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**FARMER-MANAGED TRIALS IN THE KOVAK VALLEY,
BALUCHISTAN: THE EFFECT OF VARIETY AND
ADDITION OF FERTILIZER ON WHEAT PRODUCTION**

by

C. Talug, Arshad Ali, G. Farid Sabir,
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FARMER-MANAGED TRIALS IN THE KOVAK VALLEY, BALUCHISTAN: THE
EFFECT OF VARIETY AND ADDITION OF FERTILIZER
ON WHEAT PRODUCTION

C. Talug¹, Arshad Ali², G. Farid Sabir², D.J. Rees¹,
J.G. Nagy¹, M.B.A. Chowdry², and M. Aslam².

¹ Research Scientists, International Center for
Agricultural Research in Dry Areas (ICARDA), MART/AZR
Project, Quetta, Pakistan.

² Scientific Officers, Arid Zone Research Institute,
Quetta, Pakistan.

ABSTRACT

In seven years out of ten, dryland farmers in upland Baluchistan do not receive sufficient rains from the summer monsoon for autumn wheat sowing, yet they have only one variety for both spring and autumn sowing. Farmer-managed trials comparing an "improved" spring wheat variety with this local facultative winter type with and without the addition of fertilizer (60 kg/ha phosphate as 46% triple superphosphate mixed with the seed at planting time) were conducted in the spring of 1987 in Kovak valley.

Rainfall during the growing season was only 172 mm, of which 108 mm fell in March. The "improved" variety gave somewhat more grain yield than the local (348 and 304 kg/ha respectively), and responded significantly ($P < 0.1$) to phosphate fertilizer (413 kg/ha). The local variety apparently did not respond to fertilizer.

Labor data on soil preparation, planting, harvesting and threshing are presented. Net benefits ranged from Rs. 250 to Rs. 600/ha in these trials. Fertilizer use reduced net benefits for both varieties.

A post-trial survey of the cooperating farmers indicated that they understood the trial and ranked the various treatments appropriately, but were not fully aware of the negative economic effects of fertilizer use.

This set of trials suggests a need for an improved spring wheat variety in upland Baluchistan. The fertilizer responses were disappointing, but need to be confirmed in other seasons.

INTRODUCTION

A farmer-managed field trial examining the effects of fertilizer and a new wheat variety with twenty farmers in Kovak valley (Fig 1) was initiated in 1987. In this initial attempt, trials were conducted at this single location and used to train staff and gather experience for a larger program in the following year.

Farmer-managed trials form an important link between technician designed and implemented trials and farmer outreach programs. Through the use of farmer-managed trials, farmer cooperators become involved in the technology design process and provide feedback to researchers and extension specialists.

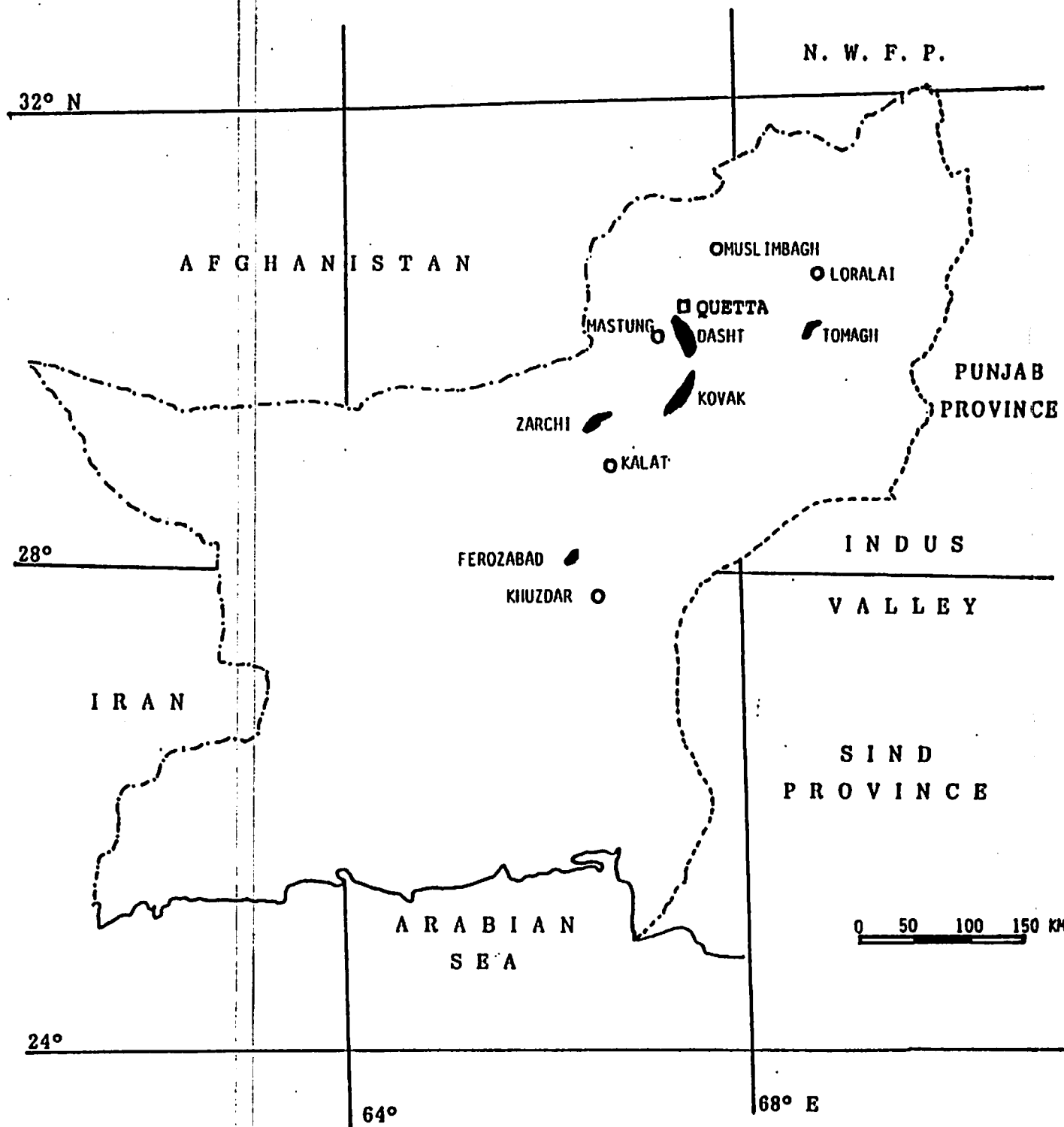
Upland Baluchistan is located in south-western Pakistan near the southern border of Afghanistan (Fig 1). There is considerable climatic variation - the northwestern high mountain ranges are extremely cold in winter with temperatures remaining below freezing during the night from December through February but maximum air temperatures can reach 40°C in the summer months of June to September. Average annual rainfall is 200-300 mm and a variable proportion of this total falls as a mixture of snow and rain in the mid winter period or as intense showers in summer.

Wheat is the most important crop grown in upland Baluchistan with wheat-fallow as the major rotation. An average of 74,100 ha. was planted to wheat from 1981-82 to 1985-86, compared to 3,900 ha. for barley (GOB). Cumin, lentils and small amounts of rapeseed are also sown. Yields are low in comparison to the rest of the world: wheat and barley grain yields are in the range 500 to 800 kg/ha in a good rainfall year (> 275 mm) and 200 to 400 kg/ha in a normal rainfall year (200 to 275 mm).

Rees et al., (1988) have described the arable dryland farming system of upland Baluchistan. Farmers base their planting decisions on the amount and timeliness of the summer, fall and winter rains. When sufficient rainfall occurs in the July to September period (> 40 mm), farmers will plant in October. This occurs about three years in ten. When fall moisture is not sufficient, farmers then plant in the January-February period and anticipate a May-June harvest. Farmers use the local wheat land race "Local White" for planting in both the fall and winter planting periods.

Most dryland farmers use animal traction for land preparation, planting and threshing. Fertilizer, herbicides and pesticides are not used.

FIGURE 1.

MART/AZR PROJECT EXPERIMENTAL SITES IN
BALUCHISTAN PROVINCE, PAKISTAN

OBJECTIVES OF THE TRIAL

1. To test an early maturing spring wheat variety against the facultative winter-type local variety.
2. Agronomy trials carried out in 1985/86 and 1986/87 indicated some response to phosphate fertilizer in upland Baluchistan (ICARDA 1988); these farmer managed trials provide a way of testing this response over a wider area, and to evaluate any problems in fertilizer application using the traditional single-row plough planter.
3. To evaluate the new variety and fertilizer interventions with respect to economic profitability, risk, and farmer acceptance.

MATERIALS AND METHODS

The Kovak Valley, in the Kalat District, is located at 29° 24'N to 29° 34'N and 66° 45'E to 66° 53'E was selected as the location for the trials. Twenty farmer cooperators were selected with the consultation of local community leaders, representing a cross-section of farmers with respect to farm management ability, economic and social status.

The trial consisted of four treatments with one replication at each farmer cooperator location; each location being treated as a replicate in a completely randomized design. The four treatments were as follows: LW = Local White variety with no phosphate fertilizer (The farmers practice); LW,F = Local White with 60 kg/ha P₂O₅; BS = Blue Silver early maturing semi-dwarf variety with no fertilizer; and, BS,F = Blue Silver and 60 kg/ha P₂O₅. The plot size was 10 x 20 m.

The plots were planted by the farmer cooperators using camel traction and the traditional wooden planter. Fertilizer was mixed with the seed prior to planting and the mixture planted in the same way as unfertilized seed - by dribbling the seed by hand down the seed tube. The seed rate was about 100 kg/ha and discussions were held with farmers to ensure a constant rate in all treatments. All trials were sown within three days of each other in the last week of January, 1987 (see individual farmer data in Appendix A.).

Information on the plot (field) history was recorded as was rainfall, the dates of soil preparation, emergence, maturity and harvest. At harvest five 1 m² samples were taken to estimate grain and straw yields. Five farmers were monitored to obtain soil preparation and planting labour times for plots with and without fertilizer. Harvest and

threshing labour times were obtained from a separate study. Farmers were surveyed for input costs and grain and straw farm gate prices. Several fertilizer outlets were surveyed for fertilizer prices. At the end of harvest, the twenty farmer cooperators were interviewed for their comments and awareness of the trial objectives (questionnaire presented in Appendix B.).

RESULTS AND DISCUSSION

The 1987-88 season was cold with minimum air temperatures falling to -18°C during the months of December and January. Rainfall in the Kovak Valley from November, 1986 to June 1987 was 172.5 mm in total, but poorly distributed - 108 mm fell in March (Fig 2).

Table 1 presents the average grain and straw yields - the data by treatment of all twenty farmer cooperators and related information is presented in Appendix A. The "improved" variety, Blue Silver, produced significantly more grain than the local, but similar amounts of straw. Phosphate fertilizer significantly increased grain yield of the "improved" variety, but the local variety apparently did not respond to the fertilizer.

Table 2 presents the labour and camel hours and costs per hectare for each treatment. Table 3 presents the economic analysis of the trials and the net benefits/ha. costs/ha from Table 3 are plotted on Fig 3.

The grain yield from the short duration Blue Silver variety - with and without fertilizer - performed well against the long duration Local White variety. The economic analysis, however, indicates that both treatments LW,F and BS,F are dominated by treatment LW (the farmers practice) as shown in Fig 3. Both treatments have a higher cost/ha and lower Net Benefit/ha than the farmer practice and would not be chosen by an economically-minded farmer. Treatment BS, as shown in Fig 3, is not dominated by treatment LW and although the cost/ha of treatment BS is slightly higher, the net benefit is Rs. 64/ha or 13% greater and has a marginal rate of return of 207%.

A sensitivity calculation was carried out on treatment BS,F assuming that the same response to phosphorus could be obtained with a 30 kg/ha application of P_2O_5 . The plot of the net benefits and costs appears on Fig 3 as BS,F'. BS,F' is not now dominated by either treatments LW or BS and the marginal rate of return above treatment LW is 50% and is 25% above treatment BS. Alternatively, a 9% increase in both grain and straw yield would result in the same net benefits using 60 kg/ha P_2O_5 . This sensitivity analysis gives some idea of the cost level or the yield response level that

FIG.2 RAINFALL DATA, KOVAK, 1986-87

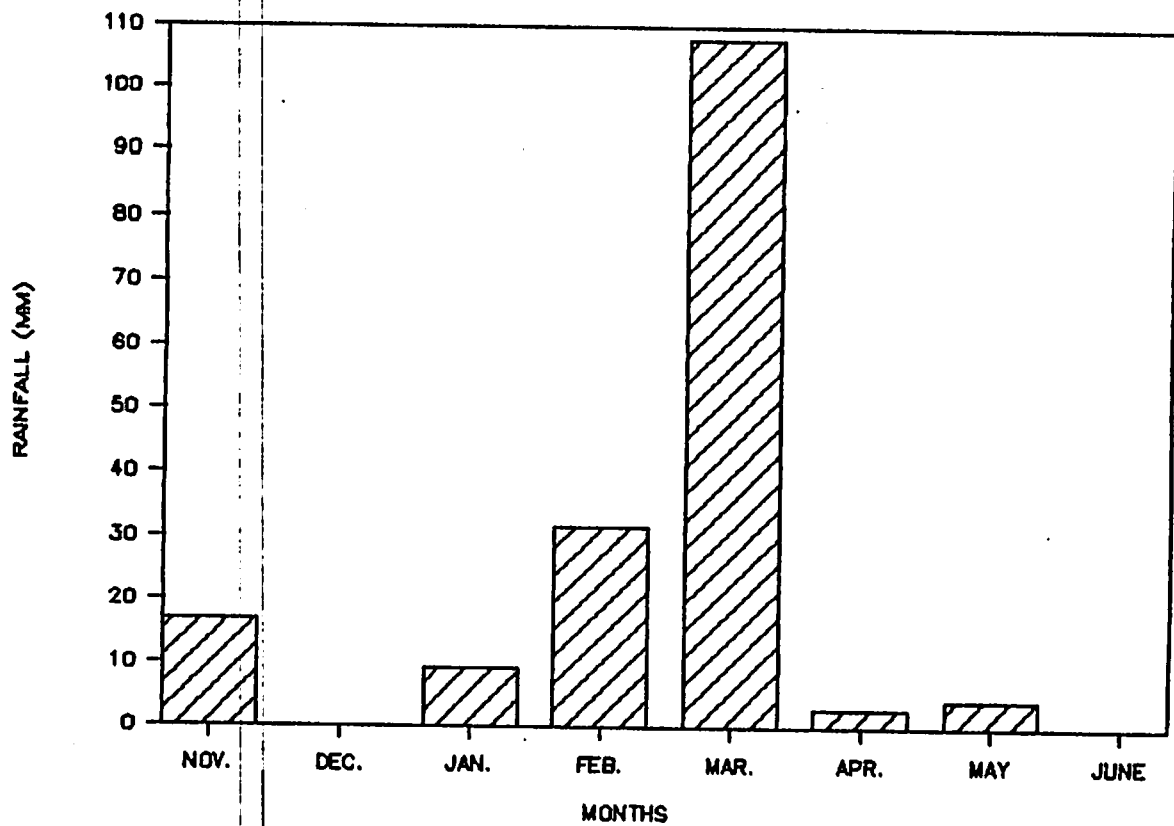


Table 1. Grain and straw yields (kg/ha dry weight) of farmer managed trials, Kovak, 1987.

	Local White(Lw)	Blue Silver(Bs)	Mean
Grain yields (kg/ha)			
-Phosphate Fertilizer	304	348	326
+Phosphate Fertilizer	329	478	403
Mean	316	413	365
S.E.	24.0	24.0	17.0
Probability	NS	<0.1%	<0.1%
Straw yields (kg/ha)			
-Phosphate Fertilizer	923	907	915
+Phosphate Fertilizer	929	927	928
Mean	926	917	922
S.E.	56.1	56.1	39.7
Probability	NS	NS	NS

Table 2. Labour and camel hours and costs per hectare by farming activity.

Activity ²	LW ¹		LW,F		BS		BS,F	
	Hrs./ha	Rs./ha	Hrs./ha	Rs./ha	Hrs./ha	Rs./ha	Hrs./ha	Rs./ha
Soil Preparation	12.4	99	12.4	99	12.4	99	12.4	99
Planting	12.4	99	13.5	108	12.4	99	13.5	108
Harvesting	12.0	30	13.0	32	13.7	34	18.9	47
Threshing								
Labour	28.6	72	30.9	77	32.7	82	44.9	112
Camel	14.3	79	15.5	85	16.4	90	22.5	124
Total Costs		379		401		404		490

¹ Treatments: LW = Local White wheat variety, BS = Blue Silver wheat variety, and F = fertilizer application of 60 kg/ha triple super phosphate mixed in and sown with the seed.

² Soil preparation and planting done by one man and one camel at a cost of Rs. 2.5/hr./man and Rs. 5.5/hr./camel. The number of hours required for harvesting and threshing wheat is a function of yield. The following relationships for wheat harvesting and threshing hours as a function of yield have been estimated from MART/AZRI time and motion field studies: The number of labour harvesting hours/ha for wheat = $0.0395 \times \text{yield}$, the number of labour threshing hours/ha for wheat = $0.094 \times \text{yield}$ and the number of camel threshing hours/ha for wheat = $0.047 \times \text{yield}$.

Table 3. Economic analysis of farmer managed trials, Kovak, 1987.

	Treatments ¹			
	LW	LW, F	BS	BS, F
Grain Yield, Kg/ha	304	329	348	478
Straw Yield, Kg/ha	915	928	915	928
Gross Revenue, Rs./ha ²	1065	1122	1154	1420
Costs ³				
Labour	379	401	404	490
Seed	200	200	200	200
Fertilizer	-	253	-	253
Total Costs	579	854	604	943
Net Benefits, Rs/ha	486	268	550	477
Return/hr. of Additional Labour above LW, Rs./hr. ⁴		-	11	-

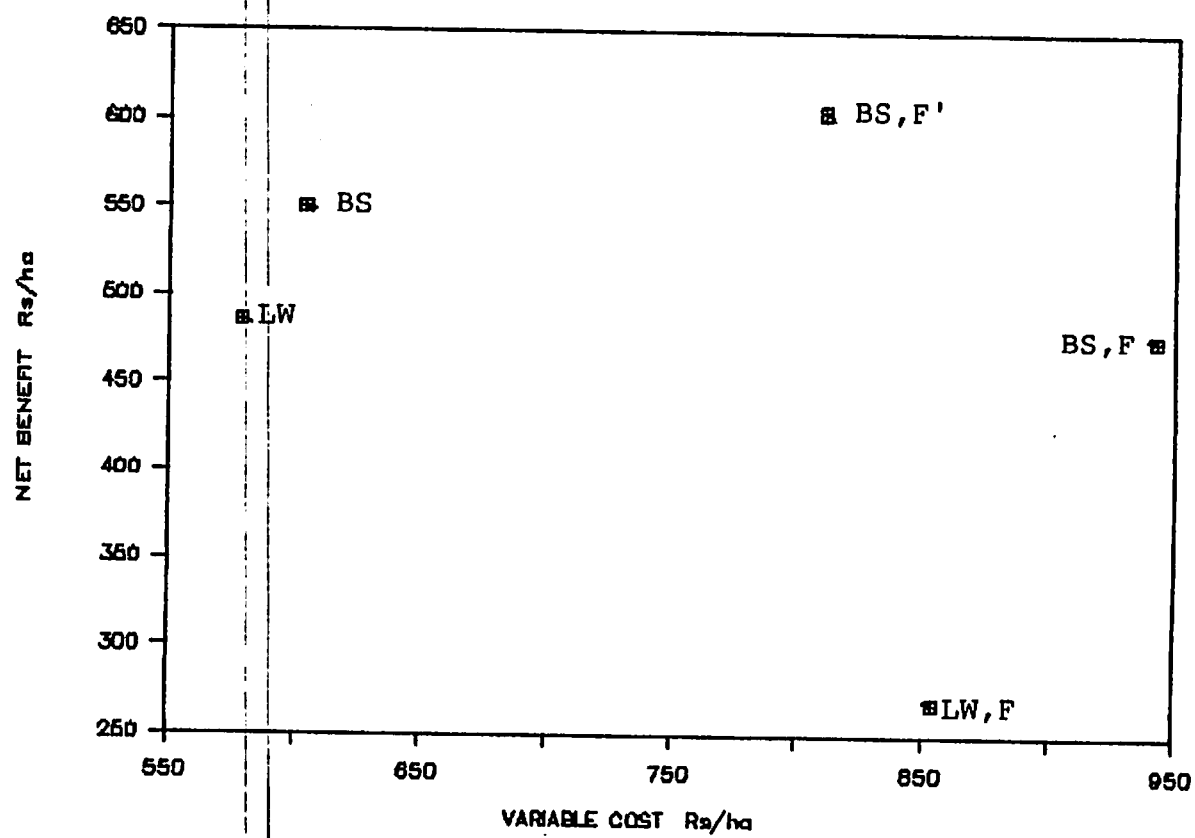
¹LW = Local White wheat variety, BS = Blue Silver wheat variety, and F = fertilizer application of 60 kg/ha triple super phosphate.

²Post harvest farm gate grain price of Rs. 2/kg and straw price of Rs. 0.5/kg.

³Labour costs from Table 2. Seed application rate at 100 kg/ha at a cost of Rs. 2/kg. Fertilizer costs Rs. 97.5/50 kg which includes Rs. 2.5/50 kg transport cost.

⁴Treatment BS requires 5.5 hours/ha more labour than Treatment LW (Table 2) while the Net Benefits are Rs. 64/ha greater.

FIG.3 VARIABLE COSTS VS. NET BENEFITS



would have to be obtained before economically-minded farmers would think about utilizing fertilizer given a similar type of rainfall year.

As an indication of risk, using the individual trial data in Appendix A., the percentage of farmers covering their fertilizer cash costs for the local and "improved" varieties were 15% and 65% respectively. Seventy percent of the farmers obtained a higher yield with Blue Silver than with Local White.

THE COOPERATIVE FARMER SURVEY

The prime objective of the survey was to obtain comments from farmers about the technologies being tested in their fields. Table 4 presents some of the information from the survey. One half of the cooperative farmers planted wheat in their fields in the January-February period which made up 25 percent of their total 1986-97 wheat plantings. Ninety-five percent said that wheat planted in the autumn (1986) out-yielded the wheat planted in the January-February (1987) period. Farmers have planted wheat in the January-February period in 4 to 5 years out of the past 10 years. Their major reason for planting in the January-February period is insufficient rainfall in autumn.

Farmers took an interest in the trials and 95% could name and readily discuss the four treatments. The farmers were able to rank the treatments with respect to yield in their own fields. Their rankings correspond with the yield data presented above. Seventy percent of the farmers said that if it would have rained less, the "improved" variety with fertilizer would still have been the best. Thirty percent said that this treatment out-yielded their own January-February planted wheat.

Ninety-five percent of the farmers responded that they would use Blue Silver next year. However, only 35% of the farmers said that they would use fertilizer next year. Their reasons for not using fertilizer was its availability, transport problems and the cash (credit) requirements to purchase the fertilizer. Ninety-five percent of the farmers said that they thought that it would pay to use fertilizer with the "improved" variety whereas 85% said that it would pay to use fertilizer with the local variety.

Farmers indicated that it took more time to plant the seed + fertilizer than the treatments without fertilizer. Only two farmers said that they had a problem with sowing the seed-fertilizer mixture.

Threshing machines were made available to harvest the field plots as well as some of the farmers grain. Ninety

Table 4. Selected information from cooperative farmers survey, Kovak, 1987.

Farmer Profile, Land and Animal Resources

Average Age	46	(13) ¹	Range 30-70
Can read and write	10%		
Private ownership of land	90%		
Average Khuskaba land owned	19 ha	(17)	Range 1-60
Sailaba land owned	4 ha		One farmer
Average Khuskaba land rented in	9 ha	(8)	14 Farmers
Average Khuskaba land rented out	6 ha	(13)	6 Farmers

Average Livestock Numbers/Farmer

Camels	2.0	(2)	Range 0-7
Sheep	30.8	(54)	Range 0-200
Goats	30.2	(42)	Range 0-150

Information on Fall Versus Jan-Feb Planting **% of Respondents**

Farmers who planted wheat in Jan-Feb, 1987	50%
Proportion of Jan-Feb to fall wheat planted, 1987	25%
Did 1986 fall planted wheat out-yield Jan-Feb wheat?	95% Yes

Number of yrs in past ten farmers planted in Jan-Feb 4-5 yrs

Farmer Awareness and Technology Assessment **% of Respondents**

Could farmers name and discuss the four treatments?	95%
Selected Blue Silver-fertilizer treatment as best	100%
Will farmers use Blue Silver next year?	95%
Will farmers use fertilizer next year?	35%
Did it pay to fertilize the Blue Silver treatment?	95%
Did it pay to fertilize the Local White treatment?	85%
Did the fertilizer treatments take more time to sow?	100%
Problems sowing mixture of fertilizer and seed	10%

Threshing Machine Information

Threshing machine used for first time this year	90%
Farmers who saw threshing machine operate first time	45%
Was the grain broken by the threshing machine?	25%
Was the straw quality as good as threshing by animal?	90%
Will you rent a threshing machine at cost next year?	35%

Survey by MART/AZRI Economics and Extension groups of twenty cooperative farmers who participated in the farmer-managed trials at Kovak.

¹Standard Deviation in parenthesis.

percent of the farmers said that it was the first time that they had used a threshing machine on their own land and 45% said that it was the first time that they had seen one in operation. Thirty-five percent of the farmers said that they would rent a threshing machine at cost for next year's harvest. The reasons for not renting a threshing machine by the remaining respondents was the high cost.

In brief, farmers were clearly aware that the "improved" variety gave better yields than the local, and that fertilizer also increased yields. Their responses indicated that they were not fully aware of the economic consequences involved in using fertilizer. This is perhaps due to the fact that they did not actually purchase the fertilizer for the experiments with their own money.

SUMMARY AND CONCLUSIONS

Twenty farmer cooperators in the Kovak Valley of Baluchistan worked with the MART/AZR project to set up farmer-managed trials. One objective of the trials was to test Blue Silver, a short duration variety, as a replacement for the Local White long duration variety for the January-February planting period. The second objective was to test the Local White and Blue Silver varieties response to phosphorus fertilizer in the environment of upland Baluchistan. Further objectives were to evaluate the interventions with respect to economic profitability and risk considerations. At the end of harvest, farmer cooperators were interviewed for their awareness, comprehension and comments of the trial objectives and results.

Grain yields from the Blue Silver variety - with and without fertilizer - were significantly greater than the Local White variety with and without fertilizer. Fertilizer and variety had no effect on straw yields. The economic analysis indicated that the farmers practice of using Local White was more economic than applying fertilizer on either Local White or Blue Silver. The use of Blue Silver however provided a 13% increase in the net benefit above the farmers practice of using Local White and a 207% marginal rate of return.

The information obtained from the first year of the trial is not sufficient to make recommendations. However, the Blue Silver variety looks promising at this time. There should perhaps be a further search for other short maturing varieties that might also fit the upland farming systems of Baluchistan. Fertilizer application did not look promising. Further fertilizer research, i.e. information on the appropriate dosage for the type of rainfall year is

required. Research that could indicate the fertilizer dosage given existing moisture levels (rainfall in pre January-February planting months) and the probability of rainfall during the growing season could make fertilizer a profitable undertaking by farmers in certain years.

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APPENDIX A

INDIVIDUAL FARMER DATA

NO:	NAME	VILLAGE	DATE OF SEED BED PREPARATION	DATE OF PLANTING	DATE OF EMERGENCE	FIELD HISTORY	DATE OF HARVESTING
01:	SHAKAR KHAN	MULLAZAI	15.01.87	19.01.87	24.02.87	CUMIN SORGHUM WHEAT	22.06.87
02:	ELAHI BUKISH	MULLAZAI	16.01.87	20.01.87	26.02.87	WHEAT CUMIN SORGHUM	22.06.87
03:	AZAM KHAN	MULLAZAI	14.01.87	20.01.87	26.02.87	SORGHUM CUMIN WHEAT	22.06.87
04:	IMAM BUKISH	MULLAZAI	17.01.87	20.01.87	25.02.87	WHEAT SORGHUM CUMIN	22.06.87
05:	SHAH MUHAMMAD	MULLAZAI	14.01.87	20.01.87	26.02.87	WHEAT SORGHUM CUMIN	22.06.87
06:	ABBAS	MULLAZAI	16.01.87	20.01.87	26.02.87	CUMIN CUMIN WHEAT	22.06.87
07:	ZAIN-UD-DIN	MULLAZAI	14.01.87	21.01.87	26.02.87	WHEAT SORGHUM WHEAT	22.06.87
08:	HABIB-ULLAH	MULLAZAI	17.01.87	20.01.87	26.02.87	CUMIN WHEAT CUMIN	26.06.87
09:	MUHAMMAD ALI	MULLAZAI	15.01.87	21.01.87	26.02.87	WHEAT SORGHUM CUMIN	26.06.87
10:	ATTA MUHAMMAD	MULLAZAI	16.01.87	20.02.87	26.02.87	CUMIN SORGHUM WHEAT	26.06.87

11:	MULA MUKISH :	MULLAZAI :	19.01.87 :	20.01.87 :	26.02.87 :	SORGHUM :	26.06.87 :
:	:	:	:	:	:	CUMIN :	:
:	:	:	:	:	:	CUMIN :	:
12:	GHULAM SHAH :	KUND :	16.01.87 :	20.01.87 :	26.02.87 :	SORGHUM :	19.06.87 :
:	:	:	:	:	:	WHEAT :	:
:	:	:	:	:	:	CUMIN :	:
13:	MUHAMMAD AMIN :	KUND :	15.01.87 :	20.01.87 :	26.02.87 :	WHEAT :	19.06.87 :
:	:	:	:	:	:	SORGHUM :	:
:	:	:	:	:	:	CUMIN :	:
14:	FAQIR M. :	KUND :	15.01.87 :	20.01.87 :	26.02.87 :	CUMIN :	19.06.87 :
:	:	:	:	:	:	WHEAT :	:
:	:	:	:	:	:	SORGHUM :	:
15:	BURKHODAR :	KUND :	15.01.87 :	20.01.87 :	26.02.87 :	SORGHUM :	19.06.87 :
:	:	:	:	:	:	CUMIN :	:
:	:	:	:	:	:	WHEAT :	:
16:	HAJI KHAN :	KUND :	15.01.87 :	20.01.87 :	26.02.87 :	WHEAT :	19.06.87 :
:	:	:	:	:	:	CUMIN :	:
:	:	:	:	:	:	SORGHUM :	:
17:	MUHAMMAD NOOR :	KUND :	14.01.87 :	20.01.87 :	26.02.87 :	CUMIN :	19.06.87 :
:	:	:	:	:	:	SORGHUM :	:
:	:	:	:	:	:	WHEAT :	:
18:	NEHAL KHAN :	KUND :	16.01.87 :	21.01.87 :	26.02.87 :	WHEAT :	19.06.87 :
:	:	:	:	:	:	FALLOW :	:
:	:	:	:	:	:	CUMIN :	:
19:	ABDUL RASOOL :	KUND :	15.01.87 :	21.01.87 :	26.02.87 :	CUMIN :	19.06.87 :
:	:	:	:	:	:	CUMIN :	:
:	:	:	:	:	:	WHEAT :	:
20:	GHOUS BUKISH :	KUND :	17.01.87 :	21.01.87 :	26.02.87 :	WHEAT :	19.06.87 :
:	:	:	:	:	:	SORGHUM :	:
:	:	:	:	:	:	CUMIN :	:

M A R T / A Z R ICOOPERATIVE FARMERS QUESTIONNAIRE: KOVAK, JULY, 1987

INTERVIEW #.....

INTERVIEWER'S NAME:.....

Date of Interview |...|...|...|
Day Month Year

TIME INTERVIEW STARTED:_____

TIME INTERVIEW ENDED :_____

QUESTIONNAIRE COMPLETED YES NO

INFORMATION MISSING PAGE NUMBER

SECTION I. FARMER PROFILE, LAND, AND ANIMAL RESOURCES.

1.1 NAME

1.2 AGE OR YEAR OF BIRTH 1. _____

1.3 PLACE OF RESIDENCE (VILLAGE).....

1.4 POTWAR CIRCLE MAUZA.....

1.5 TRIBAL GROUP.....

1.6 LITERACY:

CAN THE FARMER READ?

YES = 1 NO = 2 2. _____

CAN THE FARMER WRITE?

YES = 1 NO = 2 3. _____

1.7 NUMBER OF YEARS OF SCHOOLING 4. _____

1.8 NUMBER OF HOUSEHOLD MEMBERS

CHILDREN UNDER 10 YEARS 5. _____

MALES \geq 10 AND $<$ 15 YEARS 6. _____FEMALES \geq 10 AND $<$ 15 YEARS 7. _____ACTIVE MALES \geq 15 AND \leq 60 YEARS 8. _____ACTIVE FEMALES \geq 15 AND \leq 60 YEARS 9. _____MALES AND FEMALES $>$ 60 YEARS 10. _____

TOTAL 11. _____

1.9 Do you have land in private ownership?

YES = 1 NO = 2 GO to question 1.11

IF yes, how much land is (in acres):

1. Kushkaba 12. _____

2. Sailaba 13. _____

3. Banjar 14. _____

4. Irrigated 15. _____

5. Fallow 16. _____

1.10 Are you the only owner of this land or do you own it jointly with someone else?

Only owner = 1 Jointly with others = 2 17. _____

1.11 Are you a tenant on anothers land?

YES =1 NO = 2 GO TO QUESTION 1.12 18. _____

HOW many acres of the following land do you rent?

- | | |
|--------------|-----------|
| 1. Kushkaba | 19. _____ |
| 2. Sailaba | 20. _____ |
| 3. Irrigated | 21. _____ |

1.12 Do you rent out your land?

YES = 1 NO =2 GO TO QUESTION 1.13 22. _____

HOW many acres of the following land do you rent out?

- | | |
|--------------|-----------|
| 1. Kushkaba | 23. _____ |
| 2 Sailaba | 24. _____ |
| 3. Irrigated | 25. _____ |

1.13 How many of the following animals do you own?

- | | |
|-----------|-----------|
| 1. Camels | 26. _____ |
| 2. Oxen | 27. _____ |
| 3. Sheep | 28. _____ |
| 4. Goats | 29. _____ |
| 5. Cows | 30. _____ |

SECTION II. GENERAL INFORMATION AND INFORMATION ON FALL
VERSUS JAN/FEB PLANTING.

The questions in Section II pertain to the Farmer's experience with his own wheat crops over the years and not to the Farmer Managed Trials (FMT) that were conducted this year.

2.1. This year, Did you plant any wheat in the Jan/Feb period other than that sown in the FMT plots?

YES = 1 NO = 2, GO TO 2.4

1. _____

IF yes, what proportion of all your wheat planting this year was planted in Jan/Feb?

All = 1
Three-quarters = 2
one-half = 3
one-quarter = 4
Less than one-quarter = 5
(state %)

2. _____

2.2. What were the main reasons for planting wheat this year in the Jan/Feb period rather than in the Fall?

Rainfall insufficient last summer and Fall = 1
Labour shortage last summer and fall = 2
Other (Specify.....) = 3

3. ____/____/____

2.3 This year, did Jan/Feb planted wheat out-yield your fall planted wheat?

YES = 1 NO = 2

4. _____

2.4 In the past ten years, how many years have you planted wheat in the Jan/Feb planting period?

5. _____

IF ANSWER TO 2.4 = 0, GO TO QUESTION 2.9

2.5 Did you plant the same acreage to Jan/Feb planted wheat in each of the past ten years that you have planted Jan/Feb wheat?

YES = 1 NO = 2

6. _____

2.6 IF NO to 2.5, What are the reasons for planting different acreage amounts to Jan/Feb planted wheat?

Rainfall insufficient in the summer and Fall = 1
 Labour shortage in the summer and fall = 2
 Other (Specify.....) = 3

7. ___/___/___

2.7 How many years in the last 10 years did fall planted wheat out-yield Jan/Feb planted wheat?

8. _____

2.8 When you plant wheat in the Fall period, do you use fields (bunds) that are more productive or less productive than the fields (bunds) that you plant wheat on in Jan/Feb?

More productive = 1. Less productive = 2.

9. _____

2.9 In the last ten years, how many years would you classify as being "Good", "Normal" or "Poor" agricultural years (in relation to grain and straw yield);

Good?	10. _____
Normal?	11. _____
Poor?	12. _____

2.10 Would you classify this year as a "Good", "Normal" or "Poor" agricultural year?

Good	= 1.	
Normal	= 2.	
Poor	= 3.	13. _____

SECTION III. TECHNOLOGY EVALUATION.

The questions in section III pertain strictly to the Farmer Managed Trials conducted this year.

3.1 Can you name the four treatments that were conducted in the Farmer Managed Trials on your land?

YES = 1

NO = 2.

1. _____

NOTE: Review the four treatments with the Farmer before going on. Sketch out the four treatments for the farmer and label them as they were in the farmers field.

1. No fertilizer, Local seed.
2. Fertilizer, Local seed.
3. No fertilizer, Blue Silver.
4. Fertilizer, Blue Silver.

3.2 Which of the four treatments gave the best yield?

1. No fertilizer, Local seed = 1.
2. Fertilizer, Local seed = 2.
3. No fertilizer, Blue Silver = 3.
4. Fertilizer, Blue Silver = 4.

2. _____

3.3 Which of the four treatments gave the next best yield?

1. No fertilizer, Local seed = 1.
2. Fertilizer, Local seed = 2.
3. No fertilizer, Blue Silver = 3.
4. Fertilizer, Blue Silver = 4.

3. _____

3.4 Which of the four treatments gave the next best yield?

1. No fertilizer, Local seed = 1.
2. Fertilizer, Local seed = 2.
3. No fertilizer, Blue Silver = 3.
4. Fertilizer, Blue Silver = 4.

4. _____

3.5 Which of the four treatments gave the worst yield?

1. No fertilizer, Local seed = 1.
2. Fertilizer, Local seed = 2.
3. No fertilizer, Blue Silver = 3.
4. Fertilizer, Blue Silver = 4.

5. _____

3.6 Would the treatment that you picked as giving the best yield this year be the best if there had been MORE rain?

YES = 1. NO = 2.

6. _____

IF NO, which treatment would have the best yield if there had been MORE rain?

(1,2,3 or 4 from above)

7. _____

3.7 Would the treatment that you picked as giving the best yield this year be the best if there had been LESS rain?

YES = 1. NO = 2.

8. _____

IF NO, which treatment would have the best yield if there had been LESS rain?

(1,2,3 or 4 from above)

9. _____

3.8 Which gave the greater yield: the treatment of fertilizer and Blue Silver (Treatment 4 above) in the Farmer Managed plots OR the wheat that you Spring planted in your own fields with your own local seed ?

Fertilizer & Blue Silver = 1.
Farmers Field & local seed = 2.

10. _____

WHAT do you think are the reasons for the difference in Yield?.....
.....
.....

3.9 Would you like to use Blue Silver in your Jan/Feb planted fields next year?

YES = 1. NO = 2.

11. _____

3.10 Did you find it difficult to sow the two treatments in which fertilizer was mixed with the seed in the FMT?

YES = 1 NO = 2

12. _____

3.11 Did it take more time to sow the two treatments with the mixture of fertilizer and seed than with the two seed alone treatments?

YES = 1 No = 2

13. _____

3.12 On the two plots that were fertilized, do you think that they gave enough of an increase in yield over the two plots that were not fertilized to pay for the cost of the fertilizer?

-Fertilizer with local seed

YES = 1 NO = 2

14. _____

-Fertilizer with Blue Silver

YES = 1 NO = 2

15. _____

3.13 Will you use fertilizer next year when planting your crops?

YES = 1 NO = 2

16. _____

3.14 IF NO to 3.13; Why do you not use fertilizer?

1. Not available at time of planting = 1
2. Do not have sufficient cash at planting = 2
3. Do not have sufficient credit = 3
4. The increased yield from the use of fertilizer is not enough to pay for the fertilizer = 4
5. Not enough information or experience = 5

17. ____/____/____

SECTION IV. HARVESTING

The questions in this section pertain to the Farmers entire wheat crop.

4.1 How did you cut your wheat crop this year?

Hand = 1.

Machine = 2.

1. _____

IF ALL THE WHEAT WAS CUT BY MACHINE, GO TO QUESTION 4.6

4.2 How many people assisted in hand cutting the wheat?

2. _____

4.3 How many days did it take to hand cut the wheat?

3. _____

4.4 How many hours per day were spent on cutting?

4. _____

4.5 If labour was hired to cut the wheat, what was the cost;

IN CASH:

-The per hour cost

5. _____

-The total cost

6. _____

IN KIND:

Specify
.....
.....

IF ALL WHEAT IS CUT BY HAND, GO TO SECTION V.

4.6 What was the per hour cost of a hired machine?

7. _____

4.7 What was the total cost of hiring the machine?

8. _____

4.8 What was the cost of hired labor when the machine was used?

IN CASH:

-The per hour cost of labour

9. _____

-The total cost of labour

10. _____

IN KIND:

Specify
.....
.....

SECTION V. THRESHING.

This section pertains to threshing on both the farmers field and on the FMT.

5.1 How many acres of your total wheat crop this year was threshed by;

-Hand/animal?

1. _____

-Threshing machine?

2. _____

5.2 If you had not used a threshing machine, but did all your threshing by hand/animal, how many days would it take?

3. _____

5.3 How many laborers would it take to do the threshing in the number of days that you specified in 5.2?

4. _____

5.4 Was this year the first time that you used a threshing machine on your own land?

YES = 1

NO = 2

5. _____

5.5 When was the first time you ever saw a threshing machine operate?

1. For the first time this year on my land = 0

2. In previous years (state number of years ago)

6. _____

5.6 When using the threshing machine this year, were the wheat grains badly broken by the threshing machine?

YES = 1

NO = 2

7. _____

5.7 Is the quality of the straw from the threshing machine as good as the quality of the straw when it is hand/animal threshed?

YES = 1

NO = 2

8. _____

IF NO to question 5.7, explain what the difference is.

.....

5.8 Will you rent a threshing machine on a cost basis next year to thresh your grain?

YES = 1

NO = 2

9. _____

IF NO to question 5.8, why will you not rent a threshing machine to thresh your grain next year?

-No threshing machines available for hire = 1

-The cost of a threshing machine is too high = 2

-Do not have the cash or credit available = 3

-Other (Specify

.....

.....) = 4

10. __/__/__/

SECTION VI. PRICES, PRODUCTION AND YIELD.

6.1 What prices did you receive from the market for the grain of the crops that you harvested this spring?

- | | | | |
|------------|-----------------|----|-------|
| 1. Wheat | (Rs. per maund) | 1. | _____ |
| 2. Barley | " | 2. | _____ |
| 3. Lentils | " | 3. | _____ |
| 4. Cumin | " | 4. | _____ |

6.2 What proportion of your wheat straw this year will be used for (answer in Maunds or %);

- | | | |
|--------------------------------|----|-------|
| 1. Sold in the market for cash | 5. | _____ |
| 2. Given to the Landlord | 6. | _____ |
| 3. Used for building | 7. | _____ |
| 4. For animal feed | 8. | _____ |
| 5. Other (Specify | 9. | _____ |
| | | |

6.3 If you sold wheat straw in the market, what price did you receive? (Rs. per Maund) 10. _____

6.4 How many acres did you plant to the following crops this past year?

- | | | |
|-------------------------|-----|-------|
| 1. Fall planted Wheat | 11. | _____ |
| 2. Spring planted Wheat | 12. | _____ |
| 3. Barley | 13. | _____ |
| 4. Lentils | 14. | _____ |
| 5. Watermelon | 15. | _____ |
| 6. Sorghum | 16. | _____ |
| 7. Millet | 17. | _____ |
| 8. Cumin | 18. | _____ |

6.5 What was the grain yield you received this year for the following crops? (in Maunds/acre)

- | | | |
|-------------------------|-----|-------|
| 1. Fall planted wheat | 19. | _____ |
| 2. Winter planted Wheat | 20. | _____ |
| 3. Barley | 21. | _____ |
| 4. Cumin | 22. | _____ |
| 5. Lentils | 23. | _____ |