

PKI-1017

CROP PRODUCTION CONSULTANCY
SEED WHEAT PRODUCTION, FARM MACHINERY AND CUMIN/CARAWAY

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by

TOM EWERT

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EXECUTIVE SUMMARY

Tom Ewert, crop production consultant, was hired by Mercy Corps International under cooperative agreement no. 306-0211-A-00-0961-00 with O/AID/REP, Islamabad. The objective of the consultancy was to examine three aspects of the MCI agriculture program: seed wheat production, farm machinery and cumin/caraway production. The consultant arrived in Quetta, Pakistan on October 30, 1991.

The following report consists of three major sections divided into sub-sections. For wheat and farm machinery the sub-sections describe the MCI program; report on visits to other programs; contain a brief literature review with pertinent quotes from other consultancies and reports; and make recommendations for the Mercy Corps program. The cumin section is abbreviated partly due to the recent political trouble in Baluchistan and Afghanistan and the resulting bans on travel and transport. The MCI employee who works with this program has not been able to return to the Quetta office for debriefing. The cumin program is still small and experimental so evaluation and recommendations are not as yet important.

The MCI seed wheat program is designed to help selected farmers raise quality seed for their villages. Farmers are sold certified seed and fertilizer and given extension assistance by field workers. The farmers are encouraged to trade the seed they harvest with their neighbors so good seed spreads farmer-to-farmer through their village. MCI also has a general seed distribution program but this is not done in areas where there are seed farmers. A third part of the program is variety testing. In 1992 14 varieties of wheat and 4 of barley are being compared and increased under farmer's conditions.

A planting guide is included in the report with instructions for specific activities such as field selection, planting and inspections. This has been translated into Pashtu for the benefit of the field staff. A set of recommendations is also included at the end of the section for consideration by MCI and O/AID/REP.

For the past few years, MCI has had tractors and various implements at the centers in Afghanistan. Because of the extreme shortage of draft animals and tractors in Kandahar the MCI equipment has been used by local farmers in addition to official work. Cultivation and threshing done by the equipment has been at a set rate but not enough to cover operating costs. Scheduling, maintenance and other problems have caused the program to be shut down. This consultant has made a brief study of some of the problems by visiting with other field-based organizations, manufacturers and training organizations. A list of available farm machinery is given and suggestions made for proper use and training. Also included in the recommendations are methods for

starting again as a demonstration program rather than as a rental or contracting service. Interested farmers and businessmen can observe the benefits of certain pieces of machinery and decide to invest in them. Since most tractors and implements in Afghanistan are used on many farms this method will show people which pieces may be the most beneficial. MCI staff will learn how to use this equipment properly and train others in it's use.

In the cumin section of this report the results of the first year of planting are given and visits to several research institutes are described. One MCI field worker is involved in this area but up to this time he has not been working with the cumin farmers. A brief questionnaire has been prepared for him to use in interviews with the farmers and hopefully more knowledge will soon be gained. Since caraway is a three year crop and there is no expectation of any significant results at this time, the program will continue as it is.

SEED WHEAT PRODUCTION PROGRAM

1989-90 Program

The target for 1989-90 was 50 MT quality seed production from 75 farmers. Certified PAK 81 seed was distributed to about 90 farmers in Arghastan and Daman. MCI re-purchased 42 MT seed from 18 farmers in Arghastan who produced quality seed. The farmers in Daman were turned over to Save the Children Foundation.

1990-91 Programs

Seed Production

The 1990-91 target was 175 MT quality seed from 150-200 farmers. All farmers received PAK 81 except some in Maiwand who received Pirsabak 85. The farmers in Arghastan were from the best farmers of the 89-90 program but because there is no MCI center there, after receiving the seed they got very little follow-up. In the other districts progressive farmers were selected by MCI field staff.

Seed was planted in:

<u>District</u>	Farmers		<u>Jerib</u>
	<u>Planting</u>	<u>Harvested</u>	
Dand	50	13	92.5
Maiwand	50	34	340
Shari Safa	20	8	22
Arghastan	12	--	--
Total	132	55	454.5

Seed and DAP were sold to farmers at less than the grain wheat price (2,500 and 2,700 AFS. respectively) and farmers could purchase enough for 10 jeribs of land although most got much less. Overall the average farmer purchased seed for 7.5 jerib but in Shari Safa the average was only 3 jerib. The farmers received several visits from MCI field staff and a five page planting guide written in Pastu. Spring floods and heavy rains in 1991 caused nearly half the farmers to lose their fields. The continuous rains also prevented the sowing of spring wheat and the sale and application of urea fertilizer.

Harvested seed from 1990-91 was not purchased by MCI but rather was kept by farmers and sold or traded to their neighbors. Yields were low due to the heavy rains. The average was 450 - 500 kg/jerib, according to the field staff. This would yield about 225 MT seed. [n.b. The Agricultural Survey of Afghanistan

interviewed farmers who left in 1986. The average irrigated wheat yield for 1986 (improved and local seed) in Kandahar Province was 40 seer/jerib (280 kg/jerib). For Helmand farmers (not refugees) in 1986 the average was 62 seer/jerib (434 kg/jerib). It could be expected that progressive farmers, selected by MCI, growing only improved seed with the application of both urea and DAP would have higher yields.]

General wheat seed distribution

Seed of PAK 81 and Pirsabak 85 was distributed to about 15,000 farmers. This was enough seed to cover 35588 jeribs or 7117 hectares. With yield estimated at 500 kg/jerib in 1991 this program produced almost 18,000 MT of grain.

1990-91 General Wheat Distribution

<u>District</u>	<u>No. Vill.</u>	<u>No. Farmers</u>	<u>MT Wheat</u>	<u>MT Urea</u>	<u>MT DAP</u>	<u>Est. Jeribs</u>	<u>Est. MT Yield *</u>
Arghastan	72	769	46.8	49.95	47.00	1872	936
Dand	62	1191	100.0	85.85	100.00	4000	2000
Spin Boldak	59	2526	126.3	73.70	100.10	5052	2526
Baghran	73	2013	200.0	300.00	200.00	8000	4000
Shari Safa	192	1372	100.0	42.18	99.75	4000	2000
Kajaki	151	4778	116.7	122.17	116.68	4668	2334
Maiwand	21	2462	199.9	171.40	199.75	7996	3998
Total	630	15111	889.7	845.25	863.28	35588	17794

*Yield estimated at average 500 kg/jerib production.

Farmers in this program got one half to one bag of seed (25-50 kg) and the same amount of DAP fertilizer at the prices listed above. This would be enough to plant one to two jerib. All seed distributed by MCI from FAO or USAID sources was treated with fungicide and dye so there is no incentive for people to eat it.

Wheat Variety Trial

One farmer in Maiwand was selected to do a simple variety trial. The objective of this project was to have the farmer compare six varieties under local conditions. Yield comparisons are rough but those varieties which do well over a series of years and are preferred by farmers can be selected for increase. Plot size was not the same for each variety so the estimates of yield reported below were calculated from the yield of a smaller area and extrapolated to equal kg/jerib.

<u>Variety</u>	<u>kg planted</u>	<u>Est. kg/jerib</u>
Zardana	20	913
H22-32	15	832
Khyber	35	633
Zargoon	82	396
Pirsabak 85	72	378
Blue-Silver	33	364

The farmer planted the seed on relatively poor land but was still impressed with the yield of Zardana and H22-32. Seed of all these varieties has been saved for further comparisons.

1991-92 Program

Seed Production

The target of the program in 1991-92 is to have progressive farmers produce seed and share this with their neighbors. This group of farmers gains skill at growing pure seed and are identified in their village as recognized seed growers. This will create a local supply of quality seed and reduce the need for additional inputs of imported seed. About 200 farmers purchase a small amount of new seed for this purpose, generally one or two farmers per village. There is no general distribution of wheat seed to other farmers in these districts either by MCI or other organizations. This is done to encourage farmers to get their seed from the MCI contracted seed grower. MCI field staff visit the seed farmers regularly to ensure proper management.

The table below lists the number of farmers in each district who are involved in this program, some are in their second or third year as seed growers although they may not have had a harvest last year due to the rains. Again farmers in Arghastan are included although there will probably be little extension work done. Farmers in Panjwai may also be included but initial contact is being done by another NGO.

<u>District</u>	<u>Farmers</u>	<u>2-year</u>
Shari Safa	50	12
Dand	50	18
Maiwand	50	30
Arghastan	15-25	12 (3-yr)
Total	165-175	72

Farmers are again being sold certified PAK 81 in Kandahar but this year Shari Safa farmers will get Pirsabak 85. This was done

not by design but rather due to inadequate seed amounts and some mix up. The smaller amounts of basic and pre-basic as well as different varieties listed below come from either FAO or the 1990-91 variety trial. This seed is going to farmers on a different basis than described above. The MCI area coordinator will manage these varieties on the farmer's land. At harvest MCI will keep 2 kg of seed for each kg planted.

The following amounts and varieties of seed were distributed:

<u>District</u>	<u>Variety</u>	<u>Amount (MT)</u>
Shari Safa	Zarghoon - basic	2
	Pirsabak 85	15
Dand	PAK 81	35
	PAK 81 - basic	10
Maiwand	Zarghoon - p.basic	4
Arghestan	Blue-Silver - p.basic	1.5
	Faisalabad 83	.1
	Faisalabad 85	.1
Total		67.7 MT

Since 40 jerib can be planted from 1 MT seed and at least 500 kg/jerib yield is expected this should produce at least 1000 MT quality seed. In addition, this year 184 MT of DAP are being provided to Kandahar to support the farmers who have traded for the improved seed grown by seed farmers in their area last year.

General wheat seed distribution

General distribution was expanded in Helmand, Zabul and Urozgon provinces this year. Seed was delivered late and planting is continuing. Details of the distribution will be collected later but plans are described below.

The price of seed is 5500 AFS./50 kg and DAP is 8500 AFS./50 kg for a total of 14,000 AFS. to plant 2 jerib. Again, this is less than the current market rate for food grain wheat. This partly due to the policy of setting the price for seed and DAP in the summer before distribution begins. Then because of the increase in the rate of exchange between Rupees and Afghanis and rise in the price of food grain, the cost of seed and fertilizer appear to be subsidized.

1991-92 General Wheat Distribution Plan.

<u>Province</u>	<u>District</u>	<u>Variety</u>	<u>Quantity</u>	<u>Jeribs</u>
Urozgon	Terincot	Pirsabak 85	50 MT	2000
		PAK 81	25.5	1020
	Chora	Pirsabak 85	15	600
		Zamindar	2	80
	Khas Rozgan	Pirsabak 85	30	1200
Zabul	Mezan	Pirsabak 85	20	800
		PAK 81	34.7	1388
		Zamindar	.9	36
		Zarghoon	.4	16
Kandahar	*Panjwai	Pirsabak 85	20	800
	*Maruf	Pirsabak 85	15	600
	*Arghandab	Pirsabak 85	15	600
Helmand	Marja	PAK 81	37.7	1508
	*Marja	Pirsabak 85	20	800
	Darweshan	Pirsabak 85	100.5	4020
	*Darweshan	Pirsabak 85	40	1600
	Kajaki	PAK 81	53	2120
	*Shamalan	Pirsabak 85	40	1600
TOTAL			519.7 MT	20788 jeribs

*Distributed jointly by MCI and DAI field staff.

Wheat Variety Trial

This year 14 varieties of wheat and 4 varieties of barley are being tested at 4 sites. The project is similar to 1990-91 in that farmers are given the seed and fertilizer and asked to plant the seed under their local conditions. An MCI Area Coordinator with a degree from the agriculture faculty of Kabul University is overseeing the project. Each variety at each site will be planted on 1 jerib of land so better yield comparisons will be possible than in 1991.

In addition to the farmer in Maiwand who participated last year, sites are being selected in Terincot of Urozgan province, Shari Safa of Zabul and Darweshan in Helmand province. These four sites will provide differences of elevation, land type and climate. The larger quantities of some of these varieties mentioned above are also being increased at these sites under management of the Area Coordinator.

Farmers who receive seed grown by MCI seed growers still do not have the fertilizer for proper cultivation. Since these varieties were bred under high input conditions they are not expected to do

as well without fertilizer. A simple trial could be planned to see if any of these varieties are better adapted for lower inputs. One third of a plot could receive the recommended rate of urea and DAP. Another third would receive only urea and on the last third no fertilizer would be applied. Accurate yield measurements would be necessary. This would provide some understanding of how these varieties would do under farmer's constraints. A simple trial outline is included in Annex 1.

The varieties included for this year are:

	<u>Variety</u>	<u>Source</u>	<u>Type</u>
Wheat	Alcozana	FAO	Winter x Spring
	Blue-Silver	MCI	Spring
	Cartaya	FAO	Winter x Spring
	Dartanan	FAO	Winter x Spring
	Faisalabad 85	FAO	Spring
	Faisalabad 83	FAO	Spring
	HD 22-32	MCI	Spring
	Kyber 87	MCI	Spring
	PAK 81	FAO	Winter x Spring
	Pirsabak 85	FAO/DAI	Winter x Spring
	Punjab 85	FAO	Winter x Spring
	Zamindar	FAO	Spring
	Zardana	MCI	Winter x Spring
	Zarghoon	FAO	Winter x Spring
Barley	Arab White	FAO	Winter
	CBRA 23	FAO	Winter
	CBRA 33	FAO	Winter
	Welfajre	FAO	Winter

Training of Extension Field Staff

MCI field staff have participated in various trainings to improve their agricultural and extension skills. Eight persons attended a two-month training course in wheat production and field extension sponsored by UNDP at the Baluchistan Agricultural Training College in Quetta. Staff have also been trained by the Experiment in International Living and the FAO. Currently a group of field workers are at the Swedish Committee for Afghanistan's plant protection training and discussions are being held with Development Alternatives Inc. for MCI staff to attend parts of their upcoming training.

This process of training seems beneficial to the field staff, particularly those with less experience. There does still need to be some evaluation of these trainings, both for content and appropriateness for MCI staff. Coordinators of the programs which have previously trained MCI workers also appreciate feed-back and

help in planning for future programs.

Record Keeping

Various forms and reporting procedures are used by MCI to monitor these programs. A good system has been set up for data entry and organization of all the information. However there is always a need for better information to be reported to the office. Yield estimates are often just rough guesses. Forms may be incomplete or filled out much later than the field visit. The format is also in English although the employees feel most comfortable in Pashtu.

The field staff's time should be spent in the field, not filling out forms, but this also must be done for proper monitoring of the program. It might be worthwhile to re-examine some of the reporting forms used and to remind the field staff of the necessity of properly filling them out.

A revised format for the wheat seed farmers field report is included in Annex 2. This form has been translated into Pashtu and both versions will be given to the field workers.

REVIEW OF VISITS TO OTHER PROGRAMS

Wayne Baumann, UNDP, Peshawar

UNDP had a small increase program north of Quetta last year. He planted 6 varieties of certified seed and rouged it personally two or three times. This would be equivalent to breeder's seed. He grew 500 sq.meters of each and gave half to MCI, half to Save the Children. This was to increase the seed but it was not really useful for that purpose because that needs to be done inside Afghanistan. This kind of project is actually only good for teaching the staff about keeping the fields clean and rouging. The idea is to train the field staff who train farmers. Baumann doesn't think it is important for MCI to do variety trials, certainly not real professional ones.

It would be good to see the fields which will get the certified seed the year before the farmers plant the field. The fields must be free of wild oats. This weed is difficult to control and to clean out, either before harvest or in the seed after harvest. Volunteer wheat is usually not a problem but this may vary with the area. Selection of weed-free, oat-free villages and fields the prior year would be good.

FAO/UNDP changes villages every year to spread their seed around. There is no limit to the size of farmer who gets the seed but they suggest 5 to 10 jerib for seed production.

Zarghoon and Zardana are good new varieties. These were selected from PAK 81, or at least from the same CIMMYT source by Sher Mohammad at Sariab. Baumann heard of a farmer who grew these two and was offered 2 kg for 1 kg on the seed and wouldn't take it.

It is not a problem to promote the use of only one variety over the whole area. In fact a mono-crop reduces bird damage. If all the fields and varieties mature at the same time then the damage is spread out.

Farmers like the color (white) and size of Blue-Silver seed. They would like to grow a combination of Blue-Silver for their own family use and the higher yielding PAK 81 for profit. Blue-Silver makes whiter bread which they prefer.

Anthony Fitzherbert, FAO, Islamabad.

FAO seed wheat is produced in the Punjab by Punjab Seed Corp. and Cargill. They get basic and pre-basic seed to farmers and this year to MCI. There is no official problem getting seed from these sources into Afghanistan but increasingly there are local or

provincial problems.

He recommends changing villages every year. Farmers shouldn't need more than one year of new seed input. We should get the certified seed to new farmers each year and let them arrange trades with their neighbors. It is important that the neighbors have food wheat to trade for the seed. This could be from WFP or locally grown wheat. He also said even if you move villages to spread the seed around, you should stay in contact with the old farmers. These farmers may need new seed again in a few years.

A buy-back system won't work because the farmers won't sell you their best seed. They will keep it and sell the second quality. Fitzherbert suggests a value added benefit to the growers in their trades with neighbors.

The standard varieties for Afghanistan may not be the best varieties in Pakistan. He is in favor of limited variety testing.

Don Oelsleigle and Noori, DAI, Islamabad.

DAI has a silk-screen poster to put up in villages to promote modern variety use. They also promote the community benefit in exchanging seed by the growers with their neighbors since the system of profiting on the sale of seed could be seen as anti-Islamic. The DAI plan is for farmers to distribute the seed in the second year but this is not working. Their farmers always want more new seed. This may be a problem of their field workers.

DAI trains wheat farmers in Peshawar.

Dr. Azam Gul, Swedish Committee for Afghanistan, Peshawar.

In 1989 over 5000 MT of certified seed was offered to NGOs through FAO/UNDP. 3800 MT went inside. In 1990 about the same amount (less than 4000 MT) went into Afghanistan.

Starting in 1987 Dr. Gul collected advanced lines and got farmers to test them in formal trials in their fields. Based on the results of 10-12 good farmers, he recommended PAK 81, Blue-Silver and Pirsabak 85. There was enough certified seed available of the first two. Since it is costly to produce seed here, transport and store it, they decided to start production inside Afghanistan. Farmers there can produce good seed even if it is not certified.

SCA has field centers to help with the technical side of rouging, proper planting, water and fertilizer. Last spring FAO/SCA trained 37 people from the NGOs for two weeks.

They discourage free distribution of seed. SCA signs a contract

with the farmers. For each kg of seed they get at planting the farmer will give back 2 kg at harvest (1 kg for the seed and 1 kg for the fertilizer, extension services, spray, etc.). The seed SCA gets back is given free to poor farmers in the same village to plant. The poor farmers don't get fertilizer or sign a contract. Every year SCA moves to new villages. The farmers are encouraged to exchange the seed they grow. He says there is much friendship and cooperation among Afghan farmers.

The field centers choose progressive farmers to get the seed wheat. They usually work with medium-sized farmers who have 5-15 jerib or land for wheat. The farmer gets enough seed and fertilizer for part of his land depending on the size of the farm. They don't get enough for their whole farm. Machinery and cultivation are the farmer's business. If an SCA tractor is in the area the farmer may use it and be charged enough for maintenance. They do not choose large farms to get seed wheat because SCA couldn't supply them enough seed.

In Khost, which is liberated this year, all farmers returning to their farms received 25-50 kg seed after they arrived.

Weeds are a big problem and control is important for seed production. SCA recommends herbicides and does training in the responsible use. IRC cooperates for the expenses. The trainees also get practical experience on the SCA farm in mixing and spraying. Chemicals are available in Pakistan but must be ordered in advance, maybe two months.

Dr. Rahman Khan, General Manager, Cargill Pakistan Seeds, Lahore.

Cargill produces seed wheat for FAO (300 MT) and DAI (500-700MT). Varieties they grow are PAK 81, Blue-Silver and Pirsabak 85. They give basic seed to progressive farmers in the Punjab and procure it back with a premium. He does not recommend we work with pre-basic seed because it is too expensive and farmers will not know how to take care of it.

Cargill farmers are 100% mechanized, even with combines for harvesting. Their farmers are rich and progressive. All have tractors, drills, sprayers, combines.

Cargill does not produce commercial wheat seed for Pakistan, only seed for DAI and FAO. They do commercial maize, sunflowers and sorghum seed.

REVIEW OF WHEAT LITERATURE

The Agricultural Survey of Afghanistan. Third Report, Crops and Yields. The Swedish Committee for Afghanistan, August, 1989.

"Irrigated wheat is the principal winter crop throughout Afghanistan and typically occupies 90% or more of the winter irrigated area. It is sown from October immediately after the harvesting of maize, rice, or other summer crop, and may continue up to late November in some years though mid-November is the normal practical deadline in most areas. It is harvested from May up to the end of August in higher elevations. Rainfed wheat is usually grown as a spring crop and is usually sown in March or April and harvested from the beginning of June to September.

"Before the war improved irrigated wheat varieties, particularly Mexipak, Qafkaz, Besostaya, Chenab, and Bakhtar, had been widely introduced for the irrigated crop. Improved varieties such as E1314 and WW15 were also available for the rainfed crop but were not so widely distributed. The popularity of these improved varieties principally depended on their ability to produce higher yields (with fertilizer), and to their resistance to rusts.

"The problem of smut was occasionally serious though this could be easily controlled by seed dressing, though by 1978 this was still not very common.

"The Survey shows that the use of 'improved' wheat seed for the irrigated crop varied widely from province to province, and that the national figure in 1978 was 52%...the highest provincial figure was Helmand, in the South-West with 88%... Very few farmers used improved seed for the rainfed crop.

"Changes in the three components which contribute to total production of irrigated wheat - the proportion of farmers growing the crop, the average area under the crop on each farm, and the average yield - may seem to be unremarkable. For farmers who stayed, on a national weighted average basis, the proportion of farmers growing the crop fell by 7% from 84% to 78%; the average area per farm fell by 23% from 12 jerib to 9 jeribs; and the average yield fell by 26% from 69 seers to 51 seers/jerib. However, these three factors compounded together result in a 45% decrease in average production per farmer. For farmers who stayed the fall in production was 52%. The greatest effects of the war on overall irrigated wheat production seem to have been in the North and South-West zones where there were falls of 55% and 61% respectively. It should be borne in mind that these

figures refer only to those farmers who were still farming in Afghanistan in 1986 and 1987 and do not take account of total agricultural production which, taking account of abandoned farms, would show a greater reduction.

The following information on wheat production in Kandahar province is from refugee farmers interviewed in camps in Pakistan.

"Almost a fifth of those who left had between 20-30 jeribs. The remainder are evenly split between bigger and smaller farms. Few farms were bigger than 100 jeribs. Almost all these farms were totally irrigated, with less than 5% of farmers having rainfed land.

Ninety percent of the farmers who left in 1987 grew wheat on an average of 22 jeribs of land. Average wheat yield fell by 39%.

"The principal causes of these low yields seem to be draught power and (according to informal reports) irrigation. The use of fertilizer has also declined.

"Farmers here are starting from such comprehensive devastation that every input has to be included in the rehabilitation phase. The enormous farm power problem (oxen losses were 87%) has been discussed in the last report. Other priorities are irrigation, seed, and fertilizer.

The Agricultural Survey of Afghanistan. Fourth Report, Fertilizer. Swedish Committee for Afghanistan. February, 1990.

The following is a summary of guidelines for aid agencies.

"For irrigated wheat plan on a urea:DAP ratio of 35kgs : 25kgs/jerib. Higher N rations are valid only in special circumstances and may be harmful.

"Don't ignore the other crops such as rice, maize, barley, potatoes and grapes. They are important consumers of fertilizer. Farmers will anyway apply fertilizer to these crops whether or not it is planned by the aid agencies for, as an example, the wheat crop.

"Provide balanced fertilizer packages...Reduced phosphate application may not result in an immediate dramatic yield decline, but will limit the usefulness of urea over time.

"Don't give fertilizer free or with free credit, except in special cases, e.g. returning refugees for the first cropping season only. Exchange fertilizer for money or produce, perhaps with seasonal credit. Transport may be

subsidized, partially or fully. Price support is also permissible as long as it has an objective e.g. to increase the use of phosphate by decreasing its retail price until the [Value:Cash Ratio] is well above 2. Most farmers need seasonal credit for fertilizer and, on average, 50-60% of fertilizer purchases in developing countries are made on credit. Fertilizer marketing is therefore to a large extent dictated by credit availability. In Afghanistan's "liberated" areas this is normally provided by the retailer.

"Try to procure fertilizer in Afghanistan so that local private supply mechanisms are enhanced and not damaged. Where this is impractical, procure fertilizer either through the UN, or locally with the agreement of the Pakistan Government. This is because some fertilizer in Pakistan (not urea) is subsidized, and all has a foreign exchange element. The Pakistan Government would probably require compensation from NGOs for this subsidy and foreign exchange cost if large amounts of fertilizer are purchased on the free market in Pakistan.

**The Agricultural Survey of Afghanistan. Fifth Report, Seeds.
Swedish Committee for Afghanistan. June, 1990.**

This report is an attempt to set policy for seed production and certification inside Afghanistan by the ASA which has been officially sanctioned by ACBAR for this purpose.

Quotes from the summary:

"The Survey shows, first, that 43% of farmers who stayed in Afghanistan, and 52% of those who left, used improved varieties of irrigated wheat seed in 1978. For those who stayed and used improved seed, just under half said they had obtained it from Government, ... 38% used their own previous year's seed, and 16% obtained it from other farmers. These proportions were similar for farmers who eventually left.

"Between 1978 and 1987 there was a substantial fall of 27% in the proportion of farmers using improved seed, from 43% to 31% for irrigated wheat for farmers who stayed. The fall was greater for those who left - 88%.

"The survey results seem to show that the majority of farmers obtained their improved seed from Government and not from other farmers or from their own previous year's crop. In our opinion these results do not reflect the real situation. Farmers were asked the source of their seed - own, Government or neighbor - and often replied "Government" because that had been its original source. It may often have been colloquially known as "Government" seed, even though

they actually obtained it from their neighbors in most instances, or had used their own previous year's seed which they had originally obtained from Government. In that respect we believe that Afghanistan is no different from Pakistan where over 90% of improved seed is distributed from farmer to farmer or is re-used from the previous year.

D. Seed Policy

"The experience of other developing countries and of Pakistan is that inter-farmer exchange of improved (wheat) seed is the most common method of distribution, and this is the basis of the policy now proposed for Afghanistan. An additional benefit of this policy is that it moves towards self-sufficiency for the Afghan farming community, and away from dependency on aid agencies in Pakistan.

"It follows from this that aid agencies working in Afghanistan should not attempt to widely distribute improved or certified seed to "end users" directly. Not only is this a logistically massive task which is practically impossible, but in development terms it may not be fully sustainable. Rather, aid agencies should deal directly with selected seed growers in Afghanistan. Seed growers, as the link between the "end users" and the aid agency, would be leading farmers in an agricultural community. The aid agency would deliver to them basic seed, extension supervision, seasonal credit, and seasonal inputs not locally available...The amount of basic seed needed to provide 2% of total seed requirements, a realistic target is ... 2,750t. This is somewhat less than the 3,500t delivered cross-border for the 1989/90 planting season. On the other hand, it is more than the total national production of the national seed company in 1978.

"The seed grower would then sell the seed on the free market, and the NGO would not become involved in this except insofar as the extension agent would organize field days on the seed growers farm, and other methods, in order to stimulate demand for improved seed.

"Given the present political situation, it is premature to re-introduce a seed certification discipline on farmers. In most countries this is the responsibility of Government. Added to this, most Afghan farming communities are close-knit and self-reliant so that a farmer generally knows not only the seed's farm of origin but also the condition and subsequent treatment of the crop before he bought it. This means that seed growers have a local incentive to produce good and clean seed. However, apparently there is already a significant level of inter-valley, inter-district or inter-provincial distribution of seed, so a seed certification service would be beneficial as soon as this does become

practical.

"On the basis of the above policy, the proposed strategy for implementing agencies is as follows:

"The production of improved seed should be by farmers of the area in which the aid agency is working. These seed growers should be provided with basic seed approved by the ASA, and produced, for the present, by a Pakistani authorized grower (e.g. PSC or CSP) or the SCA Department of Agriculture.

"The agency should charge the farmer for the improved seed at 125% of the local grain price. This may be reduced to about 110% of the grain price when there is an alternative source of improved seed close by as would occur after the first year of the project. Usually 110-125% of the grain price will allow the farmer a 2:1 benefit:cost ratio which is a proven incentive in this situation. This simple rule, by not discriminating against expensively remote areas, also allows equitable distribution of improved seed, an important objective. Seasonal credit is permissible. Giving the improved seed free is not advised as it debases the value of the seed as perceived by the farmer, and does not provide him with an incentive to actually plant it rather than eat it or sell it. Improved seed sold at the grain price in Afghanistan before the war was often misdirected.

"Other inputs such as fertilizer and herbicide may also be provided on seasonal credit, though if the input is available locally only the credit, if needed, should be provided.

"Extension, to ensure that correct and timely inputs are applied, and particularly that the crop is properly weeded and rogued, and stored separately, and finally chemically treated, is most important. Without good extension, a seed programme can easily deteriorate to a situation whereby weeds, diseases, and off-types are efficiently spread throughout the farming community. Extension should be provided free of charge. A ratio of one extension agent to about 100 seed growers is a good target, depending on the area and the average size of farm. (The provision of good extension through well-trained extensionists who have specialist training in seeds is crucial to any program. It is better to provide a small amount seeds and ensure strong extension services than to provide a larger amount of seed and a weak extension service. Training courses in extension are available in Peshawar through, for example, the SCA Department of Agriculture supported by UNDP and FAO).

"Close to harvest, the extension agent should organize field days to which neighboring farmers are invited to look at the

improved crop. The use of posters to advertise these and the seed crop is also useful in generating demand for, or at least awareness of, improved seed.

"There need be nothing else in the contract, verbal or written, between the farmer and the NGO. If the NGO wants to buy back a certain proportion of the crop for distribution elsewhere, then it may do so in kind or in cash. But it is not necessary, for example, for the NGO to buy for a guaranteed minimum price a guaranteed proportion of the crop for redistribution, or to demand a higher proportion from larger than smaller farmers. In other words the NGO should not aim to undertake the distribution of the seed grower produce itself. The experience in Afghanistan over the last three seasons is that, provided the extension agent has done his job well, the seed will, figuratively speaking, sell and distribute itself. In development terms it is better that farmers purchase directly from the seed grower at free market prices than from the NGO.

"Seed rates where improved seed is used should be less than the generally higher rates used by farmers using unimproved seed, i.e. with improved seed, 4-5 seers/jerib in cooler areas, and 3.5-4.5 seers/jerib in warmer areas.

"All distributed seed should be chemically treated and dyed. These two should always go together. However, if it is not chemically treated, obviously it should not be dyed (and vice versa). Chemicals and dyes are available on the market in Pakistan, and seed dressing drums can be manufactured locally. Chemical treatment and dyeing should be done as close to the distribution/sales point as possible. Normally, this is logistically easier than transporting treated wheat. Initially, the NGO's extension agent should do the seed treatment (of the basic seed brought from Pakistan) locally and make a small charge to cover costs or add this charge to the credit package. After the first seed crop, chemical and drums should be made available to the seed grower on credit and the seed grower should also charge his customers for the treatment service to recover his own costs and to repay the credit.

"Seed is most conveniently distributed in 25-35kg bags. These amounts are normally sufficient for one jerib in warmer and cooler areas respectively. Extension agents should ensure that seed growers do not take more seed than they can manage to look after adequately under the more intensive management (in terms of fertilizer, labour, weed control, etc.) that improved seed demands.

"Finally, aid agencies, particularly NGOs, should ensure that seed which is claimed to have been tested and reliable

for Afghanistan, is in fact so for the particular area in which they are working. At the time of going press, varieties of vegetable seed were being promoted in Peshawar and Quetta for distribution through NGOs to farmers in Afghanistan (the whole country, no less) on the basis of recommendations from the agricultural research institute at Darulaman. Given the agro-ecological diversity of Afghanistan, and Darulaman's poor pre-war record, we urge caution. It would be better to carry out local trials and keep farmers' confidence than to widely distribute seeds claiming them to be proven. We have little doubt that the vegetable seeds being distributed will grow but that is not the point. First, many Afghan farmers are themselves excellent at making their own selection of local varieties and of producing vegetable seed. These farmers should not be discouraged, but rather included in projects to produce local vegetable seed. The principles that have been discussed in this report apply equally to vegetable seed. Second, yield of "improved" seed must be shown to be better than local varieties. Thirdly, quality, a highly subjective matter, should be tested.

"The conclusion for Afghanistan is that whether or not it is feasible or desirable to transport full annual seed requirements for all farmers across the border and distribute it to end-user farmers, most farmers prefer to obtain their improved seed for the first time from other farmers and depots, and moreover they will be persuaded to change to new varieties by these other farmers...The strategy therefore must be to provide basic seed to leading farmers in all parts of the country and rely on them to increase it and distribute it.

"However, at present several NGOs and other aid agencies give improved seed free to farmers. In our opinion this is the wrong strategy for several reasons. First, if it is brought in from Pakistan it costs a lot in money and effort to get it to the end user. Second, it goes against the farmers natural propensity to buy from and be influenced by neighbouring farmers. Innate farmer-to-farmer trade should be encouraged. If the Pakistan experience is anything to go by there will be a proportion of farmers who would accept improved seed from neighbors but not from any kind of officialdom. Third, as happened before the war, seed sold at the grain price or less may be sold to the millers or on the free market.

WHEAT VARIETIES

This report ends with a description of a number of wheat varieties which are recommended for Afghanistan. They are

summarized here.

PAK 81 is the primary variety for irrigated areas at lower elevations. It is the most popular variety in the Punjab. It is not cold tolerant and can be damaged by winters above 1800 m. **Pirsabak 85** is from a similar genetic background to PAK 81, but is marginally better. It is also suitable for lower elevations, less than 1800 m. **Khyber 87** is a new variety which has yielded poorly but has good resistance to rust. For this reason it is still being increased by FAO. **Bezostaya** is a winter wheat of Russian origin released in Afghanistan around 1975. It has good yield, winter hardiness, stability and moderate disease resistance and is recommended for irrigated areas above 1800 m. There are problems with this variety, however, since it is awnless, the grain is red, it is late maturing and the straw is too coarse for animal feed. **Zarghoon 79** was developed in Baluchistan and is still being tested. It has some susceptibility to rust. **Carthya**, or VFO-12, is a Spanish variety which has performed well and is being increased. **HD 2232** is a spring wheat from India which can be planted in the fall in the South. **Blue Silver** is called Sonalika in India where it is one of the most popular varieties in the Punjab. It is recommended for rainfed areas of Southwest Afghanistan where it's susceptibility to rust will not be a problem. It is also an early maturing variety so has an advantage in double cropping systems.

The Agricultural Survey of Afghanistan. Eleventh Report, Regional Farming Problems. The Swedish Committee for Afghanistan, March, 1991.

Constraints to farming in Afghanistan vary somewhat with the province but in general are the lack of irrigation water, lack of seed, war effects and lack of fertilizer.

Baumann, R. Wayne. 1990. Seed Production Guidelines and Technical Standards for Afghanistan. UNDP, Sept. 16, 1990.

Baumann, R. Wayne. Wheat Production in Afghanistan. UNDP.

These are two good sets of guidelines for seed production. They can be used in training and have been incorporated into the following instructions which can be followed by field workers and farmers.

SEED WHEAT PRODUCTION PLAN

The following recommendations will help ensure high quality seed wheat production. They are taken from several documents by Wayne Baumann (UNDP), the report on seeds by SCA and background knowledge. The recommendations do not have to be followed exactly, given the existing conditions in Afghanistan but they should be attempted. There should not be too great a reduction in standards. These guidelines have been translated into Pashtu and are attached in Annex 3. Also to be consulted are two sets of instructions in Pashtu written by Eng. Rahmatullah, MCI Agriculture Division Head. His instructions were prepared for farmers in the MCI general wheat distribution and seed wheat programs and are on file in the MCI office.

Instructions

1. Select **progressive farmers** for seed multiplication. Special care is needed which will mean extra work for the farmer from beginning to end.
2. The **extensionists** should help the farmer choose during the previous year which fields will be planted with certified seed to ensure that there are not excessive weeds or volunteer wheat.
3. It would be best for seed purposes if the field was either **fallow** or had a non-cereal crop, i.e. alfalfa, clover, vegetables, the year before. Corn can easily be rogued but oats, barley and wild oats are more difficult. Other varieties of wheat are the most difficult to detect and remove.
4. If the farmer has grown the **same variety of wheat** from certified seed the year before in the same field it can be used again.
5. A field which grew a legume or **alfalfa**, either for fodder or green manure, the year before will yield the best seed.
6. Seed fields should be isolated from other crops, especially other varieties of wheat, by a **border** of at least 2 meters (6 feet). Alfalfa or clover could be used as a border crop if it is cut and removed before wheat harvest. A border pass of wheat on each side of the field could be cut earlier for food grain.
7. No seed wheat field should be within 150 meters of other wheat fields in which **loose smut infection** is 0.1% for basic seed or 0.5% for certified or "improved" seed. Field staff and inspectors should carefully look at all surrounding wheat fields.
8. **Pre-planting irrigation** is recommended if possible. This should be done before cultivation.

9. Cultivation should be done as deep as possible. This would mean using a chisel plow or a moldboard plow. The idea is to break the plowpan without damaging soil structure. **Deep plowing** enhances yields by helping soil aeration and reducing weeds.

10. Wheat should be planted in a medium to fine **seed bed**.

11. **Fertilizer application** should be done prior to or during planting. DAP needs to be incorporated into the soil for proper utilization. One half the recommended rate of urea should also be applied at this time and incorporated with the seeds.

12. Recommended rates of fertilizer for irrigated conditions are:
Urea 210 kg/ha or 42 kg/jerib or 6 seer/jerib
DAP 80 kg/ha or 16 kg/jerib or 2.3 seer/jerib
[Rahmatullah recommends 37.5 kg/jerib urea and 25 kg/jerib DAP.]

For rainfed conditions only 2/3 this amount of fertilizer is recommended. Note that only one half the urea should be applied in the fall but all of the DAP.

13. Certified seed should be treated with **Vitavax** or other fungicide and a dye. This is done to prevent bunt and loose smut diseases. Treatment should probably be done by the extensionist before the farmer gets the seed. The proper rate for Vitavax is 200gm/100 kg seed. Instructions from the manufacturer for seed treatment should be carefully followed. Large amounts of seed need special equipment for treatment. Smaller amounts can be done in a large *khhom* or *mangai*, a country water jug.

Seed received from FAO should all have been treated. Transportation of untreated seed is safer and easier and it stays viable longer. Treated seed is not safe to eat.

14. If the seed is not officially "certified", has been exposed to heat or is older than 1 year a **germination test** should be done on each batch. Germination should be 85% or better or seed rates should be increased.

15. Recommended **seed rates** for irrigated conditions are 120 kg/ha or 24 kg/jerib or 3.4 seer/jerib. Seed rates should be increased if germination is less than 85%. Under rainfed conditions the seed rate is less. Under 'primitive' sowing conditions the rate should be increased. [Rahmatullah recommends 20-25 kg/jerib seeding rate and more for colder conditions.]

16. The optimum **planting period** for irrigated wheat is October 15 to November 30 for most of the MCI work area (800 to 1800 meters elevation). For lower land, wheat can be planted up to December 15 and for higher elevations (above 1800 meters) planting should be finished by October 15. [Rahmatullah recommends planting PAK 81 between October 10 and November 20.]

17. **Line sowing** is the preferred method of planting for seed production. Seeds should be placed 2 inches (5 cm) deep in a line or furrow. This simplifies weeding and roguing. A mechanical drill would be the ideal way of planting but understandably is not preferred by farmers. Baumann suggests line sowing using the local country plow and bullocks, a time consuming job, as a good alternative to the mechanical drill.

18. Either planting method should leave a **level field** to facilitate irrigation.

19. If possible the field should be **irrigated** once in the fall about 20 days after emergence of the wheat seedlings.

20. The **control of weeds** is important, and the fields should be weeded, preferably by hand. However, given the labor shortage this can be done with chemical sprays if they are available.

Weeding should be done soon after it warms up in the spring while weeds and the wheat plants are still small. Recommended chemicals and rates are:

2,4-D or MCPA @ .5 pt./ac = .625 l/ha = .125 l/jerib

Safety in the use of chemicals can not be over stressed. Carefully follow the manufacturer's label.

21. The remaining urea should be **top dressed** in the spring. This can be done at one time or twice but should be followed immediately by irrigation. Urea should be applied when the plants are tillering (forming large bunches at about 8 inches tall) and again at flowering. Urea needs to be watered into the soil as soon as possible after broadcasting to prevent loss to the air.

22. **Irrigation** should be given in the spring at least 3 times. Critical stages of growth when the plants need water are at tillering, flowering, and grain filling.

23. **Roguing** or the removal of undesirable plants, is necessary at least once before the plants flower. Weeds, different cereal crops and off-types or different varieties of wheat should be pulled up and removed. The field should be carefully walked through by the grower and each part closely rogued. It may seem that valuable plants are being lost but the quality is worth the effort.

24. Field staff should inspect all seed production fields at flowering time and look for weeds, other crops or varieties and loose smut as well as general field appearance. This is the critical time for **loose smut** as it is spread to other plants and fields now. They should also look at neighboring fields for smut as the small spores are carried on the wind and can infect a seed field from as far as 150 meters away (or further). Field staff

should warn growers at this time if further roguing is necessary to meet "improved" seed standards.

25. See the following note (after no. 35) for **specific inspection procedures** (from R.W. Baumann, Seed Production Guidelines and Technical Standards for Afghanistan.)

26. Further **roguing** is necessary as the fields ripen. Plants that mature earlier or later, or are taller or shorter than the rest of the field should be pulled and removed.

27. Field staff should do a **second inspection** at harvest. They should look at the purity of the variety as well as for weeds and other crops. Again the specific inspection procedures should be followed.

28. Extensionists may want to organize a **field day or farmer's rally** prior to harvest to explain to neighbors that this seed field has received special attention. They should encourage community interest in this project and farmer-to-farmer exchange of this seed.

29. The field should be **harvested** when the grain is mature and ripe. The extension field staff should be present as well as neighboring farmers who wish to purchase some of the seed. As suggested above, a border pass on all sides should be cut and kept separate from the seed wheat. Care should be taken that the "improved" seed plants are kept separate from other varieties and groups of wheat before threshing.

30. A **crop cut** can be taken from a representative number of fields to determine yield/jerib or hectare. A one meter square should be marked off and cut after walking part of the way into the field. Two or three sample cuts scattered around the field are best but one good sample from an average section of the field is better than nothing. The plants should be cut and bundled separate from the rest of the field. This sample should be threshed, weighed and recorded immediately. The grain can then be mixed in with the rest of the harvest. For yield/hectare multiply the sample weight in grams (or kg) times 10,000. For kg/jerib divide yield/hectare by five. [See also Annex 1.]

31. A mechanical **thresher** is recommended for seed wheat production. MCI could make this available to seed growers at nominal cost. The machine should be carefully cleaned out (while it is not running) so no loose kernels, heads or straw remains from the previous jobs and varieties. This is a potential source of contamination of the pure seed.

32. **Care** should also be taken during further drying, cleaning, bagging, labeling and storage that this seed is kept separate from other varieties.

33. MCI extensionists and neighbors should "certify" at harvest that this seed is distinctive and has special characteristics. Neighbors and other farmers may want to purchase seed at this time or exchange it with their own grain.

34. For official certification purposes a germination test is done after harvest to guarantee at least 85% germinability.

35. The storage of this special seed should be done by the farmer in a clean, dry room under conditions where it will not be mixed with other varieties or be exposed to heat, insects or rodents. The storage room can be sprayed with Malathion at recommended rates if grain weevils are present.

Note: Inspection Procedures. (from: R.W. Baumann, UNDP, Seed Production Guidelines and Technical Standards for Afghanistan)

Specific tolerances (applied in field inspections)			
<u>Contaminants</u>	<u>Foundation</u>	<u>Certified</u>	<u>Improved</u>
Offtype varieties (heads)	.05%	.30%	.30%
1 Other crops (heads) (oats and barley in wheat)	.01	.05	.05
2 Noxious weeds (panicles) (wild oats, <u>Avena fatua</u>)	.01	.02	.02
3 Seed borne diseases (heads) (loose smut)	.10	.50	.50

Inspection Procedure

- 1) The inspector should count, based on his own experience, how many crop heads he will look at for each step he walks through the field, (this varies with density of stand).
- 2) The total number of steps through the field should be counted (use hand counter if available).
- 3) The number of each contaminant which falls within the line or vision must be counted and recorded on separate hand counters or on paper.

Example

Suppose one step (3 ft/step, 6 ft side to side eye span) contains 500 wheat heads with a total of 75 steps through the field at random. $75 \times 500 = 37,500$ heads were seen.

The following contaminants are found:

offtypes 30	$30/37,500 = .08\%$ (within limit)
Other crops 15	$15/37,500 = .04\%$ (within limit)
noxious weeds 10	$10/37,500 = .027\%$ (above limit)*
Seed borne diseases 20	$20/37,500 = .05\%$ (within limit)

* field needs rogued otherwise it fails inspection.

WHEAT PROGRAM RECOMMENDATIONS

1. MCI field staff seem knowledgeable about general wheat farming but weak on specifics of seed production. Training in seed quality or purity is also needed. They need something more specific than the standard extension trainings they have been getting. The UNDP training last year in Quetta was helpful but additional practical training is necessary.
 2. A study tour for Mohammad Lal and others to see seed production fields at or near harvest time in the Punjab or NFWP would be a good idea. This could be similar to the up-coming DAI training, or the practical parts of it. Visits to Sariat Agricultural Research Institute could be useful. Dr. Rahman Khan at Cargill Pakistan Seeds in Lahore seemed interested in helping and a study tour could be arranged through them to visit progressive seed farmers in the Punjab.
 3. UNDP or SCA can probably serve as a resource for this but it still needs to be explored with them. A possibility would be if UNDP trainers could meet the field staff in the seed fields in Afghanistan and spend some time together, perhaps at several critical points during the season.
 4. All the trainings need to have better follow-up to see what was covered and what more was needed. Also how the trainees did and what problems were encountered. Previous trainings have been appreciated by the field staff but that may have just been because they were nearer to their families for a while.
- It would be ideal if MCI had an expatriate or professional on staff to oversee training and field monitoring but given travel restrictions it might be difficult to do the required job.
5. The Experiment in International Living (EIL) in Quetta has trained MCI personnel and are willing to do more. They have also shown a willingness to modify their courses for particular needs and to have guest lecturers come for this purpose. However this may not be covered in their funding so something additional may need to be worked out. The resources at UNDP and Sariat Agricultural Research Institute should be considered.
 6. The field staff's reporting should be improved. Maybe the Quetta office needs to reinforce the importance of regularly filling out the forms. This needs periodic spot checking, monitoring and perhaps more training. The forms for seed wheat production have been simplified and improved and are attached in Annex 1. Both English and Pashtu versions will be given to the staff. Perhaps a monitoring form for extension staff could be designed to be filled in monthly.

7. The MCI field staff should have at least four contacts with each seed farmer each season. This should be 1) in the fall when seed and DAP are distributed; 2) in the spring when urea is distributed; 3) at flowering to inspect for smut and weeds; and 4) prior to or at harvest to inspect the purity of the fields. Additional contacts may come during field days or farmer's rallies and for seed cleaning.

8. Seed cleaners are important in the seed production program. MCI should consider sending the cleaner to all seed growing areas during the time between harvest and planting. This should be a service or demonstration for the next few years with perhaps a nominal charge. It should become a part of each wheat seed growers regular practice whether or not they are getting MCI seed. Seed exchanged by the grower with his neighbors should also be cleaned under this program.

9. MCI should schedule field days or farmer's rallies to promote the seed grown by the seed growers and the variety trials. Each district Area Coordinator should organize two field days this year in different parts of his work area. A progressive farmer should host the rally and seed farmers from neighboring villages should be invited. Contacts between farmers and villages could be the start of a seed farmers association.

The venue and schedule for a field day should be appropriate to the situation but could include speeches from local officials, a short training by the area coordinator on some agronomic topic such as certified seed or fertilizer use, and a discussion among the farmers of what all they have done to keep their fields clean. The program could be concluded with tea, biscuits, bread, cold drinks or whatever is appropriate.

All MCI staff, even those not directly involved in seed production, should attend one of the rallies. Everyone associated with the seed program should visit at least one of the variety trials.

10. More reliable yield data from the seed growers is important to have. The present estimates from the growers are not adequate. A representative number of crop cuts, perhaps 10 to 20 per district would be a good survey of the annual growing conditions and how the farmers are doing with the new improved seed. These measurements will help evaluate the farmer's and extensionist's skills and help MCI understand how much new seed is getting into the community.

A simple method of doing crop cuts is included in the wheat planting guidelines. This is not difficult to do but may require some specific training which could be done by UNDP or an expatriate on the MCI staff.

11. The MCI field staff say their problems are (not in order) disease and insects, weeds and cultivation and shortages of water,

seed and fertilizer. MCI is working on seed and fertilizer. This consultancy has not looked at the irrigation issue but MCI is also addressing this. Farm machinery and mechanization are being examined but the recommendations will probably not satisfy farmers or the field personnel. Insecticides and disease control could be addressed but the question is how to do it responsibly?

12. The MCI field officers say they want more training on pest control and plant protection, probably because of previous training they have received and farmer's demands. MCI shouldn't endorse the regular use of herbicides and pesticides because of the problems associated with their control and use and the potential for abuse. Since chemicals are available in Quetta, the farmers will probably get them with or without MCI assistance. MCI field staff should be trained in the proper use and care of chemicals. They should also be informed of the reasons for not using chemicals, preferably immediately after a training.

13. MCI should try to get Vitavax to the seed farmers at planting time for their personal seed. It is not a dangerous chemical and in areas where smut is common the benefits are excellent. This could be a demonstration for the next few years like seed cleaning so that it becomes part of the farmer's routine. MCI staff could clean and treat the seed for farmers who bring it into the center. This could be done for a small charge but the fee shouldn't discourage anyone from bringing in their seed.

14. The field staff have also asked for more training on variety selection and soil testing. I'm not sure what this means but it may just be their desire for better varieties of wheat and more understanding of the benefits of fertilization. It may also be a response to previous trainings where they received some but not enough information.

15. MCI should keep expanding the area for seed growers by adding new villages every year or two. If a grower has gotten seed for 5 jerib and it yields 500 kg/jerib he gets 2500 kg of quality seed. This will be enough to plant 100 jerib or would be seed for 20 other farmers from one year's production. If the farmer is good, saves some seed for his own fields and exchanges the rest for food grain, he shouldn't need much more the next year. To help him develop a business and the skill of seed growing, MCI may get him perhaps 25 kg new seed, enough for 1 jerib, to keep a source of certified seed. Then, however it becomes more complicated and important for the farmer to keep the different sources separate. If he were to receive different varieties of certified seed then he has to be even more careful for purity and in keeping the fields and seeds isolated.

16. MCI should stick with only one variety for seed production with each farmer and perhaps only one for each district or center at least for the short term. It is too easy to get seed mixed up.

Perhaps later when seed farmers, and the MCI field staff, are proven and more experienced they can handle two or more from a center.

17. The same is true of basic and pre-basic seed. This sort of seed is best handled by professionals and is too expensive to be given to new seed growers under the primitive conditions of Afghanistan. Unless a farmer is experienced and has proven his ability to keep this premium seed separate, it is probably wasted. For current conditions, regular certified seed is good enough. The FAO early generation seed received in 1991 should be grown by MCI staff.

18. Timely delivery of seed and fertilizer is necessary for maximum production. Due to the political situation this has not been possible the past two years. I don't know what can be done but delivery should begin in September if possible, especially in the north part of the MCI work area.

19. A set of planting guidelines is included in this consultancy report and have been translated into Pashtu (Annex 3). They are probably too idealistic given the current situation in Afghanistan. These standards can be lowered somewhat, ie. row planting and inspections, but not too much. Rahmatullah should decide what can or can't be done and should combine it with the instructions he has written in Pashtu.

20. Rahmatullah's instructions and the ones included here should be used extensively. The field staff should have as much information as possible and use it. Each seed farmer should receive these instructions for cultivating modern wheat.

21. MCI should continue to support seed growers and the farmers who get their seed by selling them fertilizer for the next few years, or until the private market takes over. Modern varieties don't do well without urea and DAP so the benefit of growing improved seed in the village is lost if farmers don't get the necessary fertilizer. To help understand this problem better a simple fertilizer trial is proposed in Annex 1. Comparisons can be made between recommended rates, urea only and no fertilizer treatments.

MCI FARM MACHINERY PROGRAM

There is currently no MCI program for farm machinery although there has been in the past. MCI owns various pieces of equipment which are distributed in Afghanistan. Problems which have arisen in useage, maintanence and cost need to be addressed before MCI returns to an active program. The following report comes from various sources including MCI office and field staff.

There are 17 tractors and other implements which are distributed at the 10 field centers. These are mostly Fiat 480s, but also two MF240s and a Beloruss tractor. They are used for MCI purposes such as local transportation of personnel, seeds, fertiliser and other supplies. Three of the tractors are used full time for the animal health program for transportation.

The tractors have a full set of equipment such as trailers, tine tillers, moldboard plows and rear blades. There are also seven threshers and five reapers including one at the office in Quetta.

Previously the objective of having this equipment, in addition to center work, was to provide assistance for wheat cultivation and harvesting. Perhaps 80% of the tractor's work was for this purpose. The equipment was rented out to farmers at approximately 50% the commercial rate. The tractors also work in canal and road repairs and land leveling. The table below summarizes tractor activity for the previous year.

<u>District</u>	<u>Hours of Work</u>	<u>Jerib</u>	<u>No. of Farmers</u>	<u>No. of Tractors</u>
Baghran	235	470	39	2
Dand	243	486	41	3
Kajaki	662	476.5	89	2
Maiwand	149	298	27	2
Shari Safa	413	826	59	2
Spin Boldak	566	Blade work	66	1
Totals	2268	2556.5	321	12

As the table indicates there is wide variation in the amount of work done by each tractor in a district. This was caused by repairs and maintenance, scheduling, mujahedin fighting and the cold, wet weather.

The charge for renting the tractor for cultivation this year has been 1500 AFG./hour. This does not begin to cover the cost of the tractor, implement, diesel fuel, oil and driver. The rate was set last year about 20% lower than the market rate. However, due to inflation the regular market rate is now 3000-3500 AFG./hour. Threshing is more profitable since the price is higher.

The cost of the driver, fuel and repairs is much higher. Diesel costs about 150,000 AFG./month and the driver's salary is 120,000 AFG./month. With other expenses the total cost of running each tractor is about 375,000 AFG./month.

The cost is also an important factor for the farmer in tractor rental. They only want to pay for one pass over their field so they don't want to use a drill. If they sow the seed after cultivation there is no way to cover it so they broadcast the wheat seed and fertilizer before tillage. This saves time and money but wastes seed as some is buried too deep to germinate.

There is great demand for tractor services for cultivation and threshing. This is described in the SCA report summarized in a following sub-section but also can be understood from the fact that farmers were still plowing their fields for winter crops this year into December.

The MCI field workers say there are tractors and trailers which are used only for transportation. They are owned by businessmen who earn more money hauling people and goods than by working for cultivation although they may do their own fields. These tractor owners also have maintenance problems but they take better care of their vehicles than MCI drivers do. The mujihiddin also own tractors but they have the same problem as MCI with repairs and maintenance.

Problems of the MCI Program

There seems to be a conflict of interests between the MCI program in Quetta, the field supervisors and the farmers. It is not serious but needs to be addressed.

MCI wants to run a credible, cost-effective program but the previous program could not begin to meet the needs of the community as a rental or contracting service. There were too many problems. The objective is now being changed to increase the knowledge of Afghan farmers about farm machinery through a demonstration program. This will show the farmers and businessmen which machinery can be purchased and how to use it properly.

The MCI field staff see the needs of the farmers whom it is their job to help. They live and work in communities with people who face difficulty getting their cultivation done. They know MCI is a large organization with many resources, including tractors and implements. They have pressure from their friends to use MCI equipment to assist the farmers.

The farmers are having difficulty operating their farms with a shortage of labor, oxen and tractors. Local tractors exist but are busy. The farmers do what they can but would like to use the MCI tractors which are at the field offices.

Another factor are the powerful local people (mujahiddin or commanders) who try to control the machinery useage for their own or community benefit. This is especially a problem with commanders whose farms may be far away. The drivers may spend more time going to the fields and returning than actually cultivating. The price then must include his travel time.

There are other scheduling problems. The MCI field staff try to work systematically, finishing one village before moving to the next but everybody wants their work done at the same time.

Another set of problems come with the drivers who are necessary for the work. They can stay busy during summer (harvest and threshing) and fall (cultivating) but not the rest of the year. They can help with other things like land leveling and hauling but do not like to do non-tractor work. The MCI drivers may not do as much maintenance as the owner/operators who take better care of their equipment.

Further problems come from the tractors themselves. The field staff say that the FIAT is a stronger tractor than the Massey-Ferguson (M-F) except for the diesel pump. This needs frequent repair and average costs are Rs. 2000/month/tractor. Each month there is an MCI FIAT tractor needing diesel pump repair. The MCI owned M-F tractors have needed major overhauls and both have been opened up for boring. This is expensive and time-consuming.

Major repairs to the tractors are done in Quetta so work time is lost and the tractors have to be brought here. There are not qualified work shops inside Afghanistan. Minor repairs can be done there but even most owner/operators bring their equipment to Chaman or Quetta for repairs.

Other Considerations

If a farmer wants to own a tractor for cultivation purposes he also spends the money to get the right implements. This may take several years but he usually buys all the implements.

Farmers believe the machinery MCI buys is better quality than that which they can get. They would rather buy a used thresher from MCI which was bought in Faisalabad than a new one from a Quetta showroom. Actually they would rather have a new one but the used one from MCI is also cheaper.

There is still an extreme shortage of cultivation power so that farmers are not able to farm as much of their own land as they could. If more tractors were available, more crops could be produced or the field work done faster. If there were five tractors in each office they would stay busy fall and summer. This might solve some of the scheduling and local power struggle problems.

There is also a labor shortage at critical times such as at harvest and threshing. These are people problems due to lack of good housing, security, handicaps and jihad. Solving the housing problem would help solve the labor problem but many men are injured or still fighting.

There is a great need for training in proper useage and maintenance for tractor owners and drivers, maybe especially those employed by MCI.

The MCI field staff say all locally owned tractors and implements were purchased in Pakistan and brought across the border. They may still be registered in Pakistan so there is not a problem crossing the border. There may be some brought from Iran or Turkey but not many and most of those come through Chaman or Quetta.

Most tractors inside are M-F not FIAT. The M-F parts and repairs are easier to get inside than FIAT. Most other programs have M-F, although FAO has both. The dealers recommend M-F over FIAT.

The field officers say MCI could sell all their equipment to interested persons with no problem. In fact people would like MCI to do that for them or at least assist them with the border permit when they purchase equipment.

The threshers are busy for 4-6 weeks per year. Farmers also want to cultivate and plant maize at the same time but their first priority is threshing wheat.

People also use tractors for things such as pumping water and milling flour. Actually they use trucks for this purpose too. There is not enough demand for each village to have a flour mill now, but perhaps when all the refugees return.

REVIEW OF VISITS TO OTHER PROGRAMS AND MANUFACTURERS

Dr. Azam Gul, SCA, Peshawar.

There is a severe shortage of farm machinery but the ownership and hiring of tractors has increased. The private sector is going strong. SCA has a few tractors for which they charge just enough to cover maintenance. This program is only incidentally connected with their wheat growing program. A program needs to have good field officers who can select who will use the tractors. Tractors are too expensive to give them to individuals, even to shuras or commanders. A commander stole one of their tractors and sold it.

There is a big push by SCA on sprayers and chemical treatment with herbicides to replace cultivation. This is important, especially for seed production. The fields which are fallow have large woody weeds.

A few years ago FAO gave 400 pair of oxen to AfghanAid to give to farmers to assist in cultivation. After the plowing season the farmers realized that they would have to care for the oxen for the next 8 months and not get any income from them. Since the price of meat was also high the incentive was for them to sell or kill and eat the oxen.

Wayne Baumann, UNDP, Peshawar.

He recommends that MCI stay away from mechanization on an official basis. The man who is the strongest will get the tractor. There is no great need of convincing farmers of the wonders of machinery, they already know. This should convince the farmers: Baumann heard that there were Turkish M-F tractors for sale in Quetta for Rs. 95,000. They can then do it on their own.

The problem is training for proper useage and maintenance. But he said the FAO training with teachers from FIAT was not very good. He recommends checking out the GTZ Pak/German training program in Quetta.

Don't give machinery to people-show them or help them. He also heard that there were loads of bullocks in Quetta going inside but doesn't know if they are for sale for meat or cultivation. He has big questions on chemical useage. He supports training but not the actual useage and won't give UNDP money for it.

Don Oelsligle and Noori, DAI, Islamabad

There is great need for machinery in Afghanistan. DAI has a demonstration program, not extension, credit or sales. They charge farmers to rent the machinery something like 20% less than the local price. The policy is first come-first served for equipment use. Farmers can use the tractor or implements or both. Actually they have many more implements than tractors because there are some farmers or operators who have a tractor but not a tine tiller or chisel. They also have more threshers than tractors. They have up to 5 sets of machinery at each field office for "demonstration purposes".

There is a problem with the local commanders wanting or even taking the equipment for weeks for their own personal or community use.

There is no charge for demonstration purposes. The machines are continually in use. The program is "try before you buy". They tell people where and which kinds of machinery to buy but don't help with credit or sales. They won't say why the supply depot plan was stopped - maybe security, political or personal reasons.

Don Oelsligle likes a self-powered thresher. He says there are many uses for the engine during the off season. They are looking at two manufacturers of self-powered threshers. (Mughal will make 20 units for them and Batala will make 12.) These will have a smaller engine rather than the 50 HP tractor. But they can only get Chinese engines which is a problem for AID. DAI will ask the manufacturers to make the thresher without the engine and then it can be assembled later. They say the Chinese are the only source of this kind of engine.

There are many demands on tractors, especially when farmers are trying to plant maize while harvesting wheat. They need the tractors for threshing and for cultivating at the same time.

Other recommendations: chisel plows for fall planting; portable welders for repairs; maize shellers. They recommend a PTO sheller as better than hand-powered but maybe hand-powered is good for daily family use. The PTO sheller is probably better for program use and demonstrations. They also say reapers are important and have several different sizes, walk-behind and tractor-mounted.

Their tractors and implements are supplied with replacement parts (common belts and hoses) but other pieces must be ordered from Pakistan. There is good communication between DAI offices so this does not take a long time. However, sometimes the tractors are used 40 km from the field offices so it can take a while for repairs.

Saifuddin, Program officer, DAI, Peshawar.

DAI has equipment in 12 areas of Afghanistan in six provinces with one to four tractors in each area. The tractors work first on their demonstration plots (1-2 jerib size) and then for farmers as they need them. Their charge is less than the commercial rate by 15-20%. The field officers make a schedule of who gets to use the tractor with the help of the shura. This is for demonstration purposes only. The tractor driver is from DAI.

In Khandahar and Helmand there are lots of tractors owned by traders and landlords who work on a commercial basis.

They have tractor-mounted reapers, maize shellers and walk-behind reapers. Farmers in Peshawar are interested in the walk-behind reaper. This is a copy of a Kubota made in Pakistan with a Japanese engine. He said it was from Faizan tractors in Lahore.

Their threshers are from many companies. The most interest is from Batala. They have ordered self-powered threshers from Batala and Moghul. These have 250 or so kg/hr capacity. This is enough. The Moghul thresher has an 11 HP Chinese engine and is light enough for two or three men to pull. They have tested it in Peshawar this year and will demonstrate it inside next year. DAI has 34 PTO threshers inside and they are used in the same way as the tractors. Jihad is assuring them that there will be no problems with scheduling since there is so much need for the threshers. With the fear of war and the crops burning the farmers must hurry to finish their threshing.

DAI has 6 seed cleaners from the US. They will be sent inside soon and will be for demonstration purposes - one for each province.

Trainings in farm machinery are held twice each year, once in December and again during the Peshawar harvest season. Training is always in Pakistan. They have done 20 days at Millat in Lahore. Also the Pak-German 5 week tractor operator school in Multan (or Mardan?). This place also has a separate course for mechanics but DAI hasn't done this. The Pak-German program was very useful but was only in Urdu and English so Saifuddin and his friend had to translate into Pastu and Dari.

Khalil Rahman, ACBAR, Peshawar.

He heard that there was a farmer from Helmand who purchased 100 tractors in Quetta for resale inside Afghanistan. He also heard that FAO provided 50 tractor units for Afghanistan. He talked about the ACBAR meeting where machinery was the only topic.

Bob Bouvier, International Rescue Committee, Peshawar.

IRC works with model farms of 1 hectare, half of which is cultivated by tractor and the other half by oxen. Farmers do the cultivating so they can see and learn the equipment. This is the standard FAO power package. These tractors are available on a subsidised contract basis to farmers who have taken an IRC arranged training. The training we talked about is from the Agricultural Light Engineering Program (ALEP) in Mardan which is primarily for Pakistanis in blacksmithing.

IRC also gives tractors to a shura for their use. The shura has a contractor who does the work and get 40% of the money. The other 60% goes back to the shura for their local development fund. He did not explain what the local development fund is used for.

IRC works closely with SCA and so favors the responsible use of chemicals.

Robert Mengham and Stuart Worsley, AfghanAid, Peshawar.

They work in the north where there are so many private tractors that AfghanAid shut down whatever program they were going to start. The tractors are all run by commanders and are part of their influence. It is a good political move for AfghanAid not to have machinery. There are enough threshers brought in from the south that they don't need more. They may work with seed cleaners and flour mills in the future but not now. All tractors in their work area are Beloruss, also the implements. There is no need for any more machinery because of the excess labor, small plot size and mountainous area.

Md. Hussain Haji and 5 sons, Naeem & Co., Faisalabad.

For Afghanistan they recommend strong but simple equipment which is easy to repair-they can and have previously made seed drills for that purpose. They make 118 types of machinery which are used all over Pakistan in all four provinces. Whatever is needed they will make. They sell to DAI and SCA and also to Millat. They were to participate in the DAI trade centers and have even sent machinery to Quetta. Some Afghan traders have come here but they have a problem with the language. The Afghans also are difficult to train on the technical side.

Naeem sells seed drills to Millat-unpainted-so Millat can paint their color and use their stickers. They don't mind because some of the parts have a Naeem stamp.

Naeem does not like a clutch on their threshers. It is too complicated, they prefer PTO shaft-V belt driven best.

They exhibit every year at the Faisalabad Trade Fair, last year they were at the Peshawar Exhibition and won a prize and they will go to the annual Lahore Cattle Show this year. Anyone can visit and see them there. A current price list is available for 118 types of machinery.

Mohammad Naeem, Batala Industries, Faisalabad.

They make 20 types of machinery, mostly in large numbers. FAO, DAI, RONCO, VITA have all purchased machinery here. They were also going to participate in the DAI trade center and have machinery stored in Quetta for that.

Last year they produced 1000 wheat threshers plus many parts. There were at least 50-100 sitting around their foundry/factory. In the last years VITA bought 350 pieces, DAI 150, FAO 50. This year nobody is buying anything. The thresher has two power systems - PTO and belt driven. They have made two small models for DAI this year which are driven by a small HP diesel engine. The engine is on a separate trolley.

They also have a walk-behind Kubota copy reaper.

Sheik Fayaz, Owner, and Shabir Hussain Shah, Manager, Faizan Tractors, Lahore.

They were to participate in the Chaman Trade Center but fortunately (unlike Naeem and Batala) did not send any equipment.

Before the war different Afghan traders came to Lahore to purchase tractors but now only the missions do it. Language was not a problem since translators could easily be arranged in a short time. There are Pathans everywhere, even working for them sometimes.

He recommends the M-F 240 because it is less expensive than the FIAT and the parts are more available in Afghanistan. It also costs less to repair. FAO however, has purchased both.

Faizan seems like mostly a showroom. In the city they sell cars and in Sheikapura it is tractors. I had the feeling that because I asked to see a factory they showed me one, whether it was theirs or not I don't know. It certainly wasn't producing much, only one drill press with 2-3 boys working around it. Other workshops between Lahore and Sheikapura were busy making trailers and cultivators. Also in Faisalabad there was lots of activity. They said Faizan manufactures things only in season which may start in January. Anyway, they seem like wheeler-dealers and will "try their best to give competitive rates and quality will improve". Whatever you want you can get from them at a good

price. They can send a price list but generally it is only good for one week. He "wants to share in the effort of work in Afghanistan". They deal in all the standard pieces of equipment but don't keep much in stock.

They have a Mitsubishi 25 HP tractor, used primarily for rotovator, but also works with a front blade. There is a thrasher that works with this tractor on PTO. They also had pictures of a grain elevator hooked to this tractor but said it was foreign made, assembled here and very expensive.

They have two or three kinds of reapers, but basically all copies of Japanese models with a Japanese motorbike engine. The one in their showroom had a PAK Farm Industries label.

**Sohail Bashir Rana, General Manager (Marketing),
Millat Tractor Factory, Lahore.**

Most of Millat's business to Afghanistan is to AID related agencies. They do have four outlets in Pakistan near the Afghan border so traders don't have to come to Lahore.

They have had a training program but not now because the funding was cut.

85 to 90% of their sales is with Agricultural Development Bank Credit.

Various dealers across the street from Millat, Lahore.

There is lots of equipment available at competitive prices. If one place doesn't have what you want then go next door, or they will do it. They also do some manufacturing or copying and modifying of the standard equipment.

Afghans come to buy and bring their own translators sometimes, but most buy at the border. More often dealers from Quetta, Chaman or Peshawar come to Lahore to buy and then sell to Afghans at the border.

Mr. Ralf Bissmann, Project Manager - GTZ, Technical Training Centre Quetta (TTC).

They do lots of training of Pakistani and Afghan refugees although they are under the Baluchistan Dept. of Labor and Manpower. They have trained 144 refugees this year in six different technical trades including plumbing, electrical wiring, drafting and diesel mechanics. 29% of the trainees returned to Afghanistan. They do not have a school for drivers, per se, but

do train drivers to be mechanics. Courses vary from four weeks to four months and can be arranged in any language desired, ie. Urdu, Pashtu, Farsi. Training can begin anytime there is enough interest. They just finished training three men from Halcrow in diesel mechanics, although the class could have held six. (The short course program is included in Annex 4). They do have two M-F 240 tractors which can be used in a tractor maintenance course.

Funding for training of Afghan refugees is through UNHCR but that will be ending. They would like to do more, and possibly from Kandahar since they have six Afghan instructors who are ready to move back. They still need contacts inside and would like some partner NGOs.

Classes could begin the middle of January again, or anytime there is enough interest. The subject could be planned to fit the needs such as tractor maintenance. TTC is graduating a class of diesel mechanics in December and would like them all to apply for jobs with MCI. Most of them would want to go back inside for jobs because mechanics are earning lots of money there.

REVIEW OF FARM MACHINERY LITERATURE

This section begins with quotes and summary from the SCA report on farm power which includes some of the recommendations proposed to ACBAR. This is followed by quotes from several consultancy reports with comments. These reports form the background for the VITA/DAI approach to mechanization.

The Agricultural Survey of Afghanistan. Second Report, Farm Power, Volume I. The Swedish Committee for Afghanistan. April, 1989.

"This report demonstrates that the shortage of farm power in Afghanistan is indeed serious, to the extent that if it is not dealt with as one of the earliest priorities during the rehabilitation phase, it may inhibit the usefulness of other agricultural inputs for several years to come.

"The Survey shows that, whereas before the war more than 90% of farmers used their own oxen for ploughing, the figure in 1987 for farmers who were still there was 43%. The report estimates that about 500,000 oxen would be needed to make up the shortfall to reach pre-war levels, and further estimates that if the only way of achieving this were by natural increase, then it would take 17 years at 3% growth rate (FAO's estimated rate for Afghanistan's cattle).

"The cost of the delivered animals, the need to use scarce resources to grow fodder crops as opposed to grain crops, and the risk of disease and further losses among the better adapted local animals which survived the war, are only a few of the considerations.

"There are two main physical inputs, which are well tried and workable in Afghanistan, which can rapidly make up the shortfall in farm power, or can release existing oxen from certain tasks for which they are not essential, for more productive use. These are tractors, and stationary threshers.

"the scale of that power problem might be calculated as follows: assuming a shortfall of 250,000 pairs of oxen, and that a pair can cultivate 25 jeribs (5ha) annually (a rough weighted average for dryland and irrigated areas), then sufficient tractors to cultivate 5 million jeribs (about one million ha) are required. At 300 jeribs (60 ha) practical annual cultivation capacity for a 45hp tractor, then less than 21,000 tractors would be needed. This is a lot by any measure, but it is less than the present annual Pakistan new

tractor market of about 25,000, and about two thirds of its annual manufacturing capacity. Expressed this way, 21,000 tractors, covering the needs of both farmers in Afghanistan and returning refugees, and spread over several years, appears manageable.

"Generally the most severe bottleneck in Afghan agriculture occurs between the winter and summer crops when one crop has to be threshed and land for the other has to be prepared.

In Pakistan "the custom hire market for tractors is predominant. Tractors probably spend less than 10% of their time on the owner's farm, and the 1975 Census of Agriculture showed that the average tractor worked on 21 other farms during the year. Even on farms of over 100 jeribs about half of all work is done by contractor. About 70% of tractor time is spent on transport and stationary work such as threshing and pumping.

The principal beneficial effects of tractorization [in Pakistan] have been, in order of importance; expansion of the cultivated area; or where expansion is not possible, an increase in cropping intensity of between 22% and 30% where oxen were replaced; and an increase in the proportion of cash and food crops to fodder crops.

"Increase in the cultivated area, or cropping intensity, or both, increases largely as a result of the greater hourly output, by a factor of about forty, of tractors compared to oxen. A medium (45) horsepower (hp) tractor and a 9 tine tiller cover 5 jeribs in an hour compared to a pair of oxen and a desi plough which cover the same area in about 50 hours. (In many areas of Afghanistan there are only four weeks or less between crops, and the use of tractors means that a larger area of crop can be sown in a restricted time span).

Roy E. Harrington, VITA consultant 15-2-89
FARM MECHANIZATION STRATEGIES FOR AFGHANISTAN

"Wheat farmers in both Punjab, Pakistan and the northern part of India appear to have adopted new technologies in about the same sequence."

This follows in six steps with some discussion: 1) assurance of water from canals or preferably tube wells; 2) high yielding seeds; 3) improvements in cultural practices such as sowing depth, fertilizer placement, and timing of irrigation; 4) the use of adequate fertilizer; 5) multiple cropping to better utilize and pay for these more expensive inputs; and 6) tractors. The author suggests that tractors may fit earlier in the order in

Afghanistan because of the current lack of bullocks or other cultivation methods. In addition to these improvements in the farmer's practices other changes need to occur in the farm economy and these are usually outside the farmers control. Usually in other countries these needs are provided by the government or the free market. In this list are: 1) the supply of inputs at reasonable, dependable rates; 2) repair shops and parts; 3) affordable credit for crop production and tractors; 4) remunerative prices; and 5) access to the markets. The paper then goes through each requirement and examines how VITA could help meet those needs.

Among the recommendations the author makes are:

Water pumps need attention. An Afghan trader estimates that 2,500 diesel engine pumpsets were sold into Afghanistan in 1988 mostly imported from Pakistan. This should be encouraged in addition to repairing kerezes and canals.

The author recommends the Massey-Ferguson 240 tractor as the best for Afghanistan but says that competition is also desirable. This can be left to the individual traders and farmers. In order to make the tractors affordable, custom work will probably account for most of their work. "VITA estimates that in Afghanistan where land holdings are smaller [than Pakistan], a tractor would be used on approximately 20 farms."

Cultivators or tine tillers are preferred over moldboard plows or other pieces of equipment for the first-time owner although they all may be useful and eventually have a place.

There is already a demand for threshers and VITA estimates it will increase to more than 1,000 units annually sold in Afghanistan. The sale of 2,500 diesel engines suggests that there may be a market for smaller engine-driven threshers by these owners.

Tractor trolleys, jib cranes and rear blades are recommended as pieces of equipment which have immediate use inside Afghanistan.

Seed and fertilizer application equipment, reapers, maize shellers and other single use items should be considered for adoption later.

Summary

"Equipment for export to Afghanistan divides into two main categories. The first priority (Phase I) should be made available to prospective Afghan purchasers immediately. The second priority (phase II) will require some preparation, market development and demonstrations. Phase II items will not be commercially adopted for several years.

"Phase I: There is enough experience from Pakistan and India with reasonable confirmation from Afghanistan that those farmers who are economically able will purchase tractors, cultivators, trolleys, wheat threshers, rear blades, and a reasonable number of moldboard ploughs. Good quality, Pakistani made tractors, cultivators, trolleys, and rear blades are available from one or more manufacturers at reasonable prices.

"Phase II: Disc harrows, seed drills, tractor reapers, and front blades are likely to be adopted eventually but will take considerable demonstration to prove their utility to the first time tractor user. Hand operated chaff cutters should also be demonstrated. These would appear to have considerable utility in Afghanistan, but for reasons which are not currently understood, they don't appear to be very acceptable in Afghanistan.

Phase I. (Immediate adoption): Tractors, cultivators, trolleys, tractor powered wheat threshers, rear blades, moldboard ploughs, tractor mounted jib crane.

Phase II. (Feasible after a few years development): Chinese 12 HP tractors (4-wheel riding and 2-wheel walking), disc harrow, engine powered threshers, front blade, seed and fertilizer application equipment (drills), tractor mounted reapers, chaff cutters, maize shellers, rice hullers, flour mills, oil expellers.

Phase III. (After several years when economic and other considerations justify their use.): Chisel plough, border discs, land levelers, ridgers, ditchers, dirt scrapers, walk behind or power tiller mounted reapers, hand powered and tractor mounted maize shellers.

K. Scott Eubanks. Farm Machinery: 16 Provinces in Afghanistan, Analysis and Recommendations. Prepared for DAI, Feb. 11, 1990.

Selected quotes from the Executive Summary:

"The study evaluates six groups of farm machinery; Tractors and tractor pulled implements, Small engined tillers and attachments, Man-powered implements, Animal pulled implements, Improved hand tools and PTO (Power-Take-Off) powered vs. self-powered threshers of one ton per hour capacity and one-half ton per hour capacity.

"Tractors of the 45 HP class and the tractor pulled implements are too expensive for the average or typical Afghan farmer to afford, especially in the absence of any formalized credit system. Therefore, full-sized tractor

services will, in all probability, be supplied to the typical Afghan farmer on a custom hire basis.

"PTO powered threshers of one ton capacity per hour made in Pakistan are heavy (preventing easy movement), expensive (RS.30,000 per copy) and require a 45 HP tractor or a 30 HP diesel engine as a power source. Tractors are a scarce resource in Afghanistan and considered too valuable, considering the small planting window, to be used as a power source for threshers. Again, the weight of these machines requires a tractor or a truck/jeep to transport. Additionally, adding a 30 HP diesel engine to the thresher runs the price up to the RS.60,000 level, making the whole package very expensive.

"Pakistani threshers of one-half ton capacity per hour are much lighter (two or three men could move it about), can be powered by a 12 HP diesel and cost approximately RS.33,000 for the entire package. Once the threshing season is over, the engine could be utilized to pump water, power a flour grinder, fodder chopper or any other machine requiring a remote power source. Additionally, the price makes the machine much more affordable to a wider range of Afghan farmers.

"Given that prior to the war oxen provided the bulk of farm draught power, with 10% or less of the farmers owning or renting custom tractor services, and that an estimated 40% of the ox herd became war casualties (farmers who remained in 1987) [SCA figures], physical demand for draught power is tremendous.

"In the context of the very short harvest/planting window in Afghanistan, tractors are viewed as having far higher value preparing the land for the next crop as opposed to utilizing its ability to drive threshers with the PTO.

Also included in the report are discussions on animal-powered, small engine-powered and man-powered implements, improved hand tools, and a (confusing) economic analysis of different cropping systems and the resulting ability to pay for a tractor.

Included among the recommendations of this report are:

"Once sales of tractors begins, recruit Afghans willing to become tractor mechanics and either train them at the trade centers (Millat will send teams out) or have them trained on the line at the Lahore plant.

The General Managers of Millat have stated that they will provide a set of tools and a package of high volume spare parts to graduate mechanics at cost.

"Manufacturers on the recommended list have all stated their willingness to provide training for Afghans who purchase machinery. If additional training is required then project should contact the PAK-GERMAN TRAINING INSTITUTE just outside of Multan, Punjab.

"Project should recruit Afghan entrepreneurs, demonstrate the economics of custom agricultural services, threshing and full line of tractor services to stimulate the formation of custom service firms in Afghanistan.

There are numerous other recommendations for the trade centers and stimulating the agricultural economy. Finally:

"These recommendations have been formulated to present the widest possible array of farm machinery, equipment, services and opportunities to the Afghan market by minimizing basic costs of information, access, training and transportation. In the final analysis, competitive forces of the open market place will determine the future machinery and equipment mix utilized by Afghanistan's agricultural sector.

This paper has a brief analysis of the need for equipment inside Afghanistan and some economic estimates of what would be required for farmers to purchase machinery. Much ground work is laid for the proposed DAI Border Trade Centers including recruiting Afghans, selecting manufacturers and their equipment, and marketing and advertising of that equipment. It seems a very involved process and may replace what is or may be spontaneously evolving by the Afghan traders themselves.

Joseph Campbell. Recommendations on Farm Machinery for use in Afghanistan. Prepared for DAI and O/AID/REP, August, 1990.

A rather detailed report on what could be called the standard power package. There is an individual analysis of each of the following with recommended suppliers: tractor, tine tiller, two-bottom moldboard plow, disk plow, offset disk harrow, rotary tiller, grain drill with fertilizer box, spring drill, tractor reaper, pedestrian reaper, thresher, "self-powered" thresher, grain cleaner and farm trailer. Also included is a rather lengthy look at different manufacturers of PTO threshers.

LIST OF MACHINERY FOR USE IN AFGHANISTAN

The following list is a brief description of equipment which is available in Pakistan which may have utility in Afghanistan. It is primarily geared towards MCI demonstration purposes and not general usage. Recommendations are not made here for suppliers.

Tractors are not necessary for demonstration but as a power source and for general MCI usage. They are also important for training in proper use and maintenance. Individual preference will determine whether to get FIAT or Massey-Ferguson.

Trailer (trolley) is primarily for MCI useage but also to haul implements to farmer's fields when they need them.

A **rear blade** is a practical tool for MCI use and for demonstration but will a farmer or contractor be able to buy one and make money using it?

Tine tillers are in common use and the farmers already know the benefit. They are not necessary for a demonstration program and may be too problematic for general use. It may be easier not to have one at the center.

Moldboard plows are also in common useage now and therefore problematic for general program use. However it may be good for demonstration purposes in opening fallow ground and training may be necessary in proper use.

The **PTO-powered thresher** has high potential demand. An MCI owned machine could stay busy but then again there are problems with the schedule. Farmers already know the benefit. Could demonstrate or use only for the seed production program.

Small engine-powered thresher may be more practical for the demonstration program to see if farmers can make economical use of the small engines. These machines are labor and crop saving but not as fast as the PTO driven and a tractor is still needed to pull it around. They are not commonly available since they are still custom manufactured. DAI is working on this and their progress should be followed. MCI should obtain one as soon as feasible.

A **tractor-mounted reaper** is probably impractical for the small farm size and is too complicated and expensive, however, MCI sold one last year. Would a contractor buy one for a business?

The **walk-behind reaper** is more practical than the tractor-mounted but still has a high cost per unit of work. It still may be good for MCI to demonstrate since it is labor saving and relatively cheap compared to the tractor-mounted version. It is still a

complicated piece of machinery.

Maize shellers (PTO and hand-powered) are not as necessary as a thresher but still have potential use since it is labor saving and the farmer/businessman may see the profit potential similar to a flour mill.

Seed cleaners are important tools for the wheat seed production program. MCI should have several, perhaps one in each province or office which grows seed wheat but the expense may be too great. Someone should work with Pakistani manufacturers to see what they can develop.

A **jib crane** is a practical and inexpensive labor saving device. Each office should have one for use with the tractor.

The **disc harrow** is used primarily for seed bed preparation after primary tillage. Will farmers or contractors recognize the benefit?

A **disc plow** is used for deep plowing particularly in rainfed areas. Will farmers or contractors recognize the benefit?

Ditchers are used to clean and make canals and drainage ditches. They may be useful to have at the field office but is it economical for farmers or contractors to own one?

MCI has already tried **seed drills** and farmers don't see any benefit because of problems with uneven seeding or plugged hoses. They may be too advanced at this stage of Afghan development. It also requires 2 passes with the tractor so double the rental cost. Farmers are not interested in animal drawn drills.

Spring drills or no-till drills may be more practical than a regular drill since only one pass is required but they are not as good in hard, dry soil. This may be something for demonstration purpose to see if farmers can use. Any program will need to overcome the previous poor experience with drills with training and experience.

Rotary tillers are impractical for South West Afghanistan conditions. They are more useful for rice or secondary tillage.

The purpose of a **chisel plough** is deep primary tillage but this may require 2 passes for maximum depth with a 50 HP tractor. It is useful to break up hard-pan and prepare land for orchards but will farmers recognize the benefit?

A **small engine-powered flour mill** would seem practical. Do contractors or businessmen already recognize the benefit but the market is not there yet?

FARM MACHINERY RECOMMENDATIONS

1. The primary power package for Afghanistan consists of a **tractor, trailer, tine tiller, moldboard plow, rear blade, PTO thresher and jib crane**. These implements are commonly used by farmers, and are fairly standard in manufacture and availability.

The tractor and trailer are necessary to have at the MCI centers. Farmers may need more demonstration and training in their use but basically this equipment is necessary for transportation of MCI personnel and supplies. As mentioned above the brand of tractor will probably depend on personnel preference and experience. Choosing one brand over the other is not a recommendation of this consultancy.

2. The common implements such as tine tillers and moldboard plows do not need demonstration anymore. Farmers are already familiar with them although they may not be appropriately used. Having these pieces at the center allows people to use them, not a demonstration but still a practical way of meeting their need.

3. The rear blade, PTO thresher and jib crane are less common in Afghanistan and although they merit more attention they are not really demonstration pieces. The jib crane will probably be useful to have at each center for general MCI work.

4. A **seed cleaner** should also be considered essential although expensive and at this time probably not for every center. Seed cleaning should become part of every farmers routine.

5. The next set of equipment is more expensive and/or complicated. They are less common in useage but also are practical for Afghanistan conditions. These include the **small engine-powered thresher, walk-behind reaper, maize sheller, ditcher, chisel plow, seed/fertilizer drill and no-till drill**. Their demonstration could be beneficial.

6. MCI should not compete with DAI in the development of the small thresher. No one on MCI staff now has the time or expertise for this. However, it appears extremely useful and should be tested and demonstrated at an MCI center as soon as possible.

7. The walk-behind reaper, maize sheller and ditcher are obvious labor-saving pieces of machinery and it is a matter of showing them to the farmers and contractors to see if they are accepted and how they work.

8. The chisel plow has value in crop production and orchard rehabilitation but the advantage is hard for the farmer to see. The seed drills would help in areas like Kandahar which are limited in traction and where MCI is promoting wheat seed

production but their proper use is complex. Demonstration of these pieces is not recommended until MCI has trained staff in the field who understand the machinery's capabilities and problems and can work with it to train farmers and contractors.

9. The last set of equipment may also be useful under certain situations but are more expensive, complicated or for some reason not practical now. These are the **tractor-mounted reaper, disc harrow, disc plow, rotary tiller and small engine-powered flour mill.**

These more advanced implements should not be demonstrated at the current time because although they may benefit farmers, they are not affordable nor easy to maintain. Perhaps in a few years they could be introduced.

10. Reliable suppliers, manufacturers and dealers will have to be worked out by someone who is qualified in this matter. Rugged, high quality but relatively inexpensive equipment should be sought and tested in Afghanistan under farm conditions. In the end though, the Afghan market will be filled by those Pakistani and Afghani traders who are aggressive and innovative and who can work in these circumstances. Let the buyer beware.

11. For MCI purposes there appears to be at least two choices. MCI can continue renting out equipment for ordinary use in order to help farmers get their work done but charge higher rental fees to cover maintenance and driver costs. The market rate or even higher would be suggested. The objective is to encourage a free market. Higher rates may also help solve the scheduling problem.

12. An alternative is to remove or sell the cultivators, plows and perhaps threshers so the centers can no longer do this sort of contract work. This would mean having only tractors, trailer and jib crane for official use. Then the second set of equipment would be made available for demonstration purposes and could be rented at a nominal fee or perhaps for free. Demonstrations would be seasonal and could continue for a year or two until the neighboring farmers understand the benefits of the particular pieces of machinery.

13. The driver's salary should be tied to their work output or else paid as an hourly wage so when the tractor is not working neither do they. This puts the burden on them for better maintenance. Exceptions can be made if there is other daily work for them to do but otherwise they don't get paid. MCI should continue up-grading their training.

14. Only local drivers should be hired, not refugees. This should keep them in the field when work needs to be done instead of on leave in the camps. They should probably be from neighboring districts for political reasons. Training should be done during

the winter or slow season when there is no other work and should be continuous. Perhaps it could even be competitive so that there are a pool of drivers which can be called on. Continuous employment would be based on job performance and their supervisor's evaluation.

15. Tractor maintenance should be a regular part of the job for which the drivers get paid, evaluated and trained. The field workers and their supervisors also need training in tractor maintenance. Area coordinators and others may also need training in how to supervise others.

16. An idea which has some potential is to train qualified drivers as field workers in crop production so they can help with other work. This would probably mean a promotion for them but would solve the problem of their just doing contracting cultivation. They could be the agents of the farm machinery demonstration program.

17. The GTZ program at the Quetta TTC appears to have a good training program in diesel mechanics. They may have another session starting in January into which MCI should try to get some personnel. An outline for the short course in diesel mechanics is included in annex 4.

18. Initial contact with the ALEP program in Mardan indicate that they may also be a good resource for tractor training. There is still some question about their funding but this could be followed up when they respond.

19. More information should be gathered about local cultivation systems. A simple economic study should be undertaken to understand better how farmers in Kandahar make their decisions on tractor use and how it could be improved. Currently farmers are using a method where they broadcast the seed and cultivate in one pass. This wastes seed but lowers their input cost. A simple experiment is outlined in Annex 5 which could compare the relative costs and benefits of the local system and an improved method.

CUMIN AND CARAWAY PRODUCTION

General Information

This project was begun last year with Tom Brown's consultancy report. He interviewed a number of people involved in cumin production and made some recommendations for a small pilot program. This background information has not changed so it will not be reviewed here. The current program will be briefly described below. Also reported are visits to several Pakistani Research Institutes where some confusing questions were asked and equally confusing answers received.

There are at least two kinds of cumin which grow in this area. They belong to the coriander family and produce seed which is used as a spice or medicine. The table below outlines an attempt to classify the different kinds of cumin.

CUMIN - CARAWAY CONFUSION

<u>English name</u>	<u>Scientific name</u>	<u>Local name</u>	<u>Source</u>
Cumin	<u>Cuminum cyminum</u>		T. Brown
Caraway or Black cumin	<u>Nigella sativa L.</u>		T. Brown
White Cumin	<u>Cuminum cyminum</u>	<i>safaïd zeera</i>	PFI
Black Cumin	<u>Carum carvi</u>	<i>kala zeera</i>	PFI
??	<u>Carum belbocastamum</u>	<i>kala zeera</i>	PFI
Kalongi or Black cumin	<u>Nigella sativa</u>	<i>kalongi</i>	PFI
White Cumin	<u>Cuminum cyminum</u>	<i>spina zeera</i>	SARI
Black Cumin	<u>Bumium pericum</u>	<i>tora zeera</i>	SARI
Black Cumin	<u>Carum caraway</u>	<i>khharra zeera</i>	SARI
Onion seed	??	<i>kalongi</i>	SARI

n.b. Black in Urdu is *kala*, in Pashtu is *tora*.
White in Urdu is *safaïd*, in Pashtu is *spina*.

Tom Brown, perhaps to his benefit, does not use local names in his report, but he is the only one to refer to black cumin as caraway. Cumin confusion comes when trying to relate the local name with a scientific name.

The Pakistan Forestry Institute (PFI) in Peshawar is growing Nigella sativa, which they call *kalongi*, in their medicinal plant garden. This is a spice which is used in making pickles and for medicine but not for curries. It is commonly cultivated in the Punjab. They said it is only known as *kalongi*, never black cumin (or in Urdu, *kala zeera*) although PFI has a reference book which uses both names. They say black cumin, for which they have two scientific names, is collected wild from the mountains in Pakistan and Afghanistan. They don't think it can be cultivated as a crop. White cumin (*safaid zeera*) is the common spice and is cultivated in Punjab, Baluchistan, India and Afghanistan.

The Agricultural Research Institute at Sariab (SARI) also has three kinds of cumin, none of which is called *kalongi*. They say *kalongi* is a kind of inferior onion seed which is used for making pickles. It does not grow in the Punjab but rather in Baluchistan and Kandahar where many onions are grown. In fact cumin and onions are often intercropped. They also said that white cumin, or *spina zeera* in Pashtu, does not grow in the Punjab, India or Bangladesh but only in Baluchistan, NWFP and Afghanistan. Perhaps they are as confused as everybody else because white cumin is grown in all countries of South Asia. The SARI did have two different kinds of black cumin. The finest and most expensive kind is called *khharra* and is only collected from the hills. *Khharra* has the finest seeds and is the most pungent. *Tora zeera* is less aromatic and has larger seeds. *Spina zeera* is the least aromatic.

The SARI is interested in growing the different kinds of cumin but have not been able to germinate black cumin. They have tried several different processes, even going into the hills to collect fresh seed but nothing will grow. They have become interested since Tom Brown's visit last year and a request from the Aga Khan Foundation in Gilgit to work with the crop. Apparently some farmers around Gilgit are growing black cumin as a crop. The SARI has also collected eight ecotypes of white cumin but have found little difference among them. They are looking for a type which has resistance to fusarium wilt.

Survey of Quetta markets

Three retail spice shops in Kandahari Bazar in Quetta were visited on 5-12-91 and samples of cumin collected. The type refers to the name the vendor gave us. Prices this year are much higher than reported last year. No one had any *khharra* although MCI office staff said sample 6 from Iran could be. There were definite differences in price and quality. The cheapest generally contained the most chaff and leaves.

<u>Sample</u>	<u>Type</u>	<u>Price</u>	<u>Quality</u>
1.	spina zeera	Rs 32/kg	chaff, leaves, thin seeds
2.	spina zeera	60/kg	clean, large seeds, uniform
3.	#1 quality tora zeera	160/kg	small dark seeds, some chaff
4.	#2 quality tora zeera	120/kg	larger, lighter seeds than sample 3 but clean, uniform
5.	tora zeera from Chaman	140/kg	dark, slender (not thin) seeds some chaff
6.	tora zeera from Iran	180/kg	dark, almost red seeds, smaller more oval than other samples, some chaff

MCI Program

Black cumin seed was collected last fall from three farmers in Khakrez at a price of about Rs. 140/kg. The seed was brought to Shari Safa and sold at 50% discount to 31 farmers in 18 villages. Usually there was only one farmer per village who took the seed but in one village there were seven. These farmers were in the general wheat distribution program, not MCI seed wheat growers. The average farmer planted 1.56 jerib with a range from 0.5 to 5 jerib. Seeding rate was usually 1kg/jerib but one farmer used 4kg/3jerib and three used 2kg/jerib.

The black cumin seed was intercropped with PAK 81 wheac. Even though the black cumin seed is much smaller than wheat seed, they were broadcast together with DAP and then cultivated in the local manner. Factual reports of the growth have not yet been received but it has been suggested that black cumin doesn't germinate until spring. Then it stays small and under the wheat plants. By the time the wheat is ripe the cumin has also dried up. It stays dry all summer and fall until the next spring. The farmers think that growth of the plants and tubers are not injured by fall cultivation and some even plan to replant wheat in these fields. These may be fields which have very thin stands but this has not been established. It has been suggested that if the stand gets too thick (like alfalfa) the farmers may plow the field and remove some of the tubers. These tubers can be planted in other fields but a seeding rate is not known-maybe 500 tubers/jerib would be good.

The MCI field staff are interested in collecting more information about black cumin and a brief questionnaire has been prepared for interviews with farmers. This is enclosed in Annex 6.

TRIP REPORT

Schedule

29-10 Tue. arrive Karachi
30-10 Wed. arrive Quetta, meet Myron Jespersen, Fred Smith
(O/AID/REP), Rahamatullah
31-10 Thur. Quetta Meet MCI office staff
1-11 Fri. weekly holiday

2-11 Sat. Review contract with Myron and Rahamatullah
3-11 Sun. Office reviewing papers, plans
4-11 Mon. Discussions with key staff, Supervisors
5-11 Tue. More discussions with key staff
6-11 Wed. Visit to Unilog warehouse with MCI Engineers
7-11 Thur. Office, program set for Study tour
8-11 Fri. Quetta to Islamabad

9-11 Sat. Islamabad Anthony Fitzherbert, FAO
10-11 Sun. Don Oelsgle, Mr. Noori, DAI ADT
Islamabad to Peshawar
11-11 Mon. Peshawa Wayne Baumann, UNDP
Khalil Rahman, ACBAR
Bob Bouvier, IRC
(Gerrit Wasing, DCA: vet supplies)
Dr. Azam Gul, SCA
12-11 Tue. Robert Mangham and Stuart Worsley,
Afghan Aid
(Herb Friesen, SERVE/Eye Hospital)
13-11 Wed. Dr. K.M. Siddique and A.A. Khan,
Pakistan Forestry Inst.
Eng. Bahramy, VITA
Saifuddin, DAI
Peshawar to Islamabad to Faisalabad
14-11 Thur. Faisalabad Mirza M. Saleem, Khalil and brothers,
Naeem & Co.
Md. Naeem, Batala Industries
Faisalabad to Lahore
15-11 Fri. Lahore City Tour

16-11 Sat. Sheik Fayaz and Shabir Hussain Shah,
Faizan Tractors
17-11 Sun. Dr. A. Rahman Khan, Cargill Pakistan
Gulam Abbas Jalwi, Dir. Ag. Punjab
Sohail Bashir Rana, Millat Tractors
Various dealers across from Millat
Dinner with Sheik Fayaz
18-11 Mon. (Dr. A. Rauf, Rahmat Ali & Co. supplies)
Lahore to Quetta
19-11 Tue. Quetta Office for trip review and finances
20-11 Wed. Office
21-11 Thur. Office

22-11 Fri. Weekly holiday

23-11 Sat. Office in am., shopping in late afternoon

24-11 Sun. Office: preparation of trip report

25-11 Mon. Office: farm machinery

26-11 Tue. Office: farm machinery

27-11 Wed. Office: wheat review

28-11 Thur. Office: wheat plan

29-11 Fri. Weekly holiday-celebrate US Thanksgiving

30-11 Sat. Office: farm machinery recommendations

1-12 Sun. Office: wheat general distribution plans

2-12 Mon. Office: wheat plans
Ralf Bissman, GTZ, TTC Quetta

3-12 Tue. Dr. Jan Karpowicz, EIL, Quetta
Md. Lal, MCI key staff-wheat
Mr. Karstin (by phone), ALEP Mardan

4-12 Wed. Gary Lewis, O/AID/REP in MCI office
Mr. Ikramul Haq and Dr. Sher Mohammad, Sariab
Dr. Alistar Allen, AZRI

5-12 Thur. Office, Mary Ann Javet and DAI staff

6-12 Fri. Weekly holiday, Hash

7-12 Sat. Office: machinery and wheat draft report

8-12 Sun. Office: Draft report sent to O/AID/REP

9-12 Mon. Office: editing

10-12 Tue. Office: editing

11-12 Wed. Quetta to Islamabad

12-12 Thur. Meeting with Fred Smith, O/AID/REP

13-12 Fri. Islamabad to Quetta

14-12 Sat. Weekly holiday

15-12 Sun. Office for final wrap up
Quetta to Karachi

16-12 Mon. Karachi to Bangkok to San Francisco to Kansas

Contacts with Addresses and Phone Numbers

Anthony Fitzherbert

Program Coordinator: Afghan Agric. Rehabilitation
Food and Agriculture Organization of the United Nations (FAO)
P.O. Box 1476
House # 2, Street 52, F6/4 ph: 051-819967, 819715, 815205
Islamabad fax: 825148

Don Oelsliger

Agriculture Advisor
Agriculture Development and Training
Development Alternatives Inc. (DAI)
30 W. Blue Area, ATS Center
Islamabad

Mr. Noori

ph: 051-821342

Wayne Baumann

United Nations Development Project (UNDP)
4th Floor, Gul Hazi Plaza
Jamrud Road
Peshawar ph: 0521-45321

Khalil Rahman

Programme Officer
Agency Coordinating Body for Afghan Relief (ACBAR)
2 Rehman Baba Road
Univ. P.O. 1084 ph: 521-44392, 40839, 45347
University Town, Peshawar fax: 521-42471

Bob Bouvier

Agronomist/Program Leader
International Rescue Committee (IRC)
39C S.A.Qaium Road
University Town, Peshawar ph: 521-43242, 41845

Dr. Azam Gul

Director
Agriculture Survey of Afghanistan
Swedish Committee for Afghanistan (SCA)
57C Gul Mohar Lane ph: 0521-45257, 45357
University Town, Peshawar fax: 0521-42519

Robert Mangham

Project Officer
Afghanaid
5-b Gulmohar Road
University Town, Peshawar

Stuart Worsley
Project Officer

ph: 0521-42030, 42322, 43751
fax: 0521-42322

Dr. K.M. Siddique
Director General
Pakistan Forestry Institute
University Campus
University Town, Peshawar

A.A. Khan
Medicinal Plants Botanist

Saifuddin
Program Officer
DAI - Peshawar
31 Chinar Road
University Town, Peshawar

Mary Ann Javet
Training

ph: 0521-44617

**Md. Hussain Haji (Father), Mirza M. Saleem, Managing Partner,
Mirza M. Khalil and brothers**
Naeem & Co.

Sammundri Road
Faisalabad

ph: 0411-45771, 40723
(res. 45942)

Mohammad Naeem
Batala Industries
Samundary Road
Faisalabad

ph: 0411-41510, 46210

Sheik Fayaz
Owner
Faizan Tractors
Sheikupura Road
Lahore

Shabir Hussain Shah
Tractor Showroom Manager

ph: 042-481750, 475309
(res. 860349)

Dr. A. Rahman Khan
General Manager
Cargill Pakistan Seeds (Pvt.) Ltd.
P.O. Box 3309
76 - Shadman II
Lahore

ph: 042-488330, 485062, 476522
fax: 489653

Gulam Abbas Jalwi
Director General
Directorate of Agriculture, Punjab
Awan-E-Zarat
Lahore

Takumi Izuno
Winrock consultant

ph: 042-303779, 301765

Sohail Bashir Rana
General Manager (Marketing)
Millat Tractors Limited
Sheikhupura Road
P.O.Box 1147
Lahore

ph: 711021, 711025
fax: 711979

Ralf Bissmann

Project Manager, Pak German Technical Training Programme
Technical Training Center, Quetta
Sirki Road
P.O. Box 352
Quetta

ph: 42085

Karstin

Agricultural Light Engineering Program (ALEP)
P.O. Box 53
Mardan, NWFP

ph: 0531-91250 (res. 63372)

Dr. Jan Karpowicz

Experiment in International Living (EIL)
203/204 Block 5 Sarlath Road
Satellite Town, Quetta

ph: 43998

Mr. Ikramul Haq

Economic Botanist
Agriculture Research Institute
Sariab, Quetta

Dr. Sher Mohammad
Wheat Botanist

ph: 43581, 42061, 43631

Dr. Alistar Allen

USAID MART/AZR Project
Arid Zone Research Institute (AZRI)
P.O.Box 362
Brewery Road, Quetta

ph and FAX: 73248

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Objective: To compare the yield of different wheat varieties using three fertilizer regimes: the recommended rate, recommended urea but no DAP, and no fertilizer.

Introduction: Farmers in the MCI seed wheat program are planting improved varieties of wheat with the use of urea and DAP fertilizer. They are then exchanging the seed from these fields with their neighbors. However, DAP and urea are not commonly available in the local markets so farmers not in the MCI programs do not obtain the potential yield from their improved seed. These varieties have been bred under high input conditions so when they do not receive the recommended rates of fertilizer they do not yield well.

Instructions: A simple trial can be conducted in the variety increase fields which have not yet been planted. This should be done under MCI management but not on top of the other variety trial. Select 2-3 varieties from the larger increase fields and divide the plots into thirds. Plots should be carefully divided and marked. Border passes, as recommended in the general seed increase instructions, are not necessary. Ordinary cultivation and planting should be followed except for these specific treatments: treatment 1. recommended rate of urea and DAP; treatment 2. recommended rate of urea but no DAP; treatment 3. no urea or DAP.

Measurements: Plots need to be carefully marked and labeled. At harvest a crop cut can be taken from each treatment for each variety. This sample should be kept separate for threshing, cleaning and weighing. Comparisons can be made when yield/jerib estimations are calculated. Statistical analysis is not possible since this is not a scientifically replicated trial.

Specifics: Treatment 1/Variety 1 = Recommended fertilizer/PAK 81

T2/V1 = urea only/PAK 81

T3/V1 = no fertilizer/PAK 81

T1/V2 = Recommended fertilizer/Pirsabak 85

T2/V2 = urea only/Pirsabak 85

T3/V2 = no fertilizer/Pirsabak 85

T1/V3 = Recommended fertilizer/Zardana (and/or others)

T2/V3 = urea only/Zardana

T3/V3 = no fertilizer/Zardana

District.....

(1) Farmer's Name.....

Card No.....

(2) Father's Name.....

(3) Village.....

(4) Number of Jerib planted.....

(5) Variety planted - PAK 81 / Pir 85

(6) Date of seeding.....

(7) Rate of seeding (Kg/jerib).....

(8) DAP applied at seeding time? Yes / No

(9) Rate of DAP applied (Kg/jerib).....

(10) What was this field used for last winter:
local wheat / MCI wheat / fallow / other crops.....

(11) Did the farmer plant MCI wheat last year? Yes / No

(12) Dates of irrigation.....

(13) Dates of urea application.....

(14) Rate of urea applied (total Kg/jerib).....

(15) Date of visit by MCI personnel.....

(16) L.d farmer receive instruction sheet for seed? Yes / No

(17) Is the field weedy? No / Some / Much

(18) Is there any smut problem? No / Some / Much

(19) Is there any rust problem? No / Some / Much

(20) Date of harvest.....

(21) Yield of harvest (total Kg).....

(22) Other problems encountered

Supervisors Name

د بزگرانو د غنمو د تخم د کښت او کرهڼی

راپور (1991 - 1992)

YY

- ۱- د بزگر نوم) (د پلار نوم ()
 ولسوالی ()
 د کارت نمبر ()
 کلی یا قریه ()
- ۲- د کرل شوی مټکی اندازه .
 ۳- د کرل شوی غنمو اقسام (۸۱ پاک) یا (پیره ۸۵) .
 ۴- د غنمو د کرلو نیټه .
 ۵- د غنمو د کرلو اندازه په کیلو گرام په جریب کښی .
 ۶- آیا دکود د کرلو په وخت کښی استعمال شو ، که نه ؟ (هوکی) (نه) .
 ۷- د DAP د استعمال اندازه په جریب کښی .
 ۸- د تیر کال معلومات د مټکی په حصه کښی په مکمل ډول (د کرلو په باره کښی) .
 ۹- د MCI د ورکړل شوی غنمو د کرلو په باره کښی معلومات (هو) (نه) .
 ۱۰- د اوبو د لگولو تاریخونه .
 ۱۱- د سری د ورکولو تاریخونه .
 ۱۲- د کود د مکمل استعمال اندازه په یوه جریب کښی وښیاست .
 ۱۳- د ساحی د مامورینو سره د بزگرانو لیدنه کتنه او تاریخ ئی .
 ۱۴- آیا و بزگر ته د غنمو د کرلو ورقي ور توضیح شوی دی که نه ؟
 ۱۵- آیا د کرلو مټکه گیاهزره او یا بیکاره وښه لری که نه ؟ (هوکی) (نه) .
 ۱۶- آیا د سیاه قاق د مریضی مشکل په ساحه کښی موجود دی که نه ؟ (یوڅه) (زیاته) .
 ۱۷- آیا د سرخی د مرض مشکل په ساحه کښی شته .(نه) (یوڅه) (زیات) .
 ۱۸- د درمند کرلو نیټه وښیاست .
 ۱۹- د حاصلاتو اندازه په کیلو گرام سره وښیاست .
 ۲۰- که په ساحه کښی کوم مشکل موجود وي د هغه په باره کښی معلومات راگری .(تیر کال) .

د سوپروایزر نوم :

۱۲- څلورمه درجه اصلاح شوي تخمونه بايد په اوتا واکسي بايد تداوي شوي وي اويا په نورو پو پنک وژونکو دواگانو باندې پخاطر د وقايه د فنگس امراضو لکه سپاه قاق او يو قسم پت سپاه قاق په تخم کبني استعماليزي .

د ترويچ مامورين د تخم له توزيچ څخه مخکي د غنمو تخم وقايه او داوي وکړي . د اوتاواکس دوا استعمال په لسمه توگه ۲۰۰ گرامه په ۱۰۰ کيلو غنمو کبني دي او توزيچ کوونکي لارښوونه وکړي چي ذکر شوي دواگانې به درست او صحيح ډول استعمال کړل شي د ډيرو تخمو د پاره سامانونه پکار دي اما د لزو تخمو دپاره خم يا منگي څخه استفاده وکړو .

هغه تخمونه چه د FAO څخه لاس ته راغلي وي تداوي شوي وي او هغه تخمونه چي په دواگانو اخنبل شوي نه وي انتقالات ئي آسان دي ځکه ډير عمر لري يعني ژر نه خرابيږي . تداوي شوي تخمونه د خوړلو دپاره مناسب ندي .

۱۴- که تخم اصلاح شوي وي بايد لمر ته واچول شي او که تخم تر يو کال زاړه وي نو د شنو کيدو امتحان دي اجرا شي شنه کيدل % ۸۰ با تردي زياده بهتره ده .

۱۵- فرمايش شوي تخمونه د آبپاري په حالت کبني ۱۲۰ کيلو په يو هکتار مخکه کبني او ۲۴ آيلو گرامه په يو جريب اويا ۲،۴ سيره د کابل په جريب باندې واچول شي که چيري د امتحاني غنمو تخم له % ۸۰ لږ وي نو بايد تخم ډير وشندل شي د بارانو په حالت کبني د تخم اندازه لږ شي په زړه طريقه باندې د زاړه تخم اندازه بايد ډيره وي محترم رحمت الله خان د زراعت لسانس دي او فرمايلي ئي دي ۲۰-۲۵ کيلوگرامه په يو جريب باندې او ديخ په موسم کبني تر دا لاهم زياد وي .

۱۶- ښه وخت د کرنې د اکتوبر ۱۵ تر نوامبر تر ۳۰ پوري دي په کومو ځايو کبني چه MCI کار کړي دي د ۸۰۰ څخه تر ۱۸۰۰ متر پوري ارتفاع لري دلورو ارتفاع چه تر ۱۸۰۰ متر وي لازمه ده چه ده اکتوبر ۱۵ خلاص شي رحمت الله خان فر مائيلي دي چه کرنه PAK 81 د اکتوبر له لسمي د نوامبر تر شلمي پوري دوام پيدا کړي .

۱۷- د قطار کرل تر جيح ورکول کيږي پخاطر د ښه تخم د حاصلولو دپاره تخم بايد په لين ۲ اينچ يا 5 cm سانتي متره د خاوري لاندي شي خويشاوه يو ساده او عادي کار دي د تخنيک له لحاظه د ډريل Drill ماشين يوه ښه مفکوره ده بايد د Drill يا تخم پاش پواسطه تخم وکرل شي نه د بزگر په ذريعه بومن ويلي دي چه ښه به وي چه د وطني قلبې پواسطه يعني (د غوايو په پذريعه) وکرل شي دوو سته خلگو په ذهن کبني دا پيدا شوي چه د وخت نه ضايع کولو د پاره Drill ډريل ماشين ته ترجيح ورکړل شول .

۱۸- بايد ځمکه ښه همواره اوليول شي تر څود آبپاري په وخت کبني آساني منع ته راشي .

۱۹- په مني کبني ۲۰ ورځي د غنمو کرلو وروسته بايد اوبه کرل شي .

۲۰- په کبنت کبني خويشاوه کول ډير مهم کار دي خويشاوه کول پلاس تر جيح ورکول کيږي ليکن د مزدورانو کمي سره مخامخ کيږي ځکه د هزاره گيا ه مخ نيوي دواگانو استعمال پواسطه وشي خويشاوه بهتره ده چه ژر وشي تر څو چه دپسرلي گرمي راځي په هغه وخت کبني خويشاوه ختمو شي چه غنم او هزاره گيا ه کوچني دي . لاندي دواگانې د هزاره گيا دپاره استعماليزي .

2,4-D or MCPA Spt = 625 1,ha = 125 1,5 reb

په ډير احتياط بايد دواگانې استعمال شي کوبښن وشي چه ددوا لبيبل له مخه دوا پاشي وشي .

۲۱- متباقي يوريا UREA د پسرلي په وخت کبني کبنت ته ور کول کيږي سره(يوريا) يو يا دوه واري داوبو لگولو په وخت کبني ورکړل شي سره (کود) هم صرف هغه وخت کبني استعمال شي چي د غنمو وزي اته اينچه جگ وي اوبيا دغنمو دگل په وخت کبني ورکول شي يوريا بايد ډير ژر اوبه شي تر څو خطرناک مواد په گاز تبديل او هوا ته ولاړ شي .

۲۲- لږ تر لږه بايد د پسرلي وخت کبني دري ځلي اوبه شي کوم وخت چه نباتات اوبو ته ضرورت پيدا کړي او وزي ئي لوي شوي دي او هم دگل او دانه ډکيدو په وخت کبني اوبه شي .

۲۳- تر مخه تردي چه غنم گل وکړي ضروري ده چي ټول هغه نباتات يا غنم بايد پو چي شي (که غنم او يا هزاره گيا ه) په ډير احتياط خيشاوه شي چه غنم خراب او تر پښو لاندي نشي .

۲۴- سوپروايزران مراقبت وکړي د ټولو توليدي کبنتو څخه د گلانو په وخت کبني او هزاره گيا

• نباتات له منځ وړلو دپاره تلاش وکړي نور اقسام حاصلات او حبو بات چه دسياه قاق په مريض اخته شوي وي ښه معلوميزي دا هغه وخت وي چه يو کښت.څخه بل کښت ته د امريني نشست کوي د شاو خوا گاوندويان و گوري شايد دا مريضي له هغه ځايو څخه راغلي وي او دغه مريض له ۱۵۰ متر ليرې د باد پواسطه را تللي شي .

۲۵- د دوهم نمبر ضميمې ته و گوري دپاره د نظارت (بامن Bamann تخنيک ، معياري او دغغو د توليد اتو پټورنه په افغانستان کښي) .

۲۶- د نورو خوښياوه کولو دپاره ډيره ضروري ده چې د غغو د پخيدو په وخت کښي وشي هغه کښتونه وروسته يا وړاندي رسيزي هغه پاتي شوي نباتات له پټي څخه وويشل شي .

۲۷- د دوهم ځل دپاره سوپر واييزان د نمرن کولو د مخه بايد ښه مراقبت وکړي . دوي بايد دښه انواع د لاس ته راوړو پخاطر دومره زيات تلاش وکړي لکه چه د هزره نباتاتو له منځه وړولو دپاره کوي او مخصوص نسگراني لاري د تعقيب کړي .

۲۸- ماموران د ترويج باب: يو نعايشي پروگرام او خرمن جوړ کړي او بزگرانو د ليدو دپاره د بزگرانو دميلي په نامه راغونډ کړي او دا ورته تشریح کړي چه پدې کار کښي بزگرانو ښه توجه کړي ده پدې لارو کښي تشويق شي او دوي بايد د خلکو دلچسپي راجلب کړي پدې پلان کښي يو بزگر بل بزگر ته د غغو د تخمونه تبادلي دپاره تشويق کړي .

۲۹- غغو هغه وخت لو شي چې پاخه شي د تبادلې په وخت کښي سوپرواييزان موجود وي اوباي يو خرمن له بل خرمن څخه د پندل پواسطه جلا شي تر څو ديو نوع بل نوع تخم سره مکس (گډ نشي مخکي د بادولو) پاکولو) څخه .

۳۰- لومړي بايد يوه توتبه مځکه د جريب يا هکتار په واسطه اندازه شي او د نوموړي مځکي له دروو حصو څخه يو يو متر مربع حاصل راټول کړي او وروسته د هر متر مربع حاصل ځان ته معلوم کړي او بيا ددرو واړو د حاصل اوسط راوباسي . پدې ډول د نوموړي مځکي ټول حاصلات د لو او پاکولو څخه مخکي درته معلوميزي .

۳۱- د تريشل ماشين د تخنيکي له لحاظه د تخم ميده کيدلو او پاکولو دپاره جوړ شوي دي MCI کولاي شي دغه ماشين د تخمو د حاصلو لو دپاره په يو مقدار پيسو آماده کړي داماشين بايد ښه پاک و ساتل شي تر څو ځني شيان پکښي پاتي نشي او چټل نه وي ځکه کوم وخت چې دا ماشين پاک نه وي دا يوه منبع د مريض د انتقال وسيله گرځي يو ښه او ثابت تخم ته نور پدې لحاظ ده ي ماشين پاک ساتل حتمي ده .

۳۲- په ډير احتياط سره تخم بايد وچ کړل شي او بيا ښه پاک اوښه کوزي کښي واچول شي وروسته ليل او تاريخ ورباندي وايکل شي په گدام کښي د نورو تخمونو څخه علحيدہ وساتل شي .

۳۳- د MCI ترويج مامورين او نور گاوندويان بايد پدې تخم باندي اطمينان ولري د تخم په نوعيت اوښه ډول باندي پوه شي او فرق وکړي .

بزگران او نور گاوندويان دا دغغو تخمونه په قيمت واخلي يا يوله بل سره جنس پر جنس تبادلې وکړي .

۳۴- دا د غغو تخمونه مطمئن او تصديق شوي وي د يو رسمي مؤ سسي له خوا اوهام بايد امتحان شوي وي تر څو % ۸۵ د نښن وهلو او شنه کيدلو امکان ولري .

۳۵- دغه مخصوص تخمونه بايد د بزگر پواسطه په يو پاک ، وچ او يخ ځاي کي وساتل شي . او نور غغو ور سره نه وي او دحشراتو او موزکانو څخه حفاظت کړل شي .

Course : Diesel Vehicle Maintenance
No of Trainees : 3
Year : 1991
Shift : morning
Duration : 31.08.91 - 26.09.91
Time : 08.30 h - 14.00 h
Weeks : 4
Days : 24
Hours : 120
Capacity : 6

No.	Topics/Exercises	Number	Day	Time
01	ENGINE LUBRICATION -change engine oil (all 1.500 km) -change oil filter (all 3.000 km) -check and clean the air filter		01	5 h
02	DIESEL FUEL SYSTEM -change the fuel filter -check the high pressure lines of leakage -bleed the Diesel fuel system -sett the injection timing -check the drive belt condition -check the drive belt tension -lubricate the injection pump INJECTORS -types of injection nozzles -parts of injection nozzles -spray characteristics -replace injection nozzles -dismantel injection nozzles -reassamble injection nozzles IN LINE INJECTION PUMP -remove injection pump from engine -dismantel in line injection pump -the parts of in line injection pumps -the function of plunger & barrel -construction of the delivery valve -fuel quantity metering -reassamble in line injection pump -sett first plunger to delivery point -install injection pump to engine -sett injection timing -bleed Diesel fuel system		02-04	15 h
			05/06	10 h
			07-10	20 h
Total Training Time :			10	50 h

Course : Diesel Vehicle Maintenance
No of Trainees : 3
Year : 1991
Shift : morning
Duration : 31.08.91 - 26.09.91
Time : 08.30 h - 14.00 h
Weeks : 4
Days : 24
Hours : 120
Capacity : 6

No.	Topics/Exercises	Number	Day	Time
	SUPPLY SYSTEM - characteristics of Diesel fuel supply system - the parts of the Diesel fuel supply system - types of Diesel fuel supply pumps - function of Diesel fuel supply pumps - testing Diesel fuel supply pumps - the parts of the Diesel fuel supply pumps - dismantle a Diesel fuel supply pump - reassemble a Diesel fuel supply pump		11/12	10 h
	DISTRIBUTOR-TYPE FUEL INJECTION PUMP - the parts of a distributor-type fuel injection pump - the design of a distributor-type fuel injection pump - the function of a distributor-type fuel injection pump - replacing a distributor-type fuel injection pump - dismantle a distributor-type fuel injection pump - check the parts of a distributor-type fuel injection pump - reassemble a distributor-type fuel injection pump - sett the plunger to delivery time - sett the injection timing		13-16	20 h
	ENGINE, mechanical -check and adjust valve clearance		17	5 h
Total Training Time :			17	85 h

Course : Diesel Vehicle Maintenance
 No of Trainees : 3
 Year : 1991
 Shift : morning
 Duration : 31.08.91 - 26.09.91
 Time : 08.30 h - 14.00 h
 Weeks : 4
 Days : 24
 Hours : 120
 Capacity : 6

o.	Topics/Exercises	Number	Day	Time
	COOLING SYSTEM -check the coolant level -check the wear of the water pump b -check and adjust the fan belt -check radiator & houses of leakage		18	5 h
	ELECTRIC -check function of head light, tail light, side light, brake light and indicator light. -check and change fuses -clean the battery poles and terminals -check the battery electrolyte level -change defect bulbs		19/20	10 h
	POWER TRAIN -check the gear oil -check front and rear differential g oil -check transmission gear oil -check the universal joints -grease the nipples of the propeller shafts -check gear boxes of leakage -check & adjust free play of clutch		21/22	10 h
	BRAKE -check brake fluid level -check brake hydraulic system of lea -remove the wheels -check front disk brake pads -remove rear brake drums -check rear brake shoes -adjust rear brake shoes -check and adjust parking brake		23/24	10 h
Total Training Time :			24	120 h

ANNEX 5. LOCAL VS. IMPROVED CULTIVATION COMPARISON OUTLINE

Objective: To compare the local system of tractor cultivation with a suggested improvement. The comparisons should be based on yield, economics and risk analysis.

Introduction: A popular method of cultivation in Kandahar where tractors and bullocks are in short supply is to broadcast the seed wheat and fertilizer on the ground prior to cultivation and then plow the field using a tine tiller. This works up the soil, kills weeds and covers the seed. Only one pass with the tractor is required which saves time and money for the farmer. However, the soil is not worked deep so weeds and their seeds are not entirely killed. Wheat seed is wasted when it is buried too deep for germination. The farmer saves money when he plants but this may be a false economy.

An improved method which should be tested in a side-by-side comparison this spring would require additional time from the tractor which will increase the initial costs but should lead to higher wheat yields and better soil structure. The proposed system would use a moldboard plow for initial cultivation. The moldboard plow turns the soil over, burying weeds and their seeds and creating a medium-textured seed bed. This deeper plowing should result in better root penetration. After plowing, the seed is broadcast and then covered in another pass of the tractor, pulling a harrow or plank. The harrow will lightly cover the seed, mixing it into the top layer of soil.

Comparison: The same amount of fertilizer and seed should be used in both test plots. All inputs could be supplied or paid for by MCI with the farmer doing the local method. The size of the plots is not important but one jerib each is suggested. The plots should be planted separately but on the same day. At harvest the plots should be cut, threshed and weighed separately. A series of three to five random crop cuts could be taken from each plot so the total yield is not necessary. Yield estimates per jerib and costs per jerib should be calculated. Careful records should be kept for each plot including required tractor time for planting, cost and labor. From this the gross and net incomes can be figured. Risk analysis should be done to see what other factors need to be added. This could include the limited availability of tractors and implements meaning that a farmer can only have their use for a few hours or that he may not have the cash to pay for two passes but enough for one.

Specifics: This trial could be done on two jerib of spring planted wheat. Treatment 1 (local method): Farmer broadcasts seed and fertilizer, tractor cultivates with tine tiller. At harvest crop yield and cost per jerib are calculated. Treatment 2 (suggested improvement): Tractor cultivates with moldboard plow, farmer broadcasts seed and fertilizer, and tractor covers using a plank or harrow. Again yield and cost per jerib are calculated.

ANNEX 6. Questions for MCI field staff to ask black cumin farmers.

QUESTIONNAIRE FOR BLACK CUMIN FARMERS

1. When was seeding done? which months?
fall or spring?
any germination problems?
How long did it take for germination?
shorter or longer time than wheat?
was there good stands of seedlings?
how many seedlings per square meter?
was seed soaked in water before sowing?
2. Were all the fields pre-irrigated?
any planting or germination problems?
any weeds in fall?
was DAF given to wheat and cumin fields?
3. How do the seedlings survive the winter?
was it cold?
does the wheat turn brown or yellow?
does the cumin turn brown or yellow?
when does the cumin start growing again in spring?
which month?
4. Were fields top dressed with urea and irrigated in spring?
were spring weeds a problem?
how tall was the cumin when the wheat was cut?
any problem then with wheat harvest?
when does the cumin flower?
was any seed produced? which month?
how big were the tubers?
when can they be transplanted?
5. Are there any disease problems?
is there any drainage problem after irrigation?
did water ever stand in the fields?
do the plants wilt if water stands in the field? (fusarium)
what kind of soil has the best plants? sandy, loam, clay
are there insect problems? cut worms? army worms? aphids?
any virus or leaf spotting?