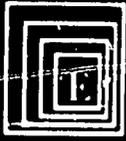


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SUMMARY REPORT

REPORT NO. 6

Dryland Agricultural Development - Pakistan Barani Project

Contract AID/NE-C-1217

William D. Burgess, Jr.

Agronomist-Northwest Frontier Province

February 23, 1976 to April 18, 1979

June 1979

This report is one of seven summary reports prepared by Experience, Incorporated for Project AID/NE-C-1217, Pakistan Barani. The reports are listed as follows:

- No. 1. Miller, Clarence J., Summary Report of Team Coordinator. September 1, 1976 to May 3, 1979
- No. 2. Miller, Clarence J., Study of Socio-Economic Impact of Barani Project Demonstrations in Punjab and Northwest Frontier Provinces, Pakistan
- No. 3. Miller, Clarence J., Study of Economics of Wheat Production in Barani Areas of Punjab and Northwest Frontier Provinces, Pakistan
- No. 4. McKay, Gerald R., Summary Report of Communications Consultant. September 1 to September 30, 1976 and October 2, 1978 to January 25, 1979
- No. 5. Ulsaker, Lawrence G., Summary Report of Agronomist-Punjab Province. June 28, 1976 to April 3, 1979
- No. 6. Burgess, William D., Jr., Summary Report of Agronomist-Northwest Frontier Province. February 23, 1976 to April 18, 1979
- No. 7. Dilawar Ali Khan, et al, Study of Marketing of Farm Products and Farm Inputs in Barani Areas of Punjab and Northwest Frontier Provinces.

TABLE OF CONTENTS

	Page
I. INTRODUCTION	1
II. OBJECTIVES OF THE BARANI PROJECT	4
III. BENCHMARK DATA SUMMARY	5
IV. PLAN OF OPERATION AND SUMMARY OF MAJOR EFFORTS	6
A. Work with Plots	6
B. Other Activities	7
V. COLLECTION OF FARMER PROFILE DATA IN NWFP	9
VI. ADMINISTRATION AND STAFFING OF THE PROJECT	9
VII. TARGETS ACHIEVED	11
A. Demonstration Plots Conducted by Barani Staff	11
B. Adaptive Research and Verification Plots Conducted by Barani Staff	14
C. Research Plots Established by Research Institutes in 1976-77	16
D. Research Plots Established by Research Institutes in 1977-78	19
E. Testing of Chisel Plows, 1977-78	23
F. Soil Testing Program	23
G. Rain Gauges and Thermometers	23
H. Introduction of Special Implements	24
I. Field Days and Farmer Training Meetings	24
J. Other Accomplishments of the Barani Project	24

LIST OF TABLES

	Page
TABLE 1. AVERAGE CROP YIELDS IN RAINFED AREA COMPARED TO IRRIGATED AREA OF PAKISTAN	3
TABLE 2. PERSONNEL DESIGNATIONS FOR BARANI PROJECT	10
TABLE 3. FERTILIZER ADAPTIVE RESEARCH TRIALS, RABI, 1975-76	15

LIST OF APPENDIXES

APPENDIX A

FARMER PROFILE DATA
FOR NWFP

APPENDIX B

BENCHMARK DATA FOR BARANI FARMERS
IN NWFP

APPENDIX C

PLOT INFORMATION FOR FARM TRIALS
IN NWFP

APPENDIX D

PLOT YIELDS AND STANDARD DEVIATIONS
SUMMARIZED BY TEHSIL FOR FARM TRIALS
IN NWFP

APPENDIX E

ADAPTIVE RESEARCH TRIALS FOR
KHARIF, 1978 IN NWFP

SUMMARY REPORT
REPORT NO. 6

Dryland Agricultural Development - Pakistan Barani Project
Contract AID/NE-C-1217

William D. Burgess, Jr.
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I. INTRODUCTION

The objective of the Barani Project was to advise and support the Government of Pakistan (GOP) Barani Project staff in their efforts to plan and implement programs that will improve the efficient production, harvesting, storing, and marketing of crops, and improve the supply of inputs and services in non-irrigated areas of Pakistan.

William D. Burgess, Jr. served as Agronomist in the Northwest Frontier Province (NWFP) as part of the Experience, Incorporated team which included Dr. Clarence J. Miller, Team Coordinator; and Lawrence G. Ulsaker, Agronomist in the Punjab Province.

The economy of the NWFP is basically agricultural. Agriculture accounts for 32 percent of the gross provincial product and employs about 70 percent of the available civilian labor force in the province. Yet, crop yields per acre are extremely low, and the total agricultural production is inadequate to meet the requirements of inhabitants of the province.

With a 3 percent growth rate, projected population of the province, including federally administered tribal areas (FATA), was estimated at 13,521,000 for 1978. It will require 1,449,000 tons of food grains (12.8 ounces per capita consumption per day) to feed this number.

The province produced 1,085,600 tons (677,700 tons of wheat and 407,900 tons of maize) of food grains during Kharif 1/, 1977 and Rabi 2/, 1977-78, which will be consumed during 1978-79. Allowing for losses in harvesting and storage, which are estimated at 108,560 tons, there remains a net availability of 977,040 tons of food grains. Thus, there is a deficit of approximately 471,960 tons of food grains during 1978-79. If alternate uses of maize are taken into account (large quantities are used for corn oil and starch production), the deficiency is estimated at 879,860 tons.

The total reported area of the NWFP is 12.81 million acres (5.18 million hectares), of which 4.637 million acres (1.876 million hectares) are cultivated and the remaining 8.177 million acres (3.309 million hectares) are uncultivated.

The average yield per acre in the rainfed area compared to the irrigated area is low, as shown in Table 1.

Wheat, gram, the oilseed crops, rape and mustard in the Rabi season; and maize, sorghum, and millet in the Kharif season are the important crops of the barani areas. Groundnut cultivation

1/ Kharif is the crop season that runs generally from April through September.

2/ Rabi is the crop season that runs generally from October through March.

TABLE 1. AVERAGE CROP YIELDS IN RAINFED AREA COMPARED TO IRRIGATED AREA OF PAKISTAN

Crop	Area			Production			Average Yield Per Acre	
	Irrigated	Unirrigated	Total	Irrigated	Unirrigated	Total	Irrigated	Unirri- gated
	-----Acres-----			-----Tons-----			----Tons---	
Maize	45,324	382,931	836,255	284,779	123,100	407,879	0.62	0.32
Jowar	8,239	52,902	61,141	1,770	9,487	11,257	0.21	0.17
Bajra	3,725	69,038	72,763	796	11,559	12,355	0.21	1.16
Cotton	5,839	427	6,120	2,606 _{a/}	156 _{a/}	2,762 _{a/}	2.00 _{a/}	1.70 _{a/}
Sesamum	177	4,570	4,747	32	529	561	0.18	0.11
Groundnut	1,481	6,997	8,478	1,149	4,194	5,353	0.77	0.59
Soybean	2,813	4,535	7,348	760	437	1,197	0.27	0.09
Wheat	687,786	1,031,352	1,719,138	376,146	304,531	677,677	0.54	0.29
Gram	14,571	261,306	275,877	3,379	40,944	44,323	0.23	0.15
Barley	48,715	105,444	154,159	21,697	28,583	50,180	0.44	0.26
Rape and Mustard	12,432	119,119	131,551	2,771	24,802	27,573	0.44	0.27
Potato	14,365	1,880	16,245	55,298	5,372	60,670	3.84	2.85

_{a/} Cotton production is presented in bales.

has recently gained importance. This can be attributed to its value as a cash crop and its suitability to the soils and climate.

Groundnut Acreage

Kharif 1975	3,300
Kharif 1976	6,089
Kharif 1977	8,478

II. OBJECTIVES OF THE BARANI PROJECT

Since the average yields per acre of various crops in the rainfed areas are low, there are economic disparities among the farmers of the barani areas and the irrigated areas. Not only are there low yields per acre of crops in the rainfed areas, but every year the ratio of cultivatable land to the population has diminished. However, every year science provides greater resources to help farmers increase their production. Progressive farming implies the use of fertilizers and other inputs as well as improved cultural practices. In the past, great emphasis was placed upon the development of irrigated areas, and the development of rainfed areas lagged behind. The small barani farmer was neglected. In spite of the best efforts put forth by the farmers in the barani areas, their farms often did not reach the level of an adequate subsistence standard. Therefore, it became necessary to make conditions more uniform in all areas, and a plan entitled "Barani Agriculture Development Project" was proposed at a total cost of Rs. 8.853 million with the assistance of USAID. An agreement was signed between the governments of the United States and Pakistan. The project duration agreed upon was three years and work was begun during the latter part of 1975.

The primary purpose of the Barani Agriculture Development Project was to induce small farmers of the barani areas to adopt modern production technology. This goal is being achieved through

establishing demonstration plots throughout the province on farmers' fields on such a scale as to produce a significant impact on the farmer's attitudes and cultural practices. This should increase agricultural productivity in the rainfed areas and improve socio-economic conditions of the people.

III. BENCHMARK DATA SUMMARY

In order to measure and compare, over a period of time, the factors affecting conditions in which barani farmers live, a benchmark survey was planned for the province. The Department of Agriculture was allocated Rs. 200,000 to carry out these studies.

Dr. Hugh S. Plunkett, a social anthropologist with USAID who had previously worked in South Asian countries and in Pakistan, was in charge of the studies. He began work in September, 1975 and interviewing was conducted during the Kharif harvest season of 1975. Administrative and financial problems contributed to delays in the completion of the project.

Staff members from the USAID Mission and Experience, Incorporated, with assistance from Ateeque Ahmad, local statistician, summarized the questionnaires and selected a subsample from which a series of 11 tables listing a variety of information about the barani areas were made. Dr. Plunkett's contract terminated in June, 1976; by that time most of the data were collected and the tabulation was underway.

The results of the benchmark study are in Appendix A.

IV. PLAN OF OPERATION AND
SUMMARY OF MAJOR EFFORTS

A. Work with Plots

To realize the objectives of the project, a large number of trials using several kinds of plots were conducted. The plots could be divided into three categories based on the objectives for which they were established.

Adaptive research plots sought to give information on levels of fertilization, rates of seeding with different soil types, and environmental conditions where research information was not available.

Verification plots were established to confirm recommended practices that were based on adaptive research results or other results of research, and to test the recommendations under broader ecological conditions.

The number of adaptive research and verification trials conducted for each crop during the period of the project is shown below.

<u>Crop</u>	<u>Number</u>
Wheat	134
Maize	86
Sorghum	84
Millet	68
Oilseed	160
Others	<u>171</u>
Total	703

Demonstration plots, as established in NWFP, consisted of two or more different treatments on equal sized pieces of land. The first treatment was the farmer's seed variety, seeding rate, fertilizer rate, and other cultural practices. The second treatment consisted of a recommended seed variety, seeding and fertilizer rate, and a package of recommended practices, such as use of pesticides and weed control methods as well as planting and cultural practices. The number of demonstration plots conducted for each crop from 1976 to 1979 is given below.

<u>Crop</u>	<u>Number</u>
Wheat	5,271
Maize	734
Sorghum	231
Millet	218
Others*	<u>2,089</u>
Total	8,543

*Includes soybeans, groundnuts, gram, sarson, sunflower, and fodder

The application of inputs and carrying out of recommended cultural practices often increased per-acre yield 50 to 100 percent.

B. Other Activities

Other project activities that were related to the work with plots, and that helped achieve the overall objectives of the Barani Project, included:

1. Conducting training for both Agricultural Extension workers and senior officers in establishing various kinds of plots.

2. Cooperating in conducting studies to discover motivational factors for barani farmers. This was a major project supervised by Dr. Clarence Miller.^{3/}
3. Introducing small-scale mechanical farming with bullocks, tractors, and improved harvesting/threshing techniques.
4. Testing chisel plowing and contour furrow plowing in selected areas according to the needs of the areas to minimize water losses. Multiple crop threshers and two types of groundnut diggers were also tested.
5. Conducting soil testing programs on farms where plots were located.
6. Procuring and distributing rain gauges and thermometers to farmers who would monitor climatic factors.
7. Procuring, through production or purchase, teaching and other information materials use for accomplishing the objectives of the project. These are described in more detail in section VII, F-J, of this report.

^{3/} See Report No. 2. Socio-Economic Impact of Barani Project Demonstrations.

V. COLLECTION OF FARMER PROFILE DATA IN NWFP

In order to better understand the kind of farmers with whom the Barani Project was concerned and to plan work with the farmers, a significant amount of profile data was collected at the time arrangements were made for the establishment of plots. Size of farm, major crops raised, and the amount of fertilizer used were noted at the time farmers agreed to have plots on their farms.

Other characteristics, such as age, number of workers per farm, and frequency of visits to the nearest city, were also determined during the first interview with the farmer. This information was helpful in planning later activities related to the plots and in interpreting the results of various trials and demonstrations in particular situations. The farmer profile data for NWFP is summarized in Appendix B.

VI. ADMINISTRATION AND STAFFING OF THE PROJECT

The position of project director was held by Lal Mohammad Khan. In the original plan, there were no posts for assistant statistical officer, assistant investigator, statistical investigator, and attendants. These positions were included in the revised (FC-1) scheme, which is shown in Table 2.

TABLE 2. PERSONNEL DESIGNATIONS FOR BARANI PROJECT

Designation	Sanctioned Strength	Actually in Position
Project Director	1	1
Agronomists	2	2
Economist-Agricultural Marketing	1	1
Assistant Station Officer	1	1
Assistant Agronomists	5	5
Statistical Investigator	1	1
Office Superintendent	1	1
Agricultural Engineering Technician	1	--
Communication Media Technician	1	--
Stenographer	1	1
Senior Clerk	1	1
Mechanic/Van Operator	2	1
Junior Clerk	1	1
Tractor Operators	5	4
Vehicle Driver	3	3
Chowkidar	1	1
Mali	1	1
Attendants	8	6
Peons	5	5

VII. TARGETS ACHIEVED

A. Demonstration Plots Conducted by Barani Staff

Demonstration plots play an important role in disseminating skills and knowledge of modern agricultural production technology to the farming community. In order to involve a maximum number of farmers in this program a demonstration plot was established only once with a farmer in each of the two main crop seasons. Consequently, 8,543 demonstration plots with various crops were established by Barani staff against a target of 9,097. During the period under review, 93.91 percent of the targets were achieved. During 1975-76, the first year, only wheat demonstration plots were established.

Results of these demonstration plots showed that high yielding varieties combined with other inputs gave astonishing results on the farmers' fields (see Appendix C, Tables C-1 to C-10). A summary of the various demonstration plots is given below.

1. Wheat

Wheat demonstration plots have been established by years as follows:

<u>Year</u>	<u>Number of Plots</u>
1975-76	836
1975-76	1,522
1977-78	1,443
1978-79	1,500 (approximate)

With a recommended rate of 110 pounds each of urea and DAP, average yields of 24.30 maunds, 23.47 maunds, and 24.67 maunds per acre were obtained during the first three of the above periods. This is about three times the provincial yield per acre. See Table C-1.

2. Gram

Gram is an important crop of the barani areas. Two hundred demonstration plots of drought and disease-resistant varieties of the crop were laid out during 1976-77 and 192 during 1977-78. Average yields per acre of 14.87 maunds and 15.07 resulted during the above period. To these demonstration plots, a recommended rate of 24 pounds per acre of urea and 110 pounds per acre of DAP was applied. The average yield per acre on the plots was about three and one-half times the provincial average yield. See Table C-2.

3. Sarson

In 1976-77, 200 demonstration plots were laid out; in 1977-78, there were 171 plots. An application of 44 pounds of urea and 110 pounds of DAP per acre was made, resulting in average yields of 14.87 maunds and 10.10 maunds per acre. This is about 2.2 times the average provincial yield, as shown in Table C-3.

4. Rabi Fodder

Forty-two demonstration plots of high yielding varieties were established for the first time during Rabi 1977-78, with an average yield of 312.85 maunds per acre. An application of 220 pounds of urea and 88 pounds of DAP per acre was used. See Table C-4.

5. Maize

In 1976-77, 270 demonstration plots of high yielding maize varieties were laid out; in 1977-78, there were 204 plots. Urea was applied at the rate of 110 pounds per acre, and DAP at the rate of 68 pounds per acre. Average yields of 24.97 maunds and 25.06 maunds per acre were obtained, which is 2.8 times the provincial yield. See Table C-5.

6. Sorghum

One hundred fifteen and 41 demonstration plots of high yielding varieties of sorghum were established during 1976-77 and 1977-78, respectively. They yielded an average 11.67 maunds and 10.95 maunds per acre, which is 2.75 maunds per acre higher than the provincial average. In these demonstrations, a uniform application of 110 pounds of urea and 68 pounds of DAP was applied. Results are summarized in Table C-6.

7. Millet

One hundred seven and 55 demonstration plots of high yielding varieties of millet were established during 1976-77 and 1977-78, respectively, with an application of 72 pounds per acre of urea and 44 pounds per acre of DAP. Average yields of 18.5 maunds and 14.34 maunds per acre were recorded -- 3.6 times higher than the provincial average. See Table C-7.

8. Soybeans

A number of demonstration plots of high yielding varieties of soybeans were established during the years 1976-77 and 1977-78, with an application of 110 pounds per acre of DAP. Average yields of 24.3 maunds and 10.92 maunds per acre were recorded for the above years, which is approximately six times higher than the provincial average. See Table C-8.

9. Groundnuts

In 1976-77, 95 demonstration plots of high yielding maize varieties were laid out; in 1977-78, there were 215 plots. DAP was applied at the rate of 165 pounds per acre. Average yields of 22.02 maunds and 20.27 maunds per acre were obtained, which is 1.29 times the provincial yield. See Table C-9.

10. Kharif Fodder

Thirty-seven plots and 22 plots of high yielding varieties of Kharif fodder were established during the years 1976-77 and 1977-78, respectively, with an application of 220 pounds per acre of urea. Average yields of 88.82 maunds and 160.44 maunds per acre were recorded. Results are summarized in Table C-10.

B. Adaptive Research and Verification Plots Conducted by Barani Staff

Prior to the Barani Agriculture Development Project in NWFP, no research had been undertaken by the research institutes in the barani areas. Emphasis in this project now was placed on conducting verification and adaptive trials. Details of the research undertaken during the years 1975-76 through 1977-78 are summarized in Appendixes C, D, and E.

This research on Rabi crops was undertaken by the Barani Project staff as follows:

1. Wheat Varietal Trials, Rabi 1975-76

Ten wheat varieties; i.e., Khushal, Tarnab-73, Mexi-Pak, Chenab, Noori, SA-42, Local, Potohar, Barani-70, and C-273 were tested at 11 different locations in the NWFP, out of which Mexi-Pak gave the highest yield with an average of 33.99 maunds per acre. Tarnab-73 was next with yields of 33.96. Chenab yielded 27.76 maunds per acre. Results are summarized in Table C-11.

2. Wheat Seed Rate Verification Trials, Rabi 1975-76

Four different seed rates -- 32 kg., 36 kg., 40 kg., and 44 kg. per acre -- were tried at 14 different locations in the NWFP. Results showed the rate of 40 kg. per acre gave the maximum average

yield of 27.75 maunds per acre, followed by 44 kg. per acre seed rate which exceeded the average yield of 27.58 per acre (see Table C-12).

3. Fertilizer Trials, Rabi 1975-76

The adaptive research plots were established to find the optimum rate of fertilizer for each area. There were seven treatments in each trial. In Bannu District, one plot was established with four treatments. Details for the different treatments are shown in Table 3.

TABLE 3. FERTILIZER ADAPTIVE RESEARCH TRIALS, RABI 1975-76

Treatment No.	<u>All Districts Other than Bannu</u>		<u>Bannu District Only</u>	
	<u>Type of Fertilizer</u>		<u>Type of Fertilizer</u>	
	Urea	DAP	Urea	DAP
	-----kg. per acre-----			
1.	0	0	28	28
2.	27.6	27.6	35	35
3.	52.2	52.2	42	42
4.	82.8	82.8	56	56
5.	38.4	0		
6.	76.4	0		
7.	114.8	0		

The results of the fertilizer adaptive research trials showed that treatment No. 4 gave the highest yield with an average of 34.81 maunds per acre, followed by treatment No. 3, which produced an average yield of 29.27. See Table C-13 for complete details.

C. Research Plots Established By
Research Institutes in 1976-77

For Kharif, 1976 and onward, the Barani Project research work was undertaken by several established research institutes, including the Maize and Millet Research Institute (MMRI), Pir Sabak, and the Agriculture Research Institute, Tarnab. A summary of their research for 1976 and 1977 is as follows:

1. Varietal Trials of Maize - Kharif, 1976

Nineteen trials of seven different varieties of maize, including Changez, Zia, Agaiti-72, Sowan, IPTT-25, and Shaheen were tried at different locations in NWFP. The results showed that the Sowan variety gave the highest yield with an average of 45.8 maunds per acre, followed by Agaiti-72 and Changez, which yielded an average of 44.6 maunds and 42.8 maunds per acre, respectively (see Table C-14).

2. Fertilizer Trials on Maize - Kharif, 1976

Nineteen trials on Changez variety of maize were conducted in different locations of the province. Results showed that a fertilizer rate of 150-50-0 gave the maximum yield of 45.4 maunds per acre, followed by 42.0 maunds per acre obtained from application of 100-50-0. Results are given in Table C-15.

3. Fertilizer Trials on Sorghum - Kharif, 1976

Fertilizer trials using different rates on JSS-263 variety of sorghum were conducted at various locations. An average yield of 22.5 maunds per acre was produced. Results showed that the fertilizer rate of 150-50-0 gave the best yields (see Table C-16 for details).

4. Fertilizer Trials on Millet - Kharif, 1976

Fertilizer trials with different rates on DB-2 variety millet were conducted in three different locations. The results from the application of 150-50-0 produced an average yield of 46.6 maunds per acre (see Table C-17).

5. Varietal Trials of Sorghum - Kharif, 1976

Six varieties of sorghum were tested at eight different locations. In these trials, the variety Sarokartuho gave the maximum average yield of 14.7 maunds per acre which was followed by 12.4 maunds per acre obtained from the variety D.G. Pearl. Details are shown in Table C-18.

6. Varietal Trials of Wheat - Rabi 1976-77 (Northern Region)

The trials included eight varieties and were established at two locations in Mansehra district and at one location each in Hazara, Mardan, Peshawar, Dir and Swat districts. The variety Tarnab-73 gave the highest yield of 31.54 maunds per acre, followed by Khushal-69 and SA-42, which yielded 28.44 maunds per acre and 22.86 maunds per acre, respectively (see Table C-19).

7. Varietal Trials of Wheat - Rabi, 1976-77 (Southern Region)

These trials included eight varieties and were established at five locations in D. I. Khan, two in Bannu, and one in Kohat districts. On the whole, Damani gave the highest yield of 14.1 maunds per acre, followed by Khushal which yielded 14 maunds per acre (see Table C-20).

8. Varietal Trials of Sarson - Rabi, 1976-77

These trials included PR-7, PL-18, and Desi varieties of Sarson and were conducted at one location in Mansehra, two locations in Swat, and two in Bannu District. The variety PR-7 yielded 6.42 maunds per acre followed by PL-18 which yielded 6.32 maunds per acre. Results are given in Table C-21.

9. Seed Rate Trials of Wheat - Rabi, 1976-77

These trials included four seeding rates of 60, 80, 100, and 120 pounds per acre; and four varieties: Damani, Tarnab-73, Barani-70, and Blue Silver. The seed rate of 120 pounds gave the highest yield of 32.9 maunds per acre, followed by 29.46 maunds per acre which was obtained from a 100 pound seed rate (see Table C-22).

10. Fertilizer Trials on Wheat - Rabi, 1976-77

These trials were established in D. I. Khan, Kohat, Malakand, and Swat districts. The results indicate there is a good response to the use of nitrogenous-phosphatic fertilizers and with applications of 100-75-0, a yield of 29.24 maunds per acre was recorded, followed by 26.69 maunds per acre obtained from the use of 75-50-0 (see Table C-23).

11. Fertilizer Trials on Gram - Rabi, 1976-77

A single trial at D. I. Khan was conducted. The result revealed that an application of 50-75-0 produced the maximum yield of 5.03 maunds per acre, but this was not a significantly different result from 50-50-0. Results are given in Table C-23.

D. Research Plots Established by Research Institutes
in 1977-78

1. Fertilizer Trials on Maize - Kharif, 1977

Sixteen trials were conducted to determine the optimum rate of fertilizer to obtain maximum yields from maize (Changez) under barani conditions. These research trials were undertaken in Swat, Dir, Mansehra, Abbottabad, and Kohat districts. The highest yield of 44.4 maunds per acre was obtained from the application of 120-30-0, followed by a yield of 38.5 maunds per acre from the application of 90-30-0 (see Table C-24).

2. Fertilizer Trials on Sorghum and Millet - Kharif, 1977

Seven trials each of sorghum (DS-75) and Millet (DB-2) were conducted. Maximum yields of 16.1 maunds of sorghum and 18.4 maunds of millet were obtained from the application of 120-30-0, as indicated in Table C-25.

3. Varietal Trials of Maize - Kharif, 1977

Eleven varieties of maize were tested in 16 different locations with a uniform application of fertilizer of 120-30-0. Sarhad variety gave the highest yield of 37.2 maunds per acre, followed by Sadaf which yielded 37.7 maunds per acre (see Table C-26).

4. Varietal Trials of Sorghum and Millet - Kharif, 1977

Six varieties of sorghum and eight varieties of millet were tested in 7 different locations. The sorghum variety D. G. Pearl gave the highest yield of 11.8 maunds per acre. Similarly, a millet variety, DA-2, gave the highest yield of 12.3 maunds per acre (see Table C-27).

5. Insecticide Trials on Maize and Sorghum - Kharif, 1977

Insecticide trials on maize and sorghum were conducted. Treatment No. 4 (Diazanone to whorl twice) gave the highest yield of 45.9 maunds of maize per acre and 12.7 maunds of sorghum per acre (see Table C-28).

6. Fertilizer and Management Trials on Maize - Kharif, 1977

Demonstration plots with maize in Kharif, 1977 were divided into two groups. The first group dealt with plots in four districts (see Table C-29) and compared farmer varieties and practices with improved varieties and practices. The variety Shaheen, grown with improved practices, gave the best results -- 49.1 maunds per acre.

The second group of plots were planted with the variety, Zia, in the district of Swat. Comparisons were made with the methods of plowing, sowing, and drainage systems (see Table C-29A). When land was prepared with a cultivator, the highest yield of 33.9 maunds per acre was obtained by planting in furrows with a tied drainage system.

When the land was chisel plowed, yields were similar for both the tied and freely drained systems.

7. Seed Rate Trials of Wheat - Rabi, 1977-78

On 32 plots of wheat seed rate trials conducted in D. I. Khan District, variety Barani-70 gave the best performances. The seed rate of 120 pounds per acre gave the highest yields for all varieties in the trials (see Tables C-30 to C-32).

8. Fertilizer Trials on Wheat - Rabi, 1977-78

Eleven fertilizer trials on wheat included Mexi-pak, Khushal, Damani, Chenab-70, and local varieties. The trials were conducted in Peshawar, Hazara, D. I. Khan, Bannu, Kohat, Swat, and Dir. In almost all districts, the application of 100-75-0 gave maximum yields followed by the application of 75-50-0 (see Table C-33).

9. Fertilizer Trials on Gram - Rabi, 1977-78

Three fertilizer trials on gram were conducted in D. I. Khan and Bannu districts. In Bannu District, treatments No. 3 and No. 5 produced the highest yields of 232 and 229 kg. of gram, respectively, as shown in Table C-34. In D. I. Khan, treatment No. 4 produced the highest yield of 767 kg. per acre.

10. Fertilizer Trials on Sarson - Rabi, 1977-78

Five fertilizer trials on Sarson were conducted in D. I. Khan, Malakand, and Swat districts. The application of 75-50-0 gave the maximum yield, followed by 50-25-0 (see Table C-35).

11. Fertilizer Trials on Fodder (Barley and Oats) - Rabi, 1977-78

Three fertilizer trials on fodder were conducted in D. I. Khan (barley and oats) and Bannu (barley) districts. The varieties of barley used were local. With an application of 60-60-0, maximum yields were obtained in both districts. For oats, 0-60-0 gave the highest yield of 258 kg. per acre. Details are shown in Table C-36.

12. Varietal Trials of Rape and Mustard No. 1 - Rabi, 1977-78

Six varieties: Poorbi-Raya (S-9), Taramira, Liho-3, PR-7, Dacca-Raya, and Desi, with uniform applications of fertilizer, were conducted in D. I. Khan. Dacca-Raya produced the highest yield per acre, followed by Poorbi-Raya (see Table C-37).

13. Varietal Trials of Rape and Mustard No. 2 - Rabi, 1977-78

The same varieties were included in this trial as in No. 1, and it was conducted in the village of Chohar Khel, Bannu District. The results showed that Dacca-Raya and Poorbi-Raya had significantly higher yields than the other varieties (see Table C-38).

14. Varietal Trials of Rape and Mustard No. 3 - Rabi, 1977-78

Six varieties were included in this trial at Ahmad Wala Research Station, Karak (Kohat). The results, given in Table C-39, showed that RL-18 and Poorbi-Raya had higher yields than the other varieties.

15. Varietal Trials of Rape and Mustard No. 4, 5, 6, and 7 - Rabi, 1977-78

Other trials at Ahmad Wala (Karak) were conducted. The yields of different varieties remained almost the same as in Trial No. 3 at Ahmad Wala Farm (see Tables C-40 and C-41).

Rape and mustard varietal trials were conducted in Mansehra. PR-7, RL-18, and Desi varieties were used in the trial. Although the yield differences were insignificant, the Desi variety had a higher yield than PR-7. The trials need to be repeated for at least a two-year period to confirm the results (see Table C-41).

Rape and mustard trials were also conducted in Serai Naurang. The same varieties were included in these trials. PR-7 produced about one and one-half times the yield of the Desi variety in these trials. These trials need to be repeated for at least two years to confirm the results (see Table C-41).

16. Varietal Trials of Wheat - Rabi, 1977-78

The cereal botanist at the Agriculture Research Institute, Tarnab, conducted varietal trials on behalf of the Barani Project. From the average of four locations, the variety Blue Silver gave the highest yield (see Table C-42 and also Appendix D).

E. Testing of Chisel Plows, 1977-78

To determine the impact of deep plowing on crop yields, chisel plowing trials were conducted on farmers' fields. These trials produced encouraging results. Thirty-seven trials were conducted during Kharif, 1977, and 78 trials were conducted during Rabi, 1977-78. Increased yields of 2.58 maunds of maize, 1 maund of sorghum, 2.75 maunds of wheat, and 6.64 maunds of barley per acre were obtained as a result of chisel plowing (see Tables C-43 and C-44).

F. Soil Testing Program

Usually the barani lands are deficient in some plant nutrients and consequently, the average yields per acre tend to be low. To identify the deficient nutrients, soil samples were collected from those fields on which demonstration plots were established. These soil samples were sent to the soils laboratory of the Agriculture Research Institute, Tarnab, for soil analysis and to determine recommended rates of fertilizer for specific crops. One thousand six hundred and ten soil samples were collected and sent to the laboratory. The recommendations received from the Agriculture Research Institute were communicated to the respective farmers.

G. Rain Gauges and Thermometers

The availability of correct data on rainfall and temperatures in the barani areas is important to sound planning with regard to the cropping pattern and use of inputs and cultural practices in

different rainfall zones. Because of this, 80 rain gauges were installed at selected locations throughout the province and data is now being regularly recorded in millimeters. Similarly, thermometers have also been supplied for recording daily minimum and maximum temperatures (in Centigrade). The data received is sent to the project headquarters each month and then disseminated to other agricultural groups and agencies.

H. Introduction of Special Implements

There is a need for implements to fit special needs of the barani areas. One of these, a groundnut digger, was designed for manufacture by the Barani agriculture staff, with outside assistance.

I. Field Days and Farmer Training Meetings

During each season, a number of field days was organized at the time of harvesting of demonstration plots. Intensive training was conducted at these times and also at farmer training and information meetings. On these occasions, farmers were shown significant differences that were obtained in stands, tillering, plant vigor, and yields. These efforts contributed to the farmers' adoption of the production practices demonstrated.

J. Other Accomplishments of the Barani Project

1. Procurement of Visual Materials and Other Items from the United States

The following visual materials and other items were procured from the United States to be used in project activities.

- a. Three 16 mm. films on agriculturally related subjects.
 - b. Several bulletins and wall charts on dryland farming from United States universities.
 - c. A project logo for identifying equipment items and for use in publicity.
 - d. Letterhead stationery with project identification.
 - e. A 16 mm. film, 20 minutes long, with soundtrack in both Urdu and English showing how to plan and establish wheat demonstration plots.
 - f. Two thousand slide-rule type fertilizer calculators for field staff and farmer use.
 - g. Nineteen sets of 2x2.inch slides to be used in conjunction with the printed fact sheets listed under No. 2.h. below.
2. Preparation of Printed Materials to Support the Project

These items were prepared and distributed to appropriate audiences.

- a. Detailed printed instructions for laying out and establishing demonstration plots each cropping season for every year.
- b. Summaries of yield data from all crops that had been raised in the various plots made each year and distributed to field staff.
- c. A bulletin on groundnut production with 500 copies in English and 3,000 copies in Urdu. These were distributed to field staff and farmers.

- d. Information on recording meteorological data sent to all agricultural officers who had received rain gauges from the Barani Project.
- e. Detailed instructions on the operation of experimental threshers prepared and made available to those interested.
- f. Five hundred copies each of four information bulletins on fertilizer technology prepared and distributed among field staff.
- g. Training manuals on procedures for the project prepared and distributed among field staff.
- h. "Farmer Fact Sheets" in color prepared and printed in Urdu on the following subjects for distribution to farmers and extension workers in the NWFP:

<u>Subject of Fact Sheets</u>	<u>No. of Titles on Each Subject</u>	<u>Total Printed for Each Subject</u>
1. Wheat Production	10	100,000
2. Groundnut Production	5	50,000
3. Maize Production	4	40,000
4. Rodent and Bird Control	<u>4</u>	<u>40,000</u>
TOTAL	23	230,000

Crop production posters were also prepared and 500 copies of each printed in Urdu for posting in major bazaars in the province. Posters measured 30 x 20 inches and were printed in colors. Subjects of the posters were the same as for the farmer fact sheets.

A series of 5 to 8 minute radio scripts was also prepared to accompany the fact sheets on the above four subjects. Copies of these were made available to the radio station program director.

Examples of these materials are given in the summary report of Gerald R. McKay, Communications Consultant (Report No. 4).

APPENDIX A

BENCHMARK DATA FOR BARANI FARMERS
IN NWFP

TABLE A-1. GENERAL INFORMATION ON BARANI FARMERS AND FARMS

Farmer Responses	Abbottabad	Bannu	Dir	Kohat	Mansehra	Ilardan	Peshawar	Swat	NWFP
% of Farmers who cannot read/write Urdu	69.40	63.00	45.30 ^{a/}	71.00	72.50	73.70	64.3 ^{b/}	59.30	63.70
% of Married Farmers	97.30	91.80	97.70 ^{a/}	99.00	100.00	83.80	100.00	89.00	95.70
No. of Persons Per Household	6.14	11.31	9.93 ^{a/}	12.97	8.17	7.74	13.96	7.42	9.93
% of Farmers with Off-farm Work	24.30	21.90	50.00 ^{a/}	23.70	25.00	^{c/}	20.70	41.80	29.60
% of Farmers who Listen to Daily Farm Program	22.50	5.50	39.80 ^{a/}	31.20	7.50	26.30	17.20	31.90	26.50
Average No. of Fragments of Land Per Farm	3.45	6.41	4.45	3.90	4.20	4.00	2.16 ^{b/}	6.32	4.40
Kanals Sown Per Farm (Rabi)	35.23	163.40	34.30	57.66	10.44	32.79	67.45	33.51	56.01
Kanals Sown Per Farm (Kharif)	22.24	20.54	15.13	22.46	23.39	27.11	20.50	27.88	22.73
Kanals Per Farm Irrigated	12.08	-	12.10	16.37	11.03	27.00	16.25	17.86	14.88
Total Respondents	111	73	99	193	40	38	29	91	674

Note: - indicates no response.

^{a/} figures calculated on the basis of 128 respondents.

^{b/} figures calculated on the basis of 28 respondents.

^{c/} less than 5 percent.

TABLE A-2. PERCENTAGE OF FARMERS IN VARIOUS AGE GROUPS

Age Group	Abbottabad	Bannu	Dir	Kohat	Manshehra	Mardan	Peshawar	Swat	NWFP
20 & Under	-	2.8 ^{a/}	2.4 ^{a/}	1.0 ^{a/}	-	2.6 ^{a/}	-	4.4 ^{a/}	1.8 ^{a/}
21 to 30	7.2	19.4	20.4	7.4	5.0	21.0	6.9	23.3	13.6
31 to 40	21.6	22.2	32.0	16.8	42.5	28.9	17.2	38.9	25.9
41 to 50	29.8	27.8	31.2	21.6	27.5	15.8	27.6	16.7	24.9
51 to 60	23.4	20.8	8.6	27.9	15.0	18.5	13.3	8.9	18.6
61 to 70	10.8	5.6	3.1 ^{a/}	16.4	10.0	7.9	27.6	7.8	10.5
Over 70	7.2	1.4 ^{a/}	2.3	8.9	-	5.3	6.9	-	4.7 ^{a/}
Total Respondents	111	72	128	190	40	38	29	90	698

Note: - Indicates no response

^{a/} Less than 5 percent

TABLE A-3. PERCENTAGE OF FARMERS AT VARIOUS LEVELS OF EDUCATION

Years of Education	Abbottabad	Bannu	Dir	Kohat	Mansehra	Mardan	Peshawar	Swat	NWFP
None	70.3	64.4	50.8	76.7	72.5	73.7	71.4	68.1	68.0
1-3	1.8 _a /	1.4 _a /	3.9 _a /	2.0 _a /	-	-	-	3.3 _a /	2.2 _a /
4-6	11.7	11.0	20.3	10.4	17.5	18.4	3.6 _a /	12.1	13.2
7-10	15.3	20.5	17.2	10.9	7.5	7.9	25.0	13.2	14.2
Over 10	0.9 _a /	2.7 _a /	7.8	0	2.5	-	-	3.3 _a /	2.4 _a /
Total Respondents	111	73	128	193	40	38	28	91	702

Note: - no response

_a/ Less than 5 percent

TABLE A-4. PERCENTAGE OF FARMERS CLASSIFIED BY AMOUNT OF LAND OPERATED

Area of Land	Abbottabad	Bannu	Dir ^{a/}	Kohat	Mansehra	Mardan	Peshawar	Swat	NWFP
0-1	0.9 ^{b/}	-	15.1	1.0 ^{b/}	5.0	7.9	-	9.9	4.7 ^{b/}
1-2.5	7.3	1.4 ^{b/}	19.2	8.3	35.0	34.2	-	9.9	11.8
2.5-5	37.8	6.8	26.3	24.4	42.5	34.2	3.4 ^{b/}	26.4	26.0
5-7.5	28.8	12.3	19.2	23.8	2.5 ^{b/}	15.8	27.6	34.1	22.5
7.5-10	6.3	15.1	5.0	8.8	7.5	-	17.3	3.3 ^{b/}	7.8
10-12.5	9.0	13.7	8.1	10.4	2.5 ^{b/}	2.6 ^{b/}	10.3	7.7	8.9
12.5 and above	9.9	50.7	7.1	23.3	5.0	5.3	41.4	8.8	18.3
Total Respondents	111	73	99	193	40	38	29	91	674

Note: - No response.

^{a/} 29 respondents are non-operator so they are excluded.

^{b/} Less than 5 percent.

TABLE A-5. NUMBER OF DRAFT ANIMALS PER FARM AND PERCENTAGE OWNED BY OPERATOR

Draft Animals	Abbottabad		Bannu		Dir		Kohat		Mansehra		Mardan		Peshawar		Swat		NWFP	
	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Bullocks	82	1.8	18	2.2	87	2.1	59	2.4	58	1.9	82	1.8	18	1.8	90	2.0	65	2.1
Cows	44	1.6	15	1.4	10	2.9	40	2.6	12	1.4	13	1.8	14	1.0	2 _a /1.5	24	2.1	
Male Buffaloes	22	1.4	-	-	6	1.0	6	1.8	-	-	3 _a /2.0	-	-	7	1.5	7	1.5	
Donkeys	59	1.0	26	1.2	42	1.6	62	1.3	-	-	5	1.0	71	1.6	19	1.5	43	1.3
Camels	1 _a /	2.0	70	1.1	-	-	17	1.5	-	-	3 _a /1.0	-	-	3 _a /1.0	13	1.2		
Others	22	2.2	1 _a /1.0	-	-	-	-	-	-	-	-	-	-	1 _a /1.0	4 _a /2.2			
Total Respondents	111	73	99	192	40	38	28	91	672									

Note: - No response.

a/ less than 5 percent.

TABLE A-6, NUMBER OF NON-DRAFT ANIMALS PER FARM AND PERCENTAGE OWNED BY OPERATOR

Non-Draft Animals	Abbottabad		Bannu		Dir		Kohat		Mansehra		Mardan		Peshawar		Swat		NFWP	
	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Milk Cows	41	1.6	88	1.6	90	1.9	61	1.5	32	1.2	32	1.3	64	2.8	66	1.6	62	1.7
Milk Buffaloes	71	1.4	-	-	21	1.3	17	1.4	52	1.1	79	1.6	7	1.0	36	1.6	32	1.4
Young Animals	26	2.7	68	1.4	48	2.9	23	1.8	42	1.2	95	1.7	11	2.3	34	1.4	38	1.9
Sheep/Goats	57	5.7	96	6.5	73	5.5	78	10.8	8	2.7	42	5.4	68	5.3	31	6.4	63	7.6
Poultry (Birds)	85	8.0	96	10.2	95	17.4	80	10.6	75	11.1	53	14.2	96	9.8	75	8.8	83	11.1
Total Respondents	111		73		99		192		40		38		28		91		672	

Note: - no response.

TABLE A-7. PERCENTAGE OF FARMERS USING VARIOUS KINDS OF MACHINERY AND EQUIPMENT

Type of Equipment and Machinery	Abbottabad	Bannu	Dir	Kohat	Mansehra	Mardan	Peshawar	Swat	NWFP
Bullock carts	6	-	-	7	-	-	7	1a/	3a/
Fodder Cutters	78	-	-	3a/	2a/	3a/	4a/	1a/	14
Persian Wheels	9	-	-	21	-	5	29	15	11
Bicycles	21	5	6	24	2a/	-	4a/	14	14
Radios	59	32	54	65	58	50	50	48	54
Total Respondents	111	73	99	193	40	38	28	91	673

Note: - no response.

a/ less than 5 percent.

TABLE A-6. CROPS GROWN AND AMOUNT OF LAND USED BY BARANI FARMERS

Crops	Abbottabad	Bannu	Dir	Kohat	Mansehra	Mardan	Peshawar	Swat	NWFP
	-----Percentage of Farmers Reporting-----								
Wheat/ Mustard	a/	31.5	11.1	17.1	-	-	7.1	8.8	11.6
Wheat/Gram	a/	a/	-	-	-	-	7.1	-	a/
Wheat	100.0	69.9	88.9	82.9	77.5	100.0	100.0	97.8	88.6
Gram	a/	98.6	-	35.8	-	-	-	-	21.7
Oilseeds (Rabi)	17.1	a/	35.3	15.5	10.0	7.9	a/	19.8	16.5
Maize/ Pulses	a/	-	7.1	-	5.0	-	-	-	a/
Maize	82.0	a/	68.7	44.6	90.0	92.1	42.9	100.0	62.6
Sorghum	32.4	9.6	-	22.8	-	5.3	17.9	-	14.0
Millet	9.0	a/	-	34.7	-	-	-	a/	12.0
Groundnut & Other Oilseeds (Kharif)	-	-	8.1	7.8	-	-	a/	a/	a/
	-----Average Size of Where Crop is Grown (Kanals)-----								
Wheat/ Mustard	5.0	73.2	4.8	37.74	-	-	7.2	16.0	40.33
Wheat/Gram	17.5	5.0	-	-	-	-	15.2	-	14.1
Wheat	32.46	89.2	25.6	47.57	8.81	26.32	62.4	27.9	39.71
Gram	5.0	78.72	-	23.14	-	-	-	-	49.9
Oilseeds (Rabi)	4.89	2.0	8.8	7.77	5.5	22.0	30.4	8.56	8.58
Maize/ Pulses	20.0	-	4.0	-	36.5	-	-	-	12.1
Maize	19.45	12.48	12.8	17.49	23.5	27.36	15.2	-	20.69
Sorghum	6.23	15.84	-	8.76	-	9.0	9.6	28.01	8.37
Millet	4.3	5.36	-	15.87	-	-	-	4.0	13.9
Groundnut & Other Oilseeds (Kharif)	-	-	2.4	14.07	-	-	1.0	12.0	9.89
Total Respondents	111	73	99	193	40	38	28	91	673

Note:

- no response
a/ less than 5 percent

TABLE A-9. PERCENTAGE OF FARMERS USING SELECTED IMPROVED PRACTICES

Farmer Responses	Abbott- abad	Bannu	Dir	Kohat	Man- sehra	Mardan	Pesh- awar	Swat	NWFP
% of Farmers Using Improved Seed	64.0	2.7	100.0	33.2	20.0	-	-	46.2	48.0
% of Farmers Using Chemical Fertilizer	63.1	a/	-	13.0	40.0	76.3	-	65.9	44.4
% of Farmers Using Farmyard Manure									
Wheat	66.7	a/	83.8	64.8	45.0	13.2	96.1	76.9	59.9
Maize	46.8	-	58.6	36.3	75.0	5.3	39.3	76.9	43.5
% of Farmers Weeding	89.2	100.0	99.0	83.9	97.5	92.1	100.0	73.6	89.3
% of Farmers Threshing by Animals	81.9	100.0	98.0	80.3	77.5	84.2	100.0	75.8	85.6
Total Respondents	111	73	99	193	40	38	28	91	673

Note: - no response
a/ less than 5 percent

TABLE A-10. PERCENTAGE OF FARMERS WHO SOLD PRODUCTS, AND VOLUME OF SALES

Crops/Livestock Products Sold	Abbott-abad	Bannu	Dir	Kohat	Man-sehra	Mardan	Pesha-war	Swat	NWFP
	-----Percent-----								
Wheat	34.2	43.8	12.1	19.7	-	34.2	-	16.5	22.0
Gram	-	93.2	-	a/	-	-	-	-	10.2
Maize	31.5	-	10.1	13.0	a/	36.8	-	17.6	15.0
Coarse Grain	a/	a/	-	a/	-	-	-	-	a/
Groundnut and Other Oilseeds	a/	-	18.2	a/	-	a/	-	-	a/
Milk (Seers)	23.4	-	a/	11.40	5.0	18.4	-	a/	8.77
Eggs (Doz.)	22.5	17.8	18.2	18.1	22.5	29.0	-	-	16.5
Poultry (No.)	19.8	68.5	34.3	13.5	20.0	5.3	-	12.1	22.7
Animals (No.)	24.3	32.9	10.1	16.6	5.0	47.4	a/	7.7	18.0
	-----Volume of Sale per Farmer-----								
Wheat (mds.)	29.13	29.16	13.7	26.11	-	19.46	-	10.67	24.39
Gram (mds.)	-	54.79	-	30.0	-	-	-	-	54.43
Maize (mds.)	17.09	-	15.6	13.0	16.0	21.79	-	23.12	17.51
Coarse Grain (mds.)	6.0	2.0	-	2.0	-	-	-	-	4.0
Groundnut and Other Oilseeds (mds.)	2.0	-	5.3	2.33	-	2.00	-	-	4.42
Milk (Seers)	6.04	-	2.0	9.09	0.75	1.14	-	2.5	6.29
Eggs (Doz.)	1.46	0.96	1.8	4.4	4.11	1.54	-	-	2.60
Poultry (No.)	12.64	9.18	8.7	15.58	16.75	25.00	-	7.82	11.17
Animals (No.)	2.04	1.37	1.0	2.69	1.5	1.72	1	3.71	2.02
Total Respondents	111	73	99	193	40	38	28	91	673

Note: - no response
a/ less than 5 percent
Other crops include: cotton, pulses, sugarcane, rice, gowara

TABLE A-11. PERCENTAGE OF FARMERS WHO HAD LOANS, & AMOUNT OF LOAN

Loan for Seed, Fertilizer Etc. From:	Abbott- abad	Bannu	Dir	Kohat	Man- sehra	Mar- dan	Pesh- awar	Swat	MWFP
-----Percentage of Farmers-----									
Friends/Relatives	41.4	41.4	17.2	9.3	-	-	-	a/	16.8
Shopkeepers	10.8	16.4	18.2	a/	a/	7.9	-	18.7	9.5
Others	a/	-	a/	-	-	-	-	-	a/
Loan for Animals and Machinery from:									
Friends/Relatives	6.3	39.7	6.1	12.4	a/	13.2	82.1	5.5	14.96
Shopkeepers	a/	6.8	8.1	a/	-	5.3	-	a/	a/
Others b/	-	a/	a/	5.4	-	-	-	a/	a/
-----Average Amount of Loan (Rs.)-----									
Friends/Relatives	4806.52	2211.33	981.76	1903.89	-	-	-	150.00	2997.35
Shopkeepers	750.00	1116.67	1035.00	400.00	1400	366.67	-	392.34	790.62
Others	1000.00	-	1500.00	817.86	-	-	-	-	913.89
Loan for Animals and Machinery from:									
Friends/Relatives	1285.71	4502.07	633.33	2356.67	4000	500.00	3934.78	2060.00	3072.20
Shopkeepers	1400.00	4860.00	1600.00	2500.00	-	2000.00	-	1300.00	2450.00
Others b/	-	500.00	1500.00	1240.00	-	-	-	500.00	1146.15

- No response

a/ Less than 5 percent

b/ Agricultural Bank and Commercial Bank included in "Others"

APPENDIX B
FARMER PROFILE DATA
FOR NWFP

TABLE B-1 AVERAGE ACREAGE OPERATED (OWNED AND RENTED) BY FARMERS
IN NWFP DURING KHARIF 1975 AND RABI 1975-76 SEASONS

District/Agency	Acres Owned			Acres Rented			Weighted Grand Total
	Barani	Irrigated	Total	Barani	Irrigated	Total	
Kurram							
Kharif	1.5(15) ^{a/}	4.0(15)	5.5	0.4(1)	2.2(1)	2.6	8.1
Rabi	1.6(15)	3.3(15)	4.9	0.9(1)	1.9(1)	2.8	7.7
Hazara							
Kharif	4.5(108)	1.6(51)	7.14	3.5(34)	3.3(17)	6.87	14.01
Rabi	4.0(111)	3.6(37)	7.8	2.6(30)	3.7(13)	5.4	13.2
Peshawar							
Kharif	--	1.1(53)	1.1	--	2.2(14)	2.2	3.3
Rabi	4.8(53)	2.8(53)	7.6	4.8(14)	4.1(14)	8.9	16.5
Khyber							
W-Kharif	3.2(7)	1.5(4)	5.16	--	--	--	5.16
W-Rabi	8.5(10)	4.1(4)	14.49	--	--	--	14.49
O-Kharif	4.0(4)	2.4(5)	6.22	--	--	--	6.22
O-Rabi	7.4(10)	6.0(5)	13.87	--	--	--	13.87
Total-Kharif	3.5(11)	2.0(9)	5.65	--	--	--	5.65
Total-Rabi	7.9(20)	4.0(9)	13.38	--	--	--	13.38
Swat							
W-Kharif	3.3(72)	3.3(72)	6.6	2.9(34)	3.1(33)	6.0	12.6
W-Rabi	4.1(102)	3.6(99)	7.71	3.1(38)	3.3(32)	6.38	14.09
O-Kharif	3.8(6)	3.1(7)	6.85	4.0(6)	4.0(6)	8.0	14.85
O-Rabi	4.2(8)	3.1(7)	7.37	3.8(7)	3.4(5)	7.27	14.64
Total-Kharif	3.6(105) ^a	3.3(79)	6.94	2.9(34)	3.1(33)	6.0	12.94
Total-Rabi	4.1(110)	3.3(79)	7.53	3.1(38)	3.3(32)	6.38	13.91

. . . continued

TABLE B-1 AVERAGE ACREAGE OPERATED (CONTINUED)

District/Agency	Acres Owned			Acres Rented			Weighted Grand Total
	Barani	Irrigated	Total	Barani	Irrigated	Total	
N. Waziristan							
Kharif	2.0(1)	1.1(2)	2.8	--	--	--	2.8
Rabi	2.1(10)	1.1(2)	3.87	3.7(3)	--	3.7	7.57
Bannu							
Kharif	1.8(88)	2.5(57)	4.15	1.5(16)	3.4(8)	4.27	8.42
Rabi	8.6(294)	5.7(64)	16.16	7.1(68)	5.2(10)	13.71	29.87
D. I. Khan							
Kharif	8.9(162)	5.2(36)	16.45	6.5(62)	6.2(9)	12.92	29.37
Rabi	16.1(215)	10.0(50)	29.90	10.8(82)	8.0(13)	20.83	50.73
Kohat							
W-Kharif	2.5(195)	1.9(80)	4.65	3.0(6)	1.6(4)	4.88	9.53
W-Rabi	5.3(230)	2.2(85)	8.93	3.9(20)	1.7(6)	6.78	15.71
G-Kharif	6.2(23)	9.3(4)	13.32	6.8(6)	5.0(2)	12.7	26.02
G-Rabi	12.3(36)	16.7(8)	26.2	7.4(14)	7.2(4)	14.71	40.73
O-Kharif	5.8(11)	1.5(2)	10.28	5.0(8)	--	5.0	15.28
O-Rabi	14.6(17)	13.8(2)	29.03	5.8(8)	---	5.8	34.83
Total-Kharif	2.3(235)	2.0(92)	4.43	3.0(6)	1.6(4)	4.88	9.31
Total-Rabi	6.1(277)	2.4(97)	10.28	4.0(23)	1.7(6)	7.05	17.33
Chitral							
Kharif	--	3.8(19)	3.8	--	1.6(7)	1.6	5.4
Rabi	2.5(20)	3.8(19)	6.27	--	1.6(7)	1.6	7.87
Mohmand							
Kharif	1.5(15)	4.0(15)	5.5	0.4(1)	2.2(1)	2.6	8.1
Rabi	1.6(15)	3.3(15)	4.9	0.9(1)	1.9(1)	2.8	7.7

a/ Number in parenthesis is number of farmers reporting.

W = Wheat plots

G = Gram plots

O = Oilseed plots

TABLE B-2 ACRES OF MAJOR CROPS PER FARM - 1975-76

District/Agency	Wheat	Maize	Jowar	Ground- Nuts	Gram	Sarson	Other	Weighted Total
Kurram								
Barani	7.6(11) ^{a/}	1.2(2)	--	--	--	--	--	7.8
Irrigated	4.1(4)	2.0(1)	--	--	--	--	3.2	--
Hazara								
Barani	3.6(106)	4.0(100)	--	--	--	1.6(22)	1.2	7.7
Irrigated	2.6(28)	2.2(17)	--	--	--	1.4(5)	2.0	--
Peshawar								
Barani	3.7(63)	--	--	0.4(4)	1.3(25)	--	2.4	4.2
Irrigated	2.4(62)	3.0(63)	0.5(16)	0.4(3)	1.2(4)	0.6(1)	0.7	--
Khyber								
Barani	7.6(11)	1.2(2)	--	--	--	--	--	7.8
Irrigated	4.1(4)	2.0(1)	--	--	--	--	3.2	--
Swat								
Barani	4.0(110)	3.5(95)	--	--	--	1.6(14)	1.6	7.2
Irrigated	3.5(76)	3.1(75)	--	--	--	1.0(3)	2.1	--
N. Waziristan								
Barani	2.0(10)	2.0(1)	--	--	--	--	--	2.2
Irrigated	1.1(2)	1.1(2)	--	--	--	--	--	--
Bannu								
Barani	5.6(304)	--	--	--	4.2(282)	1.2(62)	1.3	9.7
Irrigated	5.0(65)	1.7(48)	--	--	2.4(8)	1.0(3)	2.2	--
D. I. Khan								
Barani	10.7(205)	4.5(125)	--	--	--	6.0(85)	9.1	15.9
Irrigated	9.3(53)	--	--	--	2.8(23)	1.7(19)	2.5	--

. . . Continued

TABLE B-2 (CONTINUED) ACRES OF MAJOR CROPS PER FARM - 1975-76

District/Agency	Wheat	Maize	Jowar	Ground- Nuts	Gram	Sarson	Other	Weighted Total
Kohat								
Barani	4.4(299) ^{a/}	--	--	--	2.5(178)	0.9(140)	2.1	6.3
Irrigated	2.0(105)	1.8(54)	--	--	--	0.5(10)	1.1	--
Chitral								
Barani	2.5(20)	--	--	--	--	--	--	2.5
Irrigated	3.4(19)	2.4(19)	--	--	--	--	2.1	--
Mohmand								
Barani	1.8(15)	0.9(4)	--	0.6(3)	--	--	0.7	2.2
Irrigated	3.1(15)	1.8(15)	--	1.1(10)	--	--	3.2	--

^{a/} Number of Farmers in parenthesis ().

TABLE B-3 FERTILIZER USED BY THE FARMER PER YEAR, 1975-76

District/Agency	Average Bags Per Farm		Weighted Average
	Irrigated	Barani	
Kurram	4.5(15) ^{a/}	2.1(14)	6.68
Hazara	3.9(33)	5.1(106)	9.63
Peshawar	7.7(60)	5.2(25)	13.93
Khyber	6.6(9)	7.5(11)	14.19
Swat	5.1(69)	5.6(97)	10.78
N. Waziristan	2.0(1)	--	2.00
Bannu	3.3(34)	1.8(5)	6.22
D. I. Khan	5.0(1)	2.2(4)	5.52
Kohat	3.4(55)	3.3(38)	6.72
Chitral	11.9(19)	5.0(2)	22.49
Mohmand	2.2(4)	1.5(2)	3.93

^{a/} Number in parenthesis () is farmers reporting.

TABLE B-4 FREQUENCY OF NWFP FARMER VISITS TO NEAREST CITY - KHARIF AND RABI 1975-76

District/Agency	Very Frequent		Frequent		Occasional		Never		Total
	# Reporting	%	# Reporting	%	# Reporting	%	# Reporting	%	
Kurram	9	64	5	36	--	--	--	--	14
Hazara	60	48	58	46	7	5	1	1	126
Peshawar	19	31	35	56	8	13	--	--	62
Khyber	11	58	6	32	2	10	--	--	19
Swat	35	32	64	58	11	9	1	1	111
N. Waziristan	2	22	6	67	1	11	--	--	9
Bannu	78	32	78	32	50	21	35	15	241
D. I. Khan	75	44	86	51	1	1	7	4	169
Kohat	124	35	180	50	50	14	3	1	357
Chitral	3	15	17	85	--	--	--	--	20
Mohmand	11	55	8	40	1	5	--	--	20

TABLE B-5 NUMBER OF NWFP FARMERS REPORTING SOURCE OF INFORMATION ABOUT BARANI PROJECT, 1975-76

District/Agency	Radio		Agricultural Staff		Friends		Relatives		Total ^{a/}
	# Reporting	%	# Reporting	%	# Reporting	%	# Reporting	%	
Kurram	11	33	14	43	7	21	1	3	33
Hazara	13	91	122	89	2	2	--	--	137
Peshawar	38	31	62	51	17	14	5	4	122
Khyber	--	--	18	100	--	--	--	--	18
Swat	7	5	101	71	24	17	10	7	142
N. Waziristan	--	--	10	100	--	--	--	--	10
Bannu	18	7	232	91	4	2	--	--	254
D. I. Khan	35	15	169	71	30	13	4	1	238
Kohat	70	15	337	73	45	10	7	2	459
Chitral	--	--	20	100	--	--	--	--	20
Mohmand	--	--	20	100	--	--	--	--	20

^{a/} Some farmers give more than one source.

TABLE B-6 INFORMATION ABOUT THE NWFP FARMER, 1975-76

District/Agency	Average Age of Farmer	% Farmers Married	Average No. of Children/Family
Kurram	39(12) ^{a/}	92	6.6(10) ^{a/}
Hazara	40(124)	88	3.1(100)
Peshawar	48(60)	92	5.5(54)
Khyber	42(18)	100	6.5(15)
Swat	39(104)	88	4.4(92)
N. Waziristan	40(10)	100	2.8(10)
Bannu	42(236)	92	4.0(210)
D. I. Khan	49(166)	91	3.7(147)
Kohat	45(282)	97	5.7(258)
Chitral	39(20)	90	5.3(17)
Mohmand	44(20)	95	4.8(17)

^{a/} Number in parenthesis () is number of farmers reporting.

TABLE B-7 OFF-FARM LABOR, 1975-76

District/Agency	Farmers Holding Other Jobs (In Addition to Farming) %	Average Years of Farmer Working in Other Job
Kurram	53	10.9(8) ^{a/}
Hazara	30	12.0(31)
Peshawar	18	12.2(11)
Khyber	63	16.0(10)
Swat	18	8.4(16)
N. Waziristan	30	4.5(2)
Bannu	9	8.7(30)
D. I. Khan	17	9.6(23)
Kohat	27	17.1(80)
Chitral	11	5.5(2)
Mohmand	5	4.0(1)

^{a/} Number in parenthesis () is number of farmers reporting.

TABLE B-8 AVERAGE NUMBER OF WORKERS ON FARMS, 1975-76

District/Agency	Workers in Family			Workers Outside Family			Grand Total
	Male	Female	Total ^{a/}	Male	Female	Total ^{a/}	
Kurram	3.4(15) ^{b/}	2.5(15)	5.9	1.7(6)	1.0(1)	2.7	8.6
Hazara	2.5(101)	2.1(60)	4.6	3.5(66)	2.1(14)	5.6	10.2
Peshawar	3.3(54)	3.0(7)	6.3	2.3(26)	--	2.3	8.6
Khyber	3.1(20)	2.1(15)	5.2	2.6(11)	2.3(3)	4.9	10.1
Swat	3.1(101)	3.5(60)	6.6	2.6(61)	2.9(16)	5.5	12.1
N. Waziristan	3.6(9)	1.5(8)	5.1	--	--	--	5.1
Bannu	2.3(227)	1.9(140)	4.2	1.2(92)	1.5(4)	2.7	6.9
D. I. Khan	2.1(147)	1.8(44)	3.9	2.8(60)	2.5(20)	5.3	9.2
Kohat	2.5(286)	2.4(245)	4.9	2.2(269)	2.0(23)	4.2	9.1
Chitral	2.1(19)	2.1(20)	4.2	2.0(4)	2.3(3)	4.3	8.5
Mohmand	3.2(20)	2.4(20)	5.6	1.5(2)	--	1.5	7.1

^{a/} Unweighted figures.

^{b/} Number in parenthesis () is the number of farmers reporting.

TABLE B-9 AVERAGE ACREAGE OPERATED (OWNED AND RENTED) BY FARMERS IN NWFP DURING KHARIF 1976 AND RABI 1976-77 SEASONS

District/Agency	Acres Owned			Acres Rented			Weighted Grand Total
	Barani	Irrigated	Total	Barani	Irrigated	Total	
Abbottabad							
Kharif	2.93(22) ^{a/}	2.22(5)	5.60	4.37(2)	2.62(2)	6.99	12.59
Rabi	3.61(23)	2.41(4)	6.86	2.62(2)	1.37(2)	3.99	10.85
North Waziristan							
Kharif	1.17(3)	1.95(5)	3.31	--	--	--	3.31
Rabi	1.21(9)	1.65(6)	2.77	--	--	--	2.77
South Waziristan							
Kharif	0.39(8)	.69(8)	1.08	--	--	--	1.08
Rabi	0.56(8)	1.16(8)	1.72	--	--	--	1.72
Khyber							
Kharif	4.37(8)	2.37(5)	7.20	--	--	--	7.20
Rabi	4.22(8)	3.37(5)	7.79	--	--	--	7.79
Kohat							
Kharif	2.84(22)	1.65(11)	4.89	1.25(1)	--	1.25	6.14
Rabi	5.07(22)	1.47(12)	7.60	1.25(1)	--	1.25	8.25
Mohmand							
Kharif	1.19(20)	1.05(7)	2.31	--	--	--	2.31
Rabi	5.58(28)	1.16(7)	9.39	--	--	--	9.39
Bannu							
Kharif	2.18(23)	3.61(10)	5.23	1.87	1.56(2)	3.43	8.66
Rabi	8.57(28)	6.90(9)	16.33	4.58(3)	3.75(2)	8.50	24.83
Peshawar							
Kharif	1.71(15)	4.34(32)	7.00	1.25(2)	2.72(12)	5.02	12.02
Rabi	5.39(39)	4.33(33)	9.81	9.38(11)	3.08(12)	12.19	22.00

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TABLE B-9 (CONTINUED) AVERAGE ACREAGE OPERATED (OWNED AND RENTED) BY FARMERS IN NWFP DURING KHARIF 1976 AND RABI 1976-77 SEASONS

District/Agency	Acres Owned			Acres Rented			Weighted Grand Total
	Barani	Irrigated	Total	Barani	Irrigated	Total	
D. I. Khan							
Kharif	7.21(51)	4.54(9)	13.62	4.67(19)	2.00(1)	9.07	22.69
Rabi	12.33(58)	6.45(12)	22.64	8.52(23)	21.25(1)	18.10	40.74
Swat							
Kharif	3.93(107)	1.87(73)	6.19	2.33(51)	1.57(37)	4.02	10.21
Rabi	3.90(119)	1.92(71)	6.32	2.39(57)	1.57(37)	4.13	10.45
Malakand							
Kharif	2.66(17)	3.03(18)	5.70	2.10(5)	3.41(8)	5.81	11.51
Rabi	3.39(22)	3.26(18)	6.66	2.71(7)	3.19(9)	5.96	12.62
Orakzai							
Kharif	5.09(10)	3.92(10)	9.01	--	--	--	9.01
Rabi	6.04(10)	3.84(10)	9.88	--	--	--	9.88
Mardan							
Kharif	2.86(25)	2.71(22)	5.58	1.47(5)	6.83(3)	6.96	12.54
Rabi	4.77(36)	4.47(24)	9.30	4.06(4)	6.83(3)	10.49	19.79
Dir							
Kharif	2.17(47)	2.83(50)	5.02	2.44(4)	4.75(5)	7.45	12.47
Rabi	3.92(81)	3.17(48)	7.18	3.70(10)	3.58(6)	7.31	14.49
Hazara							
Kharif	5.64(25)	3.14(15)	9.41	1.75(2)	2.81(2)	4.56	13.97
Rabi	3.82(27)	2.72(17)	6.80	2.29(3)	1.87(3)	4.16	10.96

a/ Number in Parenthesis () is the number of farmers reporting.

TABLE B-10 ACRES OF MAJOR CROPS PER FARM - 1976-77

District/Agency	Wheat	Maize	Jowar	Ground-Nuts	Gram	Sarson	Others	Weighted Total
Abbottabad								
Barani	3.41(23) ^{a/}	2.75(22)	--	--	0.5(1)	0.54(10)	0.77(7)	6.30
Irrigated	2.16(4)	2.07(5)	--	--	--	--	1.12(2)	4.25
North Waziristan								
Barani	1.36(7)	1.17(3)	--	--	--	--	0.25(1)	1.86
Irrigated	2.3(5)	2.5(2)	--	--	--	--	0.62(2)	3.55
South Waziristan								
Barani	0.55(8)	0.39(8)	--	--	--	--	--	0.94
Irrigated	1.16(8)	0.69(8)	--	--	--	--	--	1.85
Khyber								
Barani	3.48(7)	2.81(2)	--	--	--	--	--	4.28
Irrigated	2.5(5)	2.12(5)	--	--	--	--	--	4.62
Kohat								
Barani	4.08(23)	2.05(5)	--	--	1.29(16)	0.83(18)	1.55(19)	6.07
Irrigated	1.43(12)	0.54(10)	--	--	--	2.0(3)	1.92(5)	3.18
Mohmand								
Barani	5.43(27)	0.72(19)	--	--	--	--	--	5.96
Irrigated	0.83(6)	1.00(7)	--	--	--	--	1.37(2)	2.10
Bannu								
Barani	5.37(25)	--	1.24(15)	--	3.65(23)	0.70(11)	1.18(14)	9.78
Irrigated	7.37(9)	2.18(9)	0.87(5)	--	0.67(3)	0.12(1)	3.92(3)	11.58
Peshawar								
Barani	5.80(41)	1.22(5)	0.62(2)	--	2.20(12)	2.17(3)	1.59(2)	6.78
Irrigated	3.26(34)	2.75(33)	1.02(13)	--	1.41(4)	1.20(7)	4.31(14)	8.51

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TABLE B-10 (CONTINUED) ACRES OF MAJOR CROPS PER FARM - 1976-77

District/Agency	Wheat	Maize	Jowar	Ground- Nuts	Gram	Sarson	Others	Weighted Total
D. I. Khan								
Barani	7.50(56) ^{a/}	--	4.14(38)	20.00	4.40(33)	8.94(9)	4.68(52)	14.70
Irrigated	5.10(9)	3.37(3)	3.62(4)	--	1.08(3)	1.75(4)	5.00(1)	9.53
Swat								
Barani	3.98(117)	3.79(108)	0.4(5)	--	--	0.87(14)	5.42(3)	7.59
Irrigated	1.94(68)	1.97(62)	0.59(7)	--	--	0.52(11)	0.94(18)	4.13
Malakand Agency								
Barani	2.66(20)	0.95(10)	0.45(7)	--	0.87(2)	0.81(11)	1.08(8)	3.82
Irrigated	2.45(19)	1.56(18)	0.70(8)	--	--	0.83(8)	1.31(11)	5.33
Orakzai Agency								
Barani	5.34(10)	4.91(10)	--	--	--	1.46(3)	--	10.69
Irrigated	3.24(10)	5.54(7)	--	--	--	1.46(6)	--	7.99
Mardan								
Barani	3.87(37)	2.32(21)	--	0.79(7)	--	1.42(6)	3.35(6)	5.57
Irrigated	2.05(24)	2.77(15)	--	--	--	2.12(3)	3.94(17)	6.84
Dir								
Barani	3.51(62)	1.71(43)	--	--	--	0.89(20)	1.69(11)	4.98
Irrigated	3.09(49)	2.16(50)	1.25(1)	--	--	2.85(12)	2.22(12)	6.56
Hazara								
Barani	3.74(26)	4.44(25)	1.87(2)	--	0.50(1)	1.77(15)	3.52(6)	9.19
Irrigated	1.02(15)	1.32(9)	--	--	--	0.25(1)	2.5(5)	3.46

^{a/} Number in parenthesis () is number of farmers reporting.

TABLE B- 11 FERTILIZER USED BY THE FARMER PER YEAR 1976-77

District/Agency	Barani Average	Irrigated Average	Weighted Total	Barani Average	Irrigated Average
	(Bags per Farm)			(Bags per Acre)	
Abbottabad	3.05(20) <u>a/</u>	4.60(5)	6.72	0.45	1.08
North Waziristan	--	14.00(5)	14.00	--	3.94
South Waziristan	--	2.37(8)	2.37	--	1.29
Khyber	5.20(5)	7.00(5)	12.20	0.87	1.51
Kohat	5.00(1)	2.50(6)	5.71	1.00	0.47
Mohmand	1.00(1)	1.20(5)	2.33	0.10	0.60
Bannu	3.00(5)	5.00(7)	8.15	0.22	0.41
Peshawar	7.37(20)	16.36(36)	26.30	1.38	2.03
D. I. Khan	5.00(1)	11.33(3)	19.50	0.20	1.20
Swat	6.54(112)	4.41(66)	11.49	0.83	1.07
Malakand	6.47(15)	11.83(18)	18.79	1.14	2.14
Orakzai	6.00(3)	4.50(4)	10.29	0.34	0.32
Mardan	5.80(30)	11.00(23)	16.11	1.09	1.55
Dir	2.85(53)	2.82(45)	5.67	0.52	0.43
Hazara	4.74(23)	4.00(9)	9.06	0.46	1.89

a/ Number in parenthesis () is the number of farmers reporting.

TABLE B-12 FREQUENCY OF FARMER VISITS TO NEAREST CITY - KHARIF AND RABI 1976-77

District/Agency	Very Frequent		Frequent		Occasional		Never		Total Reporting
	# Reporting	%	# Reporting	%	# Reporting	%	# Reporting	%	
Abbottabad	12	63.16	6	31.58	1	5.26	--	--	19
North Waziristan	--	--	7	77.78	2	22.22	--	--	9
South Waziristan	--	--	8	100.00	--	--	--	--	8
Khyber	8	100.00	--	--	--	--	--	--	8
Kohat	4	17.39	19	82.61	--	--	--	--	23
Mohmand	13	46.43	12	42.86	3	10.71	--	--	28
Bannu	9	33.33	14	51.85	3	11.11	1	3.7	27
Peshawar	14	32.56	20	46.51	9	20.93	--	--	43
D. I. Khan	20	32.26	37	59.68	4	6.45	1	1.61	62
Swat	28	22.95	79	64.75	13	10.66	2	1.64	122
Malakand	3	13.04	18	78.26	2	8.70	--	--	23
Orakzai	2	20.00	7	70.00	1	10.00	--	--	10
Mardan	10	23.81	25	59.52	6	14.29	1	2.38	42
DIR	30	48.39	30	48.39	1	1.61	1	1.61	62
Hazara	14	46.67	15	50.00	1	3.33	--	--	30

TABLE B-13 NUMBER OF NWFP FARMERS REPORTING SOURCE OF INFORMATION ABOUT BARANI PROJECT, 1976-77

District/Agency	Radio		Agricultural Staff		Friends		Relatives		Total ^{a/}
	# Reporting	%	# Reporting	%	# Reporting	%	# Reporting	%	
Abbottabad	1	4.17	23	95.83	--	--	--	--	24
North Waziristan	--	--	9	100.00	--	--	--	--	9
South Waziristan	3	27.27	8	72.73	--	--	--	--	11
Khyber	3	23.08	8	61.54	1	7.69	1	7.69	13
Kohat	3	10.34	23	79.31	1	3.45	2	6.90	29
Mohmand	--	--	28	100.00	--	--	--	--	28
Bannu	2	6.90	26	89.65	1	3.45	--	--	29
Peshawar	8	15.69	42	82.35	1	1.96	--	--	51
D. I. Khan	19	19.79	53	55.21	15	15.62	9	9.38	96
Swat	14	9.65	31	21.38	99	68.28	1	0.69	145
Malakand	--	--	23	100.00	--	--	--	--	23
Orakzai	6	37.50	9	56.25	1	6.25	--	--	16
Mardan	8	16.67	40	83.33	--	--	--	--	48
Dir	9	11.54	62	79.49	3	3.85	4	5.13	78
Hazara	4	11.43	29	82.86	2	5.71	--	--	35

a/ Some farmers give more than one source.

TABLE B-14 INFORMATION ABOUT THE NWFP FARMER, 1976-77

District/Agency	Average Age of Farmer	Percentage of Farmers Married	Average Number of Children
Abbottabad	40(21) ^{a/}	73.91(17)	4.37(16)
North Waziristan	41(7)	77.78(7)	3.57(7)
South Waziristan	40(8)	87.50 (7)	3.29(7)
Khyber	42(7)	87.50(7)	6.00(7)
Kohat	42(23)	91.30(21)	4.56(18)
Mohmand	43(28)	100.00(28)	4.11(28)
Bannu	41(23)	92.59(25)	4.24(21)
Peshawar	45(39)	90.70(39)	4.62(39)
D. I. Khan	43(59)	88.71(55)	4.22(55)
Swat	39(115)	90.16(110)	4.22(107)
Malakand	42(17)	78.26(18)	5.56(18)
Orakzai	37(10)	100.00(10)	4.11(9)
Mardan	43(38)	90.24(37)	3.85(34)
Dir	41(61)	93.65(59)	3.96(54)
Hazara	43(26)	73.33(22)	4.14(21)

^{a/} Number in parenthesis () is the number of farmers reporting.

TABLE B - 15 OFF-FARM LABOR, 1976-77

District/Agency	Farmers Holding Other Jobs (In Addition to Farming)		Average Years of Farmer Working in Other Job
	% of Total	# Reporting	%
Orakzai	20.00	2	2.50(2) ^{a/}
Abbottabad	17.39	4	10.50(4)
Peshawar	13.95	6	21.50(6)
Khyber	--	--	--
Swat	14.75	18	6.89(16)
North Waziristan	--	--	--
Bannu	11.11	3	15.00(3)
D. I. Khan	4.84	3	8.67(3)
Kohat	47.83	11	9.36(11)
Mardan	9.76	4	7.00(6)
Mohmand	28.57	8	10.50(8)
South Waziristan	--	--	--
Malakand	4.35	1	25.00(1)
Dir	49.21	31	8.29(31)
Hazara	46.67	14	10.67(12)

^{a/} Number in parenthesis () is the number of farmers reporting.

TABLE B-16 AVERAGE NUMBER OF WORKERS ON FARMS - 1976-77

District/Agency	Workers in Family (Per Farm)			Workers on farm outside Family ^{b/}			Grand Total ^{c/} (Per Farm)
	Male #	Female #	Total	Male #	Female #	Total	
Orakzai	3.2(10) ^{a/}	3.1(10)	6.30	3.0(1)	--	3.00	9.30
Abbottabad	2.57(21)	2.14(14)	4.71	4.4(5)	2.0(1)	6.40	11.11
Peshawar	3.77(40)	2.33(12)	6.10	2.9(12)	--	2.92	9.02
Khyber	4.37(8)	3.00(2)	7.37	1.5(2)	1.0(1)	2.50	9.87
Swat	3.18(115)	3.24(71)	6.42	3.67(51)	5.2(15)	8.87	15.29
North Waziristan	1.5(8)	1.00(8)	2.50	10.0(1)	--	10.00	12.50
Bannu	2.81(26)	2.05(22)	4.86	1.57(7)	--	1.57	6.43
D. I. Khan	2.5(54)	1.96(26)	4.46	1.76(21)	1.0(1)	2.76	7.22
Kohat	2.14(22)	2.15(20)	4.29	2.33(9)	1.50(2)	3.83	8.12
Mardan	2.27(37)	2.18(11)	4.45	4.62(29)	3.00(3)	7.62	12.07
Mohmand	2.93(28)	2.08(25)	5.01	2.00(2)	--	2.00	7.01
South Waziristan	3.25(8)	1.62(8)	4.87	2.87(8)	1.00(2)	3.87	8.74
Malakand	3.71(21)	2.40(15)	6.11	2.00(16)	1.00(3)	3.00	9.11
Dir	2.64(55)	2.41(34)	5.05	2.9(30)	2.1(10)	5.00	10.05
Hazara	3.4(25)	3.00(17)	6.40	3.08(13)	2.57(7)	5.65	12.05

^{a/} Number in () is number of farmers reporting. ^{b/} Per Farm.

^{c/} Weighted Total

APPENDIX C

PLOT INFORMATION FOR FARM TRIALS
IN NWFP

TABLE C-1 YIELDS OF WHEAT DEMONSTRATION PLOTS -- 1975-76 TO 1977-78 WITH COST-BENEFIT RATIO

District/Agency	1975-76			1976-77			1977-78		
	T. F.	T. A.	Average Yield (mds/acre)	T. F.	T. A.	Average Yield (mds/acre)	T. F.	T. A.	Average Yield (mds/acre)
Swat	60	60	36.68	120	120	38.24	100	100	28.80
Dir	50	54	24.10	110	90	29.69	100	100	26.79
Malakand	10	9	16.60	40	40	21.55	40	40	31.69
Mardan	20	21	47.40	40	40	34.67	40	34	30.75
Peshawar	60	59	12.80	110	99	27.95	100	99	22.47
Abbottabad	---	---	---	---	---	31.74	100	100	28.93
Mansehra	140	140	32.05	260	260	32.81	100	100	30.30
Kohistan	---	---	---	---	---	---	50	Not sown	
Kohat	200	209	23.60	360	323	15.33	340	337	16.55
Bannu	120	122	17.19	240	240	16.80	200	201	17.24
D. I. Khan	164	162	19.30	180	180	17.78	180	173	33.86
Chitral	Not sown			40	20	13.15	20	Not sown	
Bajawar	Not sown			30	20	28.85	30	30	25.48
Khyber	Not sown			10	10	19.14	20	20	15.68

. . . continued

TABLE C-1 YIELDS OF WHEAT DEMONSTRATION PLOTS -- 1975-76 TO 1977-78 WITH COST-BENEFIT RATIO (CONTINUED)

District/Agency	1975-76			1976-77			1977-78		
	T. F.	T. A.	Average Yield (mds/acre)	T. F.	T. A.	Average Yield (mds/acre)	T. F.	T. A.	Average Yield (mds/acre)
Mohmand		Not sown		20	20	38.84	30	30	24.11
Kurram		Not sown		20	20	19.70	30	23	22.49
Orakzai		Not sown		10	10	---	20	20	18.52
N. Waziristan		Not sown		20	20	20.60	30	16	19.09
S. Waziristan		Not sown		10	10	---	20	20	26.69
TOTAL	824	836	24.30	1610	1522	23.47	1550	1443	24.67

Cost Benefit Ratio:
for improved practices
over traditional practices

$$\left(\frac{1:2.43 \text{ (added value of the crop)}}{\text{increased cost of production}} \right)$$

1:2.28

1:3.11

With a rate of 110 lbs. each of Urea and DAP, an average yield of 24.30 mds., 23.47 mds and 24.67 mds. per acre was obtained during the first three of the above periods. This is about three times the provincial yield per acre.

T. F. - TARGET FIXED

T. A. - TARGET ACHIEVED

TABLE C-2 GRAM DEMONSTRATION PLOTS -- 1976-77 and 1977-78
WITH COST-BENEFIT RATIO

District/Agency	1976-77		Average Yield	1977-78		Average Yield
	T. F.	T. A.	Maunds/ Acre	T. F.	T. A.	Maunds/ Acre
Swat	--	--	--	--	--	--
Dir	--	--	--	--	--	--
Malakand	--	--	--	--	--	--
Mardan	20	20	23.00	20	16	19.77
Peshawar	20	20	15.78	20	20	18.30
Abbottabad	--	--	--	10	10	12.52
Mansehra	--	--	--	--	--	--
Kohistan	--	--	--	--	--	--
Kohat	60	60	11.30	50	50	19.83
Bannu	50	50	17.52	50	50	17.97
D. I. Khan	50	50	12.66	58	46	20.41
Chitral	--	--	--	--	--	--
Bajawar	--	--	--	--	--	--
Khyber	--	--	--	--	--	--
Mohmand	--	--	--	--	--	--
Kurram	--	--	--	--	--	--
Orakzai	--	--	--	--	--	--
N. Waziristan	--	--	--	--	--	--
S. Waziristan	--	--	--	--	--	--
TOTAL	200	200	14.87	200	192	18.13

Cost Benefit Ratio: 1976-77 1:2.20 1977-78 1:3.93

Note: To these demonstration plots a recommended rate of 24 lbs. of urea and 110 lbs. of DAP per acre was applied. The average yield per acre of the plots was about three and a half times the provincial average yield.

T. F. = TARGET FIXED

T. A. = TARGET ACHIEVED

TABLE C-3 YIELDS OF SARSON DEMONSTRATION PLOTS
1976-77 & 1977-78 WITH COST-BENEFIT RATIO

District/Agency	1976-77		Average Yield Maunds/ Acre	1977-78		Average Yield Maunds/ Acre
	T. F.	T. A.		T. F.	T. A.	
Swat	16	--		16	16	8.28
Dir	16	--		16	16	10.06
Malakand	10	--		10	10	9.55
Mardan	12	20	23.00	10	10	17.93
Peshawar	16	20	15.78	16	13	7.85
Abbottabad	20	Not sown		4	4	12.44
Mansehra			4	4	5.48	
Kohistan			Not sown due to not posting of field staff.			
Kohat	20	60	11.30	20	20	11.92
Bannu	20	50	17.52	16	16	18.44
D. I. Khan	20	50	12.66	20	15	12.98
Chitral	Not sown			Not sown due to non-availability of seed.		
Bajawar	Not sown			10	10	6.24
Khyber	Not sown			10	10	7.55
Mohmand	Not sown			10	10	6.16
Kurram	Not sown			10	2	9.95
Orakzai	Not sown			10	10	9.49
N. Waziristan	Not sown			10	--	--
S. Waziristan	Not sown			10	5	10.10
NWFP (TOTAL)	150	201	14.87	202	171	10.10

Cost Benefit Ratio 1976-77 - 1:1.98 1977-78 - 1:3.84

An application of 44 lbs. of urea and 110 lbs. of DAP per acre was made, resulting in average yields of 14.87 maunds and 10.10 maunds per acre. This is about 2.2 times the average provincial yield.

T. F. = TARGET FIXED

T. A. = TARGET ACHIEVED

TABLE C-4 YIELDS OF RABI FODDER DEMONSTRATION PLOTS --
1976-77 & 1977-78 WITH COST-BENEFIT RATIO

District/Agency	1976-77		Average Yield	1977-78		Average Yield
	T. F.	T. A.	Maunds/ Acre	T. F.	T. A.	Maunds/ Acre
Swat	10	No Demonstration		5	5	123.77
Dir	10	Plots of Rabi		5	5	427.62
Malakand	10	fodder were		5	--	--
Mardan	10	established.		5	--	--
Peshawar	10			5	--	--
Abbottabad				5	--	--
Mansehra	10			5	--	--
Kohistan				5	--	--
Kohat	10			5	5	450.54
Bannu	10			5	2	190.13
D. I. Khan	10			5	2	318.72
Chitral	10			5	--	--
Bajawar	--	--	--	5	5	315.80
Khyber				5	5	181.67
Mohmand				5	5	140.77
Kurram				5	3	787.09
Orakzai				5	5	862.70
N. Waziristan				5	--	--
S. Waziristan				5	--	--
TOTAL	100			95	42	379.88

Cost Benefit Ratio:

1:5.19

An application of 220 lbs. of urea and 88 lbs. of DAP per acre was used.

T. F. = TARGET FIXED

T. A. = TARGET ACHIEVED

TABLE C-5 YIELDS OF MAIZE DEMONSTRATION PLOTS --
1976-77 & 1977-78 WITH COST -BENEFIT RATIO

District/Agency	1976-77		Average Yield	1977-78		Average Yield
	T. F.	T. A.	Maunds/ Acre	T. F.	T. A.	Maunds/ Acre
Swat	20	70	28.94	20	20	24.53
Dir	15	40	31.70	15	15	26.51
Malakand	15	--	--	15	15	34.37
Mardan	20	20	15.10	20	15	18.91
Peshawar	15			15	12	8.52
Abbottabad	50	50	24.12	50	44	36.29
Mansehra	50	50	49.23	50	50	35.35
Kohistan	10	40	13.55	10	8	19.82
Kohat	10	40	13.55	10	8	19.82
Bannu	--	--	--	--	--	--
D. I. Khan	--	--	--	--	--	--
Chitral	--	--	--	--	--	--
Bajawar	6	--	--	6	6	29.71
Khyber	--	--	--	8	8	21.52
Mohmand	7	--	--	--	--	--
Kurram	8	--	--	8	5	10.13
Orakzai	6	--	--	6	6	35.06
N. Waziristan	--	--	--	--	--	--
S. Waziristan	--	--	--	--	--	--
TOTAL	222	270	24.97	223	204	25.06

Cost-Benefit Ratio:1976-77 - 1:1.35

1977-78 - 1:2.96

270 and 204 demonstration plots of high yielding varieties of maize were established during the years of 1976-77 and 1977-78, respectively, with an application of 110 lbs. per acre of urea and 68 lbs. per acre of DAP. Average yields of 24.97 maunds and 25.06 maunds per acre were obtained. This is 2.8 times the provincial yield.

T. F. = TARGET FIXED

T. A. = TARGET ACHIEVED

TABLE C-6 YIELDS OF SORGHUM DEMONSTRATION PLOTS --
1976-77 & 1977-78 WITH COST-BENEFIT RATIO.

District/Agency	1976-77		Average Yield	1977-78		Average Yield
	T. F.	T. A.	Maunds/Acre	T. F.	T. A.	Maunds/Acre
Swat	--	--	--	--	--	--
Dir	--	--	--	--	--	--
Mardan	--	--	--	--	--	--
Peshawar	--	--	--	5	1	3.00
Abbottabad	--	--	--	5	1	Not sown
Mansehra	15	--	--	--	--	--
Kohistan	--	--	--	--	--	--
Kohat	40	49	14.21	15	13	15.89
Bannu	20	24	13.35	5	2	14.34
D. I. Khan	30	42	7.76	25	20	10.59
Chitral	--	--	--	--	--	--
Bajawar	--	--	--	--	--	--
Khyber	--	--	--	--	--	--
Mohmand	--	--	--	7	4	All plots failed-- The animal browse it.
Kurram	--	--	--	--	--	--
Orakzai	--	--	--	--	--	--
N. Waziristan	--	--	--	--	--	--
S. Waziristan	--	--	--	4	--	--
TOTAL	105	115	11.67	66	41	10.95

Cost-Benefit Ratio: 1976-77 - 1:2.87

1977-78 - 1:1.21

In these demonstrations, a uniform application of 110 lbs. of urea and 68 lbs. of DAP was applied.

T. F. = TARGET FIXED

T. A. = TARGET ACHIEVED

TABLE C-7 YIELDS OF MILLET DEMONSTRATION PLOTS DURING
1976-77 & 1977-78 WITH COST-BENEFIT RATIO.

District/Agency	1976-77		Average Yield	1977-78		Average Yield
	T. F.	T. A.	Maunds/ Acre	T. F.	T. A.	Maunds/ Acre
Swat	--	--	--	--	--	--
Dir	--	--	--	--	--	--
Malakand	--	--	--	--	--	--
Mardan	--	--	--	8	8	All plots failed
Peshawar	--	--	--	--	--	--
Abbottabad	--	--	--	--	--	--
Mansehra	--	--	--	--	--	--
Kohistan	--	--	--	--	--	--
Kohat	35	54	21.43	15	13	14.72
Bannu	10	18	34.15	5	11	14.26
D. I. Khan	50	35	5.91	25	21	14.04
Chitral	--	--	--	--	--	--
Bajawar	--	--	--	--	--	--
Khyber	--	--	--	--	--	--
Mohmand	--	--	--	--	--	--
Kurram	--	--	--	--	--	--
Orakzai	--	--	--	--	--	--
N. Waziristan	--	--	--	4	2	--
S. Waziristan	--	--	--	4	--	Card not received
TOTAL	95	107	18.50	61	55	14.34

Cost Benefit Ratio: 1976-77 - 1:3.97 1977-78 - 1:4.63

Fertilizer trials with different rates on DB-2 variety were established during the period 1976-77 and 1977-78, respectively, with an application of 72 lbs. per acre of urea and 44 lbs. per acre of DAP. Average yields of 18.5 maunds and 14.34 maunds per acre were recorded. This is 3.6 times higher than the provincial average.

T. F. = TARGET FIXED

T. A. = TARGET ACHIEVED

TABLE C-8 YIELDS OF SOYBEAN DEMONSTRATION PLOTS DURING 1976-77 & 1977-78 WITH COST-BENEFIT RATIO

District/Agency	1976-77		Average Yield	1977-78		Average Yield
	T. F.	T. A.	Maunds/Acre	T. F.	T. A.	Maunds/Acre
Swat	--	5	24.30	5	5	10.89
Dir	No separate--		--	--	--	--
Malakand	targets were		--	--	--	--
Mardan	fixed,		--	--	--	--
Peshawar	"		--	--	--	--
Abbottabad	--	--	--	--	--	--
Mansehra	--	--	--	20	--	--
Kohistan	--	--	--	--	--	--
Kohat	--	--	--	--	--	--
Bannu	--	--	--	--	--	--
D. I. Khan	--	--	--	--	--	--
Chitral	--	--	--	--	--	--
Bajawar	--	--	--	--	--	--
Khyber	--	--	--	--	--	--
Mohmand	--	--	--	--	--	--
Kurram	--	--	--	4	4	10.96
Orakzai	--	--	--	3	Not sown	
N. Waziristan	--	--	--	--	--	--
S. Waziristan	--	--	--	--	--	--
TOTAL		5	24.30	37	9	10.92

Cost-Benefit Ratio: 1976-77 - 1:8.87 1977-78 1:3.52

A number of demonstration plots of high yielding varieties of soybeans were established during the years 1976-77 and 1977-78 with an application of 110 lbs. per acre of DAP. Average yields of 24.30 maunds and 10.92 maunds per acre were recorded for the above years, which is approximately 6 times higher than the provincial average.

T. F. = TARGET FIXED

T. A. = TARGET ACHIEVED

TABLE C-9 YIELDS OF GROUNDNUTS DEMONSTRATION PLOTS DURING 1976-77 AND 1977-78 WITH COST-BENEFIT RATIO

District/Agency	1976-77		Average Yield	1977-78		Average Yield
	T. F.	T. A.	Maunds/Acre	T. F.	T. A.	Maunds/Acre
Swat	16	12	4.27	20	20	23.27
Dir	12	10	4.85	12	10	19.46
Malakand	8	--	--	8	8	39.40
Mardan	20	8	11.95	20	19	28.90
Peshawar	20	3	8.25	16	13	26.43
Abbottabad	--	--	--	4	4	28.55
Mansehra	16	--	--	12	6	21.94
Kohistan	--	--	--	--	--	--
Kohat	48	28	27.88	48	45	18.29
Bannu	32	25	33.82	32	31	25.88
D. I. Khan	24	9	27.38	24	6	12.82
Chitral	--	--	--	--	--	--
Bajawar	8	--	--	8	8	20.25
Khyber	8	--	--	8	8	12.71
Mohmand	8	--	--	8	8	6.64
Kurram	12	--	--	12	8	18.26
Orakzai	8	--	--	8	4	8.63
N. Waziristan	8	--	--	8	7	21.28
S. Waziristan	8	--	--	8	10	12.61
TOTAL	256	95	22.02	256	215	20.27

Cost-Benefit Ratio: 1976-77 - 1:7.70 1977-78 - 1:5.04

95 demonstration plots were established during the period of 1976-77 and 215 demonstration plots in 1977-78, with an application of 165 lbs. per acre of DAP.

T. F. = TARGET FIXED

T. A. = TARGET ACHIEVED

TABLE C-10 YIELDS OF KHARIF FODDER DEMONSTRATION PLOTS
DURING 1976-77 & 1977-78 WITH COST-BENEFIT RATIO.

District/Agency	1976-77		Average Yield	1977-78		Average Yield
	T. F.	T. A.	Maunds/ Acre	T. F.	T. A.	Maunds/ Acre
Swat	Not fixed		--	--	--	--
Dir	--	--	--	--	--	--
Malakand	--	--	--	--	--	--
Mardan	--	--	--	--	--	--
Peshawar	--	--	--	--	--	--
Abbottabad	--	--	--	--	--	--
Mansehra	--	--	--	--	--	--
Kohistan	--	--	--	--	--	--
Kohat	--	--	--	--	--	--
Bannu	--	20	156.99	25	6	283.8
D. I. Khan	--	17	9.21	35	16	114.10
Chitral	--	--	--	--	--	--
Bajawar	--	--	--	--	--	--
Khyber	--	--	--	--	--	--
Mohmand	--	--	--	--	--	--
Kurram	--	--	--	--	--	--
Orakzai	--	--	--	--	--	--
N. Waziristan	--	--	--	--	--	--
S. Waziristan	--	--	--	--	--	--
TOTAL		37	88.82	60	22	160.44
Cost-Benefit Ratio:	1976-77	1:7.05		1977-78	1:3.99	

T. F. - TARGET FIXED

T. A. - TARGET ACHIEVED

TABLE C-11. YIELD OF WHEAT VARIETAL VERIFICATION TRIALS

Name of Place	District	Khushal	Tarnab-73	Mexi-		Chanab	Noori	SA-42	Local	Potohar	Barani-70	C-273
				Pak	maunds per acre							
Matta	Swat	16.28	39.26	42.20	46.28	--	--	--	--	--	--	--
Matta	Swat	36.75	32.67	34.03	34.03	--	--	--	--	--	--	--
Barikot	Swat	43.77	45.23	--	35.01	33.56	--	--	--	--	--	--
Barikot	Swat	29.18	20.42	--	23.34	16.05	--	--	--	--	--	--
Munda	Dir	30.05	27.08	--	28.01	--	--	--	--	--	--	--
Munda	Dir	35.01	32.04	36.06	34.02	--	--	--	--	--	--	--
Haripur	Hazara	40.85	40.82	35.01	--	--	46.68	--	--	--	--	--
Bilitong	Kohat	--	--	--	--	--	18.56	11.93	15.25	19.89	--	--
Doaba	Kohat	--	--	--	--	--	10.54	7.92	10.59	15.88	--	--
Doaba	Kohat	--	--	--	--	--	23.82	13.23	21.17	26.47	--	--
Bannu	Bannu	26.94	--	22.68	--	--	--	15.60	--	--	--	26.23
MEAN		32.35	33.96	33.99	27.76	24.80	24.9	12.17	15.67	20.71		26.23

TABLE C-12 WHEAT YIELDS UNDER VARIOUS SEEDING RATES

Site of Trials	District	Seeding Rate			
		32 kg. per acre	36 kg. per acre	40 kg. per acre	44 kg. per acre
-----yield in maunds per acre-----					
Matta	Swat	54.45	59.00	57.17	49.01
Barikot	Swat	23.34	29.18	29.18	26.26
Timergara	Dir	13.23	17.47	19.06	14.56
Abbottabad	Hazara	29.18	35.01	40.85	40.85
Haripur	Hazara	13.07	13.19	13.30	16.34
Haripur	Hazara	23.34	24.98	24.74	24.86
Haripur	Hazara	23.34	35.01	40.85	39.68
Haripur	Hazara	23.34	28.01	29.18	29.18
Bilitong	Kohat	12.13	12.83	16.54	18.49
Hangu	Kohat	14.59	23.34	14.59	17.51
Doaba	Kohat	20.08	21.44	18.38	18.04
Karak	Kohat	35.01	35.60	46.68	52.52
Karak	Kohat	17.20	19.85	20.51	21.17
Lakki	Bannu	14.99	19.73	17.48	17.73
MEAN		22.66	26.76	27.75	27.58

TABLE C-13 WHEAT YIELDS UNDER VARIOUS FERTILIZER TREATMENTS DURING RABI 1975-76

Site of Trials	District	Treatment No. ^{a/}						
		1	2	3	4	5	6	7
		-----maunds per acre-----						
Barikot	Swat	14.59	40.85	49.60	55.45	40.85	48.14	46.69
Matta	Swat	32.67	47.67	50.37	59.50	39.48	44.92	42.20
Munda	Dir	27.08	32.64	36.06	35.01	28.01	30.05	34.02
Chakdara	Dir	15.88	23.82	31.76	37.06	18.53	21.17	26.47
Haripur	Hazara	11.67	30.34	39.68	52.52	15.17	28.01	33.84
Bilitong	Kohat	4.45	8.99	15.38	21.39	18.15	16.96	18.88
Kohat	Kohat	10.59	15.88	23.29	29.12	11.91	12.70	15.88
Hangu	Kohat	17.51	21.88	26.26	32.09	23.34	30.64	46.68
Doaba	Kohat	13.23	26.47	29.12	31.76	22.50	18.53	27.53
Karak	Kohat	6.56	18.72	19.74	20.76	21.10	20.08	21.44
Karak	Kohat	9.26	18.20	21.15	39.70	13.90	17.20	21.17
Lakki	Bannu	13.99	16.98	18.98	18.40	13.49	17.98	18.23
Bannu	Bannu	14.89	17.37	19.14	19.85	--	--	--
MEAN		14.79	24.60	29.27	34.81	22.20	25.53	29.41

^{a/} Applications of fertilizer are given below for each Treatment No. :

All Districts Other Than Bannu		
Treat-ment No.	Urea	DAP
	(kg. per acre)	
1.	0	0
2.	27.6	27.6
3.	52.2	52.2
4.	82.8	82.8
5.	38.4	0
6.	76.4	0
7.	114.8	0

Bannu District Only		
Treat-ment No.	Urea	DAP
	(kg. per acre)	
1.	28.0	28.0
2.	35.0	35.0
3.	42.0	42.0
4.	56.0	56.0

TABLE C-14 VARIETAL TRIALS OF MAIZE, 1976
(Mean Grain Yield at 15% Moisture Content)

District	No. of trials	Local	Changez	Zia	Agaiti -72	Sowan	IPTT-25	Shahee
----- maunds per acre -----								
Swat	4	53.5	64.8	52.5	65.2	61.6	9.3	41.5
Dir	1	23.8	44.1	36.0	54.5	36.0	51.0	---
Hazara	12	36.3	37.7	55.4	36.6	41.6	39.3	---
Kohat	2	38.6	50.4	44.5	46.7	43.9	---	2.6
NWFP (MEAN)		39.5	42.8	40.0	44.6	45.8	38.0	36.3

TABLE C-15 FERTILIZER TRIALS ON MAIZE ^{a/}, 1976 (Mean Grain Yield at 15% Moisture Content)

District	No. of trials	FERTILIZER RATES ^{b/}							
		Without Phosphate				With Phosphate			
		0-0	50-0	100-0	150-0	0-50	50-50	100-50	150-50
----- maunds per acre -----									
Swat	4	28.5	42.5	45.8	49.4	32.7	50.6	58.4	60.9
Dir	1	35.9	38.5	49.9	63.9	28.8	41.1	61.6	65.6
Hazara	12	21.7	25.5	26.3	30.3	29.5	34.1	34.1	36.7
Kohat	19	45.0	47.5	50.6	55.4	47.5	48.6	51.9	56.0
NWFP (MEAN)		27.2	32.1	34.2	38.7	32.1	39.4	42.0	45.4

^{a/} Variety used was Changez

^{b/} Refers to nitrogen and phosphate only; i. e. 50-100 means 50 lbs. N and 100 lbs. P₂O₅.

TABLE C-16 FERTILIZER TRIALS ON SORGHUM (JSS263), 1976
(Mean Grain Yield at 15% Moisture Content)

Site No.	Location	District	Fertilizer Rates ^{a/}							
			Without Phosphate				With Phosphate			
			0-0	50-0	100-0	150-0	0-50	50-50	100-50	150-50
-----maunds per acre-----										
1.	Nizampur	Peshawar	11.6	16.8	12.6	18.9	10.5	14.0	15.8	16.8
2.	Tikana	D. I. Khan	23.1	32.6	54.7	41.0	26.3	38.9	42.0	47.3
3.	Naiwala	D. I. Khan	23.1	32.6	34.7	39.9	26.3	39.9	43.1	46.2
	MEAN		23.1	32.6	44.7	40.5	26.3	39.4	42.6	46.8
1.	Chichan	Kohat	10.2	11.3	18.8	14.0	11.4	11.8	12.7	14.0
2.	Jarma	Kohat	13.1	14.4	15.6	17.1	13.9	15.0	15.2	17.7
	MEAN	11.7	11.7	12.9	17.2	15.6	12.7	13.4	14.0	15.9
1.	Dingi	Hazara	1.6	1.6	2.6	3.2	2.4	2.1	2.6	5.2
2.	Jallu	Hazara	4.2	7.8	8.5	9.5	5.3	6.3	8.4	10.5
	MEAN		2.9	4.7	5.6	6.9	3.9	4.2	5.5	7.9
	NWFP MEAN		12.4	16.7	16.61	20.5	13.7	18.4	20.0	22.5

a/ Refers to nitrogen and phosphate only; i. e. 50-100 means 50 lbs. N and 100 lbs. P₂O₅.

TABLE C-17

FERTILIZER TRIALS ON BAJRA,- 1976

(Mean Grain Yield at 15% Moisture Content)

Site No.	District - D. I. Khan Location	FERTILIZER RATES ^{a/}							
		0-0	Without Phosphate			With Phosphate			
			50-0	100-0	150-0	0-50	50-50	100-50	150-50
-----maunds per acre-----									
1.	Tiken	22.1	30.5	32.7	38.9	24.2	36.8	39.9	46.2
2.	Naiwala	20.0	26.3	30.5	32.6	24.2	35.0	36.8	41.0
3.	Bucta	30.0	38.9	39.9	47.3	32.6	45.2	47.3	52.5
	MEAN	24.2	31.9	34.4	39.6	28.3	39.0	41.3	46.6

^{a/} Refers to nitrogen and phosphate only; i. e. 50-100 means 50 lbs. N and 100 lbs. P₂O₅.

TABLE C-18 VARIETAL TRIALS OF SORGHUM, 1976

(Mean Grain Yield at 15% Moisture Content)

No.	District	Location	JSS 263	Pak	SS2	DS-75	Sarokartuho	DG.pearl
				SS2				
-----maunds per acre-----								
1.	D. I. Khan	Tiken	22.6	23.1	19.8	34.1	19.3	13.8
1.	Peshawar	Nizampur	18.9	22.1	17.9	24.2	17.9	22.1
1.	Kohat	Chichan	9.9	9.2	9.6	9.2	9.8	8.3
2.	Kohat	Jedhe	10.0	9.6	9.4	9.2	10.5	8.9
	MEAN		10.0	9.4	9.5	9.2	10.2	8.6
1.	Hazara	Dingi	3.9	4.4	7.2	6.3	--	2.5
	Hazara	Jallu	4.4	3.3	5.0	5.0	4.4	2.8
	MEAN		4.2	3.9	6.1	5.7	4.4	2.7
NWFP MEAN			11.6	12.0	11.5	14.7	12.4	9.7

TABLE C-19 VARIETAL TRIALS OF WHEAT -- RABI, 1976-77 (Northern Region)

Site No.	Name of Variety	Mansehra	Hazara	Mardan	Peshawar	Dir	Swat	Mean
-----maunds per acre-----								
1.	Blue Silver	23.56	18.62	4.00	20.90	23.04	21.99	19.38
2.	Local	21.28	16.62	18.24	26.22	23.40	18.25	21.04
3.	Mexi-Pak	25.27	28.50	18.24	23.94	37.35	19.84	24.77
4.	Khushal-69	34.01	36.86	14.44	31.54	25.92	22.45	28.44
5.	Tarnab-73	38.95	37.62	16.34	31.54	36.90	20.52	31.54
6.	Damani	17.55	20.90	3.04	19.00	28.62	18.36	17.86
7.	S.A.42	34.20	21.66	5.70	29.26	18.90	18.82	22.53
8.	Nuri	18.05	14.86	17.10	20.90	21.60	20.06	17.54

TABLE C-20 VARIETAL TRIALS OF WHEAT -- RABI,1976-77
(Southern Region)

Site No.	Name of Variety	(5) ^{a/} D. I. Khan	(2) Bannu	(1) Kohat	Mean
-----maunds per acre-----					
1.	Blue Silver	11.24	12.50	14.00	11.90
2.	Yacora	5.60	5.50	6.40	5.42
3.	Mexi-Pak	5.52	4.50	7.00	5.20
4.	Khushal	13.44	14.00	16.80	14.12
5.	Tarnab-73	7.00	7.00	8.00	7.12
6.	Damani	11.12	17.80	21.60	14.10
7.	S.A. 42	9.80	14.50	12.00	11.25
8.	Nuri	6.48	7.30	7.40	6.80

a/ Number in Parenthesis () is the number of trials conducted.

TABLE C-21 VARIETAL TRIALS OF SARSON YIELDS IN RABI,1976-77

Site No.	Name of Variety	(1) ^{a/} Mansehra	(2) Swat	(2) Bannu	Mean
-----maunds per acre-----					
1.	PR--7	3.40	5.56	7.79	6.42
2.	PL--18	5.90	6.10	6.76	6.32
3.	Desi	2.90	6.76	5.17	5.33

a/ Number in parenthesis () is the number of trials conducted.

TABLE C-22 SEED RATE TRIALS OF WHEAT DURING RABI, 1976-77

Seed Rate	Damani	Tarnab- 73	Barani- 70	Blue Silver	Mean
	-----maunds per acre-----				
1 - S1(60 lbs. per acre)	21.19	23.83	30.41	26.86	25.72
2 - S2(80 lbs. per acre)	24.36	26.59	37.90	27.12	28.99
3 - S3(100 lbs. per acre)	24.89	25.55	37.77	29.62	29.46
4 - S4(120 lbs. per acre)	27.39	30.54	40.01	33.69	32.90

TABLE C-23 FERTILIZER TRIALS ON WHEAT & GRAM - RABI,1976-77

Detail of Treatment	(1) ^{a/} D. I. Khan	(1) Kohat	(1) Malakand	(2) Swat	(5) NWFP
<u>WHEAT</u> -----maunds per acre-----					
1. 0-0-0 ^{b/}	8.71	23.90	18.90	11.70	14.99
2. 50-25-0	10.21	25.69	26.30	26.56	23.10
3. 75-50-0	19.43	28.89	28.70	28.09	26.69
4. 100-75-0	21.09	29.99	31.70	31.70	29.24
5. 50-0-0	10.05	26.27	27.30	21.57	21.35
6. 75-0-0	25.96	27.64	30.00	22.89	25.89
7. 100-0-0	17.25	29.33	33.00	24.20	25.59
8. 0-50-0	18.59	23.09	27.10	15.92	20.30
<u>GRAM</u>					
1. 0-0-0	2.68	---	---	---	2.68
2. 25-25-0	3.00	---	---	---	3.00
3. 50-50-0	4.66	---	---	---	4.66
4. 50-75-0	5.03	---	---	---	5.03
5. 25-0-0	4.66	---	---	---	4.66
6. 0-50-0	3.32	---	---	---	3.32

a/ Number in Parenthesis () is the number of trials conducted.

b/ Refers to Nitrogen and phosphate only; i. e. 50-100 means 50 lbs. N and 100 lbs. P₂O₅.

TABLE C-24 FERTILIZER TRIALS ON MAIZE IN KHARIF, 1977
(Mean Grain Yield at 15% Moisture Content)

District	No. of trials	Without Phosphate				With Phosphate			
		0-0	60-0 ^{a/}	90-0	120-0	0-30	60-30	90-30	120-30
----- maunds per acre -----									
Swat	4	20.6	28.4	34.4	34.9	23.6	32.3	35.0	41.3
Dir	2	16.7	25.6	30.1	33.6	13.5	26.9	29.5	35.1
Mansehra	8	32.7	37.9	39.9	41.5	37.4	42.4	44.9	51.2
Abbottabad	1	23.2	29.6	34.4	37.6	29.6	33.6	42.4	49.6
Kohat	1	20.8	19.2	22.4	22.4	16.0	16.0	15.2	15.2
NWFP MEAN		25.7	32.3	36.8	37.4	29.1	35.7	38.5	44.4

^{a/} Refers to nitrogen and phosphate only; i. e. 60-30 means 60 lbs. N and 30 lbs. P₂O₅.

TABLE C-25 FERTILIZER TRIALS ON SORGHUM AND MILLET DURING KHARIF, 1977
(Mean Grain Yield at 15% Moisture Content)

District	No. of trials	Without Phosphate				With Phosphate			
		0-0	60-0	90-0	120-0	0-30	60-30	90-30	120-30
-----maunds per acre-----									
<u>SORGHUM</u>									
D. I. Khan	4	8.8	10.5	11.7	12.4	9.1	12.9	15.7	15.7
Bannu	1	17.8	25.7	25.7	17.8	21.8	25.1	27.1	24.4
Abbottabad	1	2.6	8.1	9.7	10.2	5.1	9.6	11.2	12.4
Peshawar	1	2.6	5.9	6.6	7.2	4.0	4.6	5.6	6.0
NWFP MEAN		8.3	11.7	12.6	12.1	9.6	13.0	15.2	16.1
<u>MILLET</u>									
D. I. Khan	7	7.9	9.6	11.6	13.1	12.1	13.1	14.8	18.4
NWFP MEAN		7.9	9.6	11.6	13.1	12.1	13.1	14.8	18.4

VARIETIES USED: Sorghum - D. S. 75, Sarokartuho in Bannu only
Millet - D. B. 2

TABLE C-26 VARIETAL TRIALS ON MAIZE DURING KHARIF, 1977
(Mean Grain Yield at 15% Moisture Content)

District	No. of trials	Changez	Syn 851	Soan	7525	Sarhad	Sadaf	Zia	Agaiti-72	Shaheen	PHC	Local
-----maunds per acre-----												
Swat	4	37.2	---	27.9	---	---	34.1	29.3	30.9	---	---	25.6
Dir	2	13.1	---	13.8	---	---	14.3	14.3	13.7	---	---	9.5
Manshra	8	39.2	---	41.4	---	39.2	41.2	37.6	37.1	---	---	35.0
Abbottabad	1	22.8	23.3	22.8	17.5	21.2	22.8	---	---	---	---	19.6
Kohat	1	11.7	28.1	21.2	---	---	21.2	---	---	---	---	9.5
NWFP MEAN		32.7	25.7	32.1	17.5	37.2	33.7	31.9	32.0	15.4	11.7	28.0

Note: A uniform fertilizer application of 120-30-0/acre was made in all the districts.

TABLE C-27 VARIETAL TRIALS ON SORGHUM AND MILLET DURING KHARIF, 1977

District	No. of trials	JSS263	Pak SS2	DS-75	Sarokartuho	D.G. Pearl	Local		
-----maunds per acre-----									
SORGHUM									
D. I. Khan	4	11.1	7.2	9.2	9.8	10.6	5.4		
Bannu	1	18.0	13.0	18.0	27.0	20.0	14.0		
Abbottabad	1	2.9	14.6	8.8	2.8	----	1.6		
Peshawar	1	6.1	14.4	6.1	6.1	8.3	8.3		
MEAN		10.2	7.3	10.0	10.7	11.8	6.5		
MILLET									
District	No. of trials	DA-2	MC-4	DB-8	Acc2779	NC-6	Syn 7601	ICH 105	Local
D. I. Khan	7	12.3	9.4	9.6	9.4	10.7	7.9	7.9	7.0
MEAN		12.3	9.4	9.6	9.4	10.7	7.9	7.9	7.0

Note: A uniform fertilizer application of 120-3-0/acre was made in all the districts.

TABLE C-28 INSECTICIDE TRIALS ON MAIZE AND SORGHUM
KHARIF, 1977

(Mean grain yields at 15% Moisture Content)

District	No. of trials	T. 1	T. 2	T. 3	T. 4	Date of Sowing
-----maunds per acre-----						
MAIZE:						
Swat	2	31.7	35.1	34.1	35.8	June, 1977
Mansehra	3	35.7	41.3	44.5	45.9	May, 1977
NWFP MEAN		34.1	38.8	40.3	41.8	
SORGHUM						
District	No. trials	T. 1	T. 2	T. 3	T. 4	Date of Sowing
D. I. Khan	3	6.3	10.5	9.7	12.7	August, 1977

T. 1 = Control

T. 2 = Furadan in Furrow at Sowing.

T. 3 = Diazanon to whorl once.

T. 4 = Diazanon to whorl twice.

TABLE C-29 FERTILIZER AND MANAGEMENT DEMONSTRATION PLOTS
OF MAIZE DURING KHARIF, 1977

(Mean Yields of Grain at 15% Moisture Content) in MDS/Acre)

TABLE C-29A FERTILIZER DEMONSTRATION PLOTS							
District	No. of plots	Fertilizer for T ³ & T ⁴	T ¹	T ²	T ³	T ⁴	Variety
			-----maunds per acre-----				
Mansehra	10	90-30-0	15.5	10.0	28.0	32.9	Changez
Abbottabad	11	60-30-0	16.0	19.9	18.0	18.6	Changez
Swat	2	40-20-0	16.4	18.9	18.9	22.9	Changez
Swat	2	40-20-0	15.8	19.0	22.0	23.4	Agaiti
Swat	3	60-30-0	29.5	32.2	37.2	39.8	Zia
Swat	2	80-30-0	29.6	31.4	40.3	49.1	Shaheen
Dir	5	60-30-0	26.1	27.8	31.4	35.0	Changez

- T¹ = Farmer variety + Farmer practices
T² = Improved variety + Farmer practices
T³ = Farmer variety + Improved practices
T⁴ = Improved variety + Improved practices

TABLE C-29B MANAGEMENT TRIALS ON MAIZE 1977

(Location: Titabat [Swat])

Site No.	Operational Treatments	Method of Sowing	Drainage System	No. of plants harvested per plot	No. of areas harvested per plot	Weight of fresh ears per plot (lbs)	Grain Yield at 15% Moisture Content (mds/acre)
1.	Cultivator	Flat	Freely Drained	456	365	56	13.2
2.	Cultivator	Flat	Tied Bunds	304	292	51	12.0
3.	Cultivator	Ridge	Freely Drained	471	412	84	19.8
4.	Cultivator	Ridge	Tied Bunds	274	268	60	14.1
5.	Cultivator	Furrow	Freely Drained	469	192	86	20.2
6.	Cultivator	Furrow	Tied Bunds	722	720	144	33.9
7.	Chisel Plowed	Flat	Freely Drained	503	353	92	21.6
8.	Chisel Plowed	Flat	Tied Bunds	636	634	97	22.8
9.	Chisel Plowed	Ridge	Freely Drained	448	262	46	10.2
10.	Chisel Plowed	Ridge	Tied Bunds	506	424	78	18.4
11.	Chisel Plowed	Furrow	Freely Drained	396	418	70	16.5
12.	Chisel Plowed	Furrow	Tied Bunds	469	237	85	20.0

Design of the experiment: Single plots

Season: Kharif, 1977

Plot size harvested: 18 rows (30" apart) and 30 ft. long (45' x 30')

Date of planting: June 28, 1977

Date of harvest: October 15, 1977

Variety used: Zia

Fertilizer 60 lbs. N & 30 lbs. P₂O₅.

. . . . continued

DISCUSSION FOR TABLE C-29B

A. Land Preparation with Cultivator.

The yields recorded in treatment No. 1 and 2 are almost the same showing little difference in free and tied drainage system in flat sowing.

Considerably higher yield was obtained when maize was planted in ridges and free drainage system compared to tied drainage condition. But yield of 33.9 maunds/acre was produced by Zia variety when planted in furrows with tied bunds while 20.2 maunds/acre yield was recorded under same planting system with free drainage.

It is concluded that planting maize in furrows with tied drainage system gives the highest grain yield of 33.9 maunds/acre when land preparation was done with cultivator. The data indicates that planting maize in furrows even under free drainage conditions is a better practice than flat and ridge sowing systems.

B. Land Preparation with Chisel Plow.

No difference in yield of free and tied drained flat sowing system of maize is evident from the data. Higher yield, however, is given by sowing maize on ridges under tied drainage condition as compared to free drainage. Similarly furrow sowing under tied drainage system has excelled in yield per acre as compared to freely drained furrow planting.

It is concluded that both the tied and freely drained planting system of maize in the chisel plowed land produced the same yield, i. e. 22.8 and 21.6 maunds/acre which are higher than those recorded in ridge and furrow sowing in maize production.

CONCLUSION

Highest maize yield of 33.9 maunds/acre was obtained when planting was done in furrows with tied bunds in the land prepared with cultivator. However, almost the same yields, i. e. 21.6, 22 and 20.0 maunds/acre were obtained from flat sowing both free and tied drained and furrow sowing with tied bunds under chisel plowed land conditions.

The stand in the different treatment plots was uneven as evident from the extreme variation in the number of plants, which probably, is a treatment effect.

TABLE C-30 LOCATIONS OF WHEAT SEED RATE TRIALS

Site No.	Location	District	Name of farmer	Date of sowing	Date of harvesting
1.	Kuthi	D. I. Khan	Malik Anwar	Nov.1, 1977	The trial damaged by hailstorm.
2.	Ahmad	D. I. Khan	Malik Sarwar	Nov. 3, 1977	April 4, 1978
3.	Musazai Sharif	D. I. Khan	Mr. Sawan Balouch	Nov.29, 1977	April 10, 1978

Note: The grain yield data of the 1st plot located at Kuthi was not recorded because the crop was totally destroyed by a heavy hailstorm in March, 1978.

TABLE C-31 BARANI WHEAT SEED RATE TRIALS LOCATED AT MUSAZAI SHARIF (D. I. KHAN)

No.	Variety	Seed Rate (lbs. per acre)	R1 (grams)	R2 (grams)	Total (grams)	Average (grams)	MDS/ Acre
1.	Damani	60	145	230	375	187.50	24.31
2.	Damani	80	175	260	435	217.50	28.20
3.	Damani	100	205	290	495	247.50	32.11
4.	Damani	120	230	345	575	287.50	37.28
AVERAGE			188.75	281.25	---	235.00	30.47
1.	Tarnab-73	60	275	175	450	225.00	29.18
2.	Tarnab-73	80	230	145	375	187.50	24.31
3.	Tarnab-73	100	260	290	550	275.00	35.66
4.	Tarnab-73	120	290	345	635	317.50	41.16
AVERAGE			263.75	238.75	---	251.25	32.58
1.	Barani-70	60	200	260	460	230.00	29.82
2.	Barani-70	80	230	290	520	260.00	33.85
3.	Barani-70	100	290	205	495	247.50	32.11
4.	Barani-70	120	315	370	685	342.50	44.55
AVERAGE			258.75	281.25	---	270.00	35.08
1.	Blue Silver	60	120	120	240	120.00	15.54
2.	Blue Silver	80	115	175	350	175.00	22.69
3.	Blue Silver	100	145	150	295	147.50	19.12
4.	Blue Silver	120	290	230	520	260.00	33.71
AVERAGE			182.50	168.75	---	175.62	22.76

TABLE C-32 WHEAT SEED RATE TRIALS LOCATED AT AHMAD(D. I. KHAN)

Site No.	Variety	Seed Rate (lbs. per acre)	R1 (grams)	R2 (grams)	Total (grams)	Average (grams)	MDS/Acre
1.	Damani	60	200	170	370	185	24.00
2.	Damani	80	280	180	460	230	29.83
3.	Damani	100	290	180	470	235	30.48
4.	Damani	120	280	260	540	270	31.52
AVERAGE			262.50	197.50	---	230.00	28.95
1.	Tarnab-73	60	180	210	390	195	24.71
2.	Tarnab-73	80	180	240	420	210	27.24
3.	Tarnab-73	100	200	180	380	190	24.64
4.	Tarnab-73	120	220	270	490	245	31.78
AVERAGE			195	225	---	210	27.09
1.	Barani-70	60	250	280	350	265	31.45
2.	Barani-70	80	340	300	640	320	41.50
3.	Barani-70	100	330	380	710	355	46.04
4.	Barani-70	120	380	380	760	380	42.06
AVERAGE			325	335	---	330	42.06
1.	Blue Silver	60	230	280	510	255	33.07
2.	Blue Silver	80	230	260	490	245	31.78
3.	Blue Silver	100	280	280	560	280	36.31
4.	Blue Silver	120	270	380	650	325	42.15
AVERAGE			252.50	300	---	276.25	35.82

TABLE C-33 WHEAT FERTILIZER TRIALS

District	Village	Variety	Date of Sowing	0-0	50-25	75-50	FERTILIZER RATES ^{a/}				
							100-75	50-0	75-0	100-0	0-50
kg. per acre											
Peshawar	Mairadag Basud	Mexi-Pak	Nov. 6, 1977	477	886	977	1023	841	900	932	545
Ilazara	Mira Gujar	Chanab-70	Nov. 13, 1977	279	1194	1414	1637	1135	1253	1525	1004
D. I. Khan	Khani Khel	Damani	Nov. 7, 1977	310	550	637	697	556	365	392	321
D. I. Khan	Khani Khel	Khushal	Nov. 7, 1977	236	528	669	746	384	305	395	320
D. I. Khan	Shiddi	Damani	Nov. 28, 1977	213	449	529	619	200	298	282	507
D. I. Khan	Shiddi	Khushal	Nov. 28, 1977	436	561	686	697	387	479	430	459
Bannu	Mashamansor	Local	Nov. 4, 1977	638	515	880	897	684	980	758	387
Bannu	Mashamansor	Local	Nov. 4, 1977	597	980	1096	764	847	610	893	758
Kohat	Ilangu	Mexi-Pak	Nov. 15, 1977	570	900	1050	1285	872	809	874	734
Swat	Saidabadi	Mexi-Pak	Nov. 8, 1977	508	871	1053	1246	719	902	993	579
Dir	Chakdara	Mexi-Pak	Nov. 25, 1977	583	850	1095	1282	667	867	1001	556

Result & Discussion: It is clear from this data that the fertilizer treatment in general gave higher yields of wheat as compared to the control of unfertilized plots. Almost in all of the districts treatments 100-75-0 gave the maximum yield followed by treatment 75-50-0. Treatment 0-50 alone gave the lowest yield in the fertilized plots. The combination with phosphorus produced higher yields as compared to nitrogen or phosphorus alone.

SIZE OF PLOT: 1/2 Acre

a/ Refers to nitrogen, phosphorus and potassium (which is not used in these mixtures). 50-25 means 50 lbs. of N and 25 lbs. of P₂O₅.

TABLE C-34 GRAM FERTILIZER TRIALS

District	Village	Variety	Date of Sowing	(FERTILIZER RATES) ^{a/}					
				0-0	25-25	50-50	50-75	25-0	0-50
-----kg. per acre-----									
D. I. Khan	Shiddi	Local	Nov. 28, 1977	269	531	608	767	287	233
Bannu	Masha-Mansur	Local	Nov. 8, 1977	183	215	206	225	232	193
Bannu	Masha-Mansur	Local	Nov. 8, 1977	149	202	229	192	170	157

Results & Discussion: The effect of nitrogen alone and in combination with phosphorus of the yield of gram is presented in the above table. Yield data of the two districts show different results. In D. I. Khan District treatment 50-75 gave the maximum yield of 767 kg. per acre as compared with control and other fertilized plots. In Bannu District treatment 25-0-0 and 50-50-0 produced the highest yield of 232 and 229 kg. per acre of gram respectively as compared to other treatments.

Size of Plot: 1/2 Acre

No. of Trials District-wise	
D. I. Khan	1
Bannu	2

^{a/} Refers to nitrogen, phosphorus and potassium (which is not used in these mixtures). 50-75 means 50 lbs. of N and 75 lbs. of P₂O₅.

TABLE C-35 SARSON FERTILIZER TRIALS

District	Village	Variety	Date of Sowing	(Fertilizer Rates) ^{a/}					
				0-0	25-25	50-25	75-70	50-0	0-25
-----kg. per acre-----									
D. I. Khan	Kurar	P. R. 7	Nov. 3, 1977	8.4	211	198	306	15	25
D. I. Khan	Saidu Wala	P. R. 7	Nov. 4, 1977	107	110	247	256	161	163
Malakand	Alladand	Local	Nov. 9, 1977	164	187	227	319	193	179
Swat	Saidabad	Local	Nov. 9, 1977	156	245	280	371	283	196
Swat	Aboha	Local	Nov. 20, 1977	148	235	294	360	272	186

Results & Discussion: Results in the above table show that in almost all the districts the fertilized plots gave higher yields as compared with the control plots. In all cases, treatment 75-50-0 gave the maximum yield as compared to the other plots. 75-50-0 is followed by 50-25-0 in yields. This shows that nitrogen when combined with phosphorus in the ratio of 75-50-0 produced the maximum yield.

Size of Plot: 1/2 Acre

No. of Trials District-wise

D. I. Khan	2
Malakand	1
Swat	2

^{a/} Refers to nitrogen, phosphorus and potassium (which is not used in these mixtures). 50-25 means 50 lbs. of N and 25 lbs. of P₂O₅.

TABLE C-36 FODDER (BARLEY & OATS) FERTILIZER TRIALS

District	Village	Variety	Date of Sowing	(FERTILIZER RATE) ^{a/}						
				0-0	0-30	30-30	60-30	0-60	30-60	60-60
				-----kg. per acre-----						
D. I. Khan	Kurar	Barley Local	Nov. 28, 1977	54	120	229	251	282	360	386
D. I. Khan	Kurar	Oats Local	Nov. 28, 1977	95	113	200	120	258	229	178
Bannu	Mamakhel	Barley Local	Nov. 21, 1977	347	474	598	819	510	811	976

Results & Discussion: The yields of barley and oats as affected by nitrogen and phosphorus fertilization as given in this table, 60-60-0 gave the maximum yields of 386 and 976 kb. per acre of barley fodder in both D. I. Khan and Bannu Districts respectively. However, in case of Oats 0-60-0 gave the highest yield of 258 kg. per acre in D. I. Khan District.

Size of Plot: 1/2 Acre

No. of Trials District-wise

D. I. Khan 2
Bannu 1

^{a/} Refers to nitrogen, phosphorus and potassium (which is not used in these mixtures). 60-30 means 60 lbs. of N and 30 lbs. of P₂O₅.

TABLE C-37 RAPE AND MUSTARD VARIETAL TRIALS RABI 1977-78
(Experiment No. 1)

Location: Yarik, D. I. Khan

Replication	VARIETIES						Average
	Poorbi Raya (S-9)	Tara- mira	Lih -3 (Yield-lb _s /plot) ^{a/}	PR-7	Dacca- Raya	Desi	
1	2.50	1.0	1.13	1.50	2.75	1.37	1.70
2	2.25	1.25	0.88	1.37	2.88	1.25	1.64
3	2.50	1.50	1.25	1.75	2.50	1.33	1.77
MEAN	2.41	1.25	1.09	1.54	2.71	1.25	
YIELD, MDS/ACRE	9.64	5.00	4.36	6.16	10.84	5.00	

^{a/} Plot size - 16 1/2 x 6 (4 rows 1 1/2 feet apart)

Date of Sowing: October 31, 1977
 Germination Started: November 3, 1977
 Germination Completed: November 6, 1977
 Date of Harvest: April 3, 1978
 Fertilizer: @ 14 lbs. DAP + 14 lbs. Urea/Kanal.

Results & Discussion: The results above indicate that Dacca-Raya out-yielded the other varieties included in the trial. Poorbi-Raya yielded the next higher to Dacca-Raya. Most probably the yield difference between these two entries seem to yield significantly higher than taramira, Liho-3, PR7 and desi.

From this one year observation it is concluded that Dacca-Raya and Poorbi-Raya are most suited for planting under rainfed conditions. Moreover, the maturity range of Dacca-Raya is much shorter than the other entries.

TABLE C-38 VARIETAL TRIAL OF RAPE AND MUSTARD
(Experiment No. 2)

Location: Village Chohar Khel - Bannu

Replication	Dacca- Raya	PR-7	VARIETIES		Poorbi- Raya	Desi	Average
			Liho- nowa	Taramira			
			(Yield lbs. /plot) ^{a/}				
1	2.25	1.25	0.75	1.25	2.13	1.0	1.43
2	1.75	0.88	1.25	1.13	1.75	0.88	1.27
3	1.88	1.25	0.88	1.50	1.63	1.13	1.37
MEAN	1.95	1.12	0.96	1.29	1.83	1.0	
YIELD, MDS/Acre	8.62	4.92	4.22	5.67	8.05	4.40	

^{a/} Plot Size: 40 x 4 1/2 (3 rows 1 1/2 feet apart)

Date of Sowing: October 26, 1977
 Germination Started: October 28, 1977
 Germination Completed: November 1, 1977
 Date of Harvest: March 22, 1978
 Fertilizer: 14 lbs. DAP + 14 lbs. Urea/Kanal

Results & Discussion: Varietal trials in Chohar Khel also indicates that Dacca-Raya and Poorbi Raya significantly out-yielded the other varieties included in the trial. The yield difference between Dacca-Raya and Poorbi-Raya seems insignificant.

TABLE C-39 VARIETAL TRIALS OF RAPE AND MUSTARD
 (Experiment No. 3)
 Location: Ahmad Wala Research Station
 Karak (Kohat)

Replication	RL-18	PR-7	VARIETIES			Desi	Average
			B. S. A. pindi	Taramira	Poorbi- Raya		
			(Yield lbs. /plot) ^{a/}				
1	1.13	1.00	0.88	1.0	1.25	0.75	1.0
2	5.88	5.75	5.75	5.63	1.00	1.00	0.83
3	1.25	0.63	0.50	0.50	1.13	0.37	0.73
MEAN	1.09	0.76	0.71	0.71	1.12	0.70	
YIELD, MDS/ACRE	9.59	6.68	6.24	6.24	9.85	6.16	

Notes:

^{a/} Plot Size: 20' x 6' (4 rows 1 1/2 ft. apart)

Date of Sowing: October 2, 1977
 Germination Started: October 5, 1977
 Germination Completed: October 8, 1977
 Date of Harvest: April 1, 1978
 Fertilizer: 14 lbs. DAP + 14 lbs. Urea/Kanal

Results & Discussion: The results at Ahmad Wala show that R. L. 18 Poorbi-Raya outyielded the other entries in this trial. The other four varieties yielded almost the same indicating their similar genetic potential for yield under barani conditions.

TABLE C-40 VARIETAL TRIALS OF RAPE AND MUSTARD (Experiment No. 4)
 Location: Ahmad Wala -Karak (Kohat)

Replication	RL-18	PR-7	VARIETIES		Poorbi- Raya	Desi	Average
			B. S. A. Pindi	Taramira			
			(Yield lbs. /plot) ^{a/}				
1	1.13	1.25	1.13	1.0	1.13	0.88	6.52
2	1.00	0.50	0.37	0.88	0.75	0.75	
3	0.88	0.37	0.50	0.37	1.25	0.37	
MEAN	1.00	0.70	0.66	0.75	1.04	0.66	
YIELD, MDS/ACRE	8.80	6.16	5.80	6.60	9.15	5.80	

a/ Plot Size: 20 x 6 feet (4 rows 1 1/2 feet apart) -- Central two rows were harvested for yield.

Date of Sowing: October 2, 1977
 Germination Started: October 5, 1977
 Germination Completed: October 8, 1977
 Date of Harvest: April 1, 1978
 Fertilizer: 14 lbs. DAP + 14 lbs. Urea/Kanal.

Results & Discussion: Because of the non-availability of land, another set was also planted at Ahmad Wala Farm. The yield potential of the different varieties was almost the same at both locations.

TABLE C-41 RAPE & MUSTARD VARIETAL TRIALS, BARANI CONDITIONS RABI, 1977-78
(Experiments No. 5-7)

Variety	MINGORA/SWAT		MANSEHRA		SERAI, NAURANG	
	Yield: Kilo/acre	Harvest Date	Yield: Kilo/acre	Harvest Date	Yield: Kilo/acre	Harvest Date
PR-7	433	May 17, 1978	188	May 10, 1978	738	Apr. 16, 1978
RL-18	684	May 15, 1978	222	May 7, 1978	614	Apr. 16, 1978
Desi	504	May 10, 1978	320	Apr. 17, 1978	507	Apr. 10, 1978
Date of Sowing:	Nov. 21, 1977		Dec. 15, 1977		Nov. 19, 1977	
Replications:	2		4		2	
Statistical Significance of results:	L. S. D. 5% 32.4 ^{a/}		N. S. ^{b/}		N. S. ^{c/}	
Plot Size Harvested:	400 sq. ft.		216 sq. ft.		300 sq. ft.	

Note: Fertilizer applied to all plots at the rate of 112 pounds of Diammonium Phosphate and 56 pounds of Urea per acre.

a/ RL-18 and Desi gave significantly higher yields than PR-7 at 5%.

b/ The results are not significant. The Desi variety gave a better yield than PR-7. The trials need to be repeated for a couple of years to confirm the results.

c/ Though the results are not significant, PR-7 has given about 1 1/2 times yield of Desi. Trial needs to be repeated for a couple of years to confirm the results.

TABLE C-42 WHEAT VARIETAL TRIALS, BARANI CONDITIONS, RABI 1977-78

LOCATIONS				
	BARA BANAD	MATANI	BABOZAI	MASHOKHEL
Date of Sowing	Dec. 11, 1977	Dec. 10, 1977	Dec. 9, 1977	Dec. 10, 1977
Plot Size Harvested	225 Sq. Feet	225 Sq. Feet	225 Sq. Feet	225 Sq. Feet
Replications	Two	Two	Two	Two
Previous Crop	Fallow	Sorghum	Fallow	Fallow
Soil Type	Sandy	Sandy Loam	Loam	Loam
MAUNDS/ACRE				
<u>Varietal Results</u>	<u>Yield^{a/}</u>	<u>Yield^{b/}</u>	<u>Yield^{c/}</u>	<u>Yield^{d/}</u>
Yecora	21.5	4.0	11.64	3.5
Damani	22.4	11.0	6.5	8.2
Tarnab-73	25.8	4.0	11.4	8.7
Blue Silver	29.8	9.6	13.8	9.4
Mexi-Pak	20.2	5.8	11.2	5.9
Local	20.8	8.0	5.3	7.8

- a/ The yield per acre is very good for the trial under barani conditions. This is because the soil was moist when the wheat was planted. The variety blue silver outyielded the check variety giving 29.78 and 25.78 maunds/acre respectively.
- b/ The yield of wheat per acre was low because of poor germination of the wheat. Variety Damani outyielded the check variety giving 11.04 maunds and 3.94 maunds/acre respectively. Damani variety was followed by Blue Silver with 9.58 maunds/acre.
- c/ Blue Silver outyielded all other varieties included in the trial with 13.80 maunds per acre against 11.35 maunds per acre of the check variety.

.....Continued

TABLE C-42 WHEAT VARIETAL TRIALS, BARANI CONDITIONS, RABI 1977-78 (CONTINUED)

SUMMARY:

The following varieties were included in these trials and their special characteristics are listed:

1. Tarnab-73 High yielding commercial variety.
2. Yecora Dwarf and yellow resistant variety.
3. Mexi-Pak High yielding and widely adaptable variety.
4. Blue Silver Early maturing and high yielding variety.
5. Damani Barani variety.
6. Local Any variety accepted by the farmers for special characteristics.

The yield per acre is exceptionally low for all the trials as compared to the last two years' data. The reason for low yields was a heavy rust attack and abnormal fluctuation in temperature during the month of February and March.

The average yields of 4 locations showed that variety Blue Silver gave a high yield per acre under Barani conditions during 1977-78.

TABLE C-43 CHISEL PLOWING TRIALS - KHARIF 1978

Site No.	District/ Agency	Crop	No. of chisel plowing trials conducted.	No. of successful chisel plowing trials	Average of yield per acre in mds.		Increase in yield per acre in mds.
					without chisel plowing	with chisel plowing	
1	Swat	Maize	10	10	9.89	10.69	0.80
2	Abbotabad	Maize	7	7	13.88	16.61	2.73
3	Malakand	Maize	3	3	11.20	12.53	1.33
Average of 20 plots			20	20	19.15	21.74	1.59
1	D. I. Khan	Bajra	7	6	5.03	6.40	1.37
1	D. I. Khan	Sorghum	6	3	1.84	2.32	0.48
2	Kohat	Sorghum	4	4	3.97	5.51	1.54
Average of 7 plots			10	7	2.91	3.91	1.00

TABLE C-44 CHISEL PLOWING TRIALS - RABI 1977-78

Site No.	District/ Agency	Crop	No. of chisel plowing trials conducted	No. of successful chisel plowing trials	Average of yield per acre in mds.		Increase in yield per acre in mds.
					without chisel plowing	with chisel plowing	
1	Kohat	Wheat	8	8	11.37	14.52	3.15
2	Bannu	Wheat	20	20	14.21	15.60	1.39
3	Peshawar	Wheat	8	8	7.89	12.21	4.32
4	Mardan	Wheat	3	3	25.32	30.98	5.75
5	Mohmand	Wheat	10	10	12.94	14.14	1.20
6	Khyber	Wheat	10	10	13.67	15.27	1.60
7	Abbottabad	Wheat	12	12	24.34	30.76	6.42
8	D. I. Khan	Wheat	6	6	16.60	16.93	0.33
Average			77	77	15.22	17.97	2.75
1	Kohat	Barley	1	1	6.64	13.28	6.64

APPENDIX D

PLOT YIELDS AND STANDARD DEVIATIONS
SUMMARIZED BY TEHSIL FOR FARM TRIALS
IN NWFP

TABLE D-1. ARITHMETIC MEAN AND STANDARD DEVIATIONS OF CROP YIELDS
IN CHISEL PLOWING TRIALS CONDUCTED DURING 1977-78^{a/}

Crop	Tehsil	District/ Agency	No. of trials	Arithmetic Mean		Standard Deviation of Trials	
				Trials with- out chisel	Trials with chisel	Without chisel	With chisel
Maize	Barikot	Swat	10	6.20	6.77	0.30	1.23
Maize	Haripur	Swat	7	8.71	10.43	1.03	1.92
Maize	Swat	Malakand	3	7.33	7.89	1.14	1.47
Maize	Dir	Dir	5	All Failed			
Bajra	D. I. Khan	D. I. Khan	4	5.27	6.62	2.71	7.83
Bajra	Kulachi	D. I. Khan	3	1.10	1.30	0.10	1.02
Sorghum	Tank	D. I. Khan	3	0.69	0.95	0.51	0.54
Sorghum	Kulachi	D. I. Khan	3	1.20	1.50	----	----
(Two plots used as green fodder)							
Sorghum	Kohat	Kohat	4	1.49	2.07	0.14	0.24
Wheat	Karak	Kohat	3	4.88	5.38	0.97	0.99
Wheat	Hangu	Kohat	2	5.75	8.50	0.75	1.50
Wheat	Kohat	Kohat	3	2.70	3.53	1.21	1.22
Wheat	Ghalani	Mohmand	4	4.25	5.25	1.48	0.83
Wheat	Lakki	Mohmand	6	5.29	5.37	0.87	1.23
Wheat	Jamrud	Mohmand	5	5.30	5.90	0.40	0.37
Wheat	Bara	Mohmand	5	5.00	5.60	0.54	0.20
Wheat	Peshawar	Peshawar	3	3.16	6.50	0.62	1.08
Wheat	Nowshera	Peshawar	5	2.86	3.46	0.56	0.36
Wheat	Mardan	Mardan	3	9.50	11.67	1.08	1.25
Wheat	Haripur	Abbottabad	8	10.37	12.75	1.21	2.22
Wheat	Haripur	Abbottabad	4	6.75	9.25	0.83	1.30
Wheat	D. I. Khan	D. I. Khan	6	6.25	6.37	1.31	1.29

a/ Plot size = 200 square feet.

TABLE D-2. MEAN AND STANDARD DEVIATION OF "WHEAT" DEMONSTRATION PLOTS FOR 1977-78 IN NWFP

District Agency	Tehsil	No. of demonstration plots harvested	Mean of farmers' practices	Mean of improved practices	Standard deviation of farmers' practices	Standard deviation of improved practices
-----pounds per 200 sq. ft.-----						
Peshawar	Nowshera	72	5.65	8.20	3.51	4.90
Peshawar	Peshawar	20	4.72	8.20	2.83	4.32
Peshawar	Charsadda	6	6.17	12.33	1.19	1.62
Mardan	Swabi	28	9.18	11.58	4.51	5.28
Mardan	Mardan	4	4.15	8.00	2.78	4.10
Kohat	Kohat	107	3.69	5.86	2.14	1.97
Kohat	Karak	165	5.33	6.64	1.50	2.43
Kohat	Hangu	64	4.23	5.80	1.50	1.70
D. I. Khan	Kulachi	88	9.58	11.51	3.76	4.26
D. I. Khan	D. I. Khan	43	8.83	13.87	4.30	5.84
D. I. Khan	Tank	40	5.88	13.93	1.71	3.60
Banna	Banna	41	5.37	3.08	1.98	2.93
Banna	Lakki	157	4.09	5.73	1.78	3.19
Abbottabad	Haripur	45	7.97	10.24	2.89	2.96
Abbottabad	Abbottabad	55	8.16	11.42	3.39	4.74
Mansehra	Mansehra	78	8.15	10.85	2.68	2.28
Mansehra	Batagram	22	10.27	13.41	2.54	2.96
Swat	Matta	14	8.78	10.71	1.14	1.62
Swat	Saidusharif	28	11.29	11.95	3.30	3.18
Swat	Daggar	30	6.33	7.93	2.00	1.52
Swat	Barikot	19	9.08	11.63	3.38	2.37
Swat	Kabal	9	10.94	12.78	3.55	2.10
Bagawal	Kabal	30	7.32	9.53	2.08	3.83
Malakand	Kabal	40	9.15	11.93	3.90	4.22
Dir	Adinzai	18	10.14	12.03	3.81	4.52
Dir	Ouch	12	11.25	13.58	3.16	3.06
Dir	Barva	12	5.17	7.25	2.61	3.27
Dir	Tamargara	14	9.71	11.33	1.90	2.92
Dir	Lal Qila (Midan)	12	4.25	5.60	1.73	1.41
Dir	Dir	14	8.71	11.55	1.33	0.94
Dir	Baraewal (Bandi)	18	6.65	8.62	2.98	4.15
Khyber		13	4.27	5.90	1.15	1.61
Kurram		23	6.77	8.47	0.66	2.22
Mohmand		30	6.27	9.08	2.26	3.40
Orakzai		20	5.73	6.98	0.96	1.09
S. Waziristan		20	6.81	10.05	1.75	2.67
N. Waziristan		16	5.30	7.19	2.33	3.01

TABLE D-3. MEAN AND STANDARD DEVIATION OF "MAIZE" DEMONSTRATION PLOTS FOR 1977-78 IN NWFP

District/ Agency	Tehsil	No. of demonstration plots har- vested	Mean of farmers' practices	Mean of improved practices	Standard deviation of farmers' practices	Standard deviation of of improved practices
-----pounds per 200 sq. ft. plot-----						
Peshawar	Peshawar	6	1.50	2.53	1.19	6.91
Peshawar	Nowshera	7	2.50	6.00	0.56	5.59
Mardan	Swabi	15	10.66	11.86	0.48	0.72
Kohat	Kohat	5	7.99	11.30	8.01	----
Kohat	Karak	2	11.75	17.00	7.25	----
Kohat	Hangu	1	7.50	9.00	0.00	0.00
Abbottabad	Abbottabad	20	18.79	24.18	3.93	6.71
Abbottabad	Haripur	24	17.50	22.87	6.48	8.14
Mansehra	Mansehra	40	13.82	19.19	3.94	5.68
Mansehra	Batagram	10	32.50	36.80	2.20	2.86
Swat		20	12.10	15.37	4.36	4.95
Dir		15	13.37	16.64	5.88	6.46
Malakand		15	14.04	19.91	6.89	6.83
Bajawar		6	14.03	16.55	6.91	7.09
Mohmand		8	8.50	13.50	0.00	1.00
Kurram		5	4.05	6.36	0.61	1.00
Orakzai		6	19.08	22.33	1.09	0.98

TABLE D-4. MEAN AND STANDARD DEVIATION OF "SARSON" DEMONSTRATION PLOTS FOR 1977-78 IN NWFP

District/ Agency	Tehsil	No. of demonstration plots har- vested	Mean of farmers' practices	Mean of improved practices	Standard deviation of farmers' practices	Standard deviation of improved practices
			-----pounds per 200 sq. ft. plot-----			
Malakand		10	2.37	3.59	0.41	0.51
Bajawar		10	1.75	2.35	0.81	1.18
Mohmand		10	1.10	2.03	0.83	1.65
Khyber		10	1.78	2.52	0.88	1.05
Peshawar	Peshawar	7	1.85	2.56	1.56	2.09
Peshawar	Nowshera	7	2.10	3.20	1.98	2.70
Peshawar	Charsada	2	----	----	----	----
Mardan	Swabi	10	4.41	6.75	1.08	1.22
Swat	Kabbal	16	2.65	3.12	1.00	1.40
Mansehra		4	1.37	2.06	0.24	0.39
Abbottabad	Haripur	4	3.25	4.75	1.09	0.83
Dir	Ouch	16	2.34	3.79	1.28	1.71
Kohat	Kohat	9	2.85	4.26	0.85	1.36
Kohat	Hangu	4	2.69	4.12	0.85	1.26
Kohat	Karak	7	3.23	4.87	1.17	1.58
Bannu	Lakki	12	4.63	8.24	3.30	4.84
Bannu	Bannu	4	2.69	5.0	0.54	0.93
D. I. Khan	Tank	6	3.33	4.71	1.37	1.94
D. I. Khan	Kulachi	6	3.12	4.42	1.05	1.42
D. I. Khan	D. I. Khan	3	4.08	6.16	1.24	0.90
Orakzai		10	2.50	3.57	0.22	0.56
Kurram		2	3.00	3.75	0.50	0.24
S. Waziri- stan		5	1.50	2.80	1.22	5.84

TABLE D-5. MEAN AND STANDARD DEVIATION OF "GROUNDNUT" DEMONSTRATION PLOTS FOR 1977-78 IN NWFP

District/ Agency	Tehsil	No. of demonstra- tion plots harvested	No. of one point demonstration plots ^{a/}	Mean of farmers' practices	Mean of improved practices	Standard deviation of farmers' practices	Standard deviation of improved practices
				-----pounds per 200 sq. ft. plot-----			
Peshawar		7	5	5.70	9.96	0.75	5.22
Mardan		19	-	8.72	10.88	3.08	3.34
Kohat	Kohat	11	-	4.68	5.42	1.56	1.54
Kohat	Karak	29	-	5.58	7.18	1.67	4.15
Kohat	Kohat	5	-	7.46	8.35	0.59	1.04
Abbot- tabad	Haripur	4	-	9.00	10.75	1.58	1.48
Mansehra	Mansehra	10	4	6.91	8.21	1.36	3.01
Swat		20	4	6.34	8.77	1.99	2.53
Dir		10	10	----	7.32	----	4.85
Bannu	Lakki	7	16	----	9.67	----	5.11
Bannu	Bannu	6	-	5.91	9.62	1.14	2.33
D. I. Khan	D. I. Khan	6	-	----	4.82	----	1.28
Malakand		5	2	17.83	17.70	2.01	5.21
Bajawar		4	4	----	8.57	----	3.03
Khyber		7	7	----	4.78	----	0.46
Mohmand		3	3	----	2.50	----	0.20
Kurram		8	-	5.66	6.88	1.49	1.50
Orakzai		4	4	----	3.25	----	0.26
N. Wazir- istan		7	5	2.25	8.01	0.26	3.09
S. Wazir- istan		10	10	----	4.75	----	0.57

^{a/} A demonstration plot showing improved practices only.

TABLE D-6. MEAN AND STANDARD DEVIATION OF "GRAM" DEMONSTRATION PLOTS FOR 1977-78 IN NWFP

District/ Agency	Tehsil	No. of demonstra- tion plots harvested	No. of one point demonstration plots ^{a/}	Mean of farmers' practices	Mean of improved practices	Standard deviation of farmers' practices	Standard deviation of improved practices
Peshawar	Nowshera	20	9	5.71	6.90	2.99	3.16
Mardan	Swabi	11	3	5.97	7.41	1.98	2.26
Abbotta- abad	Abbottabad	10	-	4.97	4.69	0.62	0.73
Bannu	Lakki	39	-	4.49	5.95	3.02	3.57
Bannu	Bannu	11	-	6.99	8.85	2.03	3.30
D. I. Khan	Tank	8	-	6.96	9.32	1.06	1.07
D. I. Khan	Kulachi	16	-	6.33	8.10	0.87	1.11
D. I. Khan	D. I. Khan	22	-	6.01	6.78	1.45	2.39
Kohat	Karak	50	-	6.82	7.64	2.69	3.40

a/ A demonstration plot showing improved practices only.

TABLE D-7. MEAN AND STANDARD DEVIATION OF "SOYBEAN" DEMONSTRATION PLOTS FOR 1977-78 IN NWFP

District/ Agency	Tehsil	No. of demonstration plots har- vested	Mean of farmers' practices	Mean of improved practices	Standard deviation of farmers' practices	Standard deviation of improved practices
Swat		5	3.25	4.10	0.63	0.97
Kurram		4	2.51	4.16	0.71	2.95

TABLE D-8. MEAN AND STANDARD DEVIATION OF "FODDER" DEMONSTRATION PLOTS FOR 1977-78 IN NWFP

District/ Agency	Tehsil	No. of demonstration plots har- vested	Mean of farmers' practices	Mean of improved practices	Standard deviation of farmers' practices	Standard deviation of improved practices
Swat		5	40.80	46.60	9.37	11.27
Dir		5	86.60	161.00	4.03	9.65
Bajawar		5	101.60	118.90	9.31	24.01
Mohmand		1	----	42.40	----	21.49
Khyber		5	59.40	68.40	37.63	42.45
Kohat	Kohat	5	128.20	167.10	41.09	63.73
Bannu	Bannu	3.	46.91	71.58	17.37	22.00
D.I.Khan	D.I.Khan	2	90.00	120.00	----	----
Orakzai	D.I.Khan	5	270.60	324.80	10.46	18.28
Kurram	D.I.Khan	3	237.60	296.30	6.92	20.16

TABLE D-9. MEAN AND STANDARD DEVIATION OF "SORGHUM" DEMONSTRATION PLOTS FOR 1977-78 IN NWFP

District/ Agency	Tehsil	No. of demonstration plots har- vested	Mean of farmers' practices	Mean of improved practices	Standard deviation of farmers' practices	Standard deviation of improved practices
Kohat	Karak	13	8.94	10.38	7.08	7.25
D. I. Khan	Kulachi	20	5.42	6.60	1.77	1.74
Peshawar	----	1	----	----	----	----
	----	0	----	----	----	----

TABLE D-10. MEAN AND STANDARD DEVIATION OF "MILLET" DEMONSTRATION PLOTS FOR 1977-78 IN NWFP

District/ Agency	Tehsil	No. of demonstration plots har- vested	Mean of farmers' practices	Mean of improved practices	Standard deviation of farmers' practices	Standard deviation of improved practices
D. I. Khan	Kulachi	21	4.04	5.15	1.28	1.49
Bannu	Lakki	10	3.65	5.37	1.26	1.50
Kohat	----	13	8.39	11.14	7.57	9.46

TABLE D-11. MEAN AND STANDARD DEVIATION OF "FORAGE" DEMONSTRATION PLOTS FOR 1977-78 IN NWFP

District/ Agency	Tehsil	No. of demonstration plots har- vested .	Mean of farmers' practices	Mean of improved practices	Standard deviation of farmers' practices	Standard deviation of improved practices
-----pounds per 200 sq. ft. plot-----						
Bannu	Lakki	6	78.83	106.83	18.77	14.89
D.I. Khan	D.I. Khan	16	35.52	50.04	27.69	46.89

TABLE D-12. MEAN AND STANDARD DEVIATION OF "SUNFLOWER" DEMONSTRATION PLOTS FOR 1977-78 IN NWFP

District/ Agency	Tehsil	No. of demonstration plots har- vested	Mean of farmers' practices	Mean of improved practices	Standard deviation of farmers' practices	Standard deviation of improved practices
-----pounds per 200 sq. ft. plot-----						
Bannu	Bannu	4	4.37	5.19	0.31	0.26

APPENDIX E

ADAPTIVE RESEARCH TRIALS FOR
KHARIF, 1978 IN NWFP

TABLE E-1. FERTILIZER TRIALS ON MAIZE (VARIETY-CHANGEZ) - KHARIF, 1978
(Mean Grain Yield at 15 Percent Moisture Content in Kg. per Hectare)

Site	Fertilizer Rate							
	Without Phosphate				With Phosphate			
No. Location	0-0-0	67-0-0	101-0-0	135-0-0	0-34-0	67-34-0	101-34-0	135-34-0

District: Swat (Barani)

1. Titabat	0	322	480	1,365	37	295	443	1,328
2. Gulibagh	<u>1,402</u>	<u>1,476</u>	<u>1,540</u>	<u>1,697</u>	<u>1,992</u>	<u>2,316</u>	<u>2,509</u>	<u>2,656</u>
Mean:	701	899	1,015	1,531	1,015	1,328	1,476	1,992

District: Mansehra (Barani)

1. Kuza Banda	1,771	2,171	2,878	2,970	2,066	2,250	2,878	3,154
2. Tanda	627	775	996	1,033	812	922	1,107	1,181
2. Dab No.1	1,328	1,476	1,623	1,918	1,918	2,214	2,361	2,909
4. Data	<u>2,066</u>	<u>2,361</u>	<u>2,509</u>	<u>2,656</u>	<u>2,509</u>	<u>2,656</u>	<u>2,804</u>	<u>2,804</u>
Mean:	1,448	1,697	2,002	2,144	1,826	2,011	2,288	2,412

Conclusion: Highest doses of nitrogen alone and in combination with phosphate result in two grain yields. Lower yields in the barani area of Swat District are due to insufficient moisture availability. Enough response to phosphate application, even under such unfavorable growing conditions, is evident from the above data. Therefore, a fertilizer dose of 67-34-0 kg. per hectare is recommended for maize production under barani conditions of Swat and Mansehra.

TABLE E-2. FERTILIZER TRIALS ON JOWAR (VARIETY-JSS-263) - KHARIF, 1978
(Mean Grain Yield at 15 Percent Moisture Content in Kg./Hectare)

Site	No.	Location	Fertilizer Rate							
			Without Phosphate				With Phosphate			
			0-0-0	67-0-0	101-0-0	135-0-0	0-34-0	67-34-0	101-34-0	135-34-0
<u>District: Abbottabad</u>										
1. Dingi			30	106	183	257	30	182	258	410
<u>District: Kohat</u>										
1. Nawaz Abad			1,644	2,374	2,374	1,644	2,009	2,313	2,496	2,252
<u>District: D. I. Khan</u>										
1. Ahmad			365	485	730	791	730	852	974	1,217
2. Yarrik			<u>547</u>	<u>730</u>	<u>789</u>	<u>852</u>	<u>789</u>	<u>852</u>	<u>1,096</u>	<u>1,339</u>
Mean:			456	608	760	822	760	852	1,035	1,278

Conclusion: The data indicate that sorghum shows sufficient response both to nitrogen and phosphate application. Better soil and climatic conditions in Kohat District have promoted jowar yields. Looking into the different treatments, fertilizer doses of 67-0-0 and 67-34-0 have given economically better yields. Therefore, these doses are recommended for jowar production under barani conditions of Kohat and D. I. Khan districts.

TABLE E-3. FERTILIZER TRIALS ON BAJRA - KHARIF, 1978 (Mean Grain Yield at 15 Percent Moisture Content in Kg./Hectare)

Site	Fertilizer Rate							
	Without Phosphate				With Phosphate			
No. Location	0-0-0	67-0-0	101-0-0	135-0-0	0-34-0	67-34-0	101-34-0	135-34-0
<u>District: Abbottabad</u>								
1. Dingi	335	580	852	1,065	395	669	973	1,278
<u>District: Kohat</u>								
1. Sur Dag	1,400	1,461	1,522	1,583	1,339	1,461	1,461	1,522
<u>District: D. I. Khan</u>								
1. Gilati	852	913	1,278	1,583	1,217	1,522	1,704	1,826
2. Kot Isa Khan	<u>1,096</u>	<u>1,278</u>	<u>1,461</u>	<u>1,522</u>	<u>1,461</u>	<u>1,583</u>	<u>1,704</u>	<u>1,948</u>
Mean:	974	1,096	1,370	1,553	1,339	1,553	1,704	1,887

Conclusion: It is clearly evident from the data that higher grain yields are related to higher fertilizer doses. Slight response to phosphate alone, both in D. I. Khan and Abbottabad, had been shown. Keeping in view the better results produced by nitrogen in combination with phosphate on the yield of bajra, a fertilizer dose of 67-34-0 is recommended for bajra production under barani conditions.

TABLE E-4. VARIETAL TRIALS OF MAIZE - KHARIF, 1978 (Mean Grain Yield at 15 Percent Moisture Content in Kg. per Hectare)

Site No.	Location	Changez	Zia	Shaheen	PHC	Local
<u>District: Swat (Barani)</u>						
1.	Titabat	535	194	423	323	369
2.	Guli Bagh	<u>3,182</u>	<u>2,638</u>	<u>2,887</u>	<u>3,182</u>	<u>2,057</u>
	Mean:	1,859	1,439	1,655	1,753	1,213
<u>District: Mansehra</u>						
1.	Kuza Banda	5,165	4,501	3,468	3,689	3,984
2.	Tanda	<u>1,513</u>	<u>1,328</u>	<u>1,845</u>	<u>849</u>	<u>1,808</u>
	Mean:	3,339	2,915	2,657	2,269	2,896
		<u>Khyber</u>	<u>Sarhad (Y)</u>	<u>Sarhad (W)</u>	<u>Mansehra Comp.</u>	<u>Local</u>
3.	Dab No. 1	3,031	3,128	3,031	3,226	2,835
4.	Data	<u>3,813</u>	<u>3,911</u>	<u>3,715</u>	<u>3,715</u>	<u>3,911</u>
	Mean:	3,422	3,520	3,373	3,471	3,373

Conclusion: Better varieties of Changez, PHC, Zia, and Shaheen are evident from the above data when compared with the local variety in Swat. Slightly lower yields of Zia as compared to Changez, PHC, and Shaheen may be due to its comparatively better plant type which provides much sensitivity to barani moisture stress conditions.

Top yields of Changez and Sarhad (Y) were recorded in Mansehra District. The other varieties, both in short and full season sets, were at par with local varieties except PHC.

TABLE E-5. VARIETAL TRIALS OF JOWAR - KHARIF, 1978 (Mean Grain Yield at 15 Percent Moisture Content in Kg./Hectare)

Site No.	Location	JSS 263	Giza-3	DS-75	Sarokartuho	D.G. Pearl	Local
<u>District: Abbottabad</u>							
1.	Dingi	92	92	456	--	--	330
<u>District: Kohat</u>							
1.	Nawaz Abad	1,660	1,199	1,660	2,490	1,845	1,291
<u>District: D.I. Khan</u>							
1.	Ahmad	830	1,061	553	830	784	415
2.	Yarrik	<u>922</u>	<u>1,107</u>	<u>846</u>	<u>830</u>	<u>876</u>	<u>461</u>
	Mean:	876	1,084	700	830	830	438

Conclusion: Excellent performance of Sarokartuho and D.G. Pearl is a recommendation for early planting as grain sorghum in the Kohat District. Varieties DS-75 and JSS 263 showed better results when compared with the local varieties. The soil on which Giza-3 was planted was comparatively better than DS-75 in the D.I. Khan District.

TABLE E-6. VARIETAL TRIALS OF BAJRA - KHARIF, 1978 (Mean Grain Yield at 15 Percent Moisture Content in Kg./Hectare)

Site No.	Location	DB-2	NC-4	DB-8	ACC2779	NC-6	NC-3	Local
<u>District: Abbottabad</u>								
1.	Dingi	1,115	989	973	659	811	1,060	456
<u>District: Kohat</u>								
1.	Sour Dag	1,153	830	830	1,107	1,660	1,383	1,153
<u>District: D.I. Khan</u>								
1.	Giloti	1,107	922	1,015	784	846	461	507
2.	Kot Isa Khan	<u>1,383</u>	<u>968</u>	<u>1,153</u>	<u>784</u>	<u>646</u>	<u>599</u>	<u>323</u>
	Mean:	1,245	945	1,084	784	746	530	415

Conclusion: Variety NC-6 had higher yields than all other bajra varieties in the region. The data indicate better performance of recommended varieties than the locals. DB-2 has given top yields of 1,115 and 1,245 kg. per hectare in Abbottabad and D.I. Khan districts, respectively. Its role in Kohat was similar to ACC2779. NC-3 and local DB-8 are two good varieties for D.I. Khan District.