

(See projections page 30 of the Pakistan Crop Paper for Wheat).

Farmers now know that they can grow HYV of rice successfully in West Pakistan. Refinements of production can be made, with an additional 20 to 25% increase in average yields per acre. Large numbers of small farmers continue to grow the local varieties, but they are now aware of the new varieties and of the value of fertilizer. Only about two-fifths of the coarse grain varieties have been replaced by IRRI-Pak. Another production increase of about one-fourth can be obtained if the remaining three-fifths of the coarse rice crop is seeded to HYV. GOWP Agriculture Department estimates show that approximately two-thirds of the total rice crop in West Pakistan is presently of the coarse grain varieties, with the remaining one-third in Basmati fine rice.

Using the above assumptions, without the use of additional land, without upsetting the coarse-fine rice ratios, and without introducing yet another higher producing variety, West Pakistan can increase its production by two-fifths (an additional 900 thousand tons) making total annual production around 3 million tons.

The Mission, GOWP and Ford Foundation agree that these possibilities will soon be realities if a market can be found for IRRI-Pak rice. The farmers will grow the HYV in preference to the local varieties at a price not lower than 2/3 the price for local coarse rice, or not less than 9 to 10 rupees per maund for paddy. At these prices, West Pakistan would be able to compete in the world market if better drying and milling facilities are provided and proper grading is introduced. Another encouraging factor for coarse rice production in West Pakistan is the improved quality from the IR-6 now being multiplied. If this rice proves to be equal in quality to the local coarse grains, as the research stations claim, the above projections should be obtained.

ROGERS

PAKISTAN: Country Crop Papers
Wheat & Rice

Additional Information

(1) Message to USAID requesting additional information:

Paper satisfies most requirements. This is important component in SPRING REVIEW, and congratulations are in order. Two major omissions are (1) describing research and extension historical roles in HYV program and (2) describing AID's role in building all institutions which supported HYV program. These and other omissions spelled out below, arranged according to USAID outline.

Time is short. The Pakistan wheat and rice papers are the basis for the global and functional papers and people (from both outside and within AID) are going to start working on these agency wide papers next week. Therefore, could you cable a response to the answers raised on the attached draft cable to us by April 9 at the latest? This will leave people in Washington two weeks to work the information into their papers.

The Mission's rice paper literally just arrived. We have not yet had time to go over it, but to the extent that our comments on the wheat paper apply to the rice paper, we would also like a cable by April 9 filling in the information gaps on the rice piece.

(2) USAID response (Responses are numbered according to Country Crop Paper outline is submitted by USAID. Responses are preceded by AID/W question which prompted reply.)

I. 2. Crop Production - Table I. Provide local variety acreage and production data 1960-1965 with water break. Need early material to support implicit judgement on phased causality paragraph 2, p. 23.

	WHEAT, W.P.			
	IRRIGATED ACRES	NON-IRRIGATED ACRES	TOTAL ACRES	TOTAL TONS
1960-1	NA	NA	11.46	3.77
1961-2	7.79	4.31	12.10	3.91
1962-3	NA	NA	12.41	4.12
1962-4	8.12	4.24	12.36	4.12
1964-5	8.47	4.67	13.14	4.55

	RICE, W.P.		RICE [illegible]	
	ACRES	TONS	ACRES	TONS
1960-1	2.93	1.01	21.89	9.52
1961-2	3.01	1.11	20.96	9.47
1962-3	3.20	1.17	21.48	8.73
1963-4	3.28	1.22	22.26	10.45
1964-5	3.41	1.36	22.81	10.34

I 3a [illegible] New Seed Varieties. IS passage "resultant increase was over 120 to 1" correct? Explain 1967 import of 40,000 tons red. Apparently not multiplied. Isn't this expensive way to fill short-term food gap?

1 3A. NEW SEED VARIETIES: 120 TO 1 IS CORRECT. 40 THOUSAND TONS IMPORT MEXIPAK RED OPPOSED BY MISSION, AND DIDNOT CONTRIBUTE TO PRESENT CROP. GOP WENT AHEAD IN BELIEF DEMONSTRATION EFFECT OF PURCHASE IMPORTANT TO PROVE SERIOUSNESS INTENTION GROW MORE WHEAT

3c Fertilizer. Give domestic/import break.

3C - FERTILIZER (THOUSAND NUTRIENT TONS): STOCK CHANGES IGNORED

	WEST PAKISTAN		
FY	CONSUMPTION	PRODUCTION	EXPORT	IMPORTS
63	27	33	--	2
64	50	42	19	--
65	46	43	3	9
66	55	42	--	12
67	78	43	--	50
68	99	51	--	90

3d Water. Estimate tube wells used for wheat.

3D - WATER: MAJOR FACTOR INFLUENCING TUBEWELL INSTALLATION IS SHORTAGE WATER DURING WINTER. SOME WATER FROM VIRTUALLY ALL TUBEWELLS IS USED FOR WHEAT. TUBEWELLS ALSO SUPPLY INSURANCE WATER FOR RICE IN SUMMER.

3e Pesticides. Paper discusses only insecticides. Is rust a problem? Are fungicides used?

3E - PESTICIDES: RUST HASNOT YET BEEN PROBLEM IN HYV WHEAT. FUNGICIDE NOT USED. HYV RICE NOT AFFECTED BY DISEASE IN WP. RICE BORER ONLY ECONOMICAL PESTS OF HYV IN WP.

4b Credit. Rough breakout for credit used new and old wheat, if available. Also, percentage HYV farmers who needed credit, with small farm breakout.

4B - CREDIT: INFORMATION INSUFFICIENT FOR REASONABLE GUESS. NEITHER MISSION NOR GOWP BELIEVE CREDIT HAS INFLUENCED HYV ADOPTION, ALTHOUGH LACK CREDIT SOMETIMES CITED AS SLOWING FERTILIZER GROWTH RATE. WITH PRESENT SHORT FERTILIZER SUPPLY WP, INADEQUATE CREDIT FAVORS LARGER FARMERS WHO HAVE CASH.

5a Promotion Campaign. Elaborate. We need description, relationship, chronology of SCARP, HYV, Grow More Food, Agricultural Area Development Project, Indus Plane Development Scheme.

5A - PROMOTIONAL CAMPAIGN: INDUS PLAIN SCHEME IS OUTGROWTH OF REVELLE REPORT. THE SUCCESSFUL USE OF TUBEWELLS THIS SCHEME TRIGGERED THEIR RAPID DEVELOPMENT BOTH PRIVATE AND PUBLIC SECTORS THERE IS NO REPT. NO DIRECT RELATION THIS SCHEME AND INTRODUCTION HYV BUT CERTAINLY TUBEWELLS, WITH RESULTING RECLAMATION SALINE AND WATERLOGGED LANDS AND INCREASED WATER SUPPLY HAVE GREATLY ENHANCED FOODGRAIN PRODUCTION.

AGRI. AREA DEVELOPMENT PROJECT IS MISSION'S RESPONSE TO AGRICULTURE DEVELOPMENT SECTION OF INDUS PLAIN SCHEME. UNDER THIS PROJECT MISSION ASSISTS GOWP, THROUGH LAND AND WATER DEVELOPMENT BOARD (LWDB) TO DEVELOP AGRICULTURE IN GEOGRAPHIC AREA LATER DESCRIBED AS SCARP I. SCARP I APPROACH WAS PRIOR TO INTRODUCTION OF HYV BUT WAS HIGHLY SUCCESSFUL IN MOTIVATING FARMERS USE HIGH DOSAGES FERTILIZER ON THEN EXISTING IMPROVED VARIETIES WHEAT AND RICE. SEE PAPER " WHEAT DEMONSTRATIONS IN SCARP I DURING CROP YEAR 64-65". COPIES WERE GIVEN T.S. SWAYZE AND SENT MIMMS, OFFICE IN 1965. THIS PROGRAM SET OUT TO DOUBLE YIELDS PER ACRE IN SCARP I ON EXISTING VARIETIES BY 1971. INTRODUCTION OF HYV STEPPED UP YIELD DOUBLING DATE TO 1968 AND DOUBLING IS EXPECTED BY SURPASSED IN 1969. THE " GROW MORE FOOD CAMPAIGN" WAS A TERM USED IN 1963 PRIMARILY DIRECTED TO INCREASING ACREAGES UNDER FOODGRAIN ESPECIALLY WHERE

THERE WAS CONCENTRATION OF TUBEWELLS. TERM WAS COMTINUED BUT TOOK ON NEW MEANING ESPECIALLY IN 1965 WHEN THE 350 TONS MEXICAN WHEAT IMPORTED AND FOODGRAIN SHORTAGES AROSE FY 1966 AND 67. THE TERM " GROW MORE FOOD" AND PROMOTION OF HYV ARE NOW SYNONYMOUS.

6a 1. Research. Paper omits historical survey of adaptive research program on HYV. See annotated outline. Include discussion yield superiority domestic crosses over parental imports, any relaxation traditional certification standards.

6A 1 - RESEARCH: " ANNUAL TECHNICAL REPORT ACCELERATED WHEAT IMPROVEMENT PROGRAM WEST PAKISTAN 1965-66" BY S.A. QURESHI AND IGNACIO NARVAEZ DESCRIBE ADAPTIVE RESEARCH PROGRAM AND BREEDING MATERIALS IN DIFFERENT VARIETIES. DOMESTIC CROSSES HYV WHEAT OR RICE NOT YET COMMERCIALLY GROWN PAKISTAN. SOME DOMESTIC CROSSES UNDER TEST PROMISE MORE DISEASE RESISTANCE AND SLIGHTLY BETTER QUALITY BUT WITHOUT APPRECIABLE INCREASED YIELDS. IRRI CROSSES WITH STRAINS OF FINE QUALITY DOMESTIC RICE LOOK PROMISING AND SUFFICIENT SEED MAY BE AVAILABLE FOR COMMERICAL RELEASE BY 1972. NO SEED CERTIFICATION PROGRAM NOR EFFECTIVE PLANS EXIST.

6a 2. Extension. Need description and evaluation of extension role in SCARP, HYV, etc. Was it uniform throughout participating irrigated areas? Review will try assess claim that formal extension unnecessary if profits are large, ineffective if not. AID/W aware dimension of important extension role. Request Brookshier overcome modesty.

6A 2- EXTENSION: MISSION SUPPORTED EXTENSION PROGRAM HAS HAD SUBSTANTIAL IMPACT AS ATTESTED BY HIGHER PERCENTAGE(ESTIMATED 85PERCENT) HYV (MEXIPAK) IN SCARP I THAN IN ANY OTHER SIMILAR SIZED AREA WEST PAKISTAN AND LARGER PERCENTAGE HYV FERTILIZED IN SCARP I. THIS NOT STATISTICALLY ANALYSED BUT IS VISUALLY OBVIOUS. HIGHER RATES OF ADOPTION OF HYV, USE OF RECOMMENDED DOSAGES FERTILIZER AND MORE ACTIVE EXTENSION PROGRAMS ARE ALMOST ALWAYS FOUND IN SAME AREAS. ADOPTION OF HYV SPREADING MUCH MORE RAPIDLY THAN IMPROVED TECHNOLOGY THAT MUST ACCOMPANY FOR? BEST RESULTS AND DISAPPOINTMENT AMONG FARMERS, WHERE IT EXISTS, CAN BE TRACED TO INDIFFERENT EXTENSION PROGRAMS. IN SCARP IIA, WHERE MISSION JUST BEGAN A NEW PROGRAM IN COOPERATION EXTENSION SERVICE, IT ESTIMATES HYV ARE LESS THAN 40PERCENT TOTAL WHEAT WITH HIGH PERCENTAGE HYV NOT REPT. NOT FERTILIZED. GOWP RECOGNIZED EXTENSION EFFORTS AS MAJOR CONTRIBUTOR TO SUCCESS AND ARE SPONSORING RESEARCH ON EXTENSION PROJECTS TO COMPARE CAPABILITY COLLEGE GRADUATES VS. HIGH SCHOOL GRADUATES FOR BRINGING ABOUT CHANGE FROM TRADITIONAL TO SCIENTIFIC AGRICULTURE. (SEE ASSESSMENT OF CAUSES, BELOW)

6a (3. add Seeds) Describe institutions which control seed multiplication, certification.

6A 3 - SEEDS: HYV SEEDS WERE PRODUCED AND DISTRIBUTED FARMER TO FARMER DURING FIRST 2 YEARS OF HYV INTRODUCTION. TECHNICALLY WPADC HAS PRODUCTION AND DISTRIBUTION RESPONSIBILITIES AMONG OTHER RESPONSIBILITIES. (SEED DEVELOPMENT IN EP THROUGH EPADC HASBEEN MORE SUCCESSFUL THAN IN WP). WPADC HAS PRODUCED SEEDS ON THEIR FARMS AND HAVE PURCHASED SOME SEED FROM SELECTED GROWERS AT 2 TO 3 RUPEES PER MAUND PREMIUM OVER COMMERCIAL PRICES. WPADC SELECTS THE FARM AND FARMER, INSPECTS THE GROWING CROP, DETERMINES THE PURITY OF THE SEED SOURCE, GIVES INSTRUCTION FOR ROGUEING AND WEED CONTROL, AND AFTER HARVEST INSPECTS THE SEEDS FOR MIXTURE AND GENERAL SEED QUALITY. IF ALL CONDITIONS ARE MET WPADC CONTRACTS TO BUY THE SEED AT PRE-ARRANGED PRICE. SEEDS ARE CLEANED ANDBAGGED ON FARMS AND PICKED UP AND STORED IN THE NEAREST WPADC VAREHOUSE. SYSTEM APPEARS REASONABLE ALTHOUH WPADC RECEIVES MORE CRITICISM ON SEED OPERATIONS THAN ALL REMAINI G ACTIVITIES. ACCUSATIONS INCLUDE MIXED SEED, LOSSES IN STORAGE AND GENERALLY POOR HANDLING. WPADC STATES THEY WOULD PREFER TURN SEED OPERATION RESPONSIBILITY TO PRIVATE SECTOR. SOME INTEREST EXISTS AMONG PRIVATE SECTOR INCLUDING FEW FOREIGN SEED COMPANIES TO ENTE SEED BUSINESS. HOWEVER, NOTHING YET INITIATED AND RESPONSIBILITY REMAINS WITH WPADC.

6f Agricultural Education. Last sentence unimpressive. How else did schools contribute to adaption, propagation? Were there administrative links to research, extension?

6f - AGRICULTURAL UNIVERSITIES AND COLLEGES HAVENOT CONTRIBUTED DIRECTLY TO HYV DEVELOPMENT AND ADOPTION OTHER THAN BY GIVING BAS C TRAINING TO TECHNICAL PEOPLE IN CHARGE OF PROGRAM. BOTH EPAU AND WPAU NOW DEVELOPING RESEARCH PROGRAMS FOR DEVELOPING CAPABILITY GRADUATES TO WORK IN RESEARCH STATIONS AND HOPEFULLY EVENTUALLY TO MAKE SIGNIFICANT CONTRIBUTION FROM RESEARCH PER SE. SIMILAR ROLE IS CARRIED OUT BY WPAU EXTENSION DEPARTMENT. VIRTUALLY NO ADMINISTRATIVE LINKS EXIST BETWEEN EXTENSION, RESEARCH AND THE UNIVERSITIES AND COLLEGES.

6 (g - add Coops) Paper ignors subject. If supply, production or marketing coops played significant role, describe, if not, say so.

6G - COOPS: COOPERATIVES HAVE MADE NO CONTRIBUTION TO THE ADOPTIO OF HYV. THEIR ROLE IN FERTILIZER DISTRIBUTION HAS DECREASED AS PRIVATE SECTOR BECOMES MORE ACTIVE.

II. Assessment of Causes. AID/W would appreciate more discriminating analysis of causation. Paper identifies many contributing factors. Review will try to assess relative importance, necessity and sufficiency of seeds, extension and other institutions, price and other policies. Would seeds have spread spontaneously? USAID judgment, however, guarded, will help considerably.

II. ASSESSMENT OF CAUSES: SEVERAL FACTORS FORM PART OF PACKAGE WITH EACH CONTRIBUTING. SEED ALONE WOULD CONTRIBUTE ABOUT 10PERCENT ABOVE LOCAL VARIETIES. FERTILIZER AS A SINGLE FACTOR INFLUENCES YIELDS MORE THAN SEED. EXTENSION WITHOUT SEED AND FERTILIZER CONTRIBUTES VERY LITTLE. PERHAPS HYV WOULD HAVE SPREAD SPONTANEOUSLY BECAUSE OF THE 10PERCENT INCREASE IN YIELDS IF FERTILIZER ALSO MADE AVAILABLE BUT IT IS SAFE BET THAT SPREAD CAME MUCH FASTER DUE TO EXTENSION SERVICE ORGANIZING DEMONSTRATIONS AND PLANNING FOR MAXIMUM SEED INCREASE IN EARLY STAGES. THESE PLUS ADDITIONAL FACTORS DISCUSSED ORIGINAL PAPERS ALL CONTRIBUTED. SEEDS HAVE SPARKED THE PROGRAM DUE TO RESPONSE TO HIGH DOSAGES FERTILIZER. EXTENSION SERVED TO ASSURE THAT PROPER COMBINATION OF FACTORS USED.

III. 1. Policy Influence. We would appreciate candid fuller account AID's role in planning with GOWP the new agricultural strategy, and how much credit can be attributed to AID for each of the following initiatives:

- conception and implementation of SCARP
- refocus of extension
- Grow More Food Campaign
- conception and implementation 1965 import of 350 MT red.
- decision to rapidly multiply 1966 import of 50 MT white.
- 1967 imports of 40,000 and 2,000 MT shipments.

If you can identify AID imprint on any or all of these institutions, would you ascribe it to program loan or PL 480 "conditions"?

III. 1. POLICY INFLUENCE: INFLUENCED BY PAPER DEVELOPED BY THE MISSION, GOP PROVIDED FINANCING TO IMPLEMENT THE GOVT. WHEAT PURCHASE(PRICE SUPPORT) PROGRAM.

CONCEPTION AND IMPLEMENTATION OF SCARP: MISSION SPONSORED THE REVELLE TEAM THAT RECOMMENDED SCARP APPROACH TO SOLVING WEST PAKISTAN'S WATER LOGGGING AND SALINITY PROBLEM. MISSION

DEVELOPMENT LOANS FINANCED THE FEASIBILITY STUDIES AND TOGETHER WITH WORLD BANK FINANCED INSTALLATION OF TUBEWELLS. THE OUTSIDE INFLUENCE FOR INITIATION THIS PROJECT CAME FROM USAID.

THE REFOCUS OF EXTENSION AWAY FROM THE MODEL FARM TO A MASSIVE CROP DEMONSTRATION APPROACH IN SCARP I WAS LARGELY DUE USAID INFLUENCE. APPROACH PROVED USEFUL FOR INTRODUCTION HYV AND WAS ADOPTED PROVINCE WIDE. THE GROW MORE FOOD " IMPLEMENTATION PLAN" DEVELOPED IN PLANNING AND DEVELOPMENT DEPARTMENT, GOWP, WITH ASSISTANCE FORD FOUNDATION ADVISORS WAS BASED ON THAT APPROACH.

THE CONCEPTION AND IMPLEMENTATION IN 1965 OF 350 MT RED WHEAT WAS ASSISTED BY FORD FOUNDATION. THE PURCHASE WAS FINANCED WITH GOP OWN RESOURCES. AT THAT TIME USAID HAD RESERVATIONS RELATED TO THE RED COLOR AND MILLING QUALITIES OF THE NEW MEXICAN VARIETIES.

PLANTING FOR MAXIMUM MULTIPLICATION OF THE 1966 IMPORT OF 50TONS OF 8165 WHITE(MEXIPAK) WAS INSISTED UPON BY THE MISSION AS A CONDITION OF FINANCING THE SEED PURCHASE.

THE 1965 IMPORT OF 40,000 AND 2,000 MT WAS AGAINST MISSIONJS INFORMAL ADVICE AND FINANCED BY GOP. THIS SHIPMENT HAS HAD NO INFLUENCE ON THE PRESENT STATUS OF HYVS.
DOUBTFUL THAT PL480 " CONDITIONS" HAVE SIGNIFICANTLY INFLUENCED HYV PROGRAM. USAID LOANS HAVE CONTRIBUTED SUBSTANTIALLY TO THE SCARP DEVELOPMENT.

2. Capital Inputs. Share wheat irrigation infrastructure and tube well use attributable to AID finance.

2 J CAPITAL INPUTS: THE BASIC CANAL IRRIGATION SYSTEM HAS NOT BEEN CHANGED SINCE ITS DEVELOPMENT ABOUT THE TURN OF THE CENTURY, HOWEVER, THE PUBLIC SECTOR TUBEWELL DEVELOPMENT SUPERIMPOSED ON THE CANAL SYSTEM CAN BE ATTRIBUTED LARGELY TO USAID. USAID HAS FINANCED OR IS CONSIDERING TO FINANCE APPROXIMATELY 6 THOUSAND TUBEWELLS IN THE PUBLIC SECTOR ACCOUNTING FOR ABOUT ONE-THIRD OF THE PUMPED WATER. THE 60 THOUSAND SMALLER PRIVATE SECTOR TUBEWELLS HAVE LARGELY BEEN FINANCED DIRECTLY BY FARMERS THROUGH ADB LOANS. THE INCREASED ACREAGE UNDER WHEAT SINCE 1962 CAN LARGELY BE ATTRIBUTED TO TUBEWELL INSTALLATION.

3. Technical Assistance Inputs. Discussion inadequate. No description of USAID involvement, if any, in building participating institutions and helping them play role in HYV propagation program (i.e., seed multiplication authority, extension, coops, procurement authority.) While redraft calls for reference work in USAID files, should be feasible draw rough picture AID's involvement in institution building in relatively short order. What is needed is first an assessment of AID's specific role in developing and strengthening the institutions that contributed significantly to HYV; second a description how AID-supported institutions' had to be overhauled before useful contribution could be assured; and third identification of any AID-supported institutions that should have played role but didn't. There are countries where AID supported extension, credit and other services have been ignored in rural development action programs. Missions should report such cases. Research is also given short shrift. To what extent are successful adaptive research program, and seemingly farsighted decisions during 1960's, attributable AID.

3 - TECHNICAL ASSISTANCE INPUTS: THE INSTITUTIONS FOR IMPLEMENTING HYV PROGRAM WERE HIGHLY INFLUENCED BY USAID TECHNICAL ASSISTANCE. OF 1,127 AGRICULTURISTS TRAINED UNDER PARTICIPANT PROGRAMS BOTH EAST AND WEST PAKISTAN, 675 TRAINED IN AGRONOMY, EXTENSION, PLANT BREEDING, ENTOMOLOGY, PATHOLOGY, AND SPECIAL CROPS, INCLUDING WHEAT RICE. THE DIRECTORS OF RESEARCH STATIONS, EXTENSION AND COORDINATED RESEARCH PROGRAMS IN WHEAT AND RICE NEARLY ALL RECEIVED TRAINING UNDER PARTICIPANT PROGRAM SOMETIMEDURING CAREER. IN WP ALONE, 47 MAN YEARS USAID ADVISERS HAVE ASSISTED IN DEVELOPMENT EXTENSION SERVICE, 26 MAN YEARS ADVISORY SERVICE IN AGRONOMY, MARKETING, PLANT PROTECTION, IRRIGATION AND SOILS, AND 26 MANS YEARS ASSISTED DEVELOP AGRICULTURE WORKSHOPS CARRYOUT WELL DRILLING, LAND LEVELING AND MAINTENANCE FARM TRACTORS. ALL THESE INSTITUTIONS HAVE CONTRIBUTED TO HYV PROGRAM. THE TECHNICAL BASE, AT LEAST AT ADMINISTRATIVE AND SUPERVISORY LEVEL, WAS ALREADY ON GROUND. EXTENSION, UNTIL NOW, HAS BEEN LARGEST CONTRIBUTOR AND IS WHERE MISSION HAS PUT GREATEST EMPHASIS THROUGH PARTICIPANT TRAINING AND ADVISORY SERVICE. UNTIL NOW ALL HYV SEEDS HAVE BEEN IMPORTED BUT FUTURE EFFORTS SUSTAIN GROWTH WILL REQUIRE RESEARCH WITHIN COUNTRY.

III. 5. Funding Problem. This appropriate place comment on any serious financial problems that face one or more institutional components HYV and threaten upset projections steady growth. In USAID's judgement are institutional components of HYV program scheduled to receive sufficient funds to continue to make their necessary contributions? This issue not in earlier outlines, but is important to overall review and Mission opinion requested.

III 5 - FUNDING PROBLEM: INTERDISCIPLINARY COORDINATED RESEARCH PROJECTS ARE OPERATIONAL IN WHEAT AND RICE AND FUNDING GENERALLY ADEQUATE AT PRESENT. FORDFOUNDATION FINANCING FX FOR TRAINING, EQUIPMENT AND TRANSPORTATION FACILITIES. RUPEE FUNDING MAY BECOME MORE DIFFICULT AS RESEARCH REQUIREMENTS GROW AT SAME TIME RESOURCE MOBILIZATION PROBLEM BECOMES MORE DIFFICULT. EXTENSION SERVICE FUNDING IS PRESENTLY TIGHTER THAN RESEARCH. MORE COMPLICATED CROP SUCH AS COTTON, OIL SEEDS, PULSES, ETC. THAT GOP HOPS PLACE INCREASED EMPHASIS REQUIRE BETTER QUALIFIED EXTENSION STAFF, WHICH WILL INCREASE FUNDING REQUIREMENTS BY INCREASED STAFFING OF MORE EXPENSIVE PERSONNEL OR INCREASED TRANSPORTATION FACILITIES. WITH PRESENT STAFF AVAILABILITY IT CHEAPER HIRE MORE PEOPLE THAN PURCHASE AND MAINTAIN VEHICLES BUT LIMITED AVAILABILITY HIGHER TRAINED PEOPLE WILL SOON REQUIRE MORE VEHICLES FOR MOBILITY OF SPECIALISTS, FUNDING FOR THIS IS LIKELY BECOME MORE DIFFICULT.

AGRICULTURAL CREDIT, ALREADY INADEQUATE, WILL LIKELY CONTINUE BE CONSTRAINT DUE PARTLY TO OVERALL RESOURCE MOBILIZATION PROBLEM
UNIVERSITIES, WHICH PROVIDE BASIC TRAINING FOR ALL AGRICULTURA INSTITUTIONS, ARE UNDERFUNDED AND THIS LIKELY WILL CONTINUE.
FUNDING FOR INSTITUTIONS, HOWEVER, NOT LIKELY TO CONSTRAIN GROWTH HYV IN SHORT RUN AS MUCH AS FINANCIAL SUPPORT FOR COMMODIT AND POLICY ACTIONS SUCH AS FERTILIZER IMPORTS, PRICE SUPPORTS, INPUT SUBSIDIES. IN WP REDUCTION IN SUBSIDIES AND LOWER WHEAT FLOOR PRICE WILL HAVE TO BE CONSIDERED IN FACE LIKELIHOOD EXCESS FOODGRAIN PRODUCTION NEXT FEW YEARS. OEHLERT

Department of State **TELEGRAM**

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ACTION AID 85

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R 161327Z APR 69
FM AMEMBASSY RAWALPINDI
TO SECSTATE WASHDC 7897

UNCLAS RAWALPINDI 3857

PAKISTAN

AIDAC

REFERENCE: RAWALPINDI 3679

SUBJECT: SPRING REVIEW NEW GRAIN VARIETIES

1. THIS MESSAGE SUPPLEMENTS REFTEL.

2. MARKETING 6D: FOOD DEPARTMENT, GOWP, HAS RESPONSIBILITY PURCHASE WHEAT TO MAINTAIN FLOOR PRICE. FOR 1968 CROP, 198 PURCHASING CENTERS WERE INITIALLY ESTABLISHED THROUGHOUT WHEAT PRODUCING AREA AND NUMBER LATER INCREASED TO 285. ADDITIONAL CENTERS PLANNED FOR 1969 CROP. FOOD DEPARTMENT ALSO DISPENSES WHEAT THROUGH SO-CALLED RATION SHOPS WHICH IN ESSENCE ARE MEANS FOR LOW INCOME PEOPLE WHO WISH SECURE RATION CARDS TO OBTAIN WHEAT SLIGHTLY BELOW MARKET PRICE. ABILITY TO MOVE EFFECTIVELY INTO MARKET MUST BE ATTRIBUTED TO FACT GOWP NOT NEWCOMERS TO GRAIN HANDLING, HAD INITIAL ORGANIZATION TO WORK WITH, MADE THEIR POLICY AND OPERATING DECISIONS IN TIME, AND HAD CREDIT MECHANISM ARRANGED. HAVING DETERMINED THE COURSE DESIRED THEY PURSUED IT CONSISTENTLY EVEN THOUGH THEIR NECESSARY ACTIONS IMPINGED ON OTHER TARGETS FOR CREDIT MANAGEMENT DURING THE YEAR. SECURING SELF-SUFFICIENCY GRAIN WAS EFFECTIVELY RECOGNIZED AS FIRST PRIORITY.

3. II. ASSESSMENT OF CAUSES: ONE ADDITIONAL REASON HYV CAUGHT ON QUICKER IN WP THAN EP IS THAT WP HAS MORE LARGE FARMERS WHO MORE PRONE ADOPT NEW PRACTICES. SMALLER FARMERS WP THEN LEARN FROM LARGER FARMERS. FEW COMPARABLE LARGE FARMS EP.

OEHLERT

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25

AIRGRAM

DEPARTMENT OF STATE

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PRM 4
x AGR 4-1

DATE REC'D.

For each address check one ACTION | INFO

DISTRIBUTION
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TO - AID/W TOAID A- 326 x

1969 APR 22 PM 2 52

AID

DATE SENT
4-16-69

FROM - USAID RAWALPINDI

SUBJECT - Spring Review New Grain Varieties

REFERENCE - (A) RAWALPINDI 3679 (B) TOAID A-252 (C) TOAID A-257

Following data on rainfall may be useful in the analysis, particularly re wheat.

Name of Division	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
					1961							
Lahore	3.4	1.3	0.6	0.9	0.2	1.7	11.2	11.0	4.7	0.8	0.4	1.1
R'Pindi	4.0	2.8	1.6	5.9	1.4	1.7	10.2	6.7	9.7	1.7	1.6	0.6
Sargodha	1.4	1.2	0.2	1.5	0.7	0.6	1.7	3.5	1.9	0.1	0.1	0.1
Multan	0.9	0.5	0.2	0.2	0.4	0.5	4.0	2.2	0.1	-	-	0.1
Bahawalpur	0.2	0.1	-	0.2	0.3	1.7	2.2	1.3	0.6	-	-	-
D.I. Khan	1.1	0.1	0.1	1.9	1.5	0.1	3.3	1.4	0.8	0.5	0.6	-
Peshawar	4.1	2.7	2.0	6.3	1.7	0.5	6.6	4.1	5.0	0.9	2.8	0.3
Khairpur	0.1	0.2	-	2.0	-	0.5	1.6	0.6	0.2	-	-	-

PAGE 1 OF 3 PAGES

DRAFTED BY	OFFICE	PHONE NO.	DATE	APPROVED BY
Chughtai:bbd	AGR/L		4/15/69	L. F. Hesser, AD/AP

AID AND OTHER CLEARANCES

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AID-5-39 (11-68)

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Name of Division	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
						1962						
Lahore	0.7	1.5	1.5	0.4	0.3	1.0	7.7	7.5	8.0	0.2	0.5	0.7
R'Pindi	0.5	2.2	2.7	1.7	1.4	2.0	7.4	9.0	4.7	0.3	1.2	2.3
Sargodha	1.5	1.1	1.2	0.2	0.3	0.4	2.2	4.7	0.7	-	.2	0.5
Multan	0.8	0.2	1.0	-	-	-	2.2	1.0	0.6	0.2	0.4	0.6
Bahawalpur	-	0.2	0.2	-	-	-	2.0	0.1	1.5	-	-	0.6
D.I. Khan	0.1	0.7	2.8	0.1	0.3	0.2	0.6	1.1	1.9	1.2	-	0.2
Peshawar	0.6	2.2	3.9	2.5	1.7	0.8	4.8	3.9	3.3	0.3	0.6	2.6
Khairpur	-	0.2	0.2	-	-	-	0.1	0.7	-	-	-	0.3
						1963						
Lahore	nil	0.1	2.1	1.3	1.3	1.7	0.5	9.8	2.6	0.2	0.6	0.9
R'Pindi	nil	0.9	4.4	2.9	2.4	1.1	5.6	10.2	5.8	0.1	1.7	1.8
Sargodha	nil	0.2	0.8	1.0	1.2	0.6	0.1	0.4	0.2	0.1	0.2	0.5
Multan	nil	-	0.8	1.0	0.1	0.1	0.6	0.9	-	0.5	0.1	0.1
Bahawalpur	nil	-	0.4	0.1	0.4	-	0.3	1.5	-	-	0.3	0.1
D.I.Khan	nil	0.5	1.8	0.9	0.7	-	0.8	1.1	0.6	-	0.2	0.2
Peshawar	nil	1.2	4.4	4.4	4.2	0.5	2.7	3.3	1.9	0.7	1.9	1.6
Khairpur	nil	-	-	-	0.4	-	-	-	-	-	-	-

Name of Division	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
						1964						
Lahore	2.1	0.2	0.1	0.9	1.2	1.1	13.9	9.8	3.8	-	0.6	0.1
R'Pindi	5.6	1.1	1.2	2.6	1.9	1.0	12.1	8.0	3.2	0.8	1.6	-
Sargodha	0.9	0.3	0.4	0.3	0.6	0.6	4.1	3.0	3.3	-	0.1	-
Multan	1.3	-	0.9	0.2	0.1	0.2	3.6	1.4	0.1	0.1	0.2	-
Bahawalpur	0.5	0.1	0.1	0.1	0.3	0.6	4.1	1.9	-	-	0.1	-
D.I.Khan	0.9	0.4	1.0	0.3	0.2	0.3	6.6	0.7	0.7	0.2	0.2	-
Peshawar	3.8	1.7	1.5	3.0	1.7	0.5	6.0	3.1	2.1	0.6	1.7	0.2
Khairpur	0.9	-	0.1	-	-	0.4	0.2	-	0.2	-	-	-
						1965						
Lahore	1.5	1.4	1.0	2.2	1.1	-	4.4	3.1	0.37	0.16	0.08	-
R'Pindi	1.5	4.2	3.3	7.1	6.4	1.1	6.7	6.4	0.77	0.82	0.95	0.38
Sargodha	0.3	0.8	0.5	2.7	1.6	0.5	1.6	3.5	0.33	0.03	0.13	nil
Multan	0.2	-	0.4	1.9	0.2	0.2	2.3	1.7	0.01	0.09	nil	nil
Bahawalpur	0.1	-	0.1	0.2	0.1	0.3	3.0	2.5	0.00	nil	nil	nil
D.I.Khan	0.1	0.3	0.4	2.6	0.9	0.4	1.9	2.03	0.52	nil	0.13	0.04
Peshawar	2.7	3.5	4.0	9.9	4.8	0.5	4.1	3.2	1.24	0.07	0.45	0.45
Khairpur	-	-	0.2	-	-	-	0.3	-	-	-	-	-